PHILIPPINE HEART ASSOCIATION

PHA FORMULARY

FIRST EDITION | 2023

PHILIPPINE HEART ASSOCIATION

PHA FORMULARY

FIRST EDITION

Philippine Heart Association, Inc.
Philippine College of Cardiology

2023

Philippine Heart Association, Inc. Philippine College of Cardiology
Suite 1108, East Tower, Philippine Stock Exchange Center, Ortigas Center, Pasig City
Tel. 8 470-5525 / 8 470-5528
Fax (632) 8 687-7797
Email: secretariat@philheart.org, phil.heart@yahoo.com
Website: http://www.philheart.org

This page intentionally left blank

TABLE OF CONTENTS

LIST OF TABLES

DISCLAIMER

The PHA Formulary is a comprehensive guide to cardiovascular medications for cardiologists and other healthcare providers. It features a list of cardiovascular medicines, their therapeutic and prescribing information, and other relevant data, which have been curated by the editorial team and the PHA Formulary Committee, in accordance with the latest clinical practice guidelines from reputable professional societies. The formulary reflects the most up-to-date information available at the time of drafting, but new information may emerge after its publication and thus, not included.

The authors ensure that the information provided in this formulary is essential, relevant, and useful for prescribers and other healthcare professionals for compassionate and quality cardiovascular care. They hope that the formulary will be readily accessible, easy to understand, and serve as a reliable reference for healthcare professionals, particularly physicians seeking evidence-based prescribing practices for common cardiovascular conditions. Additionally, the PHA Formulary can serve as an initial reference for recommending drugs for inclusion in the Philippine National Formulary (PNF).

It is important to note that the PHA Formulary is an informative and educational resource, not a clinical practice guideline or substitute for it. It is intended to supplement and not replace the best clinical judgment of the prescribing clinicians. Readers are encouraged to verify the information contained in the formulary with other sources, particularly regarding the newest and latest updates.

COVER ILLUSTRATION

The cover depicts the management of cardiovascular conditions. The mortar and pestle with *Rx* sign symbolizes prescription drugs – the content of the formulary. The green color and leaf symbolize the need to couple pharmacologic with non-pharmacologic interventions, specifically healthy lifestyle, and good nutrition. The background represents science/systematic methods on which the formulary was based on.

DISCLOSURE

Authors of this formulary have provided disclosure statements regarding all relationships that might be perceived as potential sources of conflict of interest. The PHA Formulary Committee members received no financial support from any pharmaceutical company in developing this formulary.

PHILIPPINE HEART ASSOCIATION FORMULARY COMMITTEE 2022-2023

CHAIR
Maria Concepcion C. Sison, MD, MAS

CO-CHAIR
Timothy Bjorn Lagos, MD

RESEARCH ASSISTANT AND COORDINATOR
Dethalee Gabrielle R. Velasquez, RPh

MEMBERS:

Pharmacotherapy Council
Mylah P. Alfeche, MD
Dioscoro DC Bayani II, MD
Jose Eduardo DL Duya, MD
Maria Cristina Joy T. Irorita, MD
Christian A. Martinez, MD
Eric Oliver D. Sison, MD
Jezreel L. Taquiso, MD
Richard Henry P. Tiongco II, MD

Council Representatives
Anna Katrina N. Chua, MD
Alfred Matthew Dayo, MD
Nathania Salazar-Fajardo, MD
Dan Brian P. Galang, MD
Eddieson M. Gonzales, MD
Wilbert Allan G. Gumatay, MD
Isaiah C. Lugtu, MD
Virginia C. Mappala, MD
Muriel A. Morilla-Buco, MD
Augusto Niccolo S. Salalima, MD
Joseph Marc S. Seguban, MD
Andre Lawrence G. Tojino, MD
Mark Denver A. Tiongson, MD

ADVISER
Lynn Crisanta R. Panganiban, MD

EDITORIAL TEAM

PHA FORMULARY WORKING GROUP 2022-2023

ACUTE CORONARY SYNDROME
Timothy Bjorn Lagos, MD
Richard Henry P. Tiongco II, MD
Anna Katrina N. Chua, MD
Andre Lawrence G. Tojino, MD
Eric Oliver D. Sison, MD

ARRHYTHMIA
Isaiah C. Lugtu, MD
Christian A. Martinez, MD
Joseph Marc S. Seguban, MD
Maria Concepcion C. Sison, MD, MAS

CARDIOGENIC SHOCK AND CARDIAC ARREST
Timothy Bjorn Lagos, MD
Joseph Marc S. Seguban, MD
Mark Denver A. Tiongson, MD

CHRONIC CORONARY SYNDROME
Dioscoro DC Bayani II, MD
Dan Brian P. Galang, MD

DYSLIPIDEMIA
Jose Eduardo DL Duya, MD
Augusto Niccolo S. Salalima, MD
Eddieson M. Gonzales, MD

HEART FAILURE
Mylah P. Alfeche, MD
Wilbert Allan G. Gumatay, MD
Nathania Salazar-Fajardo, MD
Maria Concepcion C. Sison, MD, MAS
Jezreel L. Taquiso, MD

HYPERTENSION
Alfred Matthew Dayo, MD
Maria Cristina Joy T. Irorita, MD
Maria Concepcion C. Sison, MD, MAS

PERIPHERAL VASCULAR DISEASE
Dioscoro DC Bayani II, MD
Muriel A. Morilla-Buco, MD

PULMONARY HYPERTENSION
Eric Oliver D. Sison, MD
Virginia C. Mappala, MD
Maria Concepcion C. Sison, MD, MAS

VENOUS THROMBOEMBOLISM
Muriel A. Morilla-Buco, MD
Timothy Bjorn Lagos, MD

MESSAGE FROM PHA PRESIDENT, 2023-2024

The creation and publication of this PHA Drug Formulary is another big milestone in the history of Philippine cardiology.

This is the first time that an evidence-based drug formulary, that is focused on cardiac and vascular medicines was developed. Its impact in local cardiology practice is immense, as it serves as a guide in the prescription and dispensing of available drugs in the country. We hope that this well-crafted cardiac drug listing be considered or provide the necessary impetus in the creation of the national drug formulary.

The Philippine Heart Association-Philippine College of Cardiology (PHA-PCC) takes pride in its achievement/contribution to the practice of medicine in the Philippines.

Let me congratulate and acknowledge the dedication and efforts of the Core Members of the PHA-PCC Council on Pharmacotherapy headed by Dr. Connie Sison, for painstakingly working on the drug formulary. Together, let us bring this special endeavor into full fruition.

RONALD E. CUYCO, MD, MBA, FPCP, FPCC, FPSE, FAsCC, FESC
PHA President 2023-2024

MESSAGE FROM PHA PRESIDENT, 2022-2023

On behalf of the board of directors of the PHA, we express our appreciation and gratitude to the PHA Council on Pharmacotherapy under the leadership of council chair Dr. Connie Sison for the publication of The PHA Formulary! We recognize the dedication, expertise, and inspiration that manifested into this landmark scientific achievement. Congratulations and Thank You!

This PHA Formulary is a curated compendium featuring essential medicines in cardiology. This contains vital information about pharmaceuticals that healthcare workers can utilize on a daily basis. This formulary is dynamic and by no means static, for as our collective knowledge multiplies through research and experience, so will this repository evolve.

This PHA Formulary is for us, by us, for the benefit of those we care about - our patients!

May all of us fully utilize the knowledge within.

JUDE ERRIC L. CINCO, MD, FPCP, FPCC, FPSCCM, FAsCC, FESC, FACC
PHA President 2022-2023

MESSAGE FROM PHA PRESIDENT, 2021-2022

Peace!

Congratulations for this astral initiative of the committee. You have served the association and the Filipino yonder than what your Herculean efforts aimed for. It is my hope that this formulary be an impetus for other medical societies to put out their own for every Juan.

This formulary will set standards for best practice. I envision your work will promote high quality, evidence-based prescribing and reduce variation in the level of treatment provided to patients. The PHA formulary can be used as a tool to rationalize the range of medicines used in standard practice and to prevent the use of ineffective or overly expensive drugs. With a smaller selection of drugs to choose from, prescribing becomes much simpler, and at the same time more efficient and effective.

Furthermore, this project can assist in controlling drug expenditure and improving accountability. It is my prayer that we can inform and facilitate the health care decision-making process.

Thus, this is a momentous day for the PHA as we launch the PHA Formulary. Kudos to all who have contributed greatly to the writing of this project. Godspeed, everyone!

GILBERT C. VILELA, MD, FPCP, FPCC, FACC
PHA President 2021 - 2022

MESSAGE FROM THE FORMULARY TEAM

Welcome to the Philippine Heart Association (PHA) formulary!

The PHA formulary is envisioned to provide an easy reference of drugs recommended, with varying strengths of evidence, by local and international professional societies for common cardiovascular conditions. It recognizes, with notation (asterisk), the drugs listed in the Philippine National Formulary (PNF) which is the basis for financial coverage by the Philippine Health Insurance Corporation (PhilHealth). However, alternative drugs which may later find its way in the PNF, based on local and international clinical practice guidelines, are also listed.

The formulary is an informative and educational list of drugs characterized as to mechanism of action, dose and preparation, special indication/s, contraindications, precautions, common adverse effects, and usual cost. The estimated price is mainly based on the Department of Health (DOH) Drug Reference Price Index (DPRI). If the drug is not listed in the DPRI, price source is a popular drugstore.

The PHA formulary is not a clinical practice guideline or a substitute for it. It does not recommend the drugs listed under the specific conditions. Nevertheless, it contains drugs that are available in the country and have Class I, IIa, and IIb recommendations in the corresponding guideline/s cited. Class IIb drugs are specifically described as "may be considered." The cited references should lead the user to the source clinical practice guidelines for clinical decision-making.

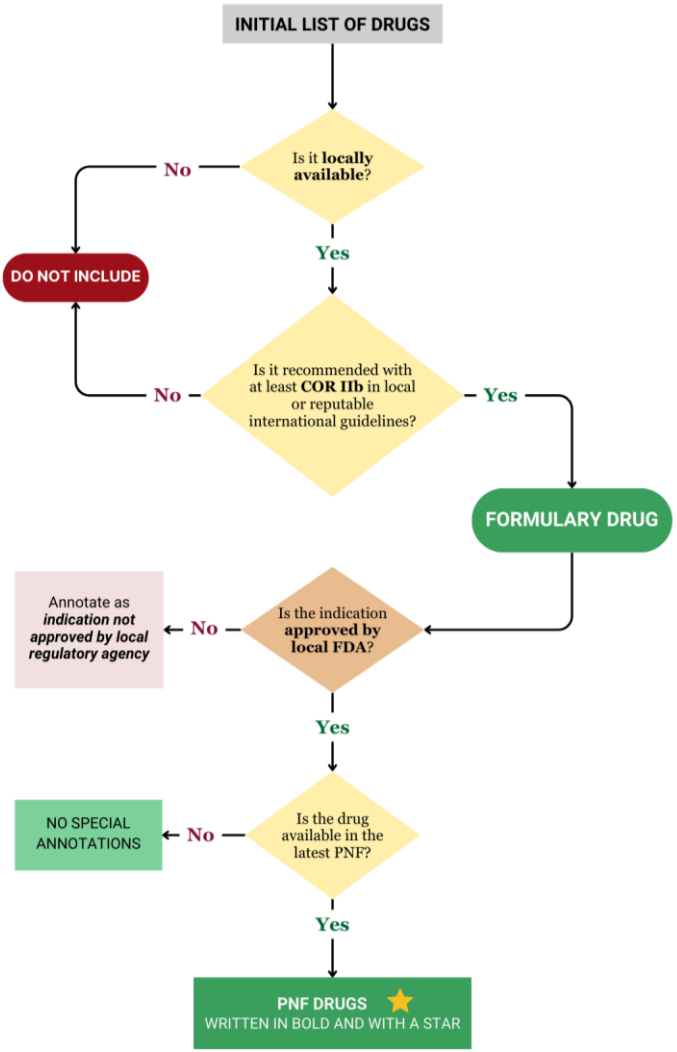
Drug prescription must be individualized based on clinical and sociodemographic characteristics of the patient, and updated evidence of drug efficacy, safety, and suitability. It must be appropriately followed by actions to promote adherence, monitor outcomes (efficacy and safety), and improve outcomes. It must be seen both as a step to provide treatment and an opportunity to engage patients and families to have a more proactive participation in their health care.

Kindly give us feedback through phil.heart.yahoo.com to help improve future versions. Help us make this PHA formulary serve any purpose that will promote health and healing to our countrymen. May God be gracious to us all!

On behalf of the PHA Formulary Team,

MARIA CONCEPCION C. SISON, MD, MAS, FPPS, FPCC, FPSECP
Chair, PHA Pharmacotherapy Council

ALGORITHM FOR DRUG INCLUSION IN THE PHA FORMULARY



GUIDE TO DRUG LIST AND DRUG INFORMATION

GENERAL LAYOUT OF DRUG MONOGRAPH

DRUGS FOR
1 Disease condition

(1)

Drug Name (2) (★)

(Synonyms) other names by which this drug is known

- **MOA** drug group or target protein and action; includes selectivity and duration of action if available or applicable

- **INDICATIONS AND DOSE**

Indication is the specific medical condition or population the medicine is used for based on cited clinical practice guidelines and/or reliable sources. Dose is the quantity of medicine prescribed to be taken at specified time and frequency.

Indication (3)
➤ *ROUTE*
Age group: Dose and frequency of administration (4)

Additional information related to the indication or dose

- **DOSAGE FORMS AND PREPARATIONS**
  - Dosage form and strength locally available in the Philippines (fixed-dose combinations are provided on a separate table)
- **CONTRAINDICATIONS** conditions when a drug should be avoided (5)
- **PRECAUTIONS** conditions when a drug may be used with caution and adverse effects are closely monitored
- **WARNING** highlights serious risks associated with the use of a drug

BLACK BOX WARNING
Indicates the highest safety-related warning that medications can have as assigned by the FDA

- **ANTIDOTE** (if available) drug or agent that negates the effect of the above medicine
- **ADVERSE EFFECTS** listed as the common, unwanted, undesirable effects that are possibly related to a drug
- **COSTS** price listed on the DOH Drug Price Reference Index 2022 (annotated with †), DOH Drug Price Watch or a popular drugstore

NOTE
Additional notes

REFERENCES

[1] Sources for common and special indications, and ideally a local or a more updated international clinical practice guideline from a reputable society (e.g., AHA or ESC).

(1) **Drug Safety Profile**
*see next page for full details

(2) **Drugs**
Drugs included in this formulary are cardiovascular medicines which are locally available and has at least Class IIb recommendations based on local and international guidelines.

(★) Drugs included in the latest edition of the Philippine National Formulary (PNF) latest edition are identified with a star ⋆

(3) **Indications**
- Indications are identified in local and international guidelines (especially AHA/ESC) and being used as such (expert/subcommittee assessment)
- Class IIb recommendations have less-well established evidence but may be used in specific circumstances and are annotated with "May be considered".

(4) **Dose**
- Dose is consistent with that advocated in the PNF; if not in the PNF, in the recognized international guideline
- It should at least contain the minimum and maximum doses, and titration as deemed clinically important.
- Must ideally contain a target dose if indicated in the condition (e.g., heart failure).

(5) **Contraindications, Precautions, Adverse Effects**
- Should mention AT LEAST, if present:
  - Contraindications for pregnancy and precautions for specific comorbidities
  - Adverse effects which should be carefully and routinely monitored during clinical encounters, and/or laboratory tests

LEGENDS OF SAFETY PROFILE

PREGNANCY CATEGORY

Category	Description
A	**CONTROLLED STUDIES SHOW NO FETAL RISK** Adequate and controlled studies in women have failed to demonstrate a risk to the developing fetus in the 1st trimester (and there is no evidence of a risk in later trimesters), and the possibility of fetal harm is considered very low.
B	**NO EVIDENCE OF FETAL RISK IN HUMANS** Animal reproduction studies have not demonstrated a fetal risk but there are no adequate and controlled studies in pregnant women | Animal-reproduction studies have shown an adverse effect (other than a decrease in fertility) but not confirmed in controlled studies in women in the 1st trimester (and there is no evidence of a risk in later trimesters).
C	**RISK CANNOT BE RULED OUT** Animal reproduction studies have revealed adverse effects on the fetus (teratogenic or embryocidal or other) and there are no adequate and controlled studies in women; Drugs should be given only if the potential benefit justifies the potential risk to the fetus.
D	**POTENTIAL EVIDENCE OF RISK** There is positive evidence of human fetal risk, but the benefits from use in pregnant women may be acceptable despite the risk (e.g., life-threatening situation or a serious disease for which safer drugs are ineffective).
E	**CONTRAINDICATED IN PREGNANCY** Studies in animals or human beings have demonstrated fetal abnormalities or there is evidence of fetal risk from investigational or marketing data, and the risk of the use of the drug in pregnant women clearly outweighs any possible benefit. The drug is contraindicated in women who are or may become pregnant.

SAFETY IN LACTATION

	Generally considered to be safe in lactating mothers
	May suppress lactation | To be used with caution
	Contraindicated in lactating mothers

SAFETY PROFILE IN KIDNEY/ LIVER

	Generally considered safe
	To be used with caution in any hepatic or renal impairment
	Hepatotoxic or nephrotoxic agent | Contraindicated in any hepatic or renal impairment

LIST OF ABBREVIATIONS

AAA	Abdominal Aortic Aneurysm
ACE	Angiotensin-Converting Enzyme
ACEIs	Angiotensin-Converting Enzyme Inhibitors
ACLS	Advanced Cardiovascular Life Support
ACS	Acute Coronary Syndrome
ACT	Activated Clotting Time
ADH	Antidiuretic Hormone
ADHF	Acute Decompensated Heart Failure
AF	Atrial Fibrillation
AFL	Atrial Flutter
ALI	Acute Limb Ischemia
ALS	Amyotrophic Lateral Sclerosis
ALT	Alanine Aminotransferase
APAP	Paracetamol / Acetaminophen
aPTT	Activated Partial Thromboplastin Time
ARB	Angiotensin Receptor Blocker
ARNI	Angiotensin Receptor/Neprilysin Inhibitor
ASA	Aspirin
AST	Aspartate Aminotransferase
AT	Atrial Tachycardia
AU TGA	Australian Government Therapeutic Goods Administration
AV	Atrioventricular
AVNRT	Atrioventricular Nodal Reentrant Tachycardia
AVRT	Atrioventricular Reentrant Tachycardia
AVT	Acute Vasoreactivity Testing
BP	Blood Pressure
bpm	Beats Per Minute
BrS	Brugada Syndrome
BUN	Blood Urea Nitrogen
BW	Body Weight
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CCB	Calcium Channel Blocker
CCS	Chronic Coronary Syndrome
CHA2DS2 VASc	Congestive Heart Failure, Hypertension, Age ≥75 (Doubled), Diabetes, Stroke (Doubled), Vascular Disease, Age 65–74 And Sex Category (Female)
CHF	Congestive Heart Failure
CKD	Chronic Kidney Disease
COPD	Chronic Obstructive Pulmonary Disease
COVID-19	Coronavirus Disease 2019
COX	Cyclooxygenase
CrCl	Creatinine Clearance
CTD	Catheter-Directed Thrombolysis
CV	Cardiovascular
CVD	Cardiovascular Disease
CYP2C19	Cytochrome P450 2C19
CYP2C9	Cytochrome P450 2C9
CYP2D6	Cytochrome P450 2D6
CYP3A4	Cytochrome P450 3A4
D/C	Discontinue
D5W	Dextrose 5% in Water
D5W	Dextrose 5% in Water
DAPT	Dual Antiplatelet Therapy
DHP	Dihydropyridine
DM	Diabetes Mellitus
DOAC	Direct Oral Anticoagulants
DVT	Deep Vein Thrombosis
EC	Enteric-Coated
ECG	Electrocardiogram
EF	Ejection Fraction
eGFR	Estimated Glomerular Filtration Rate
EPA	Eicosapentaenoic Acid
ER	Extended-Release
ERS	Early Repolarization Syndrome
ET	Endotracheal
FC	Film-Coated
FH	Familial Hypercholesterolemia
fl.oz.	Fluid Ounce
G6PD	Glucose-6-Phosphate Dehydrogenase
GDMT	Guideline-Directed Medical Therapy
GERD	Gastroesophageal Reflux Disorder
GFR	Glomerular Filtration Rate
GI	Gastrointestinal
GPIIb/IIa	Glycoprotein IIb/IIIa
GU	Genitourinary
HbA1c	Hemoglobin A1c / Glycated Hemoglobin
HCG	Human Chorionic Gonadotropin
HCTZ	Hydrochlorothiazide
HDL-C	High-Density Lipoprotein - Cholesterol
HF	Heart Failure
HFmEF	Heart Failure with Mid-Range Ejection Fraction
HFpEF	Heart Failure with Preserved Ejection Fraction
HFrEF	Heart Failure with Reduced Ejection Fraction
HIT	Heparin-Induced Thrombocytopenia
HITT	Heparin-Induced Thrombocytopenia and Thrombosis
HMGR	Hydroxymethylglutaryl-CoA Reductase
HR	Heart Rate
hr/s	Hours
IA	Intra-Arterial
IHD	Ischemic Heart Disease
IM	Intramuscular
INR	International Normalized Ratio
IO	Intraosseous
IR	Immediate-Release
ISDN	Isosorbide Dinitrate
ISMN	Isosorbide Mononitrate
IU	International Units
IU aXa	Anti-Xa International Units
IV	Intravenous
K	Potassium
kg	Kilogram
LDL	Low-Density Lipoprotein
LDL-C	Low-Density Lipoprotein - Cholesterol
LEAD	Lower Extremity Artery Disease
LFT	Liver Function Test
Li	Lithium
LQTS	Long QT Syndrome
LSU	Lipasemic Unit
LV	Left Ventricular
LVEF	Left Ventricular Ejection Fraction
LVSD	Left Ventricular Systolic Dysfunction
mcg	Microgram
MCS	Mechanical Circulatory Support
mEq	Milli Equivalents
mg	Milligram
MI	Myocardial Infarction
min/s	Minutes
mL	Milliliter
mmHg	Millimeter(S) Of Mercury
mmHg	Millimeter Mercury
mo/s	Month / Months
MR	Modified-Release
MRA	Mineralocorticoid Receptor Antagonist / Aldosterone Antagonist
NAC	N-Acetylcysteine
ng	Nanogram
NO	Nitric Oxide
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
NSTE-ACS	Non-St Elevation Acute Coronary Syndrome
NSTEMI	Non-St Elevation Myocardial Infarction
NYHA	New York Heart Association
OAC	Oral Anticoagulant
PAC	Premature Atrial Contraction
PAD	Peripheral Arterial Disease
PCI	Percutaneous Coronary Intervention
PCSK9	Proprotein Convertase Subtilisin/Kexin Type 9
PCWP	Pulmonary Capillary Wedge Pressure
PDA	Patent Ductus Arteriosus
PDE	Phosphodiesterase
PE	Pulmonary Embolism
P-gp	P-glycoprotein
PH	Philippines
PO	Oral; *Per Orem*
PPARα	Peroxisome Proliferator Activated Receptor alpha
PPCI	Primary Percutaneous Coronary Intervention
PPIs	Proton Pump Inhibitors
PR	Prolonged-Release
PRN	As Needed; *Pro Re Nata*
PSVT	Paroxysmal Supraventricular Tachycardia
PUD	Peptic Ulcer Disease
PVC	Polyvinyl Chloride
PVD	Peripheral Vascular Disease
PVOD	Pulmonary Veno-Occlusive Disease
QOL	Quality Of Life
RAS	Renal Artery Stenosis
RBC	Red Blood Cells
rt-PA	Recombinant Tissue Plasminogen Activator
SBP	Systolic Blood Pressure
SC	Subcutaneous
SCAR	Severe Cutaneous Adverse Reaction
sGC	Soluble Guanylate Cyclase
SGLT2	Sodium-Glucose Cotransporter 2
SJS-TEN	Stevens-Johnson Syndrome/Toxic Epidermal Necrolysis
SL	Sublingual
SLE	Systemic Lupus Erythematosus
SR	Sustained-Release
STEMI	ST-Elevation Myocardial Infarction
SVT	Supraventricular Tachycardia
T1D	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
TAA	Thoracic Aortic Aneurysm
TG	Triglycerides
UFH	Unfractionated Heparin
UNL	Upper Normal Limit
URI	Upper Respiratory Infection
UTI	Urinary Tract Infection
UV	Ultra-Violet
VA	Ventricular Aneurysm
VKA	Vitamin K Antagonist
VKORC1	Vitamin K Epoxide Reductase Complex Subunit 1
VLDL	Very Low-Density Lipoprotein
VLDL-TG	Very Low-Density Lipoprotein - Triglycerides
VT/VF	Ventricular Tachycardia / Ventricular Fibrillation
VTE	Venous Thromboembolism
wk/s	Weeks
WPW	Wolff-Parkinson-White
yr/s	Years

1 DRUGS FOR Acute Coronary Syndrome

Alteplase⋆

(rt-PA / Tissue-type plasminogen activator)

- **MOA** A thrombolytic agent; a recombinant human tissue-type plasminogen activator

- **INDICATIONS AND DOSE**

Acute myocardial infarction (MI)[1]

➤ *INTRAVENOUS*

Adult:

< 67 kg

Loading dose: 5 mg IV bolus for 1–2 mins; Maintenance dose: 0.75 mg/kg IV for 30 mins (not to exceed 50 mg), followed by 0.5 mg/kg for the next 60 mins (not to exceed 35 mg over 1 hr)

> 67 kg

Loading dose: 5 mg bolus over 1–2 mins; Maintenance dose: 50 mg IV for next 30 mins, followed by 35 mg over next 60 mins

Recommended total dose: not to exceed 100 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for Injection:** 20 mg, 50 mg
- **CONTRAINDICATIONS** Active bleeding | Severe uncontrolled hypertension | Recent trauma, stroke, surgery | Hyper- or hypoglycemia | Severe hepatic impairment
- **PRECAUTIONS** Hypertensive patients | Thrombocytopenia | Small recent trauma | High risk of hemorrhage
  - Avoid non-compressible arterial, internal jugular, subclavian punctures or IM injection
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hemorrhage | Pulmonary edema | Angioedema | Pleural effusion
- **COSTS**
  - 20 mg Powder (₱25,245.00)
  - 50 mg Powder (₱30,536.02)†

Aspirin⋆

(Acetylsalicylic acid)

- **MOA** A non-selective irreversible cyclooxygenase COX_1 and COX_2 inhibitor

- **INDICATIONS AND DOSE**

Unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI), ST-segment elevation myocardial infarction (STEMI)[1] | Suspected transient ischemic attack[1,2] | Following coronary by-pass surgery[1,2] | Primary prevention and management of acute MI and stroke in patients with risk factors[2] | Secondary prevention for cardiovascular disease[1,2]

➤ *ORAL*

Adult:

*Loading dose: 160–325 mg once daily

Maintenance dose: 75–100 mg once daily

** Non-enteric coated tablet: chewed then swallowed*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 80 mg, 100 mg, 300 mg, 325 mg, 500 mg
  - **EC Tablet**: 80 mg**, 100 mg

**EC Tablet for maintenance phase of ACS therapy

- **CONTRAINDICATIONS** Active peptic ulceration | Bleeding disorders | Severe cardiac failure | Severe renal and hepatic impairment
  - Lactation (long-term use and/or high dose)
  - Children under 16 years and those with flu-like symptoms
  - Concomitant use with Methotrexate ≥ 15 mg
- **PRECAUTIONS** Anemia | Asthma | Dehydration | G6PD deficiency | Hypertension | Thyrotoxicosis | Mild to moderate hepatic impairment
  - May mask symptoms of infection
  - Patients undergoing surgical procedures (including tooth extractions)
  - Concomitant use with anticoagulants, antiplatelets, thrombolytics, oral corticosteroids
  - Pregnancy category C (1st, 2nd trimester), D (3rd trimester)
  - Elderly
- **ADVERSE EFFECTS** Dyspepsia | Hemorrhage or prolonged bleeding time | Reduced uric acid excretion (low dose) | Salicylism (large, repeated doses) | Melena
- **COSTS**
  - 80 mg Tablet (₱4.00)†
  - 100 mg Tablet (₱2.50)
  - 300 mg Tablet (₱2.90)
  - 325 mg Tablet (₱0.67)

Atorvastatin calcium⋆

- **MOA** A selective and competitive HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

Acute coronary syndrome (ACS) and stroke[3,4]

➤ *ORAL*

Adult: 80 mg once daily *with dose-adjustment when necessary*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 40 mg, 80 mg
- **CONTRAINDICATIONS** Acute liver failure or decompensated cirrhosis | ALT > 5x UNL
  - Concomitant use with Cyclosporine, Gemfibrozil, Ritonavir, Grapefruit Juice
  - Pregnancy and lactation
- **PRECAUTIONS** Rhabdomyolysis | Hemorrhagic stroke | Renal impairment
  - Increased HbA1c and serum glucose levels have been reported
  - Patients with known SLCO1B1 gene polymorphism

- Children and elderly
- **ADVERSE EFFECTS** Hyperglycemia | Joint disorders | Muscle pain
- **COSTS**
  - 40 mg Tablet (₱17.00)†
  - 80 mg Tablet (₱21.12)†

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1-blocker
- **INDICATIONS AND DOSE**
  Angina[1] | Concomitant NSTE-ACS, stabilized HF, and reduced systolic function[5]
  ➤ *ORAL*
  Adult: 2.5–10 mg once daily; *Uptitrate if necessary*
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS** DM | History or recent psoriasis | Thyrotoxicosis
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Hepatic and renal impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Captopril⋆

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  MI in clinically stable patients (short-term treatment within 24 hours of onset)[1]
  ➤ *ORAL*
  Adult: Initial 6.25 mg, followed by 12.5 mg every 8 hrs;
  Titrate based on patient's BP over 3–10 days
  Maximum daily dose: 50 mg 3x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitors
- **PRECAUTIONS** Renal and hepatic impairment | Significant hyperkalemia
  - Concomitant use with lithium
  - Children and elderly
  - Pregnancy (1st trimester) and lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Rash | Hyperkalemia | Taste disorder | Insomnia | Peptic ulcer | Dry cough | Angioedema
- **COSTS**
  - 25 mg Tablet (₱3.00)†
  - 50 mg Tablet (₱12.00)

Carvedilol⋆

- **MOA** A non-selective β-blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity
- **INDICATIONS AND DOSE**
  Angina[1] | Concomitant NSTE-ACS, stabilized HF, and reduced systolic function[5]
  ➤ *ORAL*
  Adult: 3.125–6.25 mg daily every 12 hrs initially, and titrate to a target (MAX) dose of 25 mg every 12 hrs over 3–10 days
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 6.25 mg, 12.5 mg, 25 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block
  - Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema)
  - Severe hepatic impairment
- **PRECAUTIONS**
  - May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
  - Patients with peripheral vascular disease
  - May worsen renal function in heart failure patients
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 6.25 mg FC Tablet (₱8.75)
  - 12.5 mg Tablet (₱10.50)
  - 12.5 mg FC Tablet (₱12.32)
  - 25 mg Tablet (₱7.26)†
  - 25 mg FC Tablet (₱14.00)

Clopidogrel⋆

- **MOA** A selective and irreversible platelet $P2Y_{12}$ receptor antagonist
- **INDICATIONS AND DOSE**

Primary percutaneous coronary intervention (PCI)[6]

➤ *ORAL*

Adult: Loading dose 600 mg, then 150 mg daily for 7–14 days, followed by 75 mg daily

Medically managed ACS[6]

➤ *ORAL*

Adult: Loading dose 300 mg, then 75 mg daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 75 mg
- **CONTRAINDICATIONS** Active bleeding | Hypersensitivity | Severe hepatic impairment
- **PRECAUTIONS**
  - Patients with impaired CYP2C19 function may experience diminished effectiveness
  - Concomitant use with omeprazole or esomeprazole, CYP2C19 inducers
  - Interrupt use 5 days prior to surgery
  - Renal and moderate hepatic impairment
  - Elderly | Pregnancy and lactation
- **WARNINGS** Tests are available to identify patients who are CYP2C19 poor metabolizers. Consider use of another platelet P2Y12 inhibitor in patients identified as CYP2C19 poor metabolizers
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Hemorrhage | Chest pain | Flu-like symptoms | Urticaria
- **COSTS**
  - 75 mg Tablet (₱18.50)†

Dabigatran etexilate

(Dabigatran etexilate mesylate)

- **MOA** A rapid-acting direct thrombin inhibitor
- **INDICATIONS AND DOSE**

ACS with concomitant atrial fibrillation (AF)[7]

➤ *ORAL*

Adult: 110–150 mg 2x daily
CrCl > 30 mL/min: 150 mg 2x daily
CrCl 15–30 mL/min: 75 mg 2x daily

Patients who underwent primary PCI with AF[7]

➤ *ORAL*

Adult:

High bleeding risk

Triple therapy (Dabigatran + ASA + Clopidogrel) for 1 wk then Dual therapy (Dabigatran + ASA or Clopidogrel) until 6 mos then Dabigatran lifelong

High ischemic risk

Triple therapy (Dabigatran + ASA + Clopidogrel) for 1 mo then Dual therapy (Dabigatran + ASA or Clopidogrel) until 6 mos then Dabigatran lifelong

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule**: 75 mg, 110 mg, 150 mg
- **CONTRAINDICATIONS** Active bleeding | Mechanical prosthetic heart valve | Recent GI ulcer, surgery | Severe renal impairment
  - Concomitant use with other anticoagulants, strong P-gp inhibitors
- **PRECAUTIONS** Body weight < 50 kg | Recent biopsy | Thrombocytopenia | Hepatic and moderate renal impairment
  - Avoid abrupt discontinuation
  - Pregnancy and lactation

BLACK BOX WARNING

Premature discontinuation increases risk of thrombosis. There is a risk of epidural or spinal hematomas and paralysis during neuraxial anesthesia or spinal puncture.

- **ADVERSE EFFECTS** Hemorrhage | GERD | Abnormal hepatic function
- **ANTIDOTE** **Idarucizumab**
- **COSTS**
  - 110 mg Capsule (₱81.25)
  - 150 mg Capsule (₱ 78.75)

Diltiazem hydrochloride⋆

- **MOA** A non-dihydropyridine calcium-channel blocker
- **INDICATIONS AND DOSE**

Prophylaxis and treatment of angina[1,2]

➤ *ORAL*

Adult: 30 mg every 6 hrs daily then titrate every 1 or 2 days until angina is controlled (usually 180–360 mg/day, divided every 6–8 hrs)
MAX daily dose: 360 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 30 mg, 60 mg, 90 mg
  - **MR Tablet:** 120 mg, 180 mg
  - **MR Capsule:** 60 mg, 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block | Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS** Severe bradycardia | 1st degree AV block | Significantly impaired left ventricular function | Hepatic and renal impairment
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 30 mg Tablet (₱18.00)
  - 60 mg Tablet (₱18.50)†
  - 90 mg Tablet (₱84.25)

Enalapril maleate⋆

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  Acute coronary syndrome[8] | Post-MI maintenance[8]
  ➤ *ORAL*
  Adult: 2.5 mg daily every 12 hrs
  MAX daily dose: 20 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS**
  - History of angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitor
- **PRECAUTIONS**
  - Renal impairment and K-sparing diuretic increase the risk of hyperkalemia
  - May exacerbate hypotension if with concomitant diuretic, hyponatremia and hypovolemia
  - Patients younger than 5 mos are more prone to experience renal dysfunction; titrate carefully
  - Avoid in breastfeeding women during first few weeks after delivery (risk of profound neonatal hypotension)
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Hyperkalemia | Cough | Headache | Dizziness | Hypotension | Asthenia
- **COSTS**
  - 5 mg Tablet (₱8.70)†
  - 10 mg Tablet (₱9.82)
  - 20 mg Tablet (₱12.00)†

Enoxaparin sodium⋆

- **MOA** A low molecular weight heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa (highest in class)
- **INDICATIONS AND DOSE**
  Acute coronary syndrome (unstable angina, NSTEMI, STEMI)[8] | As an alternative to UFH for patients with NSTE-ACS in whom early invasive angiography (i.e. within 24 h) is anticipated[9]
  ➤ *SUBCUTANEOUS / INTRAVENOUS*
  Adult
  <75 years old
  Loading dose: 30 mg IV bolus
  Maintenance dose: 1 mg/kg SC every 12 hrs; not to exceed 100 mg cumulative loading dose

  >75 years old
  No loading dose
  Maintenance dose: 0.75 mg/kg SC every 12 hrs
  Duration of treatment: 2–8 days

With thrombolysis
15 mins before and 30 mins after fibrinolytic therapy (rt-pA)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, single dose prefilled syringe:**
    100 mg/mL (0.2 mL, 0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Recent stroke, GI ulcer, surgery | Neonates, infants
- **PRECAUTIONS**
  - Low body weight (increased risk of bleeding)
  - Obesity (increased risk of thromboembolism)
  - Renal and hepatic impairment
  - Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention in patients anticoagulated or to be anticoagulated for thromboprophylaxis

- **ADVERSE EFFECTS** Hemorrhagic anemia | Headache | Confusion | Hypersensitivity | Thrombocytopenia | Thrombocytosis
- **COSTS**
  - 100 mg/mL, 0.2 mL Solution for Injection Prefilled Syringe (₱631.50)
  - 100 mg/mL, 0.4 mL Solution for Injection prefilled Syringe (₱794.00)†
  - 100 mg/mL, 0.6 mL Solution for Injection Prefilled Syringe (₱778.00)†

Fondaparinux sodium⋆

- **MOA** A synthetic factor Xa inhibitor; selectively binds to antithrombin III (ATIII)
- **INDICATIONS AND DOSE**
  Unstable angina and NSTEMI[1,8] | NSTE-ACS patients in whom early invasive angiography (i.e. within 24 h) is not anticipated[9]
  ➤ *SUBCUTANEOUS*
  Adult: 2.5 mg once daily during hospitalization up to 8 days

  As co-therapy in patients with STEMI treated with Streptokinase[9]
  ➤ *INTRAVENOUS / SUBCUTANEOUS*
  Adult: Initial 2.5 mg IV bolus, followed by 2.5 mg by SC injection 24 hrs later

  Safety and efficacy not established in patients with STEMI undergoing PPCI[9]
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, single dose prefilled syringe:**
    5 mg/mL (0.5 mL), 12.5 mg/mL (0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Bacterial endocarditis | Serious hypersensitivity reaction (angioedema, anaphylaxis) | Severe renal impairment (CrCl < 20 mL/min) | Thrombocytopenia with anti-platelet antibody in presence of

Fondaparinux | Body weight < 50 kg in patients requiring treatment of DVT or PE

- **PRECAUTIONS** Active GI ulcer | Moderate renal and severe hepatic impairment
  - Addition of UFH during PCI for NSTEMI
  - Discontinue if platelet < 1000
  - Concomitant use with Vitamin K antagonists unless essential
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Rash | Fever | Anemia | Hemorrhage | Hypokalemia
- **COSTS**
  - 2.5 mg/ 0.5 mL Solution for Injection Prefilled Syringe (₱1,155.00)†

Heparin sodium (unfractionated)★

- **MOA** A glycosaminoglycan anticoagulant targeting Xa and IIa equally, then VIIa, IXa, and XIa clotting factors; complexes with ATIII
- **INDICATIONS AND DOSE**

Patients undergoing percutaneous coronary intervention (PCI)[5,6] | As adjunct for patients undergoing PCI treated with tPA[6]

➤ *INTRAVENOUS*

Adult

Without GPIIb/IIIa inhibitor: 70–100 Units/kg

With GPIIb/IIIa inhibitor: Initial IV bolus: 50–70 Units/kg

Target ACT > 200 seconds

STEMI as adjunct to fibrinolysis[8]

➤ *INTRAVENOUS*

Adult on fibrinolytics

IV Bolus 60 Units/kg (MAX dose: 4000 Units)

IV Infusion 12 units/kg/hr (MAX dose: 1000 Units/hr)

Target aPTT of 50–70 seconds

NSTEMI, unstable angina[8]

➤ *INTRAVENOUS*

Adult

IV bolus Initially 60–70 Units/kg (MAX: 5000 units)

IV Infusion Initially 12–15 Units/kg/hr (MAX: 1000 units per hour)

Target aPTT of 50 – 70 seconds

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, multiple dose vial:** 5000 IU/mL (5 mL), 1000 IU/mL (5 mL)
- **CONTRAINDICATIONS**
  - Neonates or infants (for products containing benzyl alcohol)
  - Severe thrombocytopenia | Uncontrolled active bleeding
- **PRECAUTIONS**
  - HIT / HITT | uncontrolled severe HPN | DM | Hepatic and renal impairment
  - Avoid IM use; hematomas frequently occur at injection site
  - Elderly, particular women, are at higher risk of bleeding
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity reactions | Osteoporosis (long-term doses) | Thrombocytopenia | Elevated liver enzymes | Chest pain | Chills | Rebound hyperlipidemia | Bruising
- **ANTIDOTE** **Protamine Sulfate** (1–1.5 mg of Protamine per 100 units of Heparin)
- **COSTS**
  - 1000 IU/mL, 5 mL Solution for Injection Vial (₱135.00)†
  - 5000 IU/mL, 5 mL Solution for Injection Vial (₱228.07)†

Isosorbide dinitrate★

- **MOA** A nitrate vasodilator via release of nitric oxide that stimulates guanylate cyclase
- **INDICATIONS AND DOSE**

Prophylaxis and treatment of angina[1,2]

➤ *INTRAVENOUS*

Adult: D5W to make 100 cc in Soluset x 10 cc per hour (1 mg/hr) and titrate accordingly

➤ *ORAL*

Adult: 10 mg every 8–12 hrs, as step-down from IV therapy

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 1 mg/mL (10 mL)
  - **Tablet**: 10 mg, 20 mg
- **CONTRAINDICATIONS**
  - Concomitant use with PDE_5 inhibitors (Sildenafil, Tadalafil)
  - Hypersensitivity to nitrates
- **PRECAUTIONS** Severe hypotension | Closed-angle glaucoma | Malnutrition | Hypothyroidism | Severe renal and hepatic impairment
  - May aggravate angina caused by hypertrophic cardiomyopathy
  - Elderly | Pregnancy and lactation
- **WARNINGS** Avoid abrupt withdrawal
- **ADVERSE EFFECTS** Orthostatic or severe hypotension | Headache | Lightheadedness
- **COSTS**
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱540.00)†
  - 10 mg Tablet (₱9.90)†

Lisinopril

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

Short-term treatment following MI in hemodynamically stable patients[1]

➤ *ORAL*

Adult: 5 mg within 24 hrs of MI, then 5 mg after 24 hrs, 10 mg after 48 hrs, and daily up to 6 wks

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg

- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitors | Angioedema | Hypersensitivity
- **PRECAUTIONS**
  - Renal and hepatic impairment | Hematologic disturbance e.g., Agranulocytosis | Severe aortic stenosis | Hypertrophic cardiomyopathy
  - Children | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Symptomatic hypotension with or without syncope | Chest pain | Hematologic effects | Dry cough | Hyperkalemia | Dizziness | Azotemia
- **COSTS**
  - 5 mg Tablet (₱53.75)
  - 10 mg Tablet (₱67.00)
  - 20 mg Tablet (₱74.50)

Metoprolol succinate

- **MOA** A selective β_1 blocker
- **INDICATIONS AND DOSE**

  Acute myocardial infarction[3] | Concomitant NSTE-ACS, stabilized HF, and reduced systolic function[5]

  ➤ *ORAL*

  Adult: Initial dose of 25–50 mg once daily, may titrate dose up to 200 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablets**: 23.75 (25) mg, 45.5 (50) mg, 95 (100) mg
- **COSTS**
  - 47.5 mg ER tablets (₱6.25)

Check Metoprolol tartrate for other product information on Metoprolol

Metoprolol tartrate⋆

- **MOA** A selective β_1 blocker
- **INDICATIONS AND DOSE**

  Acute myocardial infarction[3] | Angina[1] | Early intervention within 12 hours of infarction[1] | Acute coronary syndrome[2] | Post-MI maintenance[8]

  ➤ *ORAL*

  Adult: 25–50 mg every 6–12 hrs daily
  MAX daily dose: 200 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Sinus bradycardia, overt cardiac failure, cardiogenic shock, and sick sinus syndrome (without pacemaker) in patients with hypertensive and angina | 1st-degree heart block in patients with MI | Decompensated heart failure
  - Should not be used for hypertension with presence of drug-induced tachycardia for psychiatric patients taking antidepressant, antipsychotic drugs
- **PRECAUTIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery
  - May mask symptoms of hypoglycemia and thyrotoxicosis
  - Dose adjustment may be considered depending on CYP2D6 phenotype
  - Elderly | Pregnancy and lactation
- **WARNINGS** Patients should be warned against interruption or discontinuation of therapy without physician's advice

BLACK BOX WARNING
Ischemic Heart Disease
Do NOT abruptly discontinue in patients with coronary artery disease. Dosage should be gradually reduced over a period of 1–2 weeks.

- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - 50 mg Tablet (₱3.00)†
  - 100 mg Tablet (₱4.50)†

Morphine sulfate⋆

- **MOA** A pure opioid agonist selective to μ-opioid receptors
- **INDICATIONS AND DOSE**

  Severe pain relief in MI patients[8]

  ➤ *INTRAVENOUS*

  Adult: 2–4 mg IV initially, followed by 2–8 mg every 5–15 mins as needed; *Prefer lower dosing depending on BP*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection single dose vial:** 10 mg/mL, 16 mg/mL
- **CONTRAINDICATIONS** Severe respiratory depression | GI obstruction | Hypercapnia | Uncontrolled bleeding | Acute alcoholism | Seizure disorders | Premature labor | Pheochromocytoma | Concomitant or recent use of MAOIs
- **PRECAUTIONS** Cardiac arrhythmia | Pancreatitis | Severe cor pulmonale | Mental health conditions | Thyroid dysfunction | History of drug abuse or alcoholism | Renal and severe hepatic impairment | Pregnancy and lactation

BLACK BOX WARNING
Serious, life-threatening, or fatal respiratory depression may occur.
Exposes patients to the risks of opioid addiction, abuse, and misuse, which leads to overdose and death.
Prolonged use during pregnancy can result in neonatal opioid withdrawal.

- **ADVERSE EFFECTS** CNS depression | Pruritus | Shock | Bradycardia | Hypotension | Atrial fibrillation | Coma | Palpitation | Constipation | Miosis
- **COSTS**
  - 10 mg/mL, 1 mL Solution for Injection Ampule (₱70.00)†

Nitroglycerin⋆

(Glyceryl trinitrate)

- **MOA** A nitrate vasodilator via release of nitric oxide that stimulates guanylate cyclase
- **INDICATIONS AND DOSE**

  Angina[1] | Unstable angina[1,8] | HF in the setting of MI[3,6]

  ➤ *INTRAVENOUS*

  Adult: 5 mcg/min increased by 5 mcg/min every 3 mins up to 20 mcg/min, titrate accordingly

  For angina pectoris as monotherapy or in combination with other anti-anginal agents[1]

  May be applied while waiting for IV nitrate therapy

  ➤ *TRANSDERMAL*

  Adult: Apply 1 patch onto a fresh area of skin (e.g., chest, upper arms, thigh, or shoulder)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 1 mg/mL
  - **Transdermal Patch:** 5 mg/24 hr
- **CONTRAINDICATIONS** Hypertrophic obstructive cardiomyopathy | Acute circulatory failure or shock | Allergy to corn or corn products | Increased intracranial pressure | Severe anemia | Pericardial effusion with tamponade
  - Concomitant use with PDE-5 inhibitors (Sildenafil, Tadalafil)
- **PRECAUTIONS**
  - Withdrawal symptoms | Overt or subclinical DM | Severe renal and hepatic impairment
  - Tolerance may occur with excessive use
  - Marked hypotension with calcium channel blocker use and beta blockers
  - Elderly | Pregnancy and lactation
- **WARNINGS** May interfere with anticoagulant at high doses
- **ADVERSE EFFECTS** Blurry vision | Hypotension | Flushing | Throbbing headache | Lightheadedness
- **COSTS**
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱440.00)†

Prasugrel hydrochloride

- **MOA** An irreversible $P2Y_{12}$ platelet ADP receptor antagonist
- **INDICATIONS AND DOSE**

  Used in combination with Aspirin **for the prevention of atherothrombotic events in patients with acute coronary syndrome undergoing PCI[1] | Coronary angiography within 48 hours of admission for unstable angina or NSTEMI[1]**

  ➤ *ORAL*

  Adult: 60 mg as loading dose, then 10 mg as maintenance dose

  Adult: Loading dose of 60 mg, maintenance dose of 10 mg

  In combination with Aspirin
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 10 mg
- **CONTRAINDICATIONS** Active bleeding including peptic ulcer and intracranial hemorrhage | History of stroke or transient ischemic attack | Severe hepatic impairment
- **PRECAUTIONS**
  - Body weight < 60 kg | Recent trauma or surgery | Thrombotic thrombocytopenic purpura | Renal and moderate hepatic impairment
  - Dose-adjustment in East Asian descent (including PH)
  - Elderly ≥ 75 yrs | Pregnancy and lactation

BLACK BOX WARNING

Prasugrel can cause significant and sometimes fatal bleeding; not recommended in > 75 yrs. If possible, manage bleeding without discontinuing prasugrel, as discontinuation in the first few weeks after acute coronary syndrome may increase risk for subsequent cardiovascular events.

- **ADVERSE EFFECTS** Anemia | Hemorrhage | Skin reactions

Ramipril

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  Prophylaxis after myocardial infarction in patients with clinical evidence of heart failure (started at least 48 hours after infarction)[1]

  ➤ *ORAL*

  Adult: 2.5 mg once daily for 1 wk, then 5 mg daily for 3 wks

  Maintenance: 10 mg daily, as tolerated
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg, 10 mg also available as film-coated tablet
- **CONTRAINDICATIONS** History of angioedema | renal artery stenosis
  - Concomitant use with neprilysin inhibitors
  - Pregnancy and lactation
- **PRECAUTIONS** Renal and hepatic impairment | Reduction in RBC and hemoglobin | Hyperkalemia in patients with renal dysfunction | Elderly | Increased risk of angioedema in black patients
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Asthenia | Headache | Dizziness | Cough | Fatigue | GI disorder
- **COSTS**
  - 2.5 mg Tablet (₱13.50)
  - 5 mg Tablet (₱15.60)
  - 10 mg Tablet (₱23.20)

Rivaroxaban

- **MOA** A selective direct factor Xa inhibitor
- **INDICATIONS AND DOSE**

  Recent ACS within 7 days[5]

  ➤ *ORAL*

  Adult: 2.5 mg 2x daily

  In combination with low-dose Aspirin

  In combination with Aspirin alone or Aspirin + Clopidogrel **as prophylaxis of atherothrombotic events following ACS with elevated cardiac biomarkers**[1] | *In combination with Aspirin* **as prophylaxis of atherothrombotic events in patients with CAD or symptomatic PAD at high risk of ischemic events**[1] | **Primary PCI with AF**[7]

  ➤ *ORAL*

  Adult

  High bleeding risk:

  Triple therapy (Rivaroxaban + ASA + Clopidogrel) for 1 wk then Dual therapy (Rivaroxaban + ASA / Clopidogrel) until 6 mos then Rivaroxaban lifelong

  High ischemic risk:

  Triple therapy (Rivaroxaban + ASA + Clopidogrel) for 1 mo then Dual therapy (Rivaroxaban + ASA / Clopidogrel) until 6 mos then Rivaroxaban lifelong
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 10 mg, 15 mg, 20 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Severe hypersensitivity | Severe renal impairment or undergoing dialysis | Moderate to severe hepatic impairment
- **PRECAUTIONS**
  - Patients with bleeding risk | Severe hypertension | rheumatic heart disease | prosthetic heart valves
  - Concomitant use with CYP3A4 inducers and CYP3A4 inhibitors, HIV protease inhibitors
  - Avoid in pediatric patients > 1 yr old with moderate or severe renal impairment
- **WARNINGS** Avoid abrupt discontinuation in the absence of alternative treatment

BLACK BOX WARNING

Premature discontinuation increases the risk of thrombotic events.

Patients treated with Rivaroxaban who are receiving neuraxial anesthesia or undergoing spinal puncture are at risk for long-term or permanent paralysis; monitor frequently for neurological impairment.

- **ADVERSE EFFECTS** Hemorrhage including epistaxis | Anemia (prolonged use) | Gastroenteritis | Vomiting | Cough
- **COSTS**
  - 2.5 mg FC Tablet (₱154.50)

Rosuvastatin⋆

- **MOA** A long-acting, selective, and competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**

  ACS (as high-intensity statin management)[4,9]

  ➤ *ORAL*

  Adult: 40 mg once daily*; dose adjustment when necessary*
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 20 mg, 40 mg
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Severe renal impairment | Hypersensitivity | Concomitant use with Cyclosporine, Gemfibrozil | Pregnancy and lactation
- **PRECAUTIONS** Increased HbA1c and fasting glucose | Myopathy and rhabdomyolysis | Proteinuria and hematuria
  - Patients with known SLCO1B1 gene polymorphism
  - Children and elderly
- **WARNINGS**
  - 40 mg not recommended for Asian descent due to genetic polymorphisms
- **ADVERSE EFFECTS** Abdominal pain | Constipation | Headache | Myalgia | Asthenia
- **COSTS**
  - 20 mg Tablet (₱22.34)†

Streptokinase⋆

- **MOA** A fibrinolytic; activates plasminogen to form plasmin which degrades fibrin
- **INDICATIONS AND DOSE**

  Acute MI[1] | **Acute MI (within 12 hours of onset) with persistent ST-segment elevation or left bundle-branch block**[8]

  ➤ *INTRAVENOUS*

  Adult: 1.5M Units infused over 30–60 mins
- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for Injection, vial:** 1.5M IU/vial
- **CONTRAINDICATIONS** Recent streptococcal infection | Severe uncontrolled hypertension | Recent trauma or surgery within 2 months | Recent internal bleeding | Recent stroke | Intracranial or intraspinal surgery or head trauma (within 2 months) | Major or invasive operation (within 6–10 days) | Severe renal and hepatic impairment | Pregnancy
- **PRECAUTIONS** Previous Streptokinase administration (within 5 to 12 months) | Diabetic retinopathy | Patients currently on oral anticoagulation
  - Elderly | Lactation
- **ADVERSE EFFECTS** Arrhythmia | Asthenia | Diarrhea | Epigastric pain | Malaise | Headache | Fever | Hypotension
- **COSTS**
  - 1,500,000 IU Powder for Injection Vial (₱3,980.00)†

Ticagrelor

- **MOA** A reversible platelet P2Y12 ADP receptor inhibitor
- **INDICATIONS AND DOSE**
  In combination with Aspirin **for the prevention of atherothrombotic events in patients with ACS[1] | Prevention of atherothrombotic events in patients with a history of MI and a high risk of an atherothrombotic event[1]**
  ➤ *ORAL*
  Adult: Loading dose of 180 mg, then 90 mg 2x daily 12 hrs
  In combination with Aspirin
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 90 mg
- **CONTRAINDICATIONS** Active bleeding | History of intracranial hemorrhage
- **PRECAUTIONS** Asthma or COPD | Ventricular pauses: bradyarrhythmia including AV block | Renal and mild to moderate hepatic impairment | Pregnancy and lactation | Children
  - Concomitant use with strong CYP3A4 inducers and inhibitors, statins at doses > 40 mg
  - Avoid use in severe hepatic impairment

BLACK BOX WARNING

Ticagrelor can cause significant, sometimes fatal, bleeding. If possible, manage bleeding without discontinuing. Abrupt withdrawal increases the risk of subsequent cardiovascular events.

Maintenance doses > 100 mg of Aspirin in patients with ACS reduce the effectiveness of Ticagrelor and should be avoided.

- **ADVERSE EFFECTS** Major and minor hemorrhage | Dyspnea | Elevated serum creatinine
- **COSTS**
  - 90 mg FC Tablet (₱80.00)

Tirofiban hydrochloride

- **MOA** A reversible GP IIb/IIIa receptor antagonist
- **INDICATIONS AND DOSE**
  For ACS patients only for bailout or peri-procedural complications (evidence of no-reflow or a thrombotic complication during PCI[9]
  ➤ *INTRAVENOUS*
  Adult: Loading dose: 25 mcg/kg IV infusion within 5 mins
  Post-loading dose infusion: 0.15 mcg/kg/min

  CrCl < 60 mL/min: decrease post-loading dose infusion to 0.075 mcg/kg/min IV
  Safety and efficacy not established as routine pre-treatment in NSTEMI[9]
- **DOSAGE FORMS AND PREPARATIONS**
  - **Concentrate for Infusion, vial**: 50 mcg/mL (100 mL), 250 mcg/mL (50 mL, 100 mL, 150 mL)
- **CONTRAINDICATIONS** Severe hypersensitivity | History of thrombocytopenia | Active internal bleeding | Recent surgery or trauma within the previous month | Severe hepatic impairment
- **PRECAUTIONS** Anemia | Cardiogenic shock | Fecal occult blood | Hematuria | Uncontrolled severe hypertension | Renal and mild to moderate hepatic impairment | Pregnancy and lactation
- **ADVERSE EFFECTS** Pelvic pain | Minor bleeding | Bradyarrhythmia | Bruising | Thrombocytopenia
- **COSTS**
  - 250 mcg/mL, 50 mL Concentrate for Infusion (₱12,016.12)

Valsartan⋆

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**
  Adjunct for MI with LV failure or left ventricular systolic dysfunction (LVSD)[1] | Post-myocardial infarction[8]
  ➤ *ORAL*
  Adult: 20 mg 2x daily as early as 12 hrs after MI; may increase to 40 mg 2x daily in 7 days
  MAX daily dose: 160 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 40 mg, 80 mg, 160 mg, 320 mg
    also available as film-coated tab
- **CONTRAINDICATIONS** Biliary cirrhosis | Cholestasis | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Renal impairment and mild to moderate hepatic impairment | Hyperkalemia in patients with renal dysfunction | Symptomatic hypotension (patients with HF or post-MI) | Children | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Dizziness | Hypotension | Headache | Elevated serum BUN, creatinine | Cough
- **COSTS**
  - 80 mg Tablet (₱11.64)†
  - 160 mg Tablet (₱22.00)†

Warfarin sodium★

- **MOA** An anticoagulant; Vitamin K antagonist

- **INDICATIONS AND DOSE**

Post-MI particularly with prosthetic valve[6]

➤ *ORAL*

Adult: Initial dose 2–5 mg daily for 2 day
Check INR after 2 days then adjust accordingly.
Usual dose is between 2–10 mg per day depending on INR

Anterior MI and LV thrombus (or high risk LV thrombus, i.e. EF<40%, Anteroapical wall-motion abnormality) but had no stenting[6]

➤ *ORAL*

Adult (without stent):
Dual Therapy (Warfarin + low-dose 75–100 mg ASA)
Target INR is 2.0–3.0 for 3 months.
Discontinue Warfarin after

Anterior MI and LV thrombus (or high risk LV thrombus), and have had bare-metal stenting[6,7]

➤ *ORAL*

Adult (with bare-metal stent):
Triple Therapy (Warfarin + low-dose ASA + Clopidogrel)
Target INR is 2.0–3.0 daily for 1 mo; followed by Dual Therapy (Warfarin + ASA / Clopidogrel) for 2nd and 3rd month. Discontinue Warfarin after

Anterior MI and LV thrombus (or high risk LV thrombus), and have had drug-eluting stent placement[6,7]

➤ *ORAL*

Adult (with drug-eluding stent):
Triple Therapy (Warfarin + low-dose ASA + Clopidogrel)
Target INR is 2.0–3.0 daily for 6 mos.
Discontinue Warfarin after

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg, 2.5 mg, 5 mg
- **CONTRAINDICATIONS**
  - Active bleeding | Malignant hypertension | Recent or potential surgery
  - Pregnancy, except in pregnant women with mechanical heart valves, who are at high risk of thromboembolism
  - Concomitant use with Amiodarone, Ciprofloxacin, Macrolides, NSAIDs, fibrinolytics
- **PRECAUTIONS**
  - Vitamin K deficiency | Hepatic and renal impairment | HIT
  - Postpartum (delay Warfarin until risk of bleeding is low; 5 – 7 days after delivery)
  - CYP2C9 and VKORC1 genetic variation influences patient response to initial and maintenance therapy and increases risk of bleeding
  - Elderly | Lactation

BLACK BOX WARNING

Warfarin can cause major or fatal bleeding. Instruct patients about preventive measures to minimize risk of bleeding and to report signs and symptoms of bleeding.

- **ADVERSE EFFECTS** Abnormal hepatic function | Calciphylaxis | Alopecia | Acute kidney injury | Hypersensitivity reaction
- **ANTIDOTE** **Vitamin K**
- **COSTS**
  - 2.5 mg Tablet (₱15.79)†
  - 5 mg Tablet (₱17.91)†

REFERENCES

[1] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.
[2] PNF PHC Core Group. Philippine National Formulary Manual for Primary Care Providers. 9th ed. Department of Health; 2021
[3] Abanilla JM, Junia AT, Cruz RB, et al. 2014 PHA Clinical Practice Guidelines for the Diagnosis and Management of Patients with Coronary Artery Disease. PHA PCC; 2014
[4] Schwartz GG, Olsson AG, Ezekowitz MD, et al. Effects of atorvastatin on early recurrent ischemic events in acute coronary syndromes: the MIRACL study: a randomized controlled trial. *JAMA*. 2001;285(13):1711-1718. doi:10.1001/jama.285.13.1711
[5] Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC guideline for the management of patients with non–ST-elevation acute coronary syndromes. *Circulation*. 2014;130(25). doi:10.1161/cir.0000000000000134
[6] Kimura K, Kimura T, Ishihara M, et al. JCS 2018 guideline on diagnosis and treatment of acute coronary syndrome. *Circulation Journal*. 2019;83(5):1085-1196. doi:10.1253/circj.cj-19-0133
[7] Collet J-P, Thiele H, Barbato E, et al. 2020 ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2020;42(14):1289-1367. doi:10.1093/eurheartj/ehaa575
[8] Formulary Executive Council. *Philippine National Formulary*. 8th ed. Department of Health; 2019
[9] Byrne RA, Rossello X, Coughlan JJ, et al. 2023 ESC guidelines for the management of acute coronary syndromes. *European Heart Journal*. Published online 2023. doi:10.1093/eurheartj/ehad191

Table 1. Available Fixed-Dose Combinations for Acute Coronary Syndrome

DRUG COMBINATION	PREPARATION	DOSE
Aspirin + Clopidogrel ★	**Capsule (Aspirin/Clopidogrel)** 75 mg/75 mg **FC Tablet (Aspirin/Clopidogrel)** 75 mg/75 mg (₱52.75) 100 mg/75 mg (₱69.00)	➤ *ORAL* Adult: 1 tab once daily

2 DRUGS FOR Arrhythmia

Adenosine★

- **MOA** A Class V antiarrhythmic agent that slows impulse formation in the SA node, slows conduction time through the AV node, and interrupts reentry pathways through AV node

- **INDICATIONS AND DOSE**

Paroxysmal supraventricular tachycardia, including those associated with accessory bypass tract (e.g. WPW syndrome)[1,2] | Hemodynamically stable patient with acute management of narrow- or broad QRS tachycardia if vagal maneuvers fail[3,4,5]

➤ *INTRAVENOUS*

Adult:
First dose: 6 mg administered into a central or large peripheral vein, given over 2 seconds, with cardiac monitoring;
Second dose (if required): 12 mg after 1–2 mins
Third dose (if required): 18 mg after 1–2 mins
Increments should not be given if high level AV block develops at any particular dose

➤ *INTRAVENOUS / INTRAOSSEOUS*

Pediatric:
First dose: 0.1 mg/kg rapid bolus (MAX 6 mg)
Second dose: 0.2 mg/kg rapid bolus (MAX 12 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 2 mg/mL, 3 mg/mL (2 mL)
- **CONTRAINDICATIONS** Asthma, COPD | Decompensated heart failure | Long QT syndrome | 2nd- or 3rd-degree AV block | Sick sinus syndrome | Severe hypotension | Unstable angina | Known hypersensitivity
- **PRECAUTIONS** Atrial fibrillation or flutter | Pericardial effusion | Uncorrected hypovolemia | Pulmonary arterial hypertension | Electrolyte imbalance
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Abdominal discomfort | Arrhythmia | Chest discomfort or pain | Dizziness | Dry mouth | Dyspnea | Flushing | Headache | Hypotension
- **COSTS**
  - 3 mg/mL, 2 mL Solution for Injection Vial (₱1,960.00)†

Amiodarone hydrochloride★

- **MOA** A class III antiarrhythmic drug which blocks potassium channels; known as a broad-spectrum antiarrhythmic which also blocks sodium channels (Class I action), β adrenoceptors (Class II action), and calcium channels (Class IV action), slowing heart rate and AV node conduction

- **INDICATIONS AND DOSE**

Supraventricular and ventricular arrhythmias, particularly when other drugs are ineffective or contraindicated initiated in hospital or under specialist supervision[2] **| May be considered to slow a rapid ventricular response in patients with ACS and AF associated with severe LV dysfunction and HF or hemodynamic instability[6] |May be considered in the acute management of wide QRS tachycardia[3]**

➤ *ORAL*

Adult: Total of 10 g in 1–2 wks
Usual dose: 600–800 mg daily in 2–3 divided doses
Maintenance dose: 200 mg daily

➤ *INTRAVENOUS*
For acute management only

Adult: 150 mg over 10 mins, then 1 mg/min for 6 hrs, then 0.5 mg/min for 18 hrs

Ventricular fibrillation or pulseless ventricular tachycardia refractory to defibrillation (for cardiopulmonary resuscitation)[2]

➤ *INTRAVENOUS*

Adult:
Initial dose: 300 mg as rapid bolus (dose should be given from a prefilled syringe or diluted in 20 mL D5W)
Subsequent dose (if necessary): 150 mg

Pulseless ventricular tachycardia or ventricular fibrillation[1,5]

➤ *INTRAVENOUS / INTRAOSSEUS*

Pediatric: 5 mg/kg, as rapid IV bolus, may repeat if necessary
MAX per dose: 300 mg, a total dose of 15 mg/kg
May repeat up to 3 total doses

May be considered in acute treatment of hemodynamically stable regular narrow QRS tachycardia[7] | Hemodynamically stable wide complex tachycardia, or drug refractory supraventricular tachyarrhythmia[4]

➤ *INTRAVENOUS / INTRAOSSEUS*

Pediatric:
Loading dose: 5–10 mg/kg over 60 mins
Maintenance dose: 5–15 mcg/kg/min

➤ *ORAL*

Pediatric

<1 yr: 600–800 mg/1.73 m^2/day in divided doses every 12–24 hrs, for 4–14 days; then reduce to 200–400 mg/1.73m^2/day

≥1 yr: 10–15 mg/kg/day in divided doses every 12–24 hrs, for 4–14 days; then reduce to 5 mg/kg/day divided in every 12–24 hrs, if effective

MAX daily dose: 8 mg/kg (200mg)

Safety and efficacy not established in children

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 50 mg/mL (3mL)
  - **Tablet**: 200 mg
- **CONTRAINDICATIONS** Long QT syndrome[14] | Pre-excited AF | Severe conduction disturbances (unless pacemaker fitted) | Severe sinus-node dysfunction causing marked sinus bradycardia | 2nd- and 3rd-degree heart block | Sinus bradycardia (except in cardiac arrest) | Cardiogenic shock | Thyroid dysfunction | Congestive heart failure
  - Avoid bolus injection in cardiomyopathy
- **PRECAUTIONS** Severe bradycardia | Acute porphyrias | HF | Hypokalemia
  - Elderly | Pregnancy (possible risk of neonatal goiter)
- **WARNING**
  - Should be discontinued in amiodarone-induced thyrotoxicosis
  - For use only in patients with indicated life-threatening arrhythmia

BLACK BOX WARNING

Increased risk of pulmonary toxicity, hepatotoxicity, and heart block

- **ADVERSE EFFECTS** Respiratory disorders | Skin reactions (blue-grey skin discoloration) | Corneal microdeposits | Photosensitivity | Constipation | Vomiting | Hypotension | Hypo- and hyperthyroidism
- **COSTS**
  - 200 mg tablet (₱25.00)†
  - 50 mg/mL, 3 mL
  - Solution for Injection Ampule (₱448.00)†

Apixaban

- **MOA** A reversible and selective direct factor Xa inhibitor
- **INDICATIONS AND DOSE**

Atrial flutter or concomitant atrial fibrillation[3] except for patients with metallic prosthetic heart valves or moderate to severe mitral stenosis[2] | AF and an elevated CHA2DS2-VASc score of ≥ 2 in men or ≥ 3 in women[6] | Should be considered for AF and an elevated CHA2DS2-VASc score of ≥ 1 in men or ≥ 2 in women[6] | AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, for at least 3 weeks before and at least 4 weeks after cardioversion[2]

➤ *ORAL*

Adult: 5 mg 2x daily
Dose adjustment to 2.5 mg 2x daily, if ≥2 of following criteria are met:
- Age ≥ 80 years
- Body weight ≤ 60 kg
- Serum creatinine ≥ 133 µmol/L (1.5 mg/dL)

Safety and efficacy not established in patients with severe renal impairment (CrCl < 15 mL/min)

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome
  - Concomitant use with other anticoagulant (except under specific circumstances)
- **PRECAUTIONS** Low body weight | Renal and severe hepatic impairment
  - Concomitant use with strong CYP3A4 inducers/inhibitors
  - Elderly |Pregnancy and lactation
- **WARNING** Monitor patients for signs and symptoms of neurologic impairment and treat urgently

BLACK BOX WARNING

Premature discontinuation of any oral anticoagulant, including apixaban, increases the risk of thrombotic events.

- **ADVERSE EFFECTS** Anemia | Hemorrhage | Nausea | Contusion | Hemoptysis | Skin reactions
- **COSTS**
  - 2.5 mg FC Tablet (₱90.00)
  - 5 mg FC Tablet (₱90.00)

Atenolol★

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**

SVT and ventricular arrhythmia[8] | Chronic focal AT, inappropriate sinus tachycardia, atrial flutter, atrial fibrillation, AVRT, and chronic therapy of AVNRT[3]

➤ *ORAL*

Adult: 25–100 mg daily once or 2x daily
MAX daily dose: 100 mg

Long QT syndrome and supraventricular tachycardia[5]

➤ *ORAL*

Pediatric: 0.3–1.0 mg/kg/day divided in 1 to 2 doses
(MAX initial dose of 25 mg)
MAX daily dose: 2 mg/kg (100 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg, 100 mg
- **CONTRAINDICATIONS** Sinus bradycardia | Cardiogenic shock | Metabolic acidosis | 2nd- or 3rd-degree heart block | Severe peripheral arterial diseases | Sick sinus syndrome | Uncontrolled heart failure | Untreated pheochromocytoma | Competitive athletes

- **PRECAUTIONS**
  - May mask symptoms of hypoglycemia
  - Abrupt withdrawal may precipitate thyroid storm
  - Renal impairment
  - Elderly | Pregnancy and lactation (Risk for both use during pregnancy and when breastfeeding[15])

BLACK BOX WARNING

Abrupt withdrawal may exacerbate angina pectoris and trigger MI or ventricular arrhythmia.

- **ADVERSE EFFECTS** Fatigue | Bradyarrhythmia | Bronchospasm | Hypotension | GI disorder | Cold extremity | Depression
- **COSTS**
  - 50 mg Tablet (₱5.50)†
  - 100 mg Tablet (₱18.25)†

Atropine sulfate⋆

- **MOA** An anticholinergic that competitively blocks muscarinic cholinergic receptors M_1, M_2, M_3
- **INDICATIONS AND DOSE**

Bradycardia[1,9,10]

➤ *INTRAVENOUS*

Adult: 0.5 mg rapid IV injection, every 3–5 mins
MAX dose: 3 mg or 0.04 mg/kg
Neonate: 0.01–0.03 mg/kg/dose IV/IM over 1 min, every 10–15 min as needed, to a total of 0.04 mg/kg
Child: 0.02 mg/kg (up to 0.5 mg), 1 mg in adolescents, may repeat 1–2x as needed, every 5 mins

MAX total dose: 1 mg children, 2 mg adolescents

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule**: 500 mcg/mL, 600 mcg/mL, 1 mg/mL
- **CONTRAINDICATIONS** Primary glaucoma or predisposition to narrow anterior chamber angle glaucoma | Pediatric patients with prior severe systemic reaction to atropine | 2nd or 3rd degree AV block
  - Lactation (IV use)
- **PRECAUTIONS** Prostatic hypertrophy | Coronary insufficiency | Heart failure | Hepatic and renal impairment
  - Tachycardia may occur with recurrent use in patients with coronary artery disease
  - Pregnancy and lactation: Not known to be harmful to pregnant women but may suppress lactation in breastfeeding women, use with caution
- **ADVERSE EFFECTS** Abdominal distension | Arrhythmia | Anhidrosis | Dysphagia | Hallucination | Mydriasis | Loss of taste | Excessive thirst | Xerostomia
- **COSTS**
  - 1 mg/mL, 1 mL Solution for Injection Ampule (₱18.69)†

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

Supraventricular arrhythmia[11] | Prophylaxis of atrial fibrillation in patients undergoing CABG[12] | Chronic focal AT, inappropriate sinus tachycardia, atrial flutter, AVRT chronic therapy of AVNRT[3] | Prevention of SVT in pregnant patients without WPW syndrome[3]

➤ *ORAL*

Adult: 1.25–2.5 mg once daily, starting 2–3 days before cardiac surgery, *uptitrate according to BP and HR*
MAX daily dose: 20 mg

Supraventricular tachycardia[5]

➤ *ORAL*

Pediatric: 0.1–0.4 mg/kg/day
MAX daily dose: 10–20 mg

Safety and efficacy not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS** DM | History or recent psoriasis | Thyrotoxicosis | Hepatic and renal impairment
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Calcium gluconate⋆

- **MOA** An organic calcium salt used to prevent or treat negative calcium balance, necessary for proper function of the cardiovascular, nervous, muscular, and skeletal systems.
- **INDICATIONS AND DOSE**

Replete calcium levels for patients with hypocalcemia-induced long QT interval, ventricular and atrial arrhythmia[13]

➤ *INTRAVENOUS*

Adult: Initial dose: 1–2 g IV bolus
IV Bolus Subsequent dose: 1–2 g IV bolus every 6 hrs if needed (MAX bolus infusion rate: 200 mg/min)
Continuous IV infusion Subsequent dose: 5.4–21.5 mg/kg/hr and adjust based on serum calcium levels

➤ *INTRAVENOUS / INTRAOSSEUS*

Neonate: 200–800 mg/kg/day divided into 4 doses, given every 6 hrs
Infant: 200–500 mg/kg/day divided into 4 doses, given every 6 hrs
Child: 200–500 mg/kg/day divided into 4 doses, given every 6 hrs

Max IV administration rate: 100 mg/min (over 10–20 sec in cardiac arrest)
Max IV infusion: 200 mg/min
Max concentration of IV infusion: 50 mg/mL

Pediatric cardiac arrest

➤ *INTRAVENOUS*

Pediatric: 100 mg/kg/dose IV every 10 mins
MAX dose 3 g

DOSAGE FORMS AND PREPARATIONS

- **Solution for Injection, ampule**: 100 mg/mL, 250 mg/mL

- **CONTRAINDICATIONS** Hypercalcemia | Ventricular fibrillation | Severe renal failure | Concomitant use with Ceftriaxone injection in neonates
- **PRECAUTIONS** Cardiac disease | renal impairment
  - Patients receiving cardiac glycosides
  - Children | Pregnancy and lactation (Use with caution in lactating mothers (excreted in breastmilk)
- **ADVERSE EFFECTS** Arrhythmias | Hyperhidrosis | Hypotension | GI disorder
- **COSTS**
  - 10%, 10 mL Solution for Injection Ampule (₱164.00)†

Carvedilol⋆

- **MOA** A non-selective β- blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity

- **INDICATIONS AND DOSE**

Atrial and ventricular arrhythmia[3,6] | Chronic focal AT, inappropriate sinus tachycardia, atrial flutter, AVRT chronic therapy of AVNRT[3]

➤ *ORAL*

Adult: 3.125–25 mg, 2x daily

Paroxysmal supraventricular tachycardia in conjunction with heart failure[5]

➤ *ORAL*

Pediatric: 0.075–0.8 mg/kg/dose, every 8–12 hrs (MAX initial dose of 3.125 mg)
MAX daily dose: 25–50 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 6.25 mg, 12.5 mg, 25 mg also avail as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block
  - Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema)
  - Severe hepatic impairment
- **PRECAUTIONS**
  - May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
  - Patients with PVD
  - May worsen renal function in heart failure patients
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 25 mg Tablet (₱7.26)†

Dabigatran etexilate⋆

(Dabigatran etexilate mesylate)

- **MOA** A rapid-acting direct thrombin inhibitor

- **INDICATIONS AND DOSE**

Patients with atrial flutter or atrial fibrillation[3] | AF and an elevated CHA2DS2-VASc score of ≥ 2 in men or ≥ 3 in women[6] | Should be considered for AF and an elevated CHA2DS2-VASc score of ≥ 1 in men or ≥ 2 in women[4] | AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, for at least 3 weeks before and at least 4 weeks after cardioversion[4]

➤ *ORAL*

Adult: 110–150 mg 2x daily
Dose adjustment to 110 mg 2x daily in patients with:
- Age ≥ 80 yrs
- Concomitant use of Verapamil
- Increased bleeding risk

Safety and efficacy not established in patients with severe renal impairment (CrCl < 15 mL/min)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule**: 75 mg, 110 mg, 150 mg
- **CONTRAINDICATIONS** Active bleeding | Mechanical prosthetic heart valve | Recent GI ulcer, surgery
  - Concomitant use with other anticoagulants, strong P-gp inhibitors
  - Severe renal impairment
- **PRECAUTIONS** Body weight < 50 kg | Recent biopsy | Thrombocytopenia | Hepatic and moderate renal impairment
  - Avoid abrupt discontinuation
  - Pregnancy and lactation

BLACK BOX WARNING

Premature discontinuation increases risk of thrombosis. There is a risk of epidural or spinal hematomas and paralysis during neuraxial anesthesia or spinal puncture.

- **ADVERSE EFFECTS** Hemorrhage | GERD | Abnormal hepatic function
- **ANTIDOTE** **Idarucizumab**
- **COSTS**
  - 110 mg Capsule (₱ 81.25)
  - 150 mg Capsule (₱ 78.75)

Digoxin★

- **MOA** A Na+/K+ ATPase inhibitor
- **INDICATIONS AND DOSE**

HR control in patients with AF or atrial flutter with LVEF ≤ 40%[12] | Rate control of AT if beta–blockers fail in patients without WPW syndrome[3]

➤ *ORAL*

Adult: 0.0625–0.25 mg once daily

➤ *INTRAVENOUS*

Rapid digitalization dose

Adult: 0.5 mg IV bolus (0.75–1.5 mg over 24 hrs in divided doses)

Supraventricular tachycardia, atrial fibrillation or flutter[5,10]

➤ *ORAL*

Premature neonate: Loading dose: 20 mcg/kg/day
Maintenance dose: 5 mcg/kg/day
Full term neonate: Loading dose: 30 mcg/kg/day
Maintenance dose: 8–10 mcg/kg/day
1 mo–< 2 yrs: Loading dose: 40–50 mcg/kg/day
Maintenance dose: 10–12 mcg/kg/day
2–10 yrs: Loading dose: 30–40 mcg/kg/day
Maintenance dose: 8–10 mcg/kg/day
> 10 yrs, BW < 100 kg: Loading dose: 10–15 mcg/kg/day
Maintenance dose: 2.5–5 mcg/kg/day
MAX dose: 0.25 mg daily in one or 2 divided doses

➤ *INTRAVENOUS*

Premature neonate: Loading dose: 15 mcg/kg/day
Maintenance dose: 3–4 mcg/kg/day
Full term neonate: 20 mcg/kg/day
Maintenance dose: 6–8 mcg/kg/day
1 mo–<2 yrs: Loading dose: 30–40 mcg/kg/day
Maintenance dose: 7.5–9 mcg/kg/day
2 – 10 yrs: Loading dose: 20–30 mcg/kg/day
Maintenance dose: 6–8 mcg/kg/day
> 10 yrs, BW < 100 kg: Loading dose: 8–12 mcg/kg/day
Maintenance dose: 2–3 mcg/kg/day
MAX dose: 0.25 mg daily in one or 2 divided doses

Administration

Loading dose: Administer ½ of total loading dose initially, followed by ¼ of the total loading dose every 8 to 18 hrs for 2 doses
Maintenance dose:
< 10 yrs: Give 2x daily
≥ 10 yrs: Give once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule**: 250 mcg/mL (2 mL)
  - **Elixir** (Pediatric): 50 mcg/mL
  - **Tablet**: 250 mcg
- **CONTRAINDICATIONS** Constrictive pericarditis (unless to control atrial fibrillation or improve systolic dysfunction) | Hypertrophic cardiomyopathy | Intermittent complete heart block
- **PRECAUTIONS** Hypercalcemia, hypokalemia, hypomagnesemia, hypoxia (risk of digitalis toxicity) | Recent MI | Thyroid disease | Renal impairment
  - Children and elderly | Pregnancy and lactation
- **WARNINGS** Serum digoxin levels of 1.2 nanograms (ng)/mL or greater have been associated with a significantly higher risk of death in patients with atrial fibrillation (off-label dosage)
- **ADVERSE EFFECTS** Arrhythmia | Cardiac conduction disorder | Diarrhea | Dizziness | Skin reactions | Vomiting
- **COSTS**
  - 250 mcg Tablet (₱7.00)†
  - 50 mcg/mL, 60 mL Oral Elixir Bottle (₱734.80)†
  - 250 mcg/mL, 2 mL Solution for Injection Ampule (₱310.00)†

Diltiazem hydrochloride★

- **MOA** A non-dihydropyridine calcium-channel blocker
- **INDICATIONS AND DOSE**

HR control in patients with AF or atrial flutter with LVEF ≥ 40%[12] | Focal acute atrial tachycardia[3] | Chronic atrioventricular nodal re-entrant tachycardia[3] | Considered for supraventricular tachycardia in congenital heart diseases in adults[3]

➤ *ORAL*

Adult: 60 mg 3x daily, uptitrated to 360 mg (extended release) once daily

Supraventricular tachycardia[5]

➤ *ORAL*

Pediatric: 1–3 mg/kg/dose, every 8 hrs (MAX initial dose: 60 mg)
MAX daily dose: 3.5 mg/kg or 180 mg

Safety and efficacy not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 30 mg, 60 mg, 90 mg
  - **ER/MR Tablet/Capsule:** 60 mg, 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block | Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS** Severe bradycardia | 1st degree AV block | Significantly impaired left ventricular function
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 60 mg Tablet (₱18.50)†

Dopamine hydrochloride⋆

- **MOA** A natural catecholamine with a mixed-acting and dose-dependent adrenergic action
- **INDICATIONS AND DOSE**
  Symptomatic and unstable bradycardia[14]
  ➤ *INTRAVENOUS*
  Adult: 5–20 mcg/kg/min by IV infusion; *Titrate to patient response and taper slowly*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 40 mg/mL (5 mL), 200 mg in D5W, 1.6 mg/mL (250 mL)
- **CONTRAINDICATIONS** Pheochromocytoma | Tachyarrhythmia | Ischemic Heart Disease | Ventricular Fibrillation | Hyperthyroidism
- **PRECAUTIONS** Hypovolemia | Cardiac arrhythmia | Occlusive vascular disease | Severe hypersensitivity reaction
  - Hypotension after abrupt discontinuation
  - Concomitant use with MAOIs
  - Pregnancy and lactation

BLACK BOX WARNING

This may cause peripheral ischemia in patients with a history of occlusive vascular disease.

- **ADVERSE EFFECTS** Angina pectoris | Anxiety | Arrhythmia | Cardiac conduction disorder | Dyspnea | Gangrene | Hypertension | Mydriasis
- **COSTS**
  - 40 mg/mL, 5 mL Solution for Injection Ampule (₱234.50)†

Edoxaban

- **MOA** A reversible and selective direct factor Xa inhibitor
- **INDICATIONS AND DOSE**
  Patient with atrial flutter or atrial fibrillation[3] | AF and an elevated CHA_2DS_2-VASc score of ≥ 2 in men or ≥ 3 in women[6] | Should be considered for AF and an elevated CHA_2DS_2-VASc score of ≥ 1 in men or ≥ 2 in women[6] | AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, for at least 3 weeks before and at least 4 weeks after cardioversion[6]
  ➤ *ORAL*
  Adult: 60 mg once daily
  Dose adjustment to 15 mg or 30 mg, once daily if patient has any of the following:
  - CrCl 30–50 mL/min
  - Body weight ≤ 60
  - Concomitant use of Verapamil

  Safety and efficacy not established in patients with severe renal impairment (CrCl < 15 mL/min)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 30 mg, 60 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Hepatic disease | Prosthetic heart valve | Uncontrolled severe hypertension | Pregnancy and lactation
- **PRECAUTIONS** Body weight < 60 kg | Moderate to severe mitral stenosis | Renal and hepatic impairment
  - Concomitant use with P-gp inhibitors (Erythromycin, Ketoconazole, Cyclosporin)

BLACK BOX WARNING

Premature discontinuation increases risk of ischemic events; Resulting epidural or spinal hematomas may result in long-term paralysis.

Reduced efficacy in nonvalvular AF with CrCl > 95 mL/min

- **ADVERSE EFFECTS** Abdominal pain | Anemia | Dizziness | Hemorrhage | Headache | Nausea | Rash | Abnormal liver function tests
- **COSTS**
  - 30 mg Tablet (₱147.00)

Enoxaparin sodium⋆

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa
- **INDICATIONS AND DOSE**
  Bridging therapy for stroke prevention of AF patients maintained on Warfarin
  ➤ *SUBCUTANEOUS*
  Adult: 1 mg/kg every 12 hrs
  CrCl < 30 mL/min: 1 mg/kg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, single dose prefilled syringe:** 100mg/mL (0.2 mL, 0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Recent stroke, GI ulcer, surgery | Neonates, infants
- **PRECAUTIONS** Low body weight (increased risk of bleeding)
  - Obesity (increased risk of thromboembolism)
  - Renal and hepatic impairment
  - Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention in patients anticoagulated or to be anticoagulated for thromboprophylaxis.

- **ADVERSE EFFECTS** Hemorrhagic anemia | Headache | Confusion | Hypersensitivity | Thrombocytopenia | Thrombocytosis
- **COSTS**
  - 100 mg/mL, 0.4 mL Solution for Injection Prefilled Syringe (₱794.00)†
  - 100 mg/mL, 0.6 mL Solution for Injection Prefilled Syringe (₱778.00)†

Epinephrine / Adrenaline★

- **MOA** A non-selective sympathomimetic that acts on both α- and β-adrenergic receptors
- **INDICATIONS AND DOSE**

  Acute symptomatic bradycardia[14] | Control of bradycardia in patients with arrhythmia after MI, or if patient is unstable and failed to respond to Atropine[2]

  ➤ *INTRAVENOUS*

  Adult: 2–10 mcg per minute
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 1 mg/mL (0.3 mL, 1 mL)
- **CONTRAINDICATIONS** Pheochromocytoma | Shock (not related to anaphylaxis) | Closed-angle glaucoma | Labor
- **PRECAUTIONS** Diabetes | CV disease | Parkinson's | Hyperthyroidism
  - Avoid repeated IM or subQ injections at the same site
  - Large doses or inadvertent IV injection can cause a sharp rise in blood pressure that may lead to cerebral hemorrhage
  - Elderly | Pregnancy (May reduce placental perfusion and cause tachycardia, cardiac irregularities, and extrasystoles in the fetus; can delay second stage of labor) | Lactation
- **ADVERSE EFFECTS** Peripheral ischemia | Muscle rigidity | Hyperglycemia | Pallor | Palpitations | Sweating
- **COSTS**
  - 1 mg/mL, 1 mL Solution for Injection Ampule (₱80.00)†

Esmolol hydrochloride★

- **MOA** A short-acting cardioselective β-blocker
- **INDICATIONS AND DOSE**

  SVT, atrial fibrillation or flutter, intraoperative and postoperative tachycardia[3] | Slow a rapid ventricular response to AF in patients with ACS who do not display HF, hemodynamic instability, or bronchospasm[6] | Acute focal and multifocal atrial tachycardia, recurrent focal atrial tachycardia or atrial flutter[3] | Hemodynamically stable patients with acute management of narrow QRS tachycardia if vagal maneuvers and adenosine fail[3] | AVNRT in hemodynamically stable patients if vagal maneuvers and adenosine fail[3] | Prevention of SVT in pregnant women without WPW syndrome[3]

  ➤ *INTRAVENOUS*

  Adult:

  IV bolus 0.5 mg/kg

  IV infusion 0.05–0.3 mg/kg/min

  Supraventricular tachycardia[5]

  ➤ *INTRAVENOUS*

  Pediatric:

  IV bolus Loading dose: 0.10–0.50 mg/kg over 1 min

  IV infusion Maintenance dose: 0.025–0.50 mg/kg/min, uptitrate dose in 0.05–0.01 mg/kg/min increments every 5 – 10 mins as needed

  MAX dose: 1 mg/kg/min
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 10 mg/mL (10 mL, 250 mL), 100 mg/mL (10 mL)
- **CONTRAINDICATIONS** Cardiogenic shock | Decompensated heart failure | Pulmonary hypertension | 2nd- or 3rd-degree AV block | Sick sinus syndrome | Severe sinus bradycardia | Concomitant use with IV CCB
- **PRECAUTIONS** Avoid infusion into small veins or use of butterfly catheters
  - Abrupt withdrawal may precipitate thyrotoxicosis
  - Sudden discontinuation may exacerbate angina
  - Renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hypotension | Profound bradycardia | Decreased appetite | Drowsiness | Sweating | Headache | Fatigue | Dizziness | Anxiety
- **COSTS**
  - 10 mg/mL, 10 mL Solution for Injection Vial (₱410.30)†
  - 100 mg/mL, 10 mL Solution for Injection Vial (₱475.20)†

Flecainide acetate

- **MOA** A class IC antiarrhythmic sodium channel blocker
- **INDICATIONS AND DOSE**

  Supraventricular and ventricular arrhythmia *initiated under direction of hospital consultant*[6,7] **| Prevention of SVT in patients with WPW syndrome, and without ischemic or structural heart disease[6,7] | Patients without ischemic or structural heart disease if AV nodal blocking agents fail to prevent SVT[6] | Symptomatic patients with high burden of ventricular premature beats[8] | Pharmacological cardioversion of recent- onset AF[12]**

  ➤ *ORAL*

  Adult: Initial dose: 50 mg, every 12 hrs; titrate by 50 mg 2x daily

  Pill-in-the pocket: as needed for Paroxysmal AF

  MAX Daily dose: 300 mg

  Pediatric: 1–7 mg/kg/day divided in 2–3 doses, given every 8–12 hrs (MAX initial dose of 50 mg every 12 hrs)

  MAX daily dose: 8 mg/kg (or 200 mg)

  Safety and efficacy not established in focal acute atrial tachycardia[3]

Safety and efficacy not established in fetuses, infants, or children; initiate in hospital with rhythm monitoring and supervised by a cardiologist skilled in the treatment of arrhythmias in children

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 100 mg
- **CONTRAINDICATIONS** IHD | EF < 40% Severe LVH | Significant structural heart diseases (cardiomyopathy, LVD, MI, myocardial ischemia)[14] | Cardiogenic shock | 2nd- or 3rd- degree AV block without pacemaker | QRS > 130 ms
- **PRECAUTIONS** CHF | Hepatic impairment

BLACK BOX WARNING

Excessive mortality or nonfatal cardiac arrest was seen in patients with asymptomatic non-life-threatening ventricular arrhythmias and with MI who received Flecainide.

- **ADVERSE EFFECTS** Palpitations | Asthenia | Dizziness | Lightheadedness | Fever | Blurred vision
- **COSTS**
  - 100 mg Tablet (₱72.60)

Isoproterenol hydrochloride

(Proternol / Isoprenaline)

- **MOA** A non-selective β-agonist
- **INDICATIONS AND DOSE**

  Acute symptomatic bradyarrhythmia[12] | Electrical storm in Brugada Syndrome, idiopathic VF, Early Repolarization Syndrome[15] | Acquired LQT syndrome and recurrent torsades de pointes[15] | May be considered for the diagnosis of catecholaminergic polymorphic ventricular tachycardia[15]

  ➤ *INTRAVENOUS*

  Adult: 0.5–10 mcg/min IV and titrate to HR and rhythm response

  Pediatric: 0.05–2.0 mcg/kg/min as continuous IV infusion
  MAX: 2 mcg/kg/min

  WITH FDA PERMISSION FOR COMPASSIONATE USE

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 2 mg/mL
- **CONTRAINDICATIONS** Angina pectoris | Digitalis-induced bradycardia or heart block | Tachyarrhythmia | Recent MI | Hypersensitivity
- **PRECAUTIONS** CV diseases | DM | Hyperthyroidism
  - Hyperresponsiveness to sympathomimetics | Renal and hepatic impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Tachycardia | Palpitations | Syncope

Ivabradine hydrochloride

- **MOA** A selective sinus node I_f inhibitor; a Hyperpolarization-activated cyclic nucleotide-gated (HCN) channel blocker
- **INDICATIONS AND DOSE**

  Monotherapy or in combination with a beta- blocker for symptomatic patients with inappropriate sinus tachycardia[3] | May be considered for postural orthostatic tachycardia syndrome[3] | May be considered for chronic therapy of focal atrial tachycardia with a beta-blocker[3]

  ➤ *ORAL*

  Adult: 5–7.5 mg 2x daily; reduce to 2.5 mg 2x daily for intolerable adverse effects

  Atrial tachycardia[5]

  ➤ *ORAL*

  Off-label dosing

  Pediatric

  < 40 kg: 0.05 mg/kg 2x daily; Uptitrated to 0.2 mg/kg per dose in infants 6 months to 1 year of age and to 0.3 mg/kg per dose in children > 1 year of age

  > 40 kg: 2.5 mg 2x daily
  MAX daily dose: 0.3 mg/kg (7.5 mg)

  Not approved for pediatric arrhythmia[5]

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 5 mg, 7.5 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | 2nd- or 3rd-degree heart block | Severe hypotension | Sick sinus syndrome | Unstable angina | Unstable or acute HF | Severe hepatic impairment | Concomitant use with CYP3A4 inhibitors
- **PRECAUTIONS** AF | Retinitis pigmentosa | Congenital QT syndrome | Severe renal impairment | Consider stopping if no improvement in angina
- **ADVERSE EFFECTS** Arrhythmia | Vision disorders | Headache | Hypertension
- **COSTS**
  - 5 mg FC Tablet (₱33.81)
  - 7.5 mg FC Tablet (₱34.00)

Lidocaine hydrochloride★

(Lignocaine hydrochloride)

- **MOA** A class IB antiarrhythmic agent that blocks both initiation and conduction of nerve impulses by decreasing ionic influx thru the neuronal membrane by blocking sodium channels
- **INDICATIONS AND DOSE**

  Pulseless ventricular fibrillation or ventricular tachycardia[1] | Ventricular arrhythmias, especially after myocardial infarction in patients without gross circulatory impairment[2]

➤ *INTRAVENOUS*

Adult: 1–1.5 mg/kg as bolus injection repeated as necessary
MAX dose: 3 mg/kg

In more stable adult patients
Loading dose: 50–100 mg at 25–50 mg/min; May repeat once or 2x up to a MAX of 200–300 mg in 1 hr
Subsequent dose: 1–4 mg/min via continuous IV infusion
Reduce dose if infusion > 24 hrs

Emergency treatment of ventricular arrhythmia[1]

➤ *INTRAMUSCULAR*

Adult: 300 mg injected into deltoid muscle; repeat after 60–90 mins if necessary

Ventricular fibrillation, ventricular tachycardia[5,16]

➤ *INTRAVENOUS*

Pediatric:
IV Bolus Loading dose: Initially, 1 mg/kg/dose by slow IV bolus (may repeat twice, 10–15 min apart)
IV Infusion Maintenance dose: 20–50 mcg/kg/min
MAX per dose: 50 mcg/kg/min

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 10 mg/mL, 1% (20 mL) | 20 mg/mL, 2% (5 mL, 20 mL, 50 mL)
- **CONTRAINDICATIONS** Sensitivity to amide-type local anesthetics | Hypovolemia | Complete heart block | WPW syndrome
- **PRECAUTIONS** Use with caution when used in combination with vasoconstrictors
  - Severe shock | Bradycardia | Severe renal and hepatic impairment
  - Elderly or debilitated patients | Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Erythema | Headache | Methemoglobinemia | Anxiety | Arrhythmia | Metallic taste | Vomiting
- **COSTS**
  - 2%, 20 mL Solution for Injection Ampule (₱23.10)†
  - 2%, 5 mL Solution for Injection Ampule (₱46.00)†
  - 2%, 5 mL Solution for Injection Vial (₱9.76)†
  - 2%, 50 mL Solution for Injection Vial (₱51.00)†

Magnesium sulfate⋆

- **MOA** An antiarrhythmic agent that decreases myocardial cell excitability by modulating sodium, calcium, and potassium channels
- **INDICATIONS AND DOSE**

Emergency treatment of serious arrhythmias like torsades de pointes, ventricular arrhythmia[1,2,14] | Adjunct treatment to beta-blockers or other antiarrhythmic drugs for the prevention of post-operative AF[17]

➤ *INTRAOSSEUS / INTRAVENOUS*

Adult: 1–2 g diluted in 100 mL D5W IV/IO over 1–2 mins with extreme caution
Pediatric: 25–50 mg/kg/dose every 4–6 hr in 3–4 doses
Max single dose: 2 g
No pulse: push
With pulse: give over 20 - 60 mins

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 250 mg/mL (2 mL, 10 mL, 20 mL) | 500 mg/mL (2 mL, 10 mL)
- **CONTRAINDICATIONS** Heart block | MI | Hypermagnesemia | Myasthenia gravis | Hepatic and renal failure
- **PRECAUTIONS** Renal insufficiency may result in magnesium intoxication
  - Avoid in hepatic coma if there is risk of renal failure
  - Elderly and debilitated patients | Pregnancy and lactation
  - Continuous administration of magnesium sulfate beyond 5 to 7 days to pregnant women can lead to hypocalcemia and bone abnormalities in the developing fetus; neonatal fracture has been reported. Use during pregnancy only if clearly needed

BLACK BOX WARNING

Magnesium toxicity can cause loss of deep tendon reflexes, followed by respiratory depression and ultimately respiratory arrest. If deep tendon reflexes are absent, withhold further doses of Magnesium sulfate until reflexes return.

- **ADVERSE EFFECTS** Flushing | Nausea | Vomiting
- **COSTS**
  - 250 mg/mL, 10 mL Solution for Injection Ampule (₱95.00)†
  - 250 mg/mL, 20 mL Solution for Injection Vial (₱22.00)†
  - 500 mg/mL, 2 mL Solution for Injection Ampule (₱86.39)†

Metoprolol

(Metoprolol succinate and Metoprolol tartrate⋆)

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**

To slow a rapid ventricular response to AF in patients with ACS who do not display HF, hemodynamic instability, or bronchospasm[6] | Atrial fibrillation or flutter[1] | Supraventricular and ventricular tachycardia[12] | Premature ventricular contractions[12] | Long-term management of idiopathic sustained VT during pregnancy[6]

➤ *ORAL*

Adult
Metoprolol succinate Initial dose: 25–100 mg, once daily
Usual dose: 50–100 mg/day
MAX dose: 400 mg/day
Metoprolol tartrate Initial dose 50–100 mg/day, given 1–2x daily

Supraventricular tachycardia[5,10]

➤ *ORAL*

Pediatric:

Metoprolol tartrate

Initial dose: 1–2 mg/kg/day divided into 2–3 doses
MAX dose: 6 mg/kg/day, 2 mg/kg/dose up to 200 mg/day,

- **DOSAGE FORMS AND PREPARATIONS**
  - *Metoprolol succinate*
    ER Tablet: 23.75 mg (25 mg), 47.5 mg (50 mg), 95 mg (100 mg)
  - *Metoprolol tartrate*
    FC Tablet: 50 mg, 100 mg
- **CONTRAINDICATIONS** Sinus bradycardia, overt cardiac failure, cardiogenic shock, and sick sinus syndrome (without pacemaker) in patients with hypertensive and angina | 1st-degree heart block in patients with MI | Decompensated heart failure
  - Should not be used for hypertension with presence of drug-induced tachycardia for psychiatric patients taking antidepressant, antipsychotic drugs
- **PRECAUTIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery
  - May mask symptoms of hypoglycemia and thyrotoxicosis
  - Dose adjustment may be considered depending on CYP2D6 phenotype
  - Elderly | Pregnancy and lactation
- **WARNINGS** Patients should be warned against interruption or discontinuation of therapy without physician's advice

BLACK BOX WARNING

Ischemic Heart Disease

Do NOT abruptly discontinue in patients with coronary artery disease. Dosage should be gradually reduced over a period of 1 to 2 weeks.

- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - *Metoprolol succinate*
    47.5 mg ER tablets (₱6.25)
  - *Metoprolol tartrate*
    50 mg Tablet (₱3.00)†
    100 mg Tablet (₱4.50)†

Phenytoin sodium★

- **MOA** A class IB antiarrhythmic agent; a non-specific sodium channel blocker; reduces the rate of calcium-dependent depolarization in the plateau phase of the cardiac action potential and increases the refractory period
- **INDICATIONS AND DOSE**

Bidirectional VT secondary to Digoxin toxicity

➤ *INTRAVENOUS*

Adult: Loading dose: 3.5–5 mg/kg
MAX dose (500 mg –1 g) at 50 mg/min

➤ *ORAL*

Adult: 100 mg every 5 mins until arrhythmia is controlled
MAX: 1 g

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule**: 100 mg
  - **Suspension** (Adult): 125 mg/5 mL (120 mL)
  - **Solution for Injection, ampule:** 50 mg/mL (2 mL)
- **CONTRAINDICATIONS** 2nd- or 3rd-degree AV block | Sinus bradycardia | Severe myocardial damage | Respiratory depression | Severe renal and hepatic disorders
- **PRECAUTIONS** Avoid in older adults with history of falls or fractures
  - HLA-B*1502 allele increases risk of SJS-TEN
  - Abrupt withdrawal may precipitate status epilepticus
  - Elderly and children | Pregnancy and lactation

BLACK BOX WARNING

The rate of IV phenytoin sodium administration should not exceed 50 mg/min in adults and 1 to 3 mg/kg/min (or 50 mg/min, whichever is slower) in pediatric patients because of the risk of severe hypotension and cardiac arrhythmias.

- **ADVERSE EFFECTS** Rashes | Morbilliform eruption | Drug-induced gingival hyperplasia | Confusion | Decreased coordination | Nystagmus
- **COSTS**
  - 100 mg Capsule (₱31.00)†
  - 50 mg/mL, 2 mL Solution for Injection Ampule (₱650.00)†
  - 125 mg/5 mL, 120 mL Oral Suspension Bottle (₱374.00)†

Potassium chloride★

- **MOA** An electrolyte replenisher
- **INDICATIONS AND DOSE**

Prophylaxis of life-threatening arrhythmia related to hypokalemia[18]

➤ *ORAL*

Adult: 20–25 mEq daily *adjusted to patient's needs*

Life threatening arrhythmia related to hypokalemia[10,18]

➤ *ORAL*

Adult

Powder for solution 20–25 mEq 1–5x daily, dissolved in at least 5 fl.oz. water
MAX daily dose: 100 mEq
Sustained-release tablet 40–100 mEq daily in divided doses of 20 mEq single dose

Pediatric: 1–4 mEq/kg/day divided into 2–4 doses

➤ *INTRAVENOUS*

Adult:
Serum K < 2 mEq/mL: Up to 40 mEq/hr IV with continuous cardiac monitoring
MAX daily dose: 400 mEq

Serum K > 2.5 mEq/mL: 10–40 mEq/hr IV with continuous cardiac monitoring
MAX daily dose: 200 mEq

Pediatric: 0.5–1 mEq/kg dose given as an infusion of 0.5 mEq/kg/hr for 1–2 hr
MAX IV infusion rate: 1 mEq/kg/hr

- **DOSAGE FORMS AND PREPARATIONS**
  - **SR Tablet**: 250 mg, 600 mg, 750 mg
  - **Solution for Injection, vial**: 100 mg/mL, 2 mEq/mL (150 mg/mL), 100 mEq/L, 200 mEq/L
- **CONTRAINDICATIONS** Concomitant use with anticholinergic agents, K-sparing diuretics, ACEIs
  - Hyperkalemia; risk of cardiac arrest
  - Esophageal ulceration in certain cardiac patients with esophageal compression
  - Dysphagia or GI tract passage restrictions
- **PRECAUTIONS** Metabolic acidosis | Hepatic and mild to moderate renal impairment
  - Children and elderly | Pregnancy and lactation
- **WARNINGS** Rapid and bolus injection causes cardiac arrest or death
- **ADVERSE EFFECTS** Diarrhea | Flatulence | Nausea | Vomiting
- **COSTS**
  - 10 mEq Tablet (₱12.00)†
  - 600 mg Tablet (₱12.08)†
  - 750 mg SR Tablet (~10 mEq) (₱22.20)†
  - 2 mEq/mL, 20 mL Solution for Injection Vial (₱57.00)†

Propranolol hydrochloride*

- **MOA** A nonselective β-blocker; Inhibits peripheral conversion of thyroxine (T4) to triiodothyronine (T3)
- **INDICATIONS AND DOSE**

Supraventricular tachyarrhythmia[1] | Chronic focal AT, therapy of inappropriate sinus tachycardia, atrial flutter, chronic therapy of AVNRT, therapy of AVRT[3] | Long-term management of idiopathic sustained VT during pregnancy[15] | Slow a rapid ventricular response to AF in patients with ACS who do not display HF, hemodynamic instability, or bronchospasm[6]

➤ *ORAL*

Adult: 10–30 mg every 6–8 hrs
Maintenance dose: 10–40 mg 3–4x daily *for rate control*

Supraventricular tachycardia[5,10]

➤ *ORAL*

Pediatric: Initially 0.5–1 mg/kg/day divided in every 6–8 hrs
Increase dosage every 3–5 days as needed
Usual dose range: 2–4 mg/kg/day in divided doses every 6–8 hrs
MAX daily dose: 60 mg or 4 mg/kg

HR control in patients with tachyarrhythmia and hyperthyroidism[19]

➤ *ORAL*

Adult: 60–80 mg every 4 hrs

For symptom relief of pregnant women suffering from thyrotoxicosis[19]

➤ *ORAL*

Adult: 10–20 mg every 4 hrs

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 10 mg, 40 mg
- **CONTRAINDICATIONS** BP < 50/30 mmHg | Bronchial asthma/COPD | Cardiogenic shock | HR < 80 bpm | Overt HF | Pheochromocytoma | 2nd- or 3rd-degree heart block | Sick sinus syndrome (without pacemaker) | Infants < 2kg | Diabetes | Psoriasis| Competitive athletes
- **PRECAUTIONS** Concomitant use with non-DHP CCBs, Digoxin, Clonidine increases risk of severe bradycardia
  - Abrupt withdrawal may precipitate thyroid storm
  - May worsen bradycardia and hypotension
  - May increase risk of hypoglycemia
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Diarrhea | Vomiting | Dizziness | Hypertension | Sleep disorder | Fatigue | Bradycardia | Depression | Hyperlipidemia
- **COSTS**
  - 10 mg Tablet (₱6.35)†
  - 40 mg Tablet (₱24.00)†

Ranolazine

- **MOA** A partial fatty acid oxidation inhibitor; late sodium channel blocker in myocardium
- **INDICATIONS AND DOSE**

VT secondary to long QT syndrome type 3[15]

➤ *ORAL*

Adult: 375–1000 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet:** 375 mg, 500 mg, 750 mg, 1 g
- **CONTRAINDICATIONS** Concomitant use with CYP3A4 inducers or CYP3A4 inhibitors | Hepatic cirrhosis | Moderate to severe hepatic impairment | Severe renal impairment
- **PRECAUTIONS** Body weight < 60 kg | Moderate to severe CHF | QT interval prolongation
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Asthenia | Constipation | Headache | Vomiting
- **COSTS**
  - 375 mg, 500 mg, 750 mg Tablet (₱35.00)

Rivaroxaban

- **MOA** A selective direct factor Xa inhibitor
- **INDICATIONS AND DOSE**

  Atrial flutter or atrial fibrillation[1] | AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, for at least 3 weeks before and at least 4 weeks after cardioversion[6] | Chronic HF with permanent-persistent-paroxysmal AF and a CHA2DS2-VASc score of ≥ 2 (for men) and ≥ 3 (for women) should receive chronic anticoagulant therapy[6]

  ➤ *ORAL*

  Adult: 20 mg once daily with the evening meal

  CrCl 15–49 mL/min: 15 mg once daily

  Safety and efficacy not established in patients with severe renal impairment (CrCl < 15 mL/min)
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 10 mg, 15 mg, 20 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Severe hypersensitivity | Severe renal impairment or undergoing dialysis | Moderate to severe hepatic impairment
- **PRECAUTIONS** Patients with bleeding risk | Severe hypertension | rheumatic heart disease | prosthetic heart valves
  - Concomitant use with CYP3A4 inducers and CYP3A4 inhibitors, HIV protease inhibitors
  - Avoid in pediatric patients > 1 yr old with moderate or severe renal impairment
- **WARNINGS** Avoid abrupt discontinuation in the absence of alternative treatment

BLACK BOX WARNING

Premature discontinuation increases the risk of thrombotic events.

Patients treated with Rivaroxaban who are receiving neuraxial anesthesia or undergoing spinal puncture may result in long-term or permanent paralysis; monitor frequently for neurological impairment.

- **ADVERSE EFFECTS** Hemorrhage including epistaxis | Anemia (prolonged use) | Gastroenteritis | Vomiting | Cough
- **COSTS**
  - 15 mg FC Tablet (₱152.00)
  - 20 mg FC Tablet (₱156.00)

Verapamil hydrochloride★

- **MOA** A non-DHP L-type calcium channel blocker
- **INDICATIONS AND DOSE**

  Prophylaxis of paroxysmal supraventricular tachycardia (PSVT)[1] | Rate control for atrial fibrillation[1] | Fascicular ventricular tachycardia[1] | Acute management of narrow QRS tachycardia[3] | Focal acute atrial tachycardia[3] | Chronic AVNRT[3] | SVT in pregnancy, or in congenital heart diseases in adults[3] | Rate control of AT if beta-blockers fail in patients without WPW syndrome[3] | Long-term management of idiopathic sustained VT during pregnancy[15] | May be considered in symptomatic patients with sinus tachycardia without HFrEF[1]

  ➤ *INTRAVENOUS*

  Adult: 5–10 mg (0.075–0.15 mg/kg) IV over 2 mins
  May give additional 10 mg after 15–30 mins if necessary, then 0.005 mg/kg/min infusion

  ➤ *ORAL*

  Adult

  Immediate release Initial dose: 240–320 mg daily in 3–4 divided doses
  MAX dose: 480 mg/day

  Modified release Maintenance: 180–480 mg once daily
  CrCl < 10 mL/min: Dose reduction by 25–50%[14]

  Supraventricular arrhythmias[16] | Idiopathic fascicular left ventricular tachycardia[5]

  ➤ *INTRAVENOUS*

  Pediatric:
  Loading dose: 0.1–0.3 mg/kg over 10 mins; may repeat dose in 30 mins
  MAX dose: 5 mg (first), 10 mg (second)
  Subsequent dose: 5 mcg/kg/min
  MAX per dose: 5–15 mg

  ➤ *ORAL*

  Pediatric: 2–9 mg/kg/day divided in 3 doses
  MAX daily dose: 480 mg

  Safety and efficacy not established in wide QRS-complex tachycardia of unknown etiology
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 40 mg, 80 mg also avail as sugar-coated tablet
  - **SR Tablet:** 180 mg, 240 mg
  - **Solution for Injection, ampule**: 2.5 mg/mL (2 mL)
- **CONTRAINDICATIONS** Atrial flutter or fibrillation associated with accessory conducting pathways (e.g., WPW syndrome) | Bradycardia | Cardiogenic shock | HFrEF | Sick sinus syndrome (without pacemaker) | Acute porphyria | Concomitant use with beta-blockers, Ivabradine, Quinidine
- **PRECAUTIONS** Renal and hepatic impairment | Severe aortic stenosis | 1st degree AV block | Exacerbation of angina | Atrial fibrillation/flutter
  - Children: Avoid in children younger than 1 yr due to risk of asystole
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Hypotension | Constipation | Headache | Flu-like symptoms
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Warfarin sodium★

- **MOA** An anticoagulant; Vitamin K antagonist

- **INDICATIONS AND DOSE**

Patients with AF and metallic prosthetic heart valves or moderate to severe mitral stenosis[6,12] | AF and an elevated CHA_2DS_2-VASc score of 2 or greater in men or 3 or greater in women[6] | May be considered for patients with AF and a CHA_2DS_2-VASc score of 2 or greater in men or 3 or greater in women, and end-stage chronic kidney disease (CKD; CrCl < 15 mL/min) or on dialysis[6]

➤ *ORAL*

Adult: Initial dose: 2–5 mg once daily
Adjust dose based on target INR 2–3
Maintenance dose (usual to reach target INR): 2–10 mg, once a day

Initiation of therapy within 14 days is reasonable

AF or atrial flutter of 48 hours' duration or longer, or when the duration of AF is unknown, for at least 3 weeks before and at least 4 weeks after cardioversion[6,10]

➤ *ORAL*

Adult: Initial dose: 2–5 mg once daily;
Adjust dose based on target INR 2 - 3
Maintenance dose (usual to reach target INR): 2–10 mg once daily

Infant and child: *To achieve an INR between 2 and 3*
Loading dose (Day 1):
Baseline INR
≤ 1.3: 0.2 mg/kg/dose (MAX dose: 7.5 mg)
> 1.3: 0.05–0.1 mg/kg/dose (MAX dose: 5 mg)

Immediate post-op after a Fontan procedure:
0.05 mg/kg/dose (MAX dose: 2.5 mg)

Loading dose (Day 2–4)
INR 1.1–1.3: Repeat Day 1 loading dose
INR 1.4–1.9: Decreased Day 1 loading dose by 50%
INR ≥ 2: Hold dose for 24 hr, then give 50% of Day 1 loading dose on Day 3

Loading dose (Day 3–4)
INR 1.1-1.4: Increase previous dose by 20–50%
INR 1.5-1.9: Continue current dose
INR 2-3: Use 25–50% of Day 1 loading dose
INR 3.1-3.5: Use 25% of Day 1 loading dose
INR > 3.5: Hold until INR < 3.5, then restart at ≤ 25% of Day 1 loading dose

Maintenance dose (Goal INR 2–3):
INR 1.1–1.4: Increase previous dose by 20%
INR 1.5–1.9: Increase previous dose by 10%
INR 2–3: Continue current dose
INR 3.1–3.5: Decrease previous dose by 10%
INR > 3.5: Hold until INR < 3.5, then restart at 20% less than last dose

Usual Maintenance dose: approx. 0.1 mg/kg/day once daily (range: 0.05–0.34 mg/kg/day)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg, 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Malignant hypertension | Recent or potential surgery
  - Pregnancy, except in pregnant women with mechanical heart valves, who are at high risk of thromboembolism
  - Concomitant use with Amiodarone, Ciprofloxacin, Macrolides, NSAIDs, fibrinolytics
- **PRECAUTIONS** Vitamin K deficiency | Hepatic and renal impairment | HIT
  - Postpartum (delay Warfarin until risk of bleeding is low; 5–7 days after delivery)
  - CYP2C9 and VKORC1 genetic variation influences patient response to initial and maintenance therapy and increases risk of bleeding
  - Elderly | Lactation

BLACK BOX WARNING

Warfarin can cause major or fatal bleeding. Instruct patients about preventive measures to minimize risk of bleeding and to report signs and symptoms of bleeding.

- **ADVERSE EFFECTS** Abnormal hepatic function | Calciphylaxis | Alopecia | Acute kidney injury | Hypersensitivity reactions
- **ANTIDOTE** **Vitamin K**
- **COSTS**
  - 2.5 mg Tablet (₱15.79)†
  - 5 mg Tablet (₱17.91)†

REFERENCES

[1] Formulary Executive Council. *Philippine National Formulary.* 8th ed. Department of Health; 2019
[2] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.
[3] Brugada J, Katritsis DG, Arbelo E, et al. 2019 ESC guidelines for the management of patients with supraventricular tachycardiaThe task force for the management of patients with supraventricular tachycardia of the European Society of Cardiology (ESC). *European Heart Journal*. 2019;41(5):655-720. doi:10.1093/eurheartj/ehz467
[4] Topijan AA, Raymond TT, Atkins D, et al. Pediatric Basic and Advanced Life Support: 2020 AHA Guidelines for CPR and ECC *Circulation*. 2020;142(suppl 2):S469–S523. DOI: 10.1161/CIR.0000000000000901
[5] Oeffl N, Schober L, Faudon P, et al. Antiarrhythmic drug dosing in children—review of the literature. *Children*. 2023;10(5):847. doi:10.3390/children10050847
[6] January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS focused update of the 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *Journal of the American College of Cardiology*. 2019;74(1):104-132. doi:10.1016/j.jacc.2019.01.011
[7] Brugada J, Blom N, Sarquella-Brugada G, et al. Pharmacological and non-pharmacological therapy for arrhythmias in the pediatric population: EHRA and AEPC-Arrhythmia Working Group joint consensus statement, *EP Europace*, Volume 15, Issue 9, September 2013, Pages 1337–1382, https://doi.org/10.1093/europace/eut082
[8] Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: Executive summary. *Circulation*. 2018;138(13). doi:10.1161/cir.0000000000000548
[9] Kimura K, Kimura T, Ishihara M, et al. JCS 2018 guideline on diagnosis and treatment of acute coronary syndrome. *Circulation Journal*.

2019;83(5):1085-1196. doi:10.1253/circj.cj-19-0133
[10] Kleinman K, McDaniel L, Molloy M, eds. *The Harriet Lane Handbook: A Manual for Pediatric House Officers*. 22nd ed. Elsevier; 2021.
[11] Muresan L, Cismaru G, Muresan C, et al. Beta-blockers for the treatment of arrhythmias: Bisoprolol – a systematic review. *Annales Pharmaceutiques Françaises*. 2022;80(5):617-634. doi:10.1016/j.pharma.2022.01.007
[12] Hindricks G, Potpara T, Dagres N, et al. 2020 ESC guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). *European Heart Journal*. 2020;42(5):373-498. doi:10.1093/eurheartj/ehaa612
[13] Tang JKK, Rabkin SW. Hypocalcemia-induced QT interval prolongation. *Cardiology*. 2022;147(2):191-195. doi:10.1159/000515985
[14] Reyes DR et al. *Advanced Cardiac Life Support A Manual for the Provider*. 4th ed. PHA PCC Council on Cardiopulmonary Resuscitation; 2022.
[15] Zeppenfeld K, Tfelt-Hansen J, de Riva M, et al. 2022 ESC guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. *European Heart Journal*. 2022;43(40):3997-4126. doi:10.1093/eurheartj/ehac262
[16] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.
[17] Dan G-A, Martinez-Rubio A, Agewall S, et al. Antiarrhythmic drugs–clinical use and clinical decision making: A consensus document from the European Heart Rhythm Association (EHRA) and European Society of Cardiology (ESC) Working Group on cardiovascular pharmacology, endorsed by the Heart Rhythm Society (HRS), Asia-Pacific Heart Rhythm Society (APHRS) and International Society of Cardiovascular Pharmacotherapy (ISCP). *EP Europace*. 2018;20(5).doi:10.1093/europace/eux373
[18] Cohn JN, Kowey PR, Whelton PK, Prisant LM. New guidelines for potassium replacement in Clinical Practice. *Archives of Internal Medicine*. 2000;160(16):2429. doi:10.1001/archinte.160.16.2429
[19] Ross DS, Burch HB, Cooper DS, et al. 2016 American Thyroid Association Guidelines for Diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. Thyroid. 2016;26(10):1343-1421. doi:10.1089/thy.2016.0229

Table 2. Available Fixed-Dose Combinations for Arrhythmia

DRUG COMBINATION	PREPARATION	DOSE
Carvedilol + Ivabradine	**FC Tablet** (Carvedilol/Ivabradine): 6.25 mg/5 mg (₱26.00) 6.25 mg/7.5 mg 12.5 mg/5 mg (₱38.00) 12.5 mg/7.5 mg 25 mg/5 mg (₱40.00) 25 mg/7.5 mg	➤ *ORAL* **Adult:** 1 tab 2x daily
Metoprolol tartrate + Ivabradine	**Tablet** (Metoprolol/Ivabradine) 25 mg/5 mg (₱60.04) 50 mg/5 mg (₱62.95)	➤ *ORAL* **Adult:** 1 tab 2x daily

3 DRUGS FOR Cardiogenic Shock and Cardiac Arrest

Amiodarone hydrochloride⋆

- **MOA** A class III antiarrhythmic drug which blocks potassium channels; known as a broad-spectrum antiarrhythmic which also blocks sodium channels (Class I action), β adrenoceptors (Class II action), and calcium channels (Class IV action), slowing heart rate and AV node conduction
- **INDICATIONS AND DOSE**

  Cardiac arrest with VF or pulseless VT[1]

  ➤ *INTRAVENOUS*

  Adult: Initially 300 mg IV, then add 150 mg

  Pediatric: 5 mg/kg, as rapid IV bolus, may repeat if necessary; MAX per dose: 300 mg, a total dose of 15 mg/kg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 50 mg/mL (3 mL)
- **CONTRAINDICATIONS** Cardiogenic shock | Severe conduction disturbances (unless pacemaker fitted) | Severe sinus-node dysfunction causing marked sinus bradycardia | 2nd- and 3rd-degree heart block | Sinus bradycardia (except in cardiac arrest) |Thyroid dysfunction
  - Avoid bolus injection in cardiomyopathy, congestive heart failure
- **PRECAUTIONS** Severe bradycardia | Acute porphyrias | HF | Hypokalemia
  - Elderly | Pregnancy (possible risk of neonatal goiter)
- **WARNINGS** Should be discontinued in amiodarone-induced thyrotoxicosis
  - For use only in patients with indicated life-threatening arrhythmia

BLACK BOX WARNING

Increased risk of pulmonary toxicity, hepatotoxicity, and heart block

- **ADVERSE EFFECTS** Bradycardia | AV block | Thyroid dysfunction or abnormalities | Respiratory disorders | Skin reactions (blue-grey skin discoloration) | Corneal microdeposits | Photosensitivity | Constipation | Vomiting | Hypotension
- **COSTS**
  - 200 mg tablet (PHP25.00)†
  - 50 mg/mL, 3 mL Solution for Injection Ampule (₱448.00)†

Atropine sulfate ⋆

- **MOA** An anticholinergic that competitively blocks muscarinic cholinergic receptors M_1, M_2, M_3
- **INDICATIONS AND DOSE**

  Bradycardia following MI particularly if complicated by hypotension[2] | **Excessive bradycardia associated with beta-blocker use**[2]

  ➤ *INTRAVENOUS*

  Adult: Initially 1 mg, repeat every 3–5 mins
  MAX dose: 3 mg

  Pediatric: 0.02 mg/kg (up to 0.5 mg), rapid IV, may repeat once in 3–5 mins
  MAX total dose: 1 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 1 mg/mL, 500 mcg/mL
- **CONTRAINDICATIONS** Primary glaucoma or predisposition to narrow anterior chamber angle glaucoma | Pediatric patients with prior severe systemic reaction to atropine | 2nd or 3rd degree AV block | Lactation
- **PRECAUTIONS** Prostatic hypertrophy | Coronary insufficiency | Heart failure | Hepatic and renal impairment
  - Tachycardia may occur with recurrent use in patients with coronary artery disease
  - Pregnancy and lactation: Not known to be harmful to pregnant women but may suppress lactation in breastfeeding women, use with caution
- **ADVERSE EFFECTS** Abdominal distension | Arrhythmia | Anhidrosis | Dysphagia | Hallucination | Mydriasis | Loss of taste | Excessive thirst | Xerostomia
- **COSTS**
  - 1 mg/mL, 1 mL Solution for Injection Ampule (₱18.69)†

Calcium gluconate ⋆

- **MOA** An organic calcium salt used to prevent or treat negative calcium balance, necessary for proper function of the cardiovascular, nervous, muscular, and skeletal systems.
- **INDICATIONS AND DOSE**

  Cardiac arrest due to hyperkalemia or hypermagnesemia[3]

  ➤ *INTRAVENOUS*

  Adult: 10–20 mL, as single IV bolus over 2–5 mins

  Pediatric: 100 mg/kg/dose, by IV injection, every 10 mins as needed; MAX per dose: 3 g
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 100 mg/mL, 250 mg/mL

- **CONTRAINDICATIONS** Hypercalcemia | VF fibrillation | Severe renal failure
  - Concomitant use with Ceftriaxone injection in neonates
- **PRECAUTIONS** Cardiac disease | Renal impairment
  - Patients receiving cardiac glycosides
  - Do not administer by IM or SC route, may cause local tissue damage
  - Can cause cardiovascular collapse if administered too fast
  - Children | Pregnancy and lactation
- **WARNINGS** Do NOT administer by IM or SC route, may cause local tissue damage
  - Can cause cardiovascular collapse if administered too fast
- **ADVERSE EFFECTS** Arrhythmias | Hyperhidrosis | Hypotension | GI Disorder
- **COSTS**
  - 10%, 10 mL Solution for Injection Ampule (₱164.00)†
  - 10%, 10 mL Solution for Injection Vial (₱64.50)†
  - 10%, 20 mL Solution for Injection Bottle (₱41.80)†

Dobutamine ⋆

- **MOA** A synthetic catecholamine and direct-acting inotropic agent which selectively activates β_1 receptors in the cardiac muscle, and increases contractility
- **INDICATIONS AND DOSE**

Inotropic support in infarction, cardiac surgery, cardiomyopathies, septic shock, cardiogenic shock, and during positive end expiratory pressure ventilation[2] | Cardiogenic or vascular shock[4]

➤ *INTRAVENOUS*

Adult: 2–20 mcg/kg to titrate

May be considered in patients with SBP < 90mmHg and evidence of hypoperfusion who do not respond to standard treatment, including fluid challenge, to improve peripheral perfusion and maintain end-organ function[5]

➤ *INTRAVENOUS*

Adult: Initial dose: 0.5–1 mcg/kg/min
Target dose: 2–40 mcg/kg/min

Pediatric acute decompensated heart failure (ADHF)[6]

➤ *INTRAVENOUS*

Pediatric: 2–20 mcg/kg/min, by continuous IV infusion

First-line rescue therapy for pediatric HF with inadequate perfusion (short-term, symptomatic improvement)[7] | Symptomatic relief in the palliative setting[7]

➤ *INTRAVENOUS*

Pediatric: 1–15 mcg/kg/min

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 50 mg/mL (5 mL) | 12.5 mg/mL (5 mL) | 2 mg/mL (250 mL)
  - **Lyophilized powder**: 250 mg
- **CONTRAINDICATIONS** Pheochromocytoma | Hypertrophic cardiomyopathy with outflow tract obstruction
- **PRECAUTIONS** Arrhythmia | HF complications | Tachycardia | Aortic stenosis | Active or recent MI | Cardiogenic shock complicated by severe hypotension | DM | Hyperthyroidism
  - Children including neonates | Pregnancy and lactation
- **ADVERSE EFFECTS** Arrhythmias | Bronchospasm | Chest pain | Dyspnea | Eosinophilia | Fever | Headache | Ischemic heart disease | Nausea | Palpitations | Platelet aggregation inhibition
- **COSTS**
  - 50 mg/mL (5 mL) Solution for Injection Ampule (₱490.00)†

Dopamine hydrochloride⋆

- **MOA** A natural catecholamine with a mixed-acting and dose-dependent adrenergic action
- **INDICATIONS AND DOSE**

Cardiogenic shock in infarction or cardiac surgery[2] | Hypovolemic shock and hemorrhagic shock as adjuvant therapy to volume replacement[9] | Cardiogenic shock (where SBP < 90)[9]

➤ *INTRAVENOUS*

Adult: 4–20 mcg/kg to titrate

May be considered (at low dose) to improve diuresis and preserve renal function in acute HF[10]

➤ *INTRAVENOUS*

Adult: Initial dose: 2–5 mcg/kg/min, increase in 5–10 mcg/kg/min increments
Target dose: 20–50 mcg/kg/min

Acute decompensated heart failure (ADHF)[6]

➤ *INTRAVENOUS*

Pediatric: 1–5 mcg/kg/min (low)
5–15 mcg/kg/min (high)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 40 mg/mL (5 mL), 200 mg in D5W, 400 mg/250 mL, 1.6 mg/mL
- **CONTRAINDICATIONS** Pheochromocytoma | Tachyarrhythmia | Ischemic heart disease | Ventricular fibrillation | Hyperthyroidism | Children with HFpEF
- **PRECAUTIONS** Hypovolemia | Cardiac arrhythmia | Occlusive vascular disease | Severe hypersensitivity reaction
  - Hypotension after abrupt discontinuation
  - Concomitant use with MAOIs
  - Pregnancy and lactation

BLACK BOX WARNING

This may cause peripheral ischemia in patients with a history of occlusive vascular disease.

- **ADVERSE EFFECTS** Angina pectoris | Anxiety | Arrhythmia | Cardiac conduction disorder | Dyspnea | Gangrene | Hypertension| Mydriasis
- **COSTS**
  - 40 mg/mL, 5 mL Solution for Injection Ampule (₱234.50)†

Epinephrine / Adrenaline⋆

- **MOA** A non-selective sympathomimetic that acts on both α- and β-adrenergic receptors

- **INDICATIONS AND DOSE**

Cardiac arrest[4]

➤ *INTRAVENOUS*

Adult: 1 mg every 3–5 mins

➤ *ENDOTRACHEAL ACCESS*

Adult: 2.5 mg in 5–10 mL PNSS every 3–5 mins

Cardiogenic shock[1]

➤ *INTRAVENOUS*

Adult: 0.1–0.3 mg up to 1 mg, to titrate

Bradycardia[1]

➤ *INTRAVENOUS*

Adult: 2–10 mcg/min by IV infusion, to titrate

As bridge therapy in select patients with stage D HF, despite optimal GDMT and device therapy who are ineligible for either MCS or cardiac transplantation[11]

➤ *INTRAVENOUS*

Adult: 5–15 mcg/min

Bradycardia, asystole, pulseless arrest[12]

➤ *INTRAVENOUS*

< 1 mo: 0.01–0.03 mg/kg of 1:10 000 solution (0.1–0.3 mL/kg) every 3–5 mins

➤ *ENDOTRACHEAL ACCESS*

< 1 mo: 0.01–0.03 mg/kg of 1:10 000 solution (0.1–0.3 mL/kg) every 3–5 mins

Pediatric: 0.1 mg/kg of 1:1000 solution (0.1 mL/kg), every 3–5 mins

➤ *INTRAVENOUS / INTRAOSSEUS*

<17 yo: 0.01 mg/kg of 1:10 000 solution (0.1 mL/kg) IV/IO MAX: 1 mg or 10 mL; repeat every 3–5 mins

Pediatric HF with refractory hypotension and poor end-organ perfusion[7]

➤ *INTRAVENOUS*

Pediatric: 0.05–0.1 mcg/kg/min (low); 0.1–1 mcg/kg/min (high)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 1 mg/mL (0.3 mL, 1 mL)
- **CONTRAINDICATIONS** Pheochromocytoma | Closed-angle glaucoma | Labor | Use in local anesthesia of fingers, toes, ears, nose or genitalia
- **PRECAUTIONS** Avoid repeated IM or SC injection at the same site
  - Pregnant: May reduce placental perfusion and cause tachycardia, cardiac irregularities, and extrasystoles in the fetus; can delay second stage of labor
- **ADVERSE EFFECTS** Peripheral ischemia (IM) | Muscle rigidity (IV)
- **COSTS**
  - 1 mg/mL, 1 mL Solution for Injection Ampule (₱80.00)†

Lidocaine hydrochloride⋆

(Lignocaine hydrochloride)

- **MOA** A class Ib antiarrhythmic agent that blocks both initiation and conduction of nerve impulses by decreasing ionic influx thru the neuronal membrane by blocking sodium channels

- **INDICATIONS AND DOSE**

Cardiac arrest due to VF and pulseless VT[1]

➤ *INTRAVENOUS*

Adult: 1–1.5 mg/kg IV bolus

➤ *ENDOTRACHEAL*

Adult: Loading dose: 2–3.75 mg/kg; dilute in 5–10 mL of 0.9% saline or sterile water
Recommended IV dose: 2–2.5 mg/kg

➤ *INTRAVENOUS / INTRAOSSEUS*

<1mo and 1mo – 11 yrs: Initially 0.5–1 mg/kg, followed by immediate infusion 0.6–3 mg/kg/hr; MAX per dose: 3 mg/kg

12 – 17 yrs: Initially 50–100 mg, followed by IV infusion 120 mg for over 30 mins, then 240 mg for over 2 hrs, then 60 mg/hr; Reduce dose if continued beyond 24hrs;
MAX dose: 300 mg in 1hr

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 10 mg/mL, 1% (20 mL) | 20 mg/mL, 2% (5 mL, 20 mL, 50 mL)
- **CONTRAINDICATIONS** Sensitivity to amide-type local anesthetics | Hypovolemia | Complete heart block | WPW syndrome
- **PRECAUTIONS** Use with caution when used nn combination with vasoconstrictors | Severe shock | Bradycardia
  - Severe renal and hepatic impairment
  - Elderly or debilitated patients | Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Erythema | Headache | Methemoglobinemia | Anxiety | Arrhythmia | Metallic taste | Vomiting
- **COSTS**
  - 2%, 5 mL Solution for Injection Ampule (₱46.00)†
  - 2%, 20 mL Solution for Injection Ampule (₱23.10)†
  - 2%, 5 mL Solution for Injection Vial (₱9.76)†
  - 2%, 50 mL Solution for Injection Vial (₱51.00)†

Magnesium sulfate⋆

- **MOA** An antiarrhythmic agent that decreases myocardial cell excitability by modulating sodium, calcium, and potassium channels

- **INDICATIONS AND DOSE**

May be used to treat polymorphic VT consistent with torsade de pointes[1]

➤ *INTRAVENOUS*

Adult

With pulse, ACLS: 1–2 g slow IV (diluted in 50–100 mL D5W) over 5–60 mins, then 0.5–1 g/hr
Cardiac arrest, ACLS: 1–2 g slow IV (diluted in 10 mL D5W) over 5–20 mins

➤ *INTRAVENOUS / INTRAOSSEUS*

Pediatric

No pulse: Push 50 mg/kg

With pulse: 50 mg/kg; give over 20–60 mins

MAX single dose: 2 g

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 250 mg/mL (2 mL, 10 mL, 20 mL) | 500 mg/mL (2 mL, 10 mL)
- **CONTRAINDICATIONS** Heart block | MI | Hypermagnesemia | Myasthenia gravis | Hepatic and renal failure
- **PRECAUTIONS** Renal insufficiency may result in magnesium intoxication
  - Avoid in hepatic coma if there is risk of renal failure
  - Elderly and debilitated patients | Lactation
  - Pregnancy: Continuous administration of magnesium sulfate beyond 5 to 7 days to pregnant women can lead to hypocalcemia and bone abnormalities in the developing fetus; neonatal fracture has been reported. Use during pregnancy only if clearly needed.

BLACK BOX WARNING

Magnesium toxicity can cause loss of deep tendon reflexes, followed by respiratory depression and ultimately respiratory arrest. If deep tendon reflexes are absent, withhold further doses of Magnesium sulfate until reflexes return.

- **ADVERSE EFFECTS** Flushing | Nausea | Vomiting
- **COSTS**
  - 250 mg/mL, 10mL Solution for Injection Ampule (₱95.00)†
  - 250 mg/mL, 20mL Solution for Injection Vial (₱22.00)†
  - 500 mg/mL, 2 mL Solution for Injection Ampule (₱86.39)†

Milrinone lactate

- **MOA** A phosphodiesterase type-3 inhibitor on the myocardium resulting to positive inotropic property and vasodilator activity
- **INDICATIONS AND DOSE**

Cardiogenic shock (normotensive)[12,13] | Post-cardiac arrest syndrome[13]

➤ *INTRAVENOUS / INTRAOSSEUS*

Adult: 0.2–2 mcg/kg, to titrate

Pediatric: 50 mcg/kg over 15 mins, then 0.25–0.7 mcg/kg/min

- **DOSAGE FORMS AND PREPARATIONS**
  - **Concentrate Solution for Injection, ampule/vial:** 1 mg/mL (10 mL)
- **CONTRAINDICATIONS** Severe hypovolemia
- **PRECAUTIONS** Correct hypokalemia; increased risk of arrhythmia in digitalized patients
  - Heart failure associated with hypertrophic cardiomyopathy
- **ADVERSE EFFECTS** Supraventricular Arrhythmia | Headache | Hypotension

Norepinephrine / Noradrenaline ⋆

(as Norepinephrine bitartrate)

- **MOA** A non-selective sympathomimetic that acts on both alpha- and beta-adrenergic receptors
- **INDICATIONS AND DOSE**

Cardiogenic shock[1,13]

➤ *INTRAVENOUS*

Adult: 0.05–3 mcg/kg, to titrate

Pediatric: 0.05–2.5 mcg/kg/min

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 1 mg/mL (2 mL, 4 mL) | 2 mg/mL (4 mL)
- **CONTRAINDICATIONS** Hypertension | Hypotension from hypovolemia | Pregnancy
- **PRECAUTIONS** DM | Hypertension | Hyperthyroidism
  - Correct hypoxia, hypercapnia, and acidosis prior or during administration
  - Elderly | Lactation
- **ADVERSE EFFECTS** Acute glaucoma | Arrhythmia | Bradycardia | Peripheral ischemia | Anxiety | Transient headache | Respiratory difficulty | Hypoxia | Palpitations
- **COSTS**
  - 1 mg/mL, 2 mL Solution for Injection Ampule (₱210.00)†
  - 1 mg/mL, 4 mL Solution for Injection Ampule (₱400.00)†
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱998.00)†
  - 2 mg/mL, 4 mL Solution for Injection Ampule (₱1,701.56)†

Vasopressin

(Argipressin, Antidiuretic Hormone (ADH))

- **MOA** Endogenous hormone with a direct antidiuretic effect on the kidney
- **INDICATIONS AND DOSE**

Cardiogenic shock[1]

➤ *INTRAVENOUS*

Adult: 0.01–0.07 units/min

Pediatric: 0.17–8 mUnits/kg/min *in combination with pressors*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 20 IU/mL
- **CONTRAINDICATIONS** Chronic nephritis | CAD | Hypersensitivity to 8-L-arginine Vasopressin or Chlorobutanol
- **PRECAUTIONS** Asthma | Epilepsy | Heart failure | Hypertension | Migraine | Conditions which aggravates by water retention
  - Reversible diabetes insipidus may occur after treatment cessation; monitoring recommended
  - Drug clearance may be increased during pregnancy; May induce tonic uterine contractions
- **ADVERSE EFFECTS** Arrhythmia | Hyponatremia | Decreased cardiac output | Ischemia (coronary, mesenteric, skin, digital)

REFERENCES

[1] Reyes DR et al. Advanced Cardiac Life Support A Manual for the Provider. 4th ed. PHA PCC Council on Cardiopulmonary Resuscitation; 2022.
[2] Joint Formulary Committee. British National Formulary: 84. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.
[3] Vanden Hoek TL, Morrison LJ, Shuster M, et al. Part 12: Cardiac arrest in special situations: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care [published correction appears in Circulation. 2011 Feb 15;123(6):e239] [published correction appears in Circulation. 2011 Oct 11;124(15):e405]. Circulation. 2010;122(18 Suppl 3):S829-S861. doi:10.1161/circulationaha.110.971069
[4] Formulary Executive Council. Philippine National Formulary. 8th ed. Department of Health; 2019
[5] McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur J Heart Fail. 2022;24(1):4-131. doi:10.1002/ejhf.2333
[6] Loss KL, Shaddy RE, Kantor PF. Recent and Upcoming Drug Therapies for Pediatric Heart Failure. 2021;9(November):1-13. doi:10.3389/fped.2021.681224
[7] Ahmed H, Vanderpluym C. Medical management of pediatric heart failure. 2021;11(I):323-335. doi:10.21037/cdt-20-358
[8] Kirk R, Dipchand AI, Rosenthal DN, et al. The International Society for Heart and lung transplantation guidelines for the management of pediatric heart failure: Executive summary. The Journal of Heart and Lung Transplantation. 2014;33(9):888-909. doi:10.1016/j.healun.2014.06.002
[9] PNF PHC Core Group. Philippine National Formulary Manual for Primary Care Providers. 9th ed. Department of Health; 2021
[10] van der Meer P, Gaggin HK, Dec GW. ACC/AHA versus ESC guidelines on heart failure. Journal of the American College of Cardiology. 2019;73(21):2756-2768. doi:10.1016/j.jacc.2019.03.478
[11] Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA / ACC / HFSA Guideline for the Management of Heart Failure : A Report of the American College of Cardiology / American Heart Association Joint Committee on Clinical Practice Guidelines.; 2022. doi:10.1161/CIR.0000000000001063
[12] Kleinman K, McDaniel L, Molloy M, eds. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 22nd ed. Elsevier; 2021.
[13] Topjian AA, De Caen A, Wainwright MS, et al. Pediatric Post-Cardiac Arrest Care: A Scientific Statement from the American Heart Association. Vol 140.; 2019. doi:10.1161/CIR.0000000000000697

Chronic Coronary Syndrome

Amlodipine besylate⋆

- **MOA** A long-acting dihydropyridine-type calcium-channel blocker
- **INDICATIONS AND DOSE**
  May be considered for relief of angina in patients with HF who do not tolerate beta-blockers, and is considered safe in HF[1]
  ➤ *ORAL*
  Adult: 5–10 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Cardiogenic shock | Unstable angina | Hypotension | Significant aortic stenosis | Recent MI with heart failure or poor LV function
- **PRECAUTIONS** Severe hepatic impairment | CHF
  - Concurrent use with Sildenafil
  - Children and elderly | Pregnancy and Lactation
- **ADVERSE EFFECTS** Angioedema | Headache | Fatigue | Palpitations | Dizziness | GI disorders | Rash | Muscle cramps | Sleep disturbances | Flushing
- **COSTS**
  - 5 mg Tablet (₱3.00)†
  - 10 mg Tablet (₱4.80)†

Aspirin⋆

(Acetylsalisylic acid)

- **MOA** A non-selective irreversible cyclooxygenase COX1 and COX2 inhibitor
- **INDICATIONS AND DOSE**
  Antithrombotic therapy in patients with previous MI or revascularization[1] | Antithrombotic therapy post-PCI in patients with CCS and in sinus rhythm[1] | May be considered in patients without a history of MI or revascularization, but with definitive evidence of CAD on imaging[1]
  ➤ *ORAL*
  Adult: 75–100 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 80 mg, 100 mg also avail as film-coated, enteric-coated, modified-release
- **CONTRAINDICATIONS** Active peptic ulceration | Bleeding disorders | Severe cardiac failure | Severe renal and hepatic impairment
  - Lactation (long-term use and/or high dose)
  - Children under 16 years and those with flu-like symptoms
  - Concomitant use with Methotrexate ≥ 15 mg
- **PRECAUTIONS** Anemia | Asthma | Dehydration | G6PD deficiency | Hypertension | Thyrotoxicosis | Mild to moderate hepatic impairment | Elderly
  - May mask symptoms of infection
  - Patients undergoing surgical procedures (including tooth extractions)
  - Concomitant use with anticoagulants, antiplatelets, thrombolytics, oral corticosteroids
- **ADVERSE EFFECTS** Dyspepsia | Hemorrhage or prolonged bleeding time | Reduced uric acid excretion (low dose) | Salicylism (large repeated doses) | Melena
- **COSTS**
  - 80 mg Tablet (₱4.00)†
  - 100 mg Tablet (₱2.50)

Atenolol⋆

- **MOA** A selective β_1 blocker
- **INDICATIONS AND DOSE**
  First-line therapy for long-term prevention of chest pain in patients with stable angina[2] | LV dysfunction or systolic heart failure[1] | Long-term treatment in patients with a previous STEMI[1] | Relief of angina by reducing heart rate, contractility, AV conduction and ectopic activity[3]
  ➤ *ORAL*
  Adult: 50–100 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg
- **CONTRAINDICATIONS** Sinus bradycardia | Cardiogenic shock | Metabolic acidosis | 2nd- or 3rd-degree heart block | Severe peripheral arterial diseases | Sick sinus syndrome | Uncontrolled heart failure | Untreated pheochromocytoma | Competitive athletes
- **PRECAUTIONS**
  - May mask symptoms of hypoglycemia
  - Abrupt withdrawal may precipitate thyroid storm
  - Renal impairment
  - Elderly | Pregnancy and lactation

BLACK BOX WARNING

Abrupt withdrawal may exacerbate angina pectoris and trigger MI or ventricular arrhythmia

- **ADVERSE EFFECTS** Fatigue | Bradyarrhythmia | Bronchospasm | Hypotension | GI disorder | Cold extremity | Depression
- **COSTS**
  - 50 mg Tablet (₱5.50)†
  - 100 mg Tablet (₱18.25)

Atorvastatin calcium ⋆

- **MOA** A selective and competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering in all patients with CCS irrespective of LDL-C levels[1]
  ➤ *ORAL*
  Adult: 10–80 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg, 40 mg, 80mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver failure or decompensated cirrhosis | ALT > 5x UNL
  - Concomitant use with Cyclosporine, Gemfibrozil, Ritonavir, Grapefruit Juice
  - Pregnancy and lactation
- **PRECAUTIONS**
  - Increased HbA1c and serum glucose levels have been reported
  - Patients with known SLCO1B1 gene polymorphism
  - Rhabdomyolysis | Hemorrhagic stroke | Renal impairment
  - Children and elderly
- **ADVERSE EFFECTS** Hyperglycemia | Joint disorders | Muscle pain
- **COSTS**
  - 10 mg Tablet (₱10.00)†
  - 20 mg Tablet (₱14.00)†
  - 40 mg Tablet (₱17.00)†
  - 80 mg Tablet (₱21.12)†

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1-blocker
- **INDICATIONS AND DOSE**
  First-line therapy for long-term prevention of chest pain in patients with stable angina[2] | LV dysfunction or systolic heart failure[1] | Long-term treatment in patients with a previous STEMI[1]
  ➤ *ORAL*
  Adult: 5–10 mg once daily
  MAX daily dose: 20 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS DM | History or recent psoriasis | Thyrotoxicosis | Hepatic and renal impairment**
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Captopril⋆

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  CCS patients with other conditions (heart failure, hypertension, diabetes)[1] | CCS patients at very high risk of cardiovascular events[1]
  ➤ *ORAL*
  Adult: 6.25–25 mg 2x to 3x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitors
- **PRECAUTIONS** Renal and hepatic impairment | Significant hyperkalemia
  - Concomitant use with lithium
  - Children and elderly | Pregnancy (1st trimester) and lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Rash | Hyperkalemia | Taste disorder | Insomnia | Peptic ulcer | Dry cough | Angioedema
- **COSTS**
  - 25 mg Tablet (₱3.00)†
  - 50 mg Tablet (₱12.00)

Carvedilol

- **MOA** A non-selective β- blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity
- **INDICATIONS AND DOSE**
  LV dysfunction or systolic heart failure[1] | Relief of angina by reducing heart rate, contractility, AV conduction and ectopic activity[3]
  ➤ *ORAL*
  Adult: 25–50 mg 2x daily
  Off-label dosing
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 6.25 mg, 12.5 mg, 25 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block | Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema) | Severe hepatic impairment
- **PRECAUTIONS**
  - May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 25 mg Tablet (₱7.26)†

Clopidogrel⋆

- **MOA** A selective and irreversible platelet $P2Y_{12}$ receptor antagonist
- **INDICATIONS AND DOSE**
  Alternative to Aspirin **in patients with aspirin intolerance[1] | May be considered in symptomatic or asymptomatic patients, with either PAD or a history of ischemic stroke or transient ischemic attack in preference to Aspirin[1] | CCS patients with a higher risk of life-threatening bleeding (3-month regimen)[1]**
  ➤ *ORAL*
  Adult: 75 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 75 mg also avail as film-coated tablet
- **CONTRAINDICATIONS** Active bleeding | Hypersensitivity | Severe hepatic impairment
- **PRECAUTIONS**
  - Patients with impaired CYP2C19 function may experience diminished effectiveness
  - Concomitant use with omeprazole or esomeprazole, CYP2C19 inducers
  - Interrupt use 5 days prior surgery
  - Renal and moderate hepatic impairment
  - Elderly | Pregnancy and lactation
- **WARNINGS** Tests are available to identify patients who are CYP2C19 poor metabolizers. Consider use of another platelet P2Y12 inhibitor in patients identified as CYP2C19 poor metabolizers
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Hemorrhage | Chest pain | Flu-like symptoms | Urticaria
- **COSTS**
  - 75 mg Tablet (₱18.50)†

Diltiazem hydrochloride⋆

- **MOA** A non-dihydropyridine calcium-channel blocker
- **INDICATIONS AND DOSE**
  Alternative if beta-blockers are contraindicated e.g., in patients with decompensated heart failure[2]
  ➤ *ORAL*
  Adult:
  Immediate release 30 mg 4x daily; uptitrate to 240–360 mg per day in 3 to 4 divided doses
  12-hour formulation 60 mg 2x daily; uptitrate to 240–360 mg per day in 2 divided doses
  24 hour formulation 120–180 mg once daily; uptitrate to 240–360 mg per day
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 30 mg, 60 mg, 90 mg
  - **MR Tablet/Capsule**: 60 mg, 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block
  - Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS**
  - 1st degree AV block | Significantly impaired left ventricular function
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 30 mg Tablet (₱18.00)
  - 60 mg Tablet (₱18.50)†
  - 90 mg Tablet (₱84.25)

Enalapril maleate⋆

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  CCS patient with other conditions (heart failure, hypertension, diabetes)[1] | CCS patients at very high risk of cardiovascular events[1]
  ➤ *ORAL*
  Adult: 2.5–20 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** History of angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitor
- **PRECAUTIONS**
  - Renal impairment and K-sparing diuretic increase the risk of hyperkalemia
  - May exacerbate hypotension if with concomitant diuretic, hyponatremia and hypovolemia
  - Patients younger than 5 mos are more prone to experience renal dysfunction; titrate carefully
  - Avoid in breastfeeding women during first few weeks after delivery (risk of profound neonatal hypotension)
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Hyperkalemia | Cough | Headache | Dizziness | Hypotension | Asthenia
- **COSTS**
  - 5 mg Tablet (₱8.70)†
  - 20 mg Tablet (₱12.00)†

Eplerenone

- **MOA** A selective aldosterone antagonist by binding to the mineralocorticoid receptor

- **INDICATIONS AND DOSE**
  Post-MI patients who are already receiving therapeutic doses of an ACEI and a beta-blocker, have an LVEF < 35%, and have either diabetes or HF[1]
  ➤ *ORAL*
  Adult: 20 – 50 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 25 mg, 50 mg
- **CONTRAINDICATIONS** Hyperkalemia | Severe renal impairment | Concomitant use with a strong CYP3A4 inhibitors or other K-sparing diuretics
- **PRECAUTIONS** Diabetic patient w CHF post-MI | Metabolic and respiratory acidosis
  - Moderate renal and moderate to severe hepatic impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Dizziness | Headache | Chest pain | Arrhythmia | Electrolyte imbalance | Muscle spasm | Fatigue | Gynecomastia
- **COSTS**
  - 50 mg FC Tablet (₱43.75)

Evolocumab

- **MOA** A humanized monoclonal antibody that inhibits the binding of PCSK9 (proprotein convertase subtilisin kexin type 9) to LDL receptors (LDLR) on hepatocytes which reduces LDLR degradation

- **INDICATIONS AND DOSE**
  In combination with statins and ezetimibe **for patients at very high risk who do not achieve their goal on a maximum tolerated dose of statin and ezetimibe**[1]
  ➤ *SUBCUTANEOUS*
  Adult: 140 mg every 2 weeks
  Alternatively, 420 mg every 4 weeks

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection prefilled syringe**: 140 mg/mL (prefilled autoinjector)
- **CONTRAINDICATIONS** Hypersensitivity
- **PRECAUTIONS** Renal and hepatic impairment
  - Pregnancy and lactation (Avoid in pregnancy unless essential)
- **ADVERSE EFFECTS** Arthralgia | Back pain | Increased risk of infection | Skin reactions
- **COSTS**
  - 140 mg/mL Solution for Injection (₱18,700.00)
  - 140 mg/mL Solution for Injection Prefilled Syringe (₱27,034.25)

Ezetimibe

- **MOA** A cholesterol absorption inhibitor

- **INDICATIONS AND DOSE**
  Lipid-lowering drug if a patient's goal is not achieved with the maximum tolerated dose of statin[1]
  ➤ *ORAL*
  Adult: 10 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**:10 mg
- **CONTRAINDICATIONS** Active liver disease or severe hepatic impairment
- **PRECAUTIONS**
  - ALT ≥ 3x ULN | Hypersensitivity (anaphylaxis, angioedema, rash, urticaria) | Myopathy or rhabdomyolysis | Renal and moderate hepatic impairment
  - Pregnancy and lactation
- **WARNING** Serious warning includes hepatitis, pancreatitis, myopathy/rhabdomyolysis, myalgia, anaphylaxis
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Arthralgia | URI | Headache
- **COSTS**
  - 10 mg Tablet (₱53.75)

Icosapent ethyl

- **MOA** Converted to pure active eicosapentaenoic acid (EPA) which reduces synthesis and secretion of TG in the liver, specifically VLDL-TG

- **INDICATIONS AND DOSE**
  Elevated triglyceride in addition to a background of standard treatment for CV disease[4]
  ➤ *ORAL*
  Adult: 2 g 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule**: 1 g
- **CONTRAINDICATIONS** Hypersensitivity | Concomitant use with antithrombotic agents
- **PRECAUTIONS** History of AF or atrial flutter | Seafood allergy | Hemorrhagic disorders
  - Bleeding time increased when under anticoagulant treatment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity | Constipation | Pain in throat | Musculoskeletal pain | Vomiting

Isosorbide dinitrate⋆

- **MOA** A nitrate vasodilator via release of nitric oxide that stimulates guanylate cyclase

- **INDICATIONS AND DOSE**
  Second-line treatment option in controlling angina symptoms when initial therapy with a beta-blocker and/or a non-DHP CCB is contraindicated, poorly tolerated, or inadequate[1]
  ➤ *SUBLINGUAL*
  Adult: 5–10 mg every 2 to 4 hrs
  ➤ *ORAL*
  Adult
  Immediate release tablet 5–20 mg 2x to 3x daily
  Extended release tablet 40–160 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **SL Tablet**: 5 mg
  - **Tablet**: 10 mg, 20 mg
- **CONTRAINDICATIONS**
  - Concomitant use with PDE_5 inhibitors (Sildenafil, Tadalafil)
  - Hypersensitivity to nitrates
- **PRECAUTIONS** Severe hypotension | Closed-angle glaucoma | Malnutrition | Hypothyroidism | Severe renal and hepatic impairment
  - May aggravate angina caused by hypertrophic cardiomyopathy
  - Elderly | Pregnancy and lactation
- **WARNING** Avoid abrupt withdrawal
- **ADVERSE EFFECTS** Orthostatic or severe hypotension | Headache | Lightheadedness
- **COSTS**
  - 5 mg SL tablet (₱9.81)†
  - 10 mg Tablet (₱9.90)†

Isosorbide mononitrate⋆

- **MOA** A nitrate vasodilator via release of nitric oxide that stimulates guanylate cyclase

- **INDICATIONS AND DOSE**
  Second-line treatment option in controlling angina symptoms when initial therapy with a beta-blocker and/or a non-DHP CCB is contraindicated, poorly tolerated, or inadequate[1]
  ➤ *ORAL*
  Adult
  Immediate release 20 mg 2x daily
  Extended release 30–60 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg
  - **MR Tablet/Capsule**: 30 mg, 60 mg, 120 mg
  - **FC Tablet**: 30 mg, 60 mg
- **CONTRAINDICATIONS**
  - Concomitant use with PDE5 inhibitors (Sildenafil, Tadalafil)
  - Hypersensitivity to nitrates
- **PRECAUTIONS** Recent MI | CHF | Methemoglobinemia | Severe renal and hepatic impairment
  - Avoid abrupt withdrawal
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Dizziness | Throbbing headache | Flushing | Emotional lability | Pruritus
- **COSTS**
  - 30 mg MR Capsule (₱5.50)†
  - 30 mg MR Tablet (₱18.65)†
  - 60 mg MR Capsule (₱7.70)†
  - 60 mg MR Tablet (₱10.51)†

Ivabradine hydrochloride

- **MOA** A selective sinus node I_f inhibitor; a hyperpolarization-activated cyclic nucleotide-gated (HCN) channel blocker

- **INDICATIONS AND DOSE**
  Second-line treatment to reduce angina frequency and improve exercise tolerance in subjects who cannot tolerate, have contraindications, or whose symptoms are not adequately controlled by beta-blockers, CCBs, and long-acting nitrates[6]; | Patients who are in sinus rhythm, an LVEF < 35% and a resting HR >70 bpm, who remain symptomatic despite adequate treatment with a beta-blocker, ACE inhibitor, and MRA[1]
  ➤ *ORAL*
  Adult: 5–7.5 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 5 mg, 7.5 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | 2nd- or 3rd-degree heart block | Severe hypotension | Sick sinus syndrome | Unstable angina | Unstable or acute HF | Severe hepatic impairment
  - Concomitant use with CYP3A4 inhibitors
- **PRECAUTIONS** AF | Retinitis pigmentosa | Congenital QT syndrome | Severe renal impairment
  - Consider stopping if no improvement in angina
- **ADVERSE EFFECTS** Arrhythmia | Vision disorders | Headache | Hypertension
- **COSTS**
  - 5 mg FC Tablet (₱33.81)
  - 7.5 mg FC Tablet (₱34.00)

Metoprolol succinate

- **MOA** A selective β_1-blocker

- **INDICATIONS AND DOSE**
  First-line therapy for long-term prevention of chest pain in patients with stable angina[2] | LV dysfunction or systolic heart failure[1] | Long-term oral treatment in patients with a previous STEMI [1] | Relief of angina by reducing heart rate, contractility, atrioventricular conduction and ectopic activity[3]

➤ *ORAL*
Adult
Extended release 100–400 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet**: 23.75 (25) mg, 45.5 (50) mg, 95 (100) mg
- **COSTS**
  - 47.5 mg ER tablets (₱6.25)

Check Metoprolol tartrate for other product information on Metoprolol

Metoprolol tartrate*

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**
  First-line therapy for long-term prevention of chest pain in patients with stable angina[2] | LV dysfunction or systolic heart failure[1] | Long-term oral treatment in patients with a previous STEMI [1] | Relief of angina by reducing heart rate, contractility, atrioventricular conduction and ectopic activity[3]
  ➤ *ORAL*
  Adult: 50–200 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 50 mg, 100 mg
- **CONTRAINDICATIONS** Sinus bradycardia, overt cardiac failure, cardiogenic shock, and sick sinus syndrome (without pacemaker) in patients with hypertensive and angina | 1st-degree heart block in patients with MI | Decompensated heart failure
  - Should not be used for hypertension with presence of drug-induced tachycardia for psychiatric patients taking antidepressant, antipsychotic drugs
- **PRECAUTIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery
  - May mask symptoms of hypoglycemia and thyrotoxicosis
  - Dose adjustment may be considered depending on CYP2D6 phenotype
  - Elderly | Pregnancy and lactation
- **WARNING** Patients should be warned against interruption or discontinuation of therapy without physician's advice

BLACK BOX WARNING
Ischemic Heart Disease
Do NOT abruptly discontinue in patients with coronary artery disease. Dosage should be gradually reduced over a period of 1 to 2 weeks

- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - 50 mg Tablet (₱3.00)†
  - 100 mg Tablet (₱4.50)†

Nebivolol hydrochloride

- **MOA** A long-acting cardioselective β_1-blocker
- **INDICATIONS AND DOSE**
  Relief of angina by reducing heart rate, contractility, atrioventricular conduction and ectopic activity[3]
  ➤ *ORAL*
  Adult: 5–40 mg, once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Severe bradycardia | 2nd and 3rd degree AV block | Cardiogenic shock | Sick sinus syndrome without permanent pacemaker | Severe hepatic impairment
- **PRECAUTIONS** Bronchospastic disease | DM | Hyperthyroidism | Severe renal and hepatic impairment
  - Avoid abrupt withdrawal, especially in CAD patients
  - Pre-treatment with alpha-blockers is recommended for patients with known or suspected pheochromocytoma
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Edema | Postural hypertension | GI symptoms | Dizziness | Headache
- **COSTS**
  - 2.5 mg Tablet (₱13.25)
  - 5 mg Tablet (₱20.95)

Nifedipine*

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**
  Prophylaxis of angina[2]
  ➤ *ORAL*
  Adult:
  Extended release tablet 30–60 mg once daily
  MAX daily dose: 120 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet**: 20 mg, 30 mg, 60 mg
  - **Softgel Capsule:** 5 mg, 10 mg
- **CONTRAINDICATIONS** Cardiogenic shock | Unstable angina | Recent MI | Concomitant use with strong CYP450 inducers (like Rifampicin)
- **PRECAUTIONS** Hypotension | DM | HF | Hypertrophic cardiomyopathy | Aortic stenosis
  - Concomitant use with CYP3A inducers
  - Avoid abrupt withdrawal
  - Elderly | Pregnancy and lactation
- **WARNING**
  - Short-acting (intermediate release) Nifedipine is no longer considered acceptable in the initial treatment of hypertensive crisis because it can cause excessive falls in BP[6]; not recommended for angina or long-term management of hypertension[2]
- **ADVERSE EFFECTS** Flushing | Peripheral edema (dose-related) | Transient hypotension (dose-related) | Light-headedness | Mood changes | Tremors | Bradycardia | Gum hyperplasia | Constipation

- **COSTS**
  - 10 mg capsule (₱7.00)†
  - 30 mg MR tablet (₱45.38)†

Perindopril arginine

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  CCS patient with other conditions (heart failure, hypertension, diabetes)[1] | CCS patients at very high risk of cardiovascular events[1]
  ➤ *ORAL*
  Adult: 5–10 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Hypersensitivity | Concomitant use with antithrombotic agents Angioedema | Bilateral or unilateral renal stenosis
  - Concomitant use with neprilysin inhibitor
  - Pregnancy and lactation
- **PRECAUTIONS** Severe congestive heart failure | Hyperkalemia | Renal and hepatic impairment
  - Increased risk of angioedema in black patients
  - Concomitant use with Potassium-containing agents, NSAIDs
  - Elderly
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hyperkalemia | Muscle cramps | Headache | Visual impairment | Cough
- **COSTS**
  - 5 mg FC Tablet (₱33.00)
  - 10 mg FC Tablet (₱56.00)

Prasugrel hydrochloride

- **MOA** An irreversible $P2Y_{12}$ platelet ADP receptor antagonist
- **INDICATIONS AND DOSE**
  May be considered as initial therapy, in specific high-risk situations of elective stenting (e.g., suboptimal stent deployment or other procedural characteristics associated with high risk of stent thrombosis, complex left main stem, or multivessel stenting) or if DAPT cannot be used because of Aspirin intolerance[1]
  ➤ *ORAL*
  Adult:
  ≥ 60kg: 10 mg once daily
  < 60kg: 5 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 10 mg
- **CONTRAINDICATIONS** Active bleeding including peptic ulcer and intracranial hemorrhage | History of stroke or transient ischemic attack | Severe hepatic impairment
- **PRECAUTIONS** Body weight < 60 kg | Recent trauma or surgery | Thrombotic thrombocytopenic purpura | Renal and moderate hepatic impairment
  - Dose-adjustment in East Asian descent (including PH)
  - Elderly ≥ 75 yrs | Pregnancy and lactation

BLACK BOX WARNING

Prasugrel can cause significant and sometimes fatal bleeding; not recommended in > 75 yrs. If possible, manage bleeding without discontinuing prasugrel, as discontinuation in the first few weeks after acute coronary syndrome may increase risk for subsequent cardiovascular events.

- **ADVERSE EFFECTS** Anemia | Hemorrhage | Skin reactions

Pravastatin sodium

- **MOA** A reversible HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering in all patients with CCS irrespective of LDL-C levels[1] | Post-PCI for MI in patients who have tolerated DAPT for 1 year[5]
  ➤ *ORAL*
  Adult: 40–80 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg
- **CONTRAINDICATIONS** Acute liver disease, decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity | Pregnancy and lactation
- **PRECAUTIONS** DM | Chronic alcoholism | Myopathy and rhabdomyolysis | Preexisting amyotrophic lateral sclerosis (ALS) | Renal impairment
- **ADVERSE EFFECTS** GI discomfort | Headache | Musculoskeletal pain | Skin rash | URI
- **COSTS**
  - 20 mg Tablet (₱17.50)
  - 40 mg Tablet (₱21.50)

Propranolol hydrochloride*

- **MOA** A nonselective β-blocker
- **INDICATIONS AND DOSE**
  Long-term prevention of chest pain in patients with stable angina[2]; LV dysfunction or systolic heart failure[1]; Long-term oral treatment in patients with a previous STEMI[1]
  ➤ *ORAL*
  Adult: 80–320 mg daily in 1 to 4 divided doses
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 40 mg also available as film-coated tablet
- **CONTRAINDICATIONS** BP < 50/30 mmHg | Bronchial asthma/COPD | Cardiogenic shock | HR < 80 bpm | Overt HF | Pheochromocytoma | 2nd- or 3rd-degree heart block | Sick sinus syndrome (without pacemaker) | Infants < 2kg | Diabetes | Psoriasis| Competitive athletes

- **PRECAUTIONS**
  - Concomitant use with non-DHP CCBs, Digoxin, Clonidine increases risk of severe bradycardia
  - Abrupt withdrawal may precipitate thyroid storm
  - May worsen bradycardia and hypotension
  - May increase risk of hypoglycemia
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Diarrhea | Vomiting | Dizziness | Hypertension | Sleep disorder | Fatigue | Bradycardia | Depression | Hyperlipidemia
- **COSTS**
  - 10 mg Tablet (₱6.35)†
  - 40 mg Tablet (₱24.00)

Ramipril

- **MOA** An angiotensin converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  CCS patient with other conditions (heart failure, hypertension, diabetes)[1] | CCS patients at very high risk of cardiovascular events[1]

  ➤ *ORAL*

  Adult: 2.5–10 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** History of angioedema | renal artery stenosis| Concomitant use with neprilysin inhibitors
  - Pregnancy and lactation
- **PRECAUTIONS** Renal and hepatic impairment | Reduction in RBC and hemoglobin | Hyperkalemia in patients with renal dysfunction
  - Increased risk of angioedema in black patients
  - Elderly
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Asthenia | Headache | Dizziness | Cough | Fatigue | GI disorder
- **COSTS**
  - 2.5 mg Tablet (₱13.50)
  - 5 mg Tablet (₱15.60)
  - 10 mg Tablet (₱23.20)

Ranolazine

- **MOA** A partial fatty acid oxidation inhibitor; late sodium channel blocker in myocardium
- **INDICATIONS AND DOSE**

  Adjunctive therapy in the treatment of stable angina in patients inadequately controlled or intolerant of first-line antianginal therapies[2] | Second-line treatment to reduce angina frequency and improve exercise tolerance in subjects who cannot tolerate, have contraindications, or whose symptoms are not adequately controlled by beta-blockers, CCBs, and long-acting nitrates[1] | May be considered as first-line drug to reduce angina frequency and improve exercise tolerance in subjects with baseline low heart rate and low BP[1]

  ➤ *ORAL*

  Adult: 500–1000 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet**: 375 mg, 500 mg, 750 mg, 1 g
- **CONTRAINDICATIONS** Hepatic cirrhosis | Moderate to severe hepatic impairment| Severe renal impairment
  - Concomitant use with CYP3A4 inducers or CYP3A4 inhibitors
- **PRECAUTIONS** Body weight < 60 kg | Moderate to severe CHF | QT interval prolongation | Elderly
- **ADVERSE EFFECTS** Asthenia | Constipation | Headache | Vomiting
- **COSTS**
  - 375, 500, 750 mg Tablet (₱35.00)

Rivaroxaban

- **MOA** A selective direct factor Xa inhibitor
- **INDICATIONS AND DOSE**

  Post-MI > 1 year or multivessel coronary artery disease[5]

  ➤ *ORAL*

  Adult: 2.5 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 10 mg, 15 mg, 20 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Severe hypersensitivity | Severe renal impairment or undergoing dialysis | Moderate to severe hepatic impairment
- **PRECAUTIONS** Patients with bleeding risk | Severe hypertension | Rheumatic heart disease | Prosthetic heart valves
  - Concomitant use with CYP3A4 inducers and CYP3A4 inhibitors, HIV protease inhibitors
  - Avoid in pediatric patients > 1 yr with moderate or severe renal impairment
- **WARNING** Avoid abrupt discontinuation in the absence of alternative treatment

BLACK BOX WARNING

Premature discontinuation increases the risk of thrombotic events.

Patients treated with Rivaroxaban who are receiving neuraxial anesthesia or undergoing spinal puncture are at risk for long-term or permanent paralysis; monitor frequently for neurological impairment.

- **ADVERSE EFFECTS** Hemorrhage including epistaxis | Anemia (prolonged use) | Gastroenteritis | Vomiting | Cough
- **COSTS**
  - 10, 15, 20 mg FC Tablet (₱154.50)

Rosuvastatin⋆

- **MOA** A long-acting, selective, and competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering in all patients with CCS irrespective of LDL-C levels[1]
  ➤ *ORAL*
  Adult: 5–40 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg, 40 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Severe renal impairment | Hypersensitivity
  - Concomitant use with Cyclosporine, Gemfibrozil
  - Pregnancy and lactation
- **PRECAUTIONS** Increased HbA1c and fasting glucose | Myopathy and rhabdomyolysis | Proteinuria and hematuria
  - Patients with known SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** Abdominal pain | Constipation | Headache | Myalgia | Asthenia
- **COSTS**
  - 10 mg Tablet (₱14.55)†
  - 20 mg Tablet (₱22.34)†

Sacubitril + Valsartan⋆

- **MOA** A combination of neprilysin inhibitor and angiotensin receptor blocker
- **INDICATIONS AND DOSE**
  Ischemic cardiomyopathy and LV systolic dysfunction who remain symptomatic despite adequate treatment with an ACE inhibitor and beta-blocker, to reduce morbidity and mortality[1]
  ➤ *ORAL*
  Adult: 50–200 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 50 mg, 100 mg, 200 mg
- **CONTRAINDICATIONS** Concomitant use with an ACEIs, or with Aliskiren in patients with DM | SBP < 100 mmHg | History of angioedema, hereditary or idiopathic | Severe hepatic impairment
- **PRECAUTIONS** Hypotension | Moderate to severe renal impairment | Moderate hepatic impairment
  - Must not be administered until at least 36 hours after discontinuation of ACEIs
  - Lactation
- **ADVERSE EFFECTS** Anemia | Asthenia | Cough | Diarrhea | Dizziness | Electrolyte imbalance | Gastritis | Headache | Hypoglycemia | Hypotension
- **COSTS**
  - 50 mg Tablet, 24.3 mg + 25.7 mg (₱55.24)†
  - 100 mg Tablet, 48.6 mg + 51.4 mg (₱55.24)†
  - 200 mg Tablet, 97.2 mg + 102.8 mg (₱55.24)†

Simvastatin⋆

- **MOA** A competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering in all patients with CCS irrespective of LDL-C levels[1]
  ➤ *ORAL*
  Adult: 10–80 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg, 40 mg, 80 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity
  - Concomitant use with Cyclosporine, Gemfibrozil, strong CYP3A4 inhibitors, Danazol
- **PRECAUTIONS** Proteinuria and hematuria | Renal impairment
  - Myopathy and rhabdomyolysis (with higher risk for Chinese patients)
  - 80 mg dose is only recommended in patients at high risk of CV complications
  - Patients with SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** GI discomfort | Headache | URI | Increased HbA1c and fasting glucose
- **COSTS**
  - 20 mg Tablet (₱4.00)†
  - 40 mg Tablet (₱6.00)†

Spironolactone⋆

- **MOA** A renal competitive aldosterone antagonist that acts as a potassium-sparing diuretic
- **INDICATIONS AND DOSE**
  Post-MI patients who are already receiving therapeutic doses of an ACE inhibitor and a beta-blocker, have an LVEF < 35%, and have either diabetes or HF[1]
  ➤ *ORAL*
  Adult: 12.5–50 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 25 mg, 50 mg, 100 mg
- **CONTRAINDICATIONS** Addison's disease | Anuria | Hyperkalemia | Severe renal impairment | Lactation
  - Concomitant use with Eplerenone, and K supplements
- **PRECAUTIONS** Acute porphyria | Acute renal insufficiency | Hyperuricemia | Hyperglycemia and electrolyte disturbance | Metabolic acidosis | Renal and hepatic impairment
  - Children and elderly | Pregnancy
- **ADVERSE EFFECTS** Gynecomastia | Diarrhea | Confusion | Menstrual changes | Erectile dysfunction | Ataxia | Electrolyte imbalance
- **COSTS**
  - 25 mg Tablet (₱145.00)†
  - 50 mg Tablet (₱27.46)†
  - 100 mg Tablet (₱34.41)†

Telmisartan⋆

- **MOA** An angiotensin II receptor blocker

- **INDICATIONS AND DOSE**
  If a patient has other conditions (heart failure, hypertension, diabetes)[1]
  ➤ *ORAL*
  Adult: 80 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg, 80 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Cholestasis | Biliary obstructive disorders | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Hyperkalemia in patient with renal impairment | Mild to moderate renal impairment
  - Increased serum creatinine or blood urea nitrogen from renal artery stenosis
- **WARNINGS**
  - Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
  - Increases Digoxin peak plasma concentration
- **ADVERSE EFFECTS** Cough and URI | Peripheral edema | Myalgia | Diarrhea
- **COSTS**
  - 40 mg Tablet (₱14.46)†
  - 80 mg Tablet (₱34.00)†

Ticagrelor⋆

- **MOA** A reversible platelet $P2Y_{12}$ ADP receptor inhibitor

- **INDICATIONS AND DOSE**
  May be considered as initial therapy, in specific high-risk situations of elective stenting (e.g., suboptimal stent deployment or other procedural characteristics associated with high risk of stent thrombosis, complex left main stem, or multivessel stenting) or if DAPT cannot be used because of aspirin intolerance[1]
  ➤ *ORAL*
  Adult: 90 mg 2x daily

  Post-MI in patients who have tolerated DAPT for 1 yr[5]
  ➤ *ORAL*
  Adult: 60 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 60 mg, 90 mg
- **CONTRAINDICATIONS** Active bleeding | History of intracranial hemorrhage
- **PRECAUTIONS** Asthma or COPD | Ventricular pauses: bradyarrhythmia including AV block | Renal and mild to moderate hepatic impairment
  - Concomitant use with strong CYP3A4 inducers and inhibitors, statins at doses > 40 mg
  - Avoid use in severe hepatic impairment
  - Children | Pregnancy and lactation

BLACK BOX WARNING

Ticagrelor can cause significant, sometimes fatal, bleeding. If possible, manage bleeding without discontinuing. Abrupt withdrawal increases the risk of subsequent cardiovascular events.

Maintenance doses > 100 mg of Aspirin in patients with ACS reduce the effectiveness of Ticagrelor and should be avoided.

- **ADVERSE EFFECTS** Major and minor hemorrhage | Dyspnea | Elevated serum creatinine
- **COSTS**
  - 90 mg FC Tablet (₱80.00)

Trimetazidine⋆

- **MOA** A partial fatty acid oxidation inhibitor

- **INDICATIONS AND DOSE**
  Adjunct in treatment of symptomatic stable angina[6] | Second-line treatment to reduce angina frequency and improve exercise tolerance in subjects who cannot tolerate, have contraindications, or whose symptoms not adequately controlled by beta-blockers, CCBs, and long-acting nitrates[1] | May be considered as first-line drug to reduce angina frequency and improve exercise tolerance in subjects with baseline low heart rate and low BP[1]
  ➤ *ORAL*
  Adult
  Immediate release tablet 20 mg 3x daily
  Modified release tablet 35 mg 2x daily
  24-hour preparation 80 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg
  - **MR Tablet/Capsule**: 35 mg, 60 mg
  - **PR Hard Capsule**: 80 mg
- **CONTRAINDICATIONS** Hypersensitivity | Parkinson's disease or parkinsonian symptoms, restless leg syndrome, other movement disorders | Severe renal impairment | Lactation
- **PRECAUTIONS** Patients predisposed to closed-angle glaucoma | Mild to moderate renal impairment | Unstable angina
  - Elderly, particularly > 75 yrs
  - Avoid use during pregnancy
- **ADVERSE EFFECTS** Parkinsonian symptoms | Burning GI
- **COSTS**
  - 35 mg Tablet (₱13.33)†

Verapamil hydrochloride⋆

- **MOA** A non-DHP L-type calcium channel blocker
- **INDICATIONS AND DOSE**

  Alternative if beta-blockers are contraindicated e.g., in patients with decompensated heart failure[2]

  ➤ *ORAL*

  Adult

  Immediate release tablet 80–120 mg 3x daily; MAX daily dose: 480 mg in 3 divided doses

  Extended-release tablet 180 mg once daily; MAX daily dose: 480 mg in 1 to 2 divided doses
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 40 mg, 80 mg
  - **SR Tablet:** 180 mg, 240 mg
- **CONTRAINDICATIONS** Atrial flutter or fibrillation associated with accessory conducting pathways (e.g. WPW syndrome) | Bradycardia | Cardiogenic shock | HFrEF | Sick sinus syndrome (without pacemaker) | Acute porphyria
  - Concomitant use with beta-blockers, Ivabradine, Quinidine
- **PRECAUTIONS** Renal and hepatic impairment | Severe aortic stenosis | 1st degree AV block | Exacerbation of angina | Atrial fibrillation/flutter
  - Children: Avoid in children younger than 1 yr due to risk of asystole
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Hypotension | Constipation | Headache | Flu-like symptoms
- **COSTS**
  - 80 mg Tablet (₱20.63)†

NOTE

Concomitant use of PPIs is recommended for patients receiving ASA monotherapy, DAPT, or OAc monotherapy who are at high risk for GI bleeding[1]

REFERENCES

[1] Knuuti J, Wijns W, Saraste A, et al. 2019 ESC guidelines for the diagnosis and management of chronic coronary syndromes. *European Heart Journal*. 2019;41(3):407-477. doi:10.1093/eurheartj/ehz425

[2] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[3] Abanilla JM, Junia AT, Cruz RB, et al. *2014 PHA Clinical Practice Guidelines for the Diagnosis and Management of Patients with Coronary Artery Disease*. PHA PCC; 2014

[4] Ferraro R, Latina JM, Alfaddagh A, et al. Evaluation and management of patients with stable angina: Beyond the ischemia paradigm. *Journal of the American College of Cardiology*. 2020;76(19):2252-2266. doi:10.1016/j.jacc.2020.08.078

[5] Ynsaurriaga FA, Barrios V, Amaro MB, et al. Chronic coronary syndrome: Overcoming clinical practice guidelines. the role of the compass strategy. *Current Cardiology Reviews*. 2021;17(3):294-305. doi:10.2174/1573403x16999200817111150

[6] Formulary Executive Council. *Philippine National Formulary*. 8th ed. Department of Health; 2019

Table 3. Available Fixed-Dose Combinations for Chronic Coronary Syndrome

DRUG COMBINATION	PREPARATION	DOSE
Amlodipine + Atorvastatin	**FC Tablet** (Amlodipine/Atorvastatin) 5 mg/10 mg (₱28.75) 5 mg/20 mg (₱37.00) 5 mg/40 mg 10 mg/10 mg (₱42.00) 10 mg/20 mg (₱51.25) 10 mg/80 mg	➤ *ORAL* **Adult:** 1 tab once daily Usual dose range: 5–10mg/20 mg MAX daily dose: 10 mg Amlodipine and 80 mg Atorvastatin
Aspirin + Clopidogrel⋆	**Capsule** (Aspirin/Clopidogrel) 75 mg/75 mg **FC Tablet** (Aspirin/Clopidogrel) 75 mg/75 mg (₱52.75) 100 mg/75 mg (₱69.00)	➤ *ORAL* **Adult:** 1 tab once daily
Aspirin + Rosuvastatin	**Capsule** 80 mg/10 mg (₱27.59)	➤ *ORAL* **Adult:** 1 cap once daily
Atorvastatin + Ezetimibe	**FC Tablet** (Atorvastatin/Ezetimibe): 10 mg/10 mg (₱26.25) 20 mg/10 mg 40 mg/10 mg 80 mg/10 mg	➤ *ORAL* **Adult:** 1 tab once daily, dose based on previous monotherapy dose *May be adjusted according to response at intervals of at least 2 weeks*
Atorvastatin + Perindopril arginine + Amlodipine	**FC Tablet** 10 mg/5 mg/5 mg 20mg/5 mg/5 mg (₱40.50) 20 mg/10 mg/5 mg 20 mg/10 mg/10 mg 40 mg/10 mg/10mg (₱63.50)	➤ *ORAL* **Adult:** 1 tab once daily *Not suitable for initial therapy*
Carvedilol + Ivabradine	**FC Tablet** (Carvedilol/Ivabradine): 6.25 mg/5 mg (₱26.00) 6.25 mg/7.5 mg 12.5 mg/5 mg (₱38.00) 12.5 mg/7.5 mg 25 mg/5 mg (₱40.00) 25 mg/7.5 mg	➤ *ORAL* **Adult:** 1 tab 2x daily
Simvastatin + Ezetimibe	**Tablet** (Simvastatin/Ezetimibe): 10 mg/10 mg (₱53.00) 20 mg/10 mg (₱67.25) 40 mg/10 mg (₱96.50) 80 mg/10 mg	➤ *ORAL* **Adult:** 10 mg/10 mg to 20 mg/10 mg, once daily
Rosuvastatin + Ezetimibe	**Capsule** (Rosuvastatin/Ezetimibe) 10 mg/10mg 20 mg/10mg **FC Tablet** (Rosuvastatin/Ezetimibe) 5 mg/10mg 10 mg/10mg (₱88.25) 20 mg/10mg (₱106.00)	➤ *ORAL* **Adult:** 1 tab once daily, *dose based on previous monotherapy dose* *May be adjusted according to response at intervals of at least 2 weeks*

Atorvastatin calcium⋆

- **MOA** A long-acting, selective, and competitive HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

Adjunct to diet for the reduction of elevated total cholesterol, LDL cholesterol, apolipoprotein B, and triglycerides, and elevation HDL cholesterol in patients with FH and combined hyperlipidemia[1] | Familial hypercholesterolemia (FH)[2] | Primary prevention of CV events in patients without diabetes aged ≥45 years with LDL-C ≥ 130 mg/dL AND ≥ 2 risk factors[3,4] | Primary prevention of CV events in patients with DM and dyslipidemia[5] | Secondary prevention of CV events in patients with acute MI regardless of baseline LDL[5] | Secondary prevention of CV events in patients with chronic kidney disease (not on dialysis)[3]

➤ *ORAL*

Adult: 10 mg once daily, titrate if necessary to 80 mg once daily
Dose titrated at intervals of at least 4 weeks

Hyperlipidemia including FH[6] | Children and adolescents 10 years of age or older if LDL-C persists to be > 190 mg/ dL even after 3 to 6 months of lifestyle modifications and dietary therapy[5,7] | Children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5]

➤ *ORAL*

Pediatric (10–17 yrs): Initially 10 mg once daily, then increased if necessary up to 20 mg once daily
Dose to be adjusted at intervals of at least 4 weeks

Homozygous FH[6]

➤ *ORAL*

Pediatric: Initially 10 mg once daily, then increased if necessary up to 80 mg once daily*; Dose to be adjusted at intervals of at least 4 weeks*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg, 40 mg, 80 mg
- **CONTRAINDICATIONS** Acute liver failure or decompensated cirrhosis | ALT > 5x UNL | Concomitant use with Cyclosporine, Gemfibrozil, Ritonavir, Grapefruit Juice | Pregnancy and lactation
- **PRECAUTIONS** Rhabdomyolysis | Hemorrhagic stroke | Renal impairment
  - Increased HbA1c and serum glucose levels have been reported
  - Patients with known SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** Hyperglycemia | Joint disorders | Muscle pain
- **COSTS**
  - 10 mg Tablet (₱10.00)†
  - 20 mg Tablet (₱14.00)†
  - 40 mg Tablet (₱17.00)†
  - 80 mg Tablet (₱21.12)†

Ciprofibrate

- **MOA** Binds to peroxisome proliferator activated receptor alpha (PPARα), increasing fatty acid oxidation and decreasing serum triglycerides

- **INDICATIONS AND DOSE**

Adjunct to diet and other appropriate measures in mixed hyperlipidemia if Statin is contraindicated or not tolerated[1] | As monotherapy or in combination with Statin for control of triglyceride concentration[5] | May be used for other appropriate measures in severe hypertriglyceridemia[1]

➤ *ORAL*

Adult: 100 mg once daily

May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5]

Safety and effectiveness not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 100 mg
- **CONTRAINDICATIONS** Gallbladder disease | Hypoalbuminemia | Nephrotic syndrome | Photosensitivity | Severe renal and hepatic impairment | GFR < 30 mL/min
  - Concomitant use with other fibrates
  - Pregnancy (including suspected pregnancy) and lactation
- **PRECAUTIONS** Correct hypothyroidism before initiating treatment
  - Risk factor for myopathy
  - Galactose intolerance | Mild to moderate hepatic and renal impairment
- **ADVERSE EFFECTS** Rashes | Alopecia | Diarrhea | Dizziness | Drowsiness | Fatigue | GI discomfort

Eicosapentaenoic Acid - Docosahexaenoic acid (EPA-DHA)

(Omega-3 fatty acids)

- **MOA** A mixture of omega-3 fatty acids which reduces synthesis and secretion of TG in the liver, specifically VLDL-TG

- **INDICATIONS AND DOSE**

Hypertriglyceridemia[8]

➤ *ORAL*

Adult: 2–4 g daily
Alternatively, 2–4 capsules daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Softgel Capsule:** 460 mg/380 mg (EPA/DHA)

- **CONTRAINDICATIONS** Hypersensitivity to EPA, DHA, or soya | Not recommended as monotherapy in type IIb dyslipidemia
- **PRECAUTIONS** Fish allergy | Increased bleeding time with ASA, Warfarin
  - Children, adolescent, elderly
- **ADVERSE EFFECTS** GI disorders including abdominal distension, pain, constipation, diarrhea, dyspepsia, flatulence | GERD | Nausea | Vomiting

Evolocumab

- **MOA** A humanized monoclonal antibody that inhibits the binding of Proprotein convertase subtilisin kexin type 9 (PCSK9) to LDL receptors (LDLR) on hepatocytes and reduces LDLR degradation. Increased LDLRs results in increased uptake of LDL-cholesterol (LDL-C) from the blood.
- **INDICATIONS AND DOSE**

  FH or mixed dyslipidemia in patients who have not responded adequately to: (1) other appropriate measures in combination with a Statin; (2) Statin and other lipid-lowering therapies; or (3) other lipid-lowering therapies alone (if a Statin contraindicated or not tolerated)[2] | Combination for secondary prevention in patients at very-high risk not achieving their goal on a maximum tolerated dose of Statin and Ezetimibe[8] | May be considered to concurrent use for the very high-risk group if LDL-C target is not achieved even after using maximum tolerable dose of Statin alone or with Ezetimibe[5]

  ➤ *SUBCUTANEOUS*

  Adult: 140 mg every 2 weeks
  Alternatively, 420 mg every month

  Combination for very high-risk FH patients not achieving their goal on a maximum tolerated dose of Statin and Ezetimibe[8]

  ➤ *SUBCUTANEOUS*

  Adult: Initially 420 mg every month, titrate to 420 mg every 2 wks if inadequate response after 12 wks of treatment

  Homozygous FH in combination with other lipid-lowering therapies[2]

  ➤ *SUBCUTANEOUS*

  Pediatric (1–17 yrs): Initially 420 mg every month, titrate to 420 mg every 2 wks if inadequate response after 12 wks of treatment

  Homozygous FH in patients on apheresis in combination with other lipid-lowering therapies[2]

  ➤ *SUBCUTANEOUS*

  Pediatric: 420 mg every 2 wks to correspond with apheresis schedule
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, prefilled auto-injector:** 140 mg/mL
- **CONTRAINDICATIONS** Hypersensitivity
- **PRECAUTIONS** Renal and hepatic impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Arthralgia | Back pain | Increased risk of infection | Skin reactions
- **COSTS**
  - 140 mg/mL Solution for Injection (₱18,700.00)
  - 140 mg/mL Solution for Injection Prefilled Syringe (₱27,034.25)

Ezetimibe

- **MOA** Selectively inhibits intestinal absorption of cholesterol and phytosterols
- **INDICATIONS AND DOSE**

  Adjunct to Statin (if inappropriate or insufficient or intolerant) for FH and homozygous FH[2,5,8] | May be added for individuals with ACS, and LDL-C target not achieved despite maximally tolerated high-intensity Statin therapy[3]

  ➤ *ORAL*

  Adult: 10 mg once daily

  Adjunct therapy when Statin monotherapy fails to provide goal LDL-C levels in children with FH[9]

  ➤ *ORAL*

  Pediatric (>10 yrs): 10 mg once daily

  Not FDA-approved for the pediatric age group[6]
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg
- **CONTRAINDICATIONS** Active liver disease or severe hepatic impairment
- **PRECAUTIONS** ALT ≥ 3x ULN | Hypersensitivity (anaphylaxis, angioedema, rash, urticaria) | Myopathy or rhabdomyolysis | Renal and moderate hepatic impairment
  - Pregnancy and lactation
- **WARNINGS** Serious warning includes hepatitis, pancreatitis, myopathy/rhabdomyolysis, myalgia, anaphylaxis
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Arthralgia | URI | Headache
- **COSTS**
  - 10 mg Tablet (₱53.75)

Fenofibrate★

- **MOA** Activates peroxisome proliferator activated receptor alpha (PPARα), increasing lipolysis, activating lipoprotein lipase, and reducing apoprotein C-II
- **INDICATIONS AND DOSE**

  Primary hypertriglyceridemia and diabetic dyslipidemia (if Statin therapy is inadequate)[1] | Adjunct treatment (if Statin therapy is inadequate) for primary prevention of cardiovascular disease in men with hyperlipidemias, mixed hyperlipidemia, FH, and severe hypertriglyceridemia[2]

➤ *ORAL*

Adult

Capsules Initially 200 mg daily, then increased if necessary to 267 mg daily

Tablets 160 mg daily

With concomitant Statin

MAX daily dose: 200 mg

May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5] | Hyperlipidemia including FH[6]

➤ *ORAL*

Pediatric

Micronized Capsules **4–14 yrs:** One (1) 67 mg caps per 20 kg body-weight daily; MAX daily: four (4) 67 mg caps

Micronized Capsules **15–17 yrs:** Initially 3 caps daily, then increased if necessary to 4 caps daily

With concomitant Statin

MAX daily dose: three (3) 67 mg caps

Safety and effectiveness have not been established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **IR Capsule:** 67 mg, 160 mg, 200 mg, 300 mg
  - **SR Capsule:** 250 mg
  - **Micronized Capsule:** 200 mg
  - **FC Tablet:** 145 mg, 160 mg
- **CONTRAINDICATIONS** Gallbladder disease | Pancreatitis | Photosensitivity to Ketoprofen and Fibrates | Active liver disease including primary biliary cirrhosis | Severe renal impairment | Lactation
- **PRECAUTIONS** Myopathy or rhabdomyolysis | Risk factors for VTE | Mild to moderate renal impairment
  - Elderly | Pregnancy
- **ADVERSE EFFECTS** Abdominal pain | Diarrhea | Flatulence | Nausea | Vomiting | Back pain
- **COSTS**
  - 67 mg Micronized Capsule (₱33.75)
  - 100 mg Capsule (₱18.75)
  - 145 mg Tablet (₱49.41)
  - 160 mg Tablet (₱30.25)†
  - 200 mg Capsule (₱14.00)†
  - 200 mg Micronized Tablet (₱17.50)
  - 200 mg Micronized Capsule (₱35.24)

Gemfibrozil

- **MOA** A fibrate lipid regulator that stimulates Peroxisome Proliferator Activated Receptor-alpha (PPARα)
- **INDICATIONS AND DOSE**

Adjunct treatment (if Statin therapy is inadequate) for primary prevention of cardiovascular disease in men with hyperlipidemias, mixed hyperlipidemia, FH, and severe hypertriglyceridemia[2]

➤ *ORAL*

Adult: 1.2 g daily in 2 divided doses

Maintenance dose: 0.9–1.2 g daily

Safety and effectiveness not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 300 mg, 600 mg
- **CONTRAINDICATIONS** Severe hepatic impairment, including primary biliary cirrhosis | Severe renal impairment | Gallbladder disease | Photosensitivity with fibrates
  - Concomitant use with Repaglinide, Selexipag
  - Lactation
- **PRECAUTIONS** Correct hypothyroidism before initiating treatment
  - Myopathy | Mild to moderate renal impairment
  - Pregnancy
- **ADVERSE EFFECTS** Constipation | Diarrhea | Flatulence | GI discomfort | Fatigue | Vertigo | Vomiting
- **COSTS**
  - 300 mg Capsule (₱15.00)
  - 600 mg Capsule (₱38.64)
  - 900 mg Tablet (₱129.92)

Icosapent ethyl

(Omega-3-acid ethyl esters)

- **MOA** Converted to pure active eicosapentaenoic acid (EPA) which reduces synthesis and secretion of TG in the liver, specifically VLDL-TG
- **INDICATIONS AND DOSE**

As monotherapy to control triglyceride concentration[5] | Combined with statin for mixed hyperlipidemia[5] | Adjunct to diet and statin in type IIb or III hypertriglyceridemia, type IV hypertriglyceridemia, and in secondary prevention in patients who have had a recent MI within 3 months[2] | Adjunct to statin in high-risk (or above) patients with TG between 1.5 and 5.6 mmol/L despite statin treatment[8]

➤ *ORAL*

Adult: Initially 2 caps daily, then titrate if necessary to 4 caps daily; *should be taken with food.*

May be considered in children if fasting triglyceride is between 200 to 499 mg/dL and non-HDL-C is > 145 mg/ dL even after lifestyle adjustment and dietary therapy[5]

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule:** 1 g
- **CONTRAINDICATIONS** Hypersensitivity | Concomitant use with antithrombotic agents
- **PRECAUTIONS** History of AF or atrial flutter | Seafood allergy | Hemorrhagic disorders
  - Bleeding time increased when under anticoagulant treatment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity | Constipation | Pain in throat | Musculoskeletal pain | Vomiting

Nicotinic acid / Niacin

- **MOA** A vitamin B3 with antihyperlipidemic effects; reduces hepatic triglycerides esterification and inhibits cholesterol and triglyceride synthesis

- **INDICATIONS AND DOSE**

Adjunct to Statin in dyslipidemia or used alone if statin not tolerated[2]

➤ *ORAL*

Adult: 1.5–3 g daily

May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5]

➤ *ORAL*

Pediatric (>16 yrs)

Extended-release tablet 500 mg once daily, titrate every 4 wks; MAX daily dose: 2 g

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 100 mg, 500 mg
- **CONTRAINDICATIONS** Active peptic ulcer disease | Arterial bleeding | Active liver disease
- **PRECAUTIONS** Acute MI | Unstable angina | Alcoholism | Renal and hepatic impairment
  - DM, may cause increase in fasting glucose
  - Gout, may increase uric acid
- **ADVERSE EFFECTS** Flushing | Nausea | Vomiting

Pravastatin sodium

- **MOA** A reversible HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

First line treatment for patients with diabetes and dyslipidemia[5] | Adjunct to diet for FH or combined (mixed) hyperlipidemia in patients who have not responded adequately to dietary control[2] | Prevention of CV events among individuals with chronic kidney disease[3] | Prevention of CV events in individuals without diabetes aged ≥45 years with LDL-C ≥130 mg/dL AND ≥2 risk factors[3] | Moderate-dose therapy for patients with a 10-y CVD risk ≥12%, an LDL-C level ≥4.9 mmol/L (≥190 mg/dL), or diabetes[4]

➤ *ORAL*

Adult: 10–40 mg daily at night; *Dose titrated at intervals of at least 4 weeks*; MAX daily dose: 80 mg

Hyperlipidemia including heterozygous FH[6] | May be considered in children under the age of 10 if LDL-C persists to be > 190 mg/ dL even after 3 to 6 months of lifestyle modifications and dietary therapy[5] | May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5]

➤ *ORAL*

Pediatric

8–13 yrs: 5–20 mg once daily

14–18 yrs: 5–40 mg once daily

Dose to be adjusted at intervals of at least 4 weeks

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg
- **CONTRAINDICATIONS** Acute liver disease, decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity | Pregnancy and lactation
- **PRECAUTIONS** DM | Chronic alcoholism | Myopathy and rhabdomyolysis | Preexisting amyotrophic lateral sclerosis (ALS) | Renal impairment
- **ADVERSE EFFECTS** GI discomfort | Headache | Musculoskeletal pain | Skin rash | URI
- **COSTS**
  - 20 mg Tablet (₱17.50)
  - 40 mg Tablet (₱21.50)

Rosuvastatin⋆

- **MOA** A long-acting, selective, and competitive HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

Adjunct to diet for the reduction of elevated total cholesterol, LDL cholesterol, apolipoprotein B, and triglycerides, and elevation HDL cholesterol in patients with FH and combined hyperlipidemia[1] | FH[2] | Primary prevention of CV events in patients without diabetes aged ≥45 years with LDL-C ≥130 mg/dL AND ≥2 risk factors[3,4] | Primary prevention of CV events in patients with DM and dyslipidemia[5] | Secondary prevention of CV events in patients with acute MI regardless of baseline LDL[5] | Secondary prevention of CV events in patients with chronic kidney disease (not on dialysis)[3]

➤ *ORAL*

Adult: Initially 5 – 10 mg once daily, titrate if necessary to 20 mg once daily

Treatment of heterozygous and homozygous FH in children and adolescents[1,6] | May be considered in children under the age of 10 if LDL-C persists to be > 190 mg/ dL even after 3 to 6 months of lifestyle modifications and dietary therapy[5] | May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5] | Heterozygous familial hypercholesterolaemia

➤ *ORAL*

Pediatric: Initially, 5 mg once daily

6–9 yrs: 5–10 mg once daily

10–17 yrs: 5–20 mg once daily

Homozygous familial hypercholesterolaemia

➤ *ORAL*

Pediatric: Initially, 5 or 10 mg once daily, depending on age, weight and prior statin use, may titrate dose up to MAX of 20 mg once daily according to individual response and tolerability, and depending on treatment recommendations.

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 5 mg, 10 mg, 20 mg 40 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Severe renal impairment | Hypersensitivity
  - Concomitant use with Cyclosporine, Gemfibrozil
  - Pregnancy and lactation
- **PRECAUTIONS** Increased HbA1c and fasting glucose | Myopathy and rhabdomyolysis | Proteinuria and hematuria
  - Patients with known SLCO1B1 gene polymorphism
  - Children and elderly
- **WARNINGS** 40 mg not recommended for Asian descent due to Cytochrome differences
- **ADVERSE EFFECTS** Abdominal pain | Constipation | Headache | Myalgia | Asthenia
- **COSTS**
  - 5 mg Tablet (₱23.25)
  - 10 mg Tablet (₱14.55)†
  - 20 mg Tablet (₱22.34)†

Simvastatin⋆

- **MOA** A short-acting and competitive HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

Adjunct to diet for the reduction of elevated total cholesterol, LDL cholesterol, apolipoprotein B, and triglycerides, and elevation HDL cholesterol in patients with FH and combined hyperlipidemia[1] | FH[2] | Primary prevention of CV events in patients without diabetes aged ≥45 years with LDL-C ≥130 mg/dL AND ≥2 risk factors[3,4] | Primary prevention of CV events in patients with DM and dyslipidemia[5] | Secondary prevention of CV events in patients with acute MI regardless of baseline LDL[5] | Secondary prevention of CV events in patients with chronic kidney disease (not on dialysis)[3]

➤ *ORAL*

Adult: 10–20 mg once daily at night, titrate if necessary to 80 mg once daily. *Dose titrated at intervals of at least 4 weeks*

Patients should not be started on 80 mg and only be maintained on 80 mg if they have been taking this dose for 12 months or more without evidence of myopathy

Hyperlipidemia[6] | Heterozygous FH[1] | May be considered in children under the age of 10 if LDL-C persists to be > 190 mg/ dL even after 3 to 6 months of lifestyle modifications and dietary therapy[5] | May be considered in children above the age of 10 if the target LDL-C has been met but non-HDL-C is > 145 mg/dL[5]

➤ *ORAL*

Pediatric

5–9 yrs: Initial dose 5 mg, MAX daily dose: 20 mg

>10 yrs: Initial dose 10 mg, MAX daily dose: 40 mg

Dosage is individualized and adjusted according to the recommended goal of therapy at intervals of at least 4 weeks.

Patients should be placed on a cholesterol-lowering diet prior to and during drug therapy.

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 5 mg, 10 mg, 20 mg, 40 mg, 80 mg
    also available as film-coated
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity
  - Concomitant use with Cyclosporine, Gemfibrozil, strong CYP3A4 inhibitors, Danazol
- **PRECAUTIONS** Myopathy and rhabdomyolysis (with higher risk for Chinese patients)
  - Proteinuria and hematuria | Renal impairment
  - 80 mg dose is only recommended in patients at high risk of CV complications
  - Patients with SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** GI discomfort | Headache | URI | Increased HbA1c and fasting glucose
- **COSTS**
  - 20 mg Tablet (₱4.00)†
  - 40 mg Tablet (₱6.00)†

REFERENCES

[1] PNF PHC Core Group. *Philippine National Formulary Manual for Primary Care Providers*. 9th ed. Department of Health; 2021

[2] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[3] Gonzalez-santos LE, Oliva R, Jimeno C, et al. Executive Summary of the 2020 Clinical Practice Guidelines for the Management of Dyslipidemia in the Philippines. 2021;36(1):5-11.

[4] O'Malley PG, Arnold MJ, Kelley C, et al. Clinical Guideline Management of Dyslipidemia for Cardiovascular Disease Risk Reduction : Synopsis of the 2020 Updated U. S. Department of Veterans Affairs and U. S. Department of Defense Clinical Practice Guideline. Published online 2020. doi:10.7326/M20-4648

[5] Rhee E-J, Kim HC, Kim JH, et al. 2018 guidelines for the management of dyslipidemia. *The Korean Journal of Internal Medicine*. 2019;34(4):723-771. doi:10.3904/kjim.2019.188

[6] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.

[7] Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [published correction appears in J Am Coll Cardiol. 2019 Jun 25;73(24):3234-3237]. *Journal of the American College of Cardiology*. 2019;73(24):3168-3209. doi:10.1016/j.jacc.2018.11.002

[8] Mach F, Baigent C, Catapano AL, et al. 2019 ESC/EAS guidelines for the management of dyslipidaemias: Lipid modification to reduce cardiovascular risk. *Atherosclerosis*. 2019;290:140-205. doi:10.1016/j.atherosclerosis.2019.08.014

[9] Gujral J, Gupta J. Pediatric Dyslipidemia. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; July 25, 2023.

Table 4. Available Fixed-Dose Combinations for Dyslipidemia

DRUG COMBINATION	PREPARATION	DOSE
Atorvastatin + Ezetimibe	**FC Tablet** (Atorvastatin/Ezetimibe) 10 mg / 10 mg (₱26.25) 20 mg / 10 mg 40 mg / 10 mg 80 mg / 10 mg	➤ *ORAL* **Adult:** 1 tab once daily, dose based on previous monotherapy dose May be adjusted according to response at intervals of at least 2 weeks
Atorvastatin + Fenofibrate	**FC Tablet** (Atorvastatin/Fenofibrate) 10 mg / 160 mg (₱28.28) 20 mg / 160 mg (₱30.24) 40 mg / 160 mg	➤ *ORAL* **Adult:** 1 tab once daily MAX daily dose: 40 mg Atorvastatin and 160 mg Fenofibrate
Fenofibrate + Pravastatin	**Capsule** (Fenofibrate/Pravastatin) 160 mg / 40 mg	➤ *ORAL* **Adult:** 1 tab once daily
Fenofibrate + Rosuvastatin	**FC Tablet** (Fenofibrate/Rosuvastatin) 160 mg / 10 mg (₱26.25) 160 mg / 20 mg (₱30.25)	➤ *ORAL* **Adult:** 1 tab once daily after dinner
Fenofibrate + Simvastatin	**FC Tablet** (Fenofibrate/Simvastatin) 145 mg / 20 mg (₱69.50) 145 mg / 40 mg (₱74.25)	➤ *ORAL* **Adult:** 1 tab once daily
Rosuvastatin + Ezetimibe	**Capsule** (Rosuvastatin/Ezetimibe) 10 mg / 10 mg 20 mg / 10 mg **FC Tablet** (Rosuvastatin/Ezetimibe) 5 mg / 10 mg 10 mg / 10 mg (₱88.25) 20 mg / 10 mg (₱106.00)	➤ *ORAL* **Adult:** 1 tab once daily, dose based on previous monotherapy dose May be adjusted according to response at intervals of at least 2 weeks
Simvastatin + Ezetimibe	**Tablet** (Simvastatin/Ezetimibe) 10 mg / 10 mg (₱53.00) 20 mg / 10 mg (₱67.25) 40 mg / 10 mg (₱96.50) 80 mg / 10 mg	➤ *ORAL* **Adult:** 1 tab daily, based on previous monotherapy dose
Simvastatin + Fenofibrate	**FC Tablet** (Simvastatin/Fenofibrate) 20 mg / 145 mg 40 mg / 145 mg (₱67.50)	➤ *ORAL* **Adult:** 1 tab once daily, dose based on previous monotherapy dose

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

  Stable and symptomatic HF (NYHA functional class II to IV)[1] | Current or prior HF symptoms[1,2] | Short- and long-term rate control in patients with HF and AF[3] | Women planning pregnancy imminently, during pregnancy, or for postpartum women with severe acute HF[2]

  ➤ *ORAL*

  Adult: 1.25 mg once daily
  MAX daily dose: 10 mg

  Symptomatic children with systemic LV dysfunction[4,5] | Asymptomatic children with systemic LV dysfunction[5]

  ➤ *ORAL*

  Pediatric: 0.625 mg once daily
  MAX daily dose: 10 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg, 10 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS** DM | History or recent psoriasis | Thyrotoxicosis | Hepatic and renal impairment
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Bumetanide⋆

- **MOA** A short and rapid-acting loop diuretic
- **INDICATIONS AND DOSE**

  Evidence of congestion or fluid retention[2] | Maintenance for patients with history of congestion[2]

  ➤ *ORAL*

  Adult: 0.5–1 mg once or 2x daily
  MAX daily dose: 10 mg

  First-line therapy for pediatric acute decompensated HF[4,6] | Patients with fluid retention, pulmonary congestion, or volume overload and ventricular dysfunction[4,5]

  ➤ *ORAL / INTRAMUSCULAR / INTRAVENOUS*

  Pediatric

  ≤6 mos: 0.01–0.05 mg/kg/dose once daily or every other day

  >6 mos: 0.015–0.1 mg/kg/dose once to 2x daily
  MAX daily dose: 10 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg
  - **Solution for Injection, ampule**: 500 mcg/mL (4 mL)
- **CONTRAINDICATIONS** Anuria | Hepatic coma | Severe electrolyte depletion | Hypersensitivity to bumetanide
  - Concomitant use with Lithium, Indomethacin, Aminoglycosides, and other ototoxic or nephrotoxic agents
- **PRECAUTIONS** Patient with sulfonamide allergy | Renal and hepatic impairment
  - Pregnancy and lactation
  - Bumetanide should not be used to treat gestational hypertension because of the maternal hypovolemia associated with this condition

BLACK BOX WARNING

If given in excess amounts can lead to profound diuresis with water and electrolyte depletion

- **ADVERSE EFFECTS** Dehydration | Hypotension | Skin reactions | Hyperuricemia | Hypochloremia | Hypokalemia | Azotemia
- **COSTS**
  - 1 mg Tablet (₱20.85)

Canagliflozin

- **MOA** A reversible sodium-glucose cotransporter 2 (SGLT2) inhibitor
- **INDICATIONS AND DOSE**

  T2DM and HFrEF or at risk of CV events to reduce hospitalizations for HF, major CV events, end-stage renal dysfunction, and CV death[2,3]

  ➤ *ORAL*

  Adult: 100–300 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 100 mg, 300 mg
- **CONTRAINDICATIONS** Dialysis | Hypersensitivity | Renal impairment | Diabetic ketoacidosis
- **PRECAUTIONS** CV diseases | Severe dehydration | Uncircumcised males | Severe hepatic impairment
  - Bone mineral density may be affected; increased risk of bone fracture

- Correct hypovolemia before starting treatment
- Elderly | Pregnancy

- **ADVERSE EFFECTS** Constipation | Dyslipidemia | Micturition frequency and polyuria | UTI | Mycosis in female genital
- **COSTS**
  - 100 mg FC Tablet (₱53.50)
  - 300 mg FC Tablet (₱87.50)

Candesartan cilexetil

- **MOA** An angiotensin-receptor blocker
- **INDICATIONS AND DOSE**

HFrEF (Stage C HF)[2] or may be considered as first-line therapy for long-term HFrEF therapy[1] | May be considered in patients with current or previous symptomatic HFmrEF (LVEF, 41%–49%)[2] | May be considered for symptomatic heart failure with LVEF ≥ 50%[2] | Heart failure with impaired left ventricular systolic function when ACE inhibitors are not tolerated or in conjunction with an ACE inhibitor under expert supervision[7]

➤ *ORAL*

Adult: 4–8 mg once daily
MAX daily dose: 32 mg

Symptomatic and asymptomatic children with systemic LV dysfunction intolerant of ACEIs[4,5] | May be considered to control hypertension in HFpEF, but careful monitoring of hemodynamics and renal function is indicated due to the enhanced risk of hypotension and renal toxicity[5]

➤ *ORAL*

Pediatric

1–6 yrs: Start with 0.2 mg/kg once daily or in two divided doses; Dose range: 0.05–0.4 mg/kg/day
6–17 yrs, <50 kg: Start with 4–8 mg once daily; Adjust within 2 wks to dose range 2–16 mg once daily;
MAX daily dose: 32 mg
6–17 yrs, >50 kg: Start with 8–16 mg once daily; Adjust within 2 wks to dose range 4–32 mg once daily;
MAX daily dose: 32 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 4 mg, 8 mg, 16 mg
- **CONTRAINDICATIONS** Cholestasis | Severe hepatic impairment | Children < 1 year | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | Angioedema | Primary hyperaldosteronism
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Increased risk of infection | Flushing | Fatigue | GI symptoms
- **COSTS**
  - 8 mg Tablet (₱25.89)
  - 16 mg Tablet (₱34.00)

Captopril⋆

- **MOA** A short-acting angiotensin-converting enzyme (ACE) inhibitor; Blocks conversion of Angiotensin I to Angiotensin II
- **INDICATIONS AND DOSE**

Congestive heart failure with left ventricular dysfunction following MI[8] | LVEF ≤ 40% to prevent symptomatic HF (Stage B Pre-HF)[2] | Previous or current symptoms of chronic HFrEF (Stage C HF)[1,2] | May be appropriate for women during breastfeeding[2]

➤ *ORAL*

Adult: 6.25 mg 3x daily
MAX: 50 mg 3x daily

Symptomatic children with systemic LV dysfunction[4,5] |
Asymptomatic children with systemic LV dysfunction[4,5]

➤ *ORAL*

Neonate: 0.01–0.05 mg/kg/dose every 8–12 hrs

Infant (< 6 mos): Initially 0.01–0.5 mg/kg/dose 2x to 3x daily; MAX daily dose: 6 mg/kg

Child: Initially 0.3–0.5 mg/kg/dose 2x to 3x daily
MAX daily dose: 6 mg/kg up to 450 mg

Adolescent: Initially 12.5–25 mg/dose 2x to 3x daily
MAX daily dose: 450 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitors
- **PRECAUTIONS** Renal and hepatic impairment | Significant hyperkalemia
  - Concomitant use with lithium
  - Children and elderly
  - Pregnancy (1st trimester) and lactation
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Rash | Hyperkalemia | Taste disorder | Insomnia | Peptic ulcer | Dry cough | Angioedema
- **COSTS**
  - 25 mg Tablet (₱3.00)†

Carvedilol⋆

- **MOA** A non-selective β-blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity

- **INDICATIONS AND DOSE**

Adjunct use in symptomatic chronic heart failure[8] | Current or prior HF symptoms[1,2] | Stable and symptomatic HF (NYHA functional class II to IV)[1] | Short- and long-term rate control in patients with HF and AF[3] | May be considered for patients with HFmrEF[3] | Considered in cancer patients developing LV systolic dysfunction (10–50% decrease in LVEF) during Anthracycline chemotherapy[3] **| Women planning pregnancy imminently, during pregnancy, or for postpartum women with severe acute HF[2]**

➤ *ORAL*

Adult: 3.125 mg 2x daily
Target dose: 25–50 mg 2x daily

Symptomatic children with systemic LV dysfunction[4,5] | Asymptomatic children with systemic LV dysfunction[5]

➤ *ORAL*

Pediatric (Infant, child, adolescent)
Start with small dose then uptitrate
< 62.5 kg: Start at 0.1 mg/kg/day divided every 12 hrs
Dose may be doubled every 2 wks if needed and tolerated up to 0.8–1 mg/kg/day divided every 12 hrs *(divide daily dosage by every 8 hrs if < 4 yrs old due to altered pharmacokinetics)*
MAX per dose: 25 mg

≥ 62.5 kg: Start at 3.125 mg 2x daily
Dose may be doubled every 2 wks if needed and tolerated up to 25 mg 2x daily;
25 mg 3x daily may be needed for **patients > 75 kg**

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 6.25 mg, 12.5 mg, 25 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block
  - Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema) | Severe hepatic impairment
- **PRECAUTIONS** May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
  - Patients with peripheral vascular disease
  - May worsen renal function in heart failure patients
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 25 mg Tablet (₱7.26)†

Dapagliflozin

(Dapagliflozin propanediol monohydrate)

- **MOA** A reversible sodium-glucose cotransporter 2 (SGLT2) inhibitor

- **INDICATIONS AND DOSE**

All HF patients with or without T2DM[3] | All HF-at risk patients to reduce HF hospitalizations, major CV events, end-stage renal dysfunction, and CV death[2,3]

➤ *ORAL*

Adult: 10 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 5 mg, 10 mg
- **CONTRAINDICATIONS** Dialysis/renal replacement therapy | Serious hypersensitivity
- **PRECAUTIONS** Hypotension | Raised hematocrit | Type 1 DM | Severe renal impairment
  - Limited experience with initiating treatment in patients with EGFR < 25 mL/min/1.73m^2
  - Children and adolescents | Lactation
- **ADVERSE EFFECTS** Back pain | Diabetic ketoacidosis | Rash | UTI
- **COSTS**
  - 10 mg FC Tablet (₱44.00)

Digoxin⋆

- **MOA** A cardiac glycoside that inhibits Na+/K+ ATPase

- **INDICATIONS AND DOSE**

Patients with AF with a rapid ventricular rate (>110 bpm) despite beta-blockers[3] | May be considered for Stage C HFrEF or symptomatic patients in sinus rhythm despite guideline-directed medical therapy[1,2,3]

➤ *ORAL*

Adult: 0.125–0.25 mg once daily
Dose adjustment depending on CrCl

Relieve symptoms in children with symptomatic HF and low EF[4,5]

➤ *ORAL*

Premature neonate: Loading dose: 20 mcg/kg/day
Maintenance dose: 5 mcg/kg/day
Full term neonate: Loading dose: 30 mcg/kg/day
Maintenance dose: 8–10 mcg/kg/day
1 mo to < 2yrs: Loading dose: 40–50 mcg/kg/day
Maintenance dose: 10–12 mcg/kg/day
2–10 yrs: Loading dose: 30–40 mcg/kg/day
Maintenance dose: 8–10 mcg/kg/day
>10 yrs, BW < 100 kg: Loading dose: 10–15 mcg/kg/day
Maintenance dose: 2.5–5 mcg/kg/day
MAX dose: 0.25 mg daily in one or 2 divided doses

➤ *INTRAVENOUS / INTRAMUSCULAR*

Premature neonate: Loading dose: 15 mcg/kg/day
Maintenance dose: 3–4 mcg/kg/day

Full term neonate: Loading dose: 20 mcg/kg/day
Maintenance dose: 6–8 mcg/kg/day

1 mo to < 2yrs: Loading dose: 30–40 mcg/kg/day
Maintenance dose: 7.5–9 mcg/kg/day

2–10 yrs: Loading dose: 20–30 mcg/kg/day
Maintenance dose: 6 – 8 mcg/kg/day

> 10 yrs, BW < 100 kg): Loading dose: 8–12 mcg/kg/day
Maintenance dose: 2–3 mcg/kg/day
MAX dose: 0.25 mg daily in one or 2 divided doses

Administration

Loading dose: Administer ½ of total loading dose initially, followed by ¼ of the total loading dose every 8 to 18 hrs for 2 doses
Maintenance dose:
< 10 yrs: Give 2x daily
≥ 10 yrs: Give once daily

Doses targeting lower serum digoxin concentration doses (0.5 -0.9 ng/mL) should be considered.

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 250 mcg
  - **Solution for Injection, ampule**: 250 mcg/mL (2 mL)
  - **Elixir** (for pedia use only): 50 mcg/mL
- **CONTRAINDICATIONS**
  - Children with asymptomatic left ventricular dysfunction[4]
  - Children with asymptomatic LV dysfunction because no survival benefit was seen with Digoxin in adults with HF and low EF[6]
  - Constrictive pericarditis (unless to control atrial fibrillation or improve systolic dysfunction) | Hypertrophic cardiomyopathy | Intermittent complete heart block
- **PRECAUTIONS** Hypercalcemia, hypokalemia, hypomagnesemia, hypoxia (risk of digitalis toxicity) | Recent MI | Thyroid disease | Renal impairment
  - With cautious use in conjunction with Carvedilol and Amiodarone[4]
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Arrhythmia | Cardiac conduction disorder | Diarrhea | Dizziness | Skin reactions | Vomiting
- **COSTS**
  - 250 mcg Tablet (₱7.00)†
  - 50 mcg/mL, 60 mL Oral Elixir Bottle (₱734.80)†
  - 250 mcg/mL, 2 mL Solution for Injection Ampule (₱310.00)†

Empagliflozin

- **MOA** A reversible, and selective sodium-glucose cotransporter-2 (SGLT2) inhibitor
- **INDICATIONS AND DOSE**

T2DM and HF or at risk of CV events to reduce hospitalizations for HF, major CV events, end-stage renal dysfunction, and CV death[2,3] | Heart failure with preserved ejection fraction (HFpEF)[2]

➤ *ORAL*

Adult: 10 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 10 mg, 25 mg
- **CONTRAINDICATIONS** Diabetic ketoacidosis | Dialysis/renal replacement therapy | Hypersensitivity | Severe renal impairment | Lactation
- **PRECAUTIONS** CV diseases | Type 1 DM | eGFR <20 mL/min/1.73 m2 | Renal and severe hepatic impairment
  - Increased risk of genital mycotic infection
  - Elderly | Pregnancy
- **ADVERSE EFFECTS** Constipation | Increased risk of infection | Thirst | Micturition frequency
- **COSTS**
  - 10 mg FC Tablet (₱53.75)
  - 25 mg FC Tablet (₱55.25)

Enalapril maleate★

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

Heart failure[7,8] | For HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]

➤ *ORAL*

Adult: 2.5 mg 2x daily
Target dose: 10–20 mg 2x daily

Symptomatic children with left ventricular dysfunction[4] | Should be considered in children with asymptomatic left ventricular dysfunction[4,5] | Should not be routinely instituted for all patients with single-ventricle CHD, but could be considered in specific cases such as in situations of valve regurgitation or ventricular dysfunction[5]

➤ *ORAL*

Pediatric: 0.1–0.5 mg/kg/day divided every 12 hrs
Initiate at low end of dosing range and uptitrate every 3–10 days
MAX daily dose: 10–20 mg once or 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet** 2.5 mg, 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** History of angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitor
- **PRECAUTIONS** Renal impairment and K-sparing diuretic increase the risk of hyperkalemia
  - May exacerbate hypotension if with concomitant diuretic, hyponatremia and hypovolemia
  - Patients younger than 5 mos are more prone to experience renal dysfunction; titrate carefully
  - Avoid in breastfeeding women during first few weeks after delivery (risk of profound neonatal hypotension)
- **WARNING** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Hyperkalemia | Cough | Headache | Dizziness | Hypotension | Asthenia
- **COSTS**
  - 5 mg Tablet (₱8.70)†
  - 10 mg Tablet (₱9.82)

- 20 mg Tablet (₱12.00)†

Eplerenone

- **MOA** A selective aldosterone antagonist
- **INDICATIONS AND DOSE**

  HFrEF and NYHA class II to IV symptoms if eGFR > 30 mL/min/1.73m² and serum potassium is < 5.0 mEq/L[2] | Patients who remain symptomatic despite treatment with an ACE inhibitor and beta blocker[1] | Following acute MI complicated by LVEF < 40% with HF symptoms or DM[1] | May be considered for symptomatic patients with LVEF ≥ 50%[2]

  ➤ *ORAL*

  Adult: 25–50 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 25 mg, 50 mg
- **CONTRAINDICATIONS** Hyperkalemia | Severe renal impairment
  - Concomitant use with a strong CYP3A4 inhibitors or other K-sparing diuretics
- **PRECAUTIONS** Diabetic patient w CHF post-MI | Metabolic and respiratory acidosis
  - Moderate renal and moderate to severe hepatic impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Dizziness | Headache | Chest pain | Arrhythmia | Electrolyte imbalance | Muscle spasm | Fatigue | Gynecomastia
- **COSTS**
  - 50 mg FC Tablet (₱43.75)

Furosemide⋆

- **MOA** A potent loop diuretic inhibiting Na and Cl absorption in the proximal and distal tubules and thick ascending loop of Henle (Na/K/2Cl transporter)
- **INDICATIONS AND DOSE**

  HF with congestion or fluid retention[2] | Maintenance for patients with history of congestion[1,2]

  ➤ *ORAL*

  Adult: 20–40 mg once or 2x daily
  MAX daily dose: 600 mg

  ➤ *INTRAVENOUS*

  Adult: 20–40 mg, by slow IV, over 1 to 2 mins; may repeat 2 hrs later or increase by 20 mg; *titrate accordingly*

  Fluid retention, pulmonary congestion, or volume overload and ventricular dysfunction[4,5] | First-line therapy for pediatric acute decompensated HF[4,6]

  ➤ *ORAL*

  Pediatric: 1–2 mg/kg/dose every 6 to 24 hrs

  ➤ *INTRAVENOUS / INTRAMUSCULAR*

  Pediatric: 0.5–2 mg/kg/dose IM or slow IV, every 6 to 24 hrs

  ➤ *INTRAVENOUS*

  Pediatric:

  Continuous IV infusion 0.1–0.4 mg/kg/hr
  MAX dose: 6mg/kg/dose
  (1 mg/kg/day in **premature infants**)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg, 80 mg
  - **Solution for Injection, ampule**: 10 mg/mL (2 mL, 4 mL, 10 mL)
- **CONTRAINDICATIONS** Anuria | Renal failure | Addison's disease | Hepatic cirrhosis | Hypersensitivity to sulfonamides | Concomitant use with aminoglycosides | Lactation
- **PRECAUTIONS** DM | Hepatorenal syndrome | Renal and hepatic impairment
  - Hypoproteinemia may reduce diuretic effect and increase risk of side-effects
  - Not recommended in patients at high risk for radiocontrast nephropathy
  - Children and elderly | Pregnancy

BLACK BOX WARNING

When given in excess amounts can lead to profound diuresis with water and electrolyte depletion. Careful medical supervision is required with dosage intervals adjusted to the patient's needs.

- **ADVERSE EFFECTS** Photosensitivity | Electrolyte imbalance | Hypokalemia | Asymptomatic hyperuricemia | Nephrotoxicity | Ototoxicity | Decreased glucose tolerance | Syncope | Dehydration
- **COSTS**
  - 20 mg Tablet (₱1.90)†
  - 40 mg Tablet (₱2.50)†
  - 10 mg/mL, 2 mL Solution for Injection Ampule (₱20.00)†

Heparin sodium (unfractionated)⋆

- **MOA** A glycosaminoglycan anticoagulant targeting Xa and IIa equally, then VIIa, IXa, and XIa clotting factors

- **INDICATIONS AND DOSE**

Treatment of LV thrombus after acute MI, typically for a duration of 3 months, with follow-up imaging[9]

➤ *INTRAVENOUS / SUBCUTANEOUS*

Adult: 7500 units 3x daily

Discontinue if LVEF improves to >35% (assuming resolution of the LV thrombus) or if major bleeding occurs

With a history of thrombus or a thromboembolic event who have an EF < 25% (fractional shortening < 15%)[5] | Children with low EF and persistent of uncontrolled paroxysmal atrial fibrillation or flutter[5]

➤ *INTRAVENOUS / SUBCUTANEOUS*

Infant: Initial dose: 75–100 units/kg IV bolus over 10 mins Maintenance dose: 25–300 units/kg/hr; *Adjust to maintain aPTT of 60–85 secs*

> 1 yr: Initial dose: 75–100 units/kg IV bolus over 10 mins Maintenance dose: 18–20 units/kg/hr; *Adjust to maintain aPTT of 60–85 secs*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 5000 IU/mL, 1000 IU/mL
- **CONTRAINDICATIONS** Neonates or infants (for products containing benzyl alcohol) | Severe thrombocytopenia | Uncontrolled active bleeding
- **PRECAUTIONS** HIT / HITT | uncontrolled severe HPN | DM | Hepatic and renal impairment
  - Avoid IM use; hematomas frequently occur at injection site
  - Elderly, particular women, are at higher risk of bleeding
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity reactions | Osteoporosis (long-term doses) | Thrombocytopenia | Elevated liver enzymes | Chest pain | Chills | Rebound hyperlipidemia | Bruising
- **ANTIDOTE** **Protamine sulfate**: 1–1.5 mg of Protamine per 100 units of Heparin
- **COSTS**
  - 1000 IU/mL, 5 mL Solution for Injection Vial (₱135.00)†
  - 5000 IU/mL, 5 mL Solution for Injection Vial (₱228.07)†

Hydralazine hydrochloride⋆

- **MOA** A direct-acting peripheral vasodilator predominantly acting on the arterioles

- **INDICATIONS AND DOSE**

Used in combination with ISDN (Isosorbide dinitrate)

May be used for patients with current or previous symptomatic HFrEF who cannot be given first-line agents, such as ARNI, ACEI, or ARB, because of drug intolerance or renal insufficiency[2]

➤ *ORAL*

Adult: 25 mg 3x to 4x daily, *uptitrate if needed*
Usual maintenance: 50–75 mg 4x daily

Used in combination with ISDN

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 25 mg, 50 mg
  - **Solution for Injection, ampule**: 20 mg/mL (1 mL)
- **CONTRAINDICATIONS** High output heart failure | MI due to mechanical obstruction | CAD | RHD of the mitral valve | Severe tachycardia
- **PRECAUTIONS** Hypotension | Peripheral neuropathy | Hematologic dyscrasias | Renal and hepatic impairment
  - Avoid abrupt withdrawal
  - Use with caution in patients with pulmonary hypertension
  - May cause severe fluid retention and tachycardia
  - May provoke angina
  - May induce SLE
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Angina pectoris | Diarrhea | Dizziness | GI disorders | Lupus-like syndromes | Nasal congestion
- **COSTS**
  - 25 mg Tablet (₱18.30)
  - 20 mg/mL, 1 mL Solution for Injection Ampule (₱232.00)†

Hydrochlorothiazide⋆

- **MOA** A thiazide diuretic that affects electrolyte reabsorption at the distal convoluted tubule by inhibiting NaCl transport

- **INDICATIONS AND DOSE**

HF with congestion or fluid retention[2] | In combination with loop diuretics for AHF patients with insufficient response[1,3]

➤ *ORAL*

Adult: 25 mg once or 2x daily
MAX daily dose: 200 mg

Fluid retention, pulmonary congestion, or volume overload and ventricular dysfunction[4,5]

➤ *ORAL*

Pediatric: 1–2 mg/kg, in single or 2 divided doses daily
Infants < 6 mos: May require dose up to 3 mg/kg orally in 1 or 2 divided doses
< 2 yrs: MAX daily dose: 37.5 mg
2–12 yrs: MAX daily dose: 100 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 12.5 mg, 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Anuria | Hypersensitivity to sulfa drugs
- **PRECAUTIONS** Competitive athletes | Electrolyte disturbance | Male sexual dysfunction | Hepatic and severe renal impairment
  - Avoid exposure to UV light
  - May induce SLE
  - May exacerbate hypercholesterolemia, hyperuricemia
  - Children and elderly
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hyperuricemia | Hypotension | Phototoxicity | Vertigo | Risk of non-melanoma skin cancer (long-term use) | Metabolic alkalosis | Electrolyte imbalance | Dizziness | Hypokalemia
- **COSTS**
  - 12.5 mg Tablet (₱5.25)
  - 25 mg Tablet (₱6.45)

Imidapril hydrochloride

- **MOA** A competitive angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]
  ➤ *ORAL*
  Adult: Initially 2.5 mg, daily; Increase if necessary to 10 mg daily, at intervals of at least 3 weeks
  MAX daily dose: 20 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg
- **CONTRAINDICATIONS** Angioedema | Renal failure with or without hemodialysis | Pregnancy
- **PRECAUTIONS** Cardiac failure | IHD | Angina | Aortic or mitral valve stenosis | DM | Renal and hepatic impairment
  - Elderly | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Symptomatic hypotension with or without syncope | Dry and nonproductive cough | Hematologic effects | SJS-like symptoms
- **COSTS**
  - 5 mg Tablet (₱14.75)
  - 10 mg Tablet (₱18.75)

Iron (Ferric carboxymaltose)

- **MOA** Releases iron via a carbohydrate polymer complexed with a colloidal iron (III) hydroxide
- **INDICATIONS AND DOSE**
  HFrEF and iron deficiency with or without anemia, intravenous iron replacement is reasonable to improve functional status and QOL[2]
  ➤ *INTRAVENOUS*
  Adult: 500–1000 mg elemental Iron in 1 or 2 doses
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 50 mg/mL
- **CONTRAINDICATIONS** Hypersensitivity | Anemia not associated with Fe deficiency (microcytic anemia) | Iron overload
- **PRECAUTIONS** Hypertension | Symptomatic hypophosphatemia | Pre-existing hematologic disorders other than iron deficiency | Renal and hepatic impairment
  - Risk cannot be ruled out; Use with caution in pregnancy (2nd-3rd trimester) and lactation
  - Pregnancy category in US FDA is labelled as *not assigned;* B3 in AU TGA
- **ADVERSE EFFECTS** Erythema | Decreased phosphate level | Hypertension | Nausea | Dizziness | Headache
- **COSTS**
  - 50 mg/mL, Solution for Injection (₱118.00)

Isosorbide dinitrate★

- **MOA** A nitrate vasodilator via release of nitric oxide (NO) that stimulates guanylate cyclase
- **INDICATIONS AND DOSE**
  Used in combination with Hydralazine
  May be considered in patients with current or previous symptomatic HFrEF who cannot be given first-line agents, such as ARNI, ACEI, or ARB, because of drug intolerance or renal insufficiency[2]
  ➤ *ORAL*
  Adult:
  Used in combination with Hydralazine
  20–30 mg 3x to 4x daily
  MAX total daily dose: 120 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule:** 1 mg/mL (10 mL)
  - **Tablet**: 10 mg, 20 mg
  - **SL Tablet**: 5 mg
- **CONTRAINDICATIONS** Concomitant use with PDE5 inhibitors (Sildenafil, Tadalafil) | Hypersensitivity to nitrates
- **PRECAUTIONS** Severe hypotension | Closed-angle glaucoma | Malnutrition | Hypothyroidism | Severe renal and hepatic impairment
  - May aggravate angina caused by hypertrophic cardiomyopathy
  - Elderly | Pregnancy and lactation
- **WARNING** Avoid abrupt withdrawal
- **ADVERSE EFFECTS** Orthostatic or severe hypotension | Headache | Lightheadedness
- **COSTS**
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱540.00)†
  - 5 mg SL tablet (₱9.81)†
  - 10 mg Tablet (₱9.90)†

Ivabradine hydrochloride

- **MOA** A selective sinus node I_f inhibitor; a Hyperpolarization-activated Cyclic Nucleotide-gated (HCN) channel blocker

- **INDICATIONS AND DOSE**

Symptomatic (NYHA class II to III) stable chronic HFrEF (LVEF ≤ 35%) who are receiving GDMT, and who are in sinus rhythm with a heart rate of ≥ 70 bpm at rest[2] |
Symptomatic patients who cannot tolerate or have contraindications for β-blocker, ACEIs/ARBS, and MRA[3]

➤ *ORAL*

Adult: 5 mg 2x daily; Target dose: 7.5 mg 2x daily

Symptomatic HF > 6 mos of age[6]

➤ *ORAL*

Pediatric

> 40 kg: Starting dose is 2.5 mg 2x daily, with food

< 40 kg: Starting dose is 0.05 mg/kg, 2x daily, with food; Adjust dose every 2 wks by 0.05 mg/kg based on heart rate

6 mos to < 1yr: MAX dose: 0.2 mg/kg

> 1yr: MAX dose: 0.3 mg/kg up to a total of 7.5 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 5 mg, 7.5 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | 2nd- or 3rd-degree heart block | Severe hypotension | Sick sinus syndrome | Unstable angina | Unstable or acute HF | Severe hepatic impairment | Concomitant use with CYP3A4 inhibitors
- **PRECAUTIONS** AF | Retinitis pigmentosa | Congenital QT syndrome | Severe renal impairment
  - Consider stopping if no improvement in angina
- **ADVERSE EFFECTS** Arrhythmia | Vision disorders | Headache | Hypertension
- **COSTS**
  - 5 mg FC Tablet (₱33.81)
  - 7.5 mg FC Tablet (₱34.00)

Lisinopril

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]

➤ *ORAL*

Adult: 2.5–5 mg once daily; Target dose: 20–40 mg daily

Symptomatic children with systemic LV dysfunction[4,5] |
Asymptomatic children with systemic LV dysfunction[4,5] |
Patients with Duchenne Muscular Dystrophy[4]

➤ *ORAL*

Pediatric: 5 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitors | Angioedema | Hypersensitivity
- **PRECAUTIONS** Renal and hepatic impairment | Hematologic disturbance e.g., Agranulocytosis | Severe aortic stenosis | Hypertrophic cardiomyopathy
  - Children | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Symptomatic hypotension with or without syncope | Chest pain | Hematologic effects | Dry cough | Hyperkalemia | Dizziness | Azotemia
- **COSTS**
  - 5 mg Tablet (₱53.75)
  - 10 mg Tablet (₱67.00)
  - 20 mg Tablet (₱74.50)

Losartan potassium★

- **MOA** A competitive angiotensin-II receptor blocker
- **INDICATIONS AND DOSE**

HF with reduced ejection fraction (HFrEF) or Stage C HF[2] | May be considered as first-line therapy for long-term HFrEF therapy[1] | Chronic heart failure when ACE inhibitors are unsuitable or contra-indicated[7] | May be considered in current or previous symptomatic HFmrEF (LVEF 41–49%)[2]

➤ *ORAL*

Adult: 25–50 mg once daily
Target daily dose: 50–150 mg

Symptomatic and asymptomatic children with systemic LV dysfunction intolerant of ACEIs[4,5] | Patients with Duchenne Muscular Dystrophy[4]

➤ *ORAL*

Pediatric: 25 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Severe heart failure | Hypotension (volume- or salt-depleted patients) | Renal impairment and mild to moderate hepatic impairment
  - Hyperkalemia; concomitant use with Potassium-containing agents
  - Children and elderly | Lactation
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury or death to the developing fetus
- **ADVERSE EFFECTS** Anemia | Hypoglycemia | Postural disorders | Nasal congestion | Dizziness | Headache
- **COSTS**
  - 50 mg Tablet (₱9.00)†
  - 100 mg Tablet (₱8.50)†

Metolazone

- **MOA** A long-acting thiazide-like diuretic that blocks Na reabsorption in the distal convoluted tubules

- **INDICATIONS AND DOSE**

  Congestion for chronic HF[2] | HF and congestive symptoms (addition to loop diuretic should be reserved for patients who do not respond to moderate- or high-dose loop diuretics to minimize electrolyte abnormalities)[1,2,3]

  ➤ *ORAL*

  Adult: 2.5 mg once daily; MAX daily dose: 20 mg

  Pediatric patients with acute HF with pulmonary congestion (PCWP > 18mm)[4]

  ➤ *ORAL*

  Pediatric: 0.2–0.4 mg/kg, once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg
- **CONTRAINDICATIONS** Anuria | Hepatic coma or precoma | Known allergy or hypersensitivity
- **PRECAUTIONS** Prediabetes or diabetes | Acute porphyria | Renal and hepatic impairment
  - Concomitant use with Lithium
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Orthostatic hypotension | Electrolyte changes | Dizziness | Fatigue
- **COSTS**
  - 5 mg Tablet (₱25.85)

Metoprolol succinate

- **MOA** A selective β_1-blocker

- **INDICATIONS AND DOSE**

  Stable and symptomatic HF (NYHA functional class II to IV)[1] | Current or prior HF symptoms[1,2] | Short- and long-term rate control in patients with HF and AF[3] | Women planning pregnancy imminently, during pregnancy, or for postpartum women with severe acute HF[2] | May be considered for HFmrEF[3]

  ➤ *ORAL*

  Adult: 12.5–25 mg once daily
  MAX daily dose: 200 mg

  Symptomatic and asymptomatic children with systemic LV dysfunction[4,5]

  ➤ *ORAL*

  Pediatric (> 6 yrs): 1 mg/kg once daily; *Start at small dose and slowly uptitrate*
  MAX daily dose: 50 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet**: 23.75 (25) mg, 45.5 (50) mg, 95 (100) mg
- **CONTRAINDICATIONS** Sinus bradycardia, overt cardiac failure, cardiogenic shock, and sick sinus syndrome (without pacemaker) in patients with hypertensive and angina | 1st-degree heart block in patients with MI | Decompensated heart failure
  - Should not be used for hypertension with presence of drug-induced tachycardia for psychiatric patients taking antidepressant, antipsychotic drugs
- **PRECAUTIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery
  - May mask symptoms of hypoglycemia and thyrotoxicosis
  - Dose adjustment may be considered depending on CYP2D6 phenotype
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - 47.5 mg ER tablets (₱6.25)

Milrinone lactate

- **MOA** A phosphodiesterase-3 inhibitor resulting to positive inotropic property and vasodilator activity

- **INDICATIONS AND DOSE**

  Acute heart failure, including low output states following heart surgery[7] | Short-term treatment of severe congestive heart failure unresponsive to conventional maintenance therapy, not immediate after MI[7]

  ➤ *INTRAVENOUS*

  Adult: Initially 50 mcg/kg, given over 10 mins, followed by 375–750 nanograms/kg/min usually given ff surgery for up to 12 hrs, or in CHF for 48–72 hrs
  MAX daily dose: 1.13 mg/kg

  First-line rescue therapy for pediatric HF with inadequate perfusion[4]; for immediate postoperative period for children who underwent cardiac bypass; for patients with stable chronic HF | Symptomatic relief in the palliative setting[5]

  ➤ *INTRAVENOUS*

  Neonate: Initially 50–75 mcg/kg given over 30–60 mins, reduce or omit initial dose if at risk of hypotension, then 0.5–0.75 mcg/kg/min, by continuous IV infusion, for 2–3 days

  Child: Initially 50–75 mcg/kg given over 30–60 mins, reduce or omit initial dose if at risk of hypotension, then 0.5–0.75 mcg/kg/min, by continuous IV infusion, for 2–3 days (usually for 12 hrs after cardiac surgery)

  Safety and efficacy not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Concentrate solution for Injection, ampule/vial**: 1 mg/mL (10 mL)
- **CONTRAINDICATIONS** Severe hypovolemia
- **PRECAUTIONS** Correct hypokalemia; increased risk of arrhythmia in digitalized patients
  - Heart failure associated with hypertrophic cardiomyopathy

- **ADVERSE EFFECTS** Supraventricular arrhythmia | Hypotension | Headache

Nebivolol hydrochloride

- **MOA** A long-acting cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

  Long-term rate control in patients with HF and AF[3] | May be considered for HFmrEF[3] or for HFpEF[1]

  ➤ *ORAL*

  Adult: 1.25 mg orally once daily; uptitrate and adjust every 1 to 2 weeks to reach a target dose of 10 mg once daily over a MAX of 16 weeks if tolerated
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Severe bradycardia | 2nd and 3rd degree AV block | Cardiogenic shock | Sick sinus syndrome without permanent pacemaker | Severe hepatic impairment
- **PRECAUTIONS** Bronchospastic disease | DM | Hyperthyroidism | Severe renal and hepatic impairment
  - Avoid abrupt withdrawal, especially in CAD patients
  - Pre-treatment with alpha-blockers is recommended for patients with known or suspected pheochromocytoma
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Edema | Postural hypertension | GI symptoms | Dizziness | Headache
- **COSTS**
  - 2.5 mg Tablet (₱13.25)
  - 5 mg Tablet (₱20.95)

Nitroglycerin⋆

(Glyceryl trinitrate)

- **MOA** A nitrate vasodilator via release of nitric oxide
- **INDICATIONS AND DOSE**

  Congestive heart failure[7] | Acute heart failure with a significant myocardial volume load[4] | Acute heart failure in the absence of hypotension[4]

  ➤ *INTRAVENOUS*

  Adult

  via Non-absorptive infusion tubing Initial 5 mcg/min IV, titrate based on response at intervals of 3–5 mins
  MAX: 10–20 mcg/min

  via PVC infusion tubing Initial 25 mcg/min, *titrate based on patient response*

  Pediatric: Initial 0.25–0.5 mcg/kg/min; may increase by 0.5–1 mcg/kg/min every 3–5 mins as needed
  Usual dose: 1–5 mcg/kg/min
  MAX dose: 20 mcg/kg/min
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule**: 1 mg/mL (10 mL)
- **CONTRAINDICATIONS** Hypertrophic obstructive cardiomyopathy | Acute circulatory failure or shock | Allergy to corn or corn products | Increased intracranial pressure | Severe anemia | Pericardial effusion with tamponade | Concomitant use with PDE-5 inhibitor
- **PRECAUTIONS** Withdrawal symptoms | Overt or subclinical DM | Severe renal and hepatic impairment
  - Tolerance may occur with excessive use
  - Marked hypotension with calcium channel blocker use and beta blockers
  - Elderly | Pregnancy and lactation
- **WARNING** May interfere with anticoagulant at high doses
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱440.00)†

Perindopril

(as Perinodpril arginine and Perindopril erbumine)

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  Adjunct use for symptomatic heart failure under close medical supervision[7] | **For HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]**

  ➤ *ORAL*

  Adult

  Perindopril arginine 2.5 mg once daily for 2 wks, then increase if tolerated to 5 mg once daily

  Perindopril erbumine 2 mg once daily for at least 2 wks
  Target daily dose: 8–16 mg

  Patients with Duchenne Muscular Dystrophy[4] | Symptomatic children with systemic LV dysfunction[4,5] | Asymptomatic children with systemic LV dysfunction[4,5]

  ➤ *ORAL*

  Pediatric

  Perindopril erbumine 2–4 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - *Perindopril arginine*
    FC Tablets: 2.5 mg, 5 mg, 10 mg
  - *Perindopril erbumine*
    Tablet: 2 mg, 4 mg, 8 mg
- **CONTRAINDICATIONS** Angioedema | Bilateral or unilateral renal stenosis | Pregnancy and lactation | Concomitant use with neprilysin inhibitor
- **PRECAUTIONS** Severe congestive heart failure | Hyperkalemia | Renal and hepatic impairment
  - Increased risk of angioedema in black patients
  - Concomitant use with Potassium-containing agents, NSAIDs | Elderly

- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hyperkalemia | Muscle cramps | Headache | Visual impairment | Cough
- **COSTS**

Perindopril arginine
- 5 mg FC Tablet (₱33.00)
- 10 mg FC Tablet (₱56.00)

Quinapril hydrochloride

- **MOA** An angiotensin converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]

➤ *ORAL*

Adult: 5 mg 2x daily
Target dose: 20 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg, 40 mg
- **CONTRAINDICATIONS** Angioedema | Concomitant use with neprilysin inhibitors | Pregnancy
  - **PRECAUTIONS** Diarrhea | Agranulocytosis | Unilateral or bilateral renal artery stenosis | Renal and hepatic impairment | Lactation
  - Increased risk of angioedema in black patients
  - Risk of profound neonatal hypotension
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Chest pain | Dizziness | Elevated BUN and serum creatinine | Cough | Fatigue
- **COSTS**
  - 10 mg Tablet (₱20.00)
  - 20 mg Tablet (₱33.40)

Ramipril

- **MOA** An angiotensin converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

HFrEF (Stage C HF) and for patients with current or prior chronic HF symptoms[1,2]

➤ *ORAL*

Adult: 1.25–2.5 mg, once daily
MAX daily dose: 10 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1.25 mg, 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitors | History of angioedema | renal artery stenosis | Pregnancy and lactation
- **PRECAUTIONS** Renal and hepatic impairment | Reduction in RBC and hemoglobin | Hyperkalemia in patients with renal dysfunction
  - Increased risk of angioedema in black patients
  - Elderly
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Asthenia | Headache | Dizziness | Cough | Fatigue | GI disorder
- **COSTS**
  - 2.5 mg Tablet (₱13.50)
  - 5 mg Tablet (₱15.60)
  - 10 mg Tablet (₱23.20)

Sacubitril + Valsartan⋆

- **MOA** A combination of neprilysin inhibitor and angiotensin receptor blocker
- **INDICATIONS AND DOSE**

HFrEF and NYHA class II to III symptoms[2] | May be considered in symptomatic heart failure with LVEF ≥ 50%[2]

➤ *ORAL*

Adult: 50 mg 2x daily
Target dose: 200 mg 2x daily

Stable symptomatic HF due to dilated cardiomyopathy in children 1 yr and older[4,6]

➤ *ORAL*

Pediatric
40–50 kg: 1.6 mg/kg or 50 mg once daily
> 50 kg: 100 mg once daily

Safety and efficacy not established in pediatric population by the local FDA

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 50 mg, 100 mg, 200 mg
- **CONTRAINDICATIONS** Concomitant use with an ACEIs | SBP < 100 mmHg | History of angioedema, hereditary or idiopathic | Severe hepatic impairment
- **PRECAUTIONS** Hypotension | Moderate to severe renal impairment | Moderate hepatic impairment
  - Must not be administered until at least 36 hours after discontinuation of ACEIs
  - Lactation
- **WARNING** Restricted for patients with symptomatic HFrEF and for those who have been on stable doses of ACE inhibitors and/or ARBs but remain symptomatic
- **ADVERSE EFFECTS** Anemia | Asthenia | Cough | Diarrhea | Dizziness | Electrolyte imbalance | Gastritis | Headache | Hypoglycemia | Hypotension
- **COSTS**
  - 50 mg Tablet, 24.3 mg + 25.7 mg (₱55.24)†
  - 100 mg Tablet, 48.6 mg + 51.4 mg (₱55.24)†
  - 200 mg Tablet, 97.2 mg + 102.8 mg (₱55.24)†

Spironolactone⋆

- **MOA** A renal competitive aldosterone antagonist that acts as a potassium-sparing diuretic

- **INDICATIONS AND DOSE**

HFrEF and NYHA class II to IV symptoms if eGFR is > 30 mL/min/1.73m² and serum potassium is < 5.0 mEq/L[2] | Remain symptomatic despite treatment with an ACE inhibitor and beta blocker[1] | Following acute MI complicated by LVEF < 40% with HF symptoms or DM[1] | May be considered for symptomatic patients with LVEF ≥ 50%[2]

➤ *ORAL*

Adult: 12.5–25 mg once daily
Target daily dose: 25–50 mg

Edema in heart failure[10] | Children with systemic LV dysfunction[4,5]

➤ *ORAL*

Neonate: Initially 1–2 mg/kg daily in 1–2 divided doses;
increase if necessary up to 7 mg/kg daily
Child 1 mo – 11 yrs: Initially 1–3 mg/kg daily in 1–2 divided doses; increase if necessary up to 9 mg/kg daily
Child 12–17 yrs: Initially 50–100 mg daily in 1–2 divided doses; increase if necessary up to 9 mg/kg daily
MAX daily dose: 400 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg, 100 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Addison's disease | Anuria | Hyperkalemia | Severe renal impairment | Concomitant use with Eplerenone, and K supplements | Lactation
- **PRECAUTIONS** Acute porphyria | Acute renal insufficiency | Hyperuricemia | Hyperglycemia and electrolyte disturbance | Metabolic acidosis | Renal and hepatic impairment
  - Children and elderly | Pregnancy
- **ADVERSE EFFECTS** Gynecomastia | Diarrhea | Confusion | Menstrual changes | Erectile dysfunction | Ataxia | Electrolyte imbalance
- **COSTS**
  - 25 mg Tablet (₱145.00)†
  - 50 mg Tablet (₱27.46)†
  - 100 mg Tablet (₱34.41)†

Tolvaptan⋆

- **MOA** A selective vasopressin V2-receptor antagonist

- **INDICATIONS AND DOSE**

Acute management of volume overload to decrease congestion while maintaining serum sodium[2]

➤ *ORAL*

Adult: 15 mg once daily; MAX daily dose: 30 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 15 mg, 30 mg
- **CONTRAINDICATIONS** Significant liver impairment or injury (excluding uncomplicated polycystic liver disease) | Anuria | Hyponatremia
- **PRECAUTIONS** Concomitant use with moderate CYP3A4 inhibitors | Dehydration | Hyperkalemia | Hepatic and renal impairment
  - Pregnancy and lactation

BLACK BOX WARNING

Risk of serious and potentially fatal liver injury

- **ADVERSE EFFECTS** Polydipsia | Polyuria | Diarrhea | Elevated serum bilirubin and liver enzymes
- **COSTS**
  - 15 mg Tablet (₱607.20)†

Valsartan⋆

- **MOA** An angiotensin II receptor blocker

- **INDICATIONS AND DOSE**

HF with reduced ejection fraction (HFrEF) or Stage C HF[2] | May be considered as first-line therapy for long-term HFrEF therapy[1] | May be considered in current or previous symptomatic HFmrEF (LVEF 41–49%)[2] | May be considered in symptomatic heart failure with LVEF ≥ 50%[2]

➤ *ORAL*

Adult: 20–40 mg, once daily
Target dose: 160 mg, 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 40 mg, 80 mg, 160 mg, 320 mg also available as film-coated tablet
  - **Capsule**: 80 mg, 160 mg
- **CONTRAINDICATIONS** Biliary cirrhosis | Cholestasis | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Renal impairment and mild to moderate hepatic impairment | Hyperkalemia in patients with renal dysfunction | Symptomatic hypotension (patients with HF or post-MI)
  - Children | Lactation
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Dizziness | Hypotension | Headache | Elevated serum BUN, creatinine | Cough
- **COSTS**
  - 80 mg FC Tablet (₱11.64)†
  - 160 mg FC Tablet (₱22.00)†

Warfarin sodium⋆

- **MOA** An anticoagulant; Vitamin K antagonist

- **INDICATIONS AND DOSE**

Treatment of LV thrombus after acute MI, typically for a duration of 3 months, with follow-up imaging[9]

➤ *ORAL*

Adult: *To target INR 2–3*

History of thrombus or a thromboembolic event who have an EF < 25% (fractional shortening < 15%)[5] | Children with low EF and persistent of uncontrolled paroxysmal atrial fibrillation or flutter[5]

➤ *ORAL*

Neonate: Initial dose: 200 mcg/kg/dose
Subsequent dose: 100 mcg/kg, once daily for 3 days
Adjust dose to target INR of 2–3

Check Chapter on Arrhythmia for the pediatric dosing of Warfarin sodium

Not licensed for children use; must be initiated under specialist supervision

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg, 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Malignant hypertension | Recent or potential surgery
  - Pregnancy, except in pregnant women with mechanical heart valves, who are at high risk of thromboembolism
  - Concomitant use with Amiodarone, Ciprofloxacin, Macrolides, NSAIDs, fibrinolytics
- **PRECAUTIONS** Vitamin K deficiency | Hepatic and renal impairment | HIT
  - Postpartum (delay Warfarin until risk of bleeding is low; 5 – 7 days after delivery)
  - CYP2C9 and VKORC1 genetic variation influences patient response to initial and maintenance therapy and increases risk of bleeding
  - Elderly | Lactation

BLACK BOX WARNING

Warfarin can cause major or fatal bleeding. Instruct patients about preventive measures to minimize risk of bleeding and to report signs and symptoms of bleeding.

- **ADVERSE EFFECTS** Abnormal hepatic function | Calciphylaxis | Alopecia | Acute kidney injury | Hypersensitivity reactions
- **ANTIDOTE** **Vitamin K**
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00

Table 5. Available Fixed-Dose Combinations for Heart Failure

DRUG COMBINATION	PREPARATION	DOSE
Carvedilol + Ivabradine	**FC Tablet** (Carvedilol/Ivabradine): 6.25 mg/5 mg (₱26.00) 6.25 mg/7.5 mg 12.5 mg/5 mg (₱38.00) 12.5 mg/7.5 mg 25 mg/5 mg (₱40.00) 25 mg/7.5 mg	➤ *ORAL* **Adult:** 1 tab 2x daily
Metoprolol tartrate + Ivabradine	**Tablet** (Metoprolol/Ivabradine) 25 mg/5 mg (₱60.04) 50 mg/5 mg (₱62.95)	➤ *ORAL* **Adult:** 1 tab 2x daily

REFERENCES

[1] van der Meer P, Gaggin HK, Dec GW. ACC/AHA versus ESC guidelines on heart failure. *Journal of the American College of Cardiology*. 2019;73(21):2756-2768. doi:10.1016/j.jacc.2019.03.478

[2] Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: A report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;145(18). doi:10.1161/cir.0000000000001063

[3] McDonagh TA, Metra M, Adamo M, et al. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *European Journal of Heart Failure*. 2022;24(1):4-131. doi:10.1002/ejhf.2333

[4] Ahmed H, Vanderpluym C. Medical management of pediatric heart failure. 2021;11(I):323-335. doi:10.21037/cdt-20-358

[5] Kirk R, Dipchand AI, Rosenthal DN, et al. The International Society for Heart and lung transplantation guidelines for the management of pediatric heart failure: Executive summary. *The Journal of Heart and Lung Transplantation*. 2014;33(9):888-909. doi:10.1016/j.healun.2014.06.002

[6] Loss KL, Shaddy RE, Kantor PF. Recent and Upcoming Drug Therapies for Pediatric Heart Failure. 2021;9(November):1-13. doi:10.3389/fped.2021.681224

[7] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[8] Formulary Executive Council. *Philippine National Formulary.* 8th ed. Department of Health; 2019

[9] Levine GN, McEvoy JW, Fang JC, et al. Management of patients at risk for and with left ventricular thrombus: A scientific statement from the American Heart Association. *Circulation*. 2022;146(15). doi:10.1161/cir.0000000000001092

[10] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.

7 DRUGS FOR Hypertension

Amlodipine*

(as Amlodipine besylate / Amlodipine camsylate)

- **MOA** A long-acting dihydropyridine-type calcium-channel blocker

- **INDICATIONS AND DOSE**

Uncomplicated hypertension as monotherapy or combination with ACEIs, ARBs, or Thiazide/Thiazide-like diuretics[1] | Initial hypertensive treatment in black patients[2] | Initial therapy in combination with RAS blocker for hypertensive patients with T2DM and/or CKD[2] | Patients with symptomatic angina[2]

➤ *ORAL*

Adult: 5 mg once daily; MAX daily dose: 10 mg

May be used as initial treatment for children 1–13 years[3,4] | For children with hypertension and migraine or where hypertension persisted after coarctation repair[5] | Consider for adolescents of childbearing potential

➤ *ORAL*

Pediatric

1–5 yrs: Initially at 0.1 mg/kg once daily; Increase if necessary to 0.6 mg/kg;
MAX daily dose: 5 mg

≥ 6 yrs: Initially at 2.5 mg/kg once daily;
MAX daily dose: 10 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 2.5 mg, 5 mg, 10 mg
  - **Oral solution:** 5 mg/mL
  - **Extemporaneous liquid:** 1 mg/mL
- **CONTRAINDICATIONS** Cardiogenic shock | Unstable angina | Hypotension | Significant aortic stenosis | Recent MI with heart failure or poor LV function
- **PRECAUTIONS** Severe hepatic impairment | CHF
  - Concurrent use with Sildenafil
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Angioedema (severe) | Headache | Fatigue | Palpitations | Dizziness | GI disorders | Rash | Muscle cramps | Sleep disturbances | Flushing
- **COSTS**
  - 5 mg Tablet (₱3.00)†
  - 10 mg Tablet (₱4.80)†

Atenolol*

- **MOA** A long-acting selective β_1 blocker

- **INDICATIONS AND DOSE**

Hypertension, alone or in combination with other agents[6] | Initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and if pregnant women[4,7] | As first-line agent when the hypertensive patient has IHD or HF[1]

Cardioselective beta blockers are preferred in patients with bronchospastic airway disease requiring a beta blocker

➤ *ORAL*

Adult: 25–100 mg in 2 divided doses daily

In combination with Chorthalidone

For monogenic hypertension like apparent mineralocorticoid Gordon syndrome (adult/child)

➤ *ORAL*

Adult: 1 tab (50 mg/12.5 mg Atenolol/Chlorthalidone) once daily
MAX daily dose: 100 mg Atenolol and 25 mg Chlorthalidone

For children with hypertension and migraine or where hypertension persisted after coarctation repair[5] | Consider for adolescents of childbearing potential[8]

➤ *ORAL*

Pediatric (1–17 yrs): Initially 0.5 mg/kg/day in 1–2 divided doses
MAX daily dose: 2 mg/kg/day up to 100 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg
- **CONTRAINDICATIONS** Sinus bradycardia | Cardiogenic shock | Metabolic acidosis | 2nd- or 3rd-degree heart block | Severe peripheral arterial diseases | Sick sinus syndrome | Uncontrolled heart failure | Untreated pheochromocytoma | Competitive athletes
- **PRECAUTIONS** May mask symptoms of hypoglycemia
  - Abrupt withdrawal may precipitate thyroid storm
  - Renal impairment
  - Elderly | Pregnancy and lactation

BLACK BOX WARNING

Abrupt withdrawal may exacerbate angina pectoris and trigger MI or ventricular arrhythmia.

- **ADVERSE EFFECTS** Fatigue | Bradyarrhythmia | Bronchospasm | Hypotension | GI disorder | Cold extremity | Depression
- **COSTS**
  - 50 mg Tablet (₱5.50)†
  - 100 mg Tablet (₱18.25)

Benazepril hydrochloride

- **MOA** An angiotensin converting enzyme (ACE) inhibitor

- **INDICATIONS AND DOSE**

HFpEF, stable IHD, hypertension, and persistent hypertension after management of volume overload[1]

➤ *ORAL*

Adult: 10–40 mg daily in 1 or 2 divided doses

Initial prescription of children ≥ 6 yrs with chronic hypertension[3] | First-line agent for a child with hypertension associated with diabetes mellitus and microalbuminuria, or with CKD and proteinuria[5] | Suggested as first-line agent for children with obesity-linked hypertension[5]

➤ *ORAL*

Pediatric: 0.2–0.6 mg/kg (10–40 mg) once daily
MAX daily dose: 40 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 10 mg
  - **Extemporaneous liquid:** 2 mg/mL
- **CONTRAINDICATIONS** Angioedema | Concomitant use with ARBs, or neprilysin inhibitor
- **PRECAUTIONS** CHF | IHD | Bilateral renal artery stenosis | DM | ascites | Renal and hepatic impairment
  - Use not recommended in pediatric patients under 6 years of age
  - Elderly | Lactation
- **WARNINGS** Discontinue as soon as pregnancy is detected; Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus.
- **ADVERSE EFFECTS** Cough | Dizziness | Headache | Fatigue

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1 blocker
- **INDICATIONS AND DOSE**

Resistant hypertension if intolerant to spironolactone | Initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and pregnant women; and for those with congestive heart failure, along with beta-blockers Carvedilol, Metoprolol succinate, and Nebivolol[1,4]

➤ *ORAL*

Adult: 5–10 mg once daily; MAX daily dose: 20 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS** DM | History or recent psoriasis | Thyrotoxicosis | Hepatic and renal impairment
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Bumetanide⋆

- **MOA** A short- and rapid-acting loop diuretic
- **INDICATIONS AND DOSE**

Edema secondary to heart failure or hepatic or renal disease, including nephrotic syndrome[9] | Preferred diuretics in patients with symptomatic HF; preferred over thiazides in patients with moderate-to-severe CKD (e.g., GFR < 30 mL/min)[1]

➤ *ORAL*

Adult: 0.5–2 mg in 1 or 2 divided doses daily

Hypertension due to volume overload[7]

➤ *ORAL*

Adult: 0.5–2 mg/dose once or 2x daily

➤ *INTRAVENOUS / INTRAMUSCULAR*

Adult: 0.5–1 mg over 1–2 mins; May give additional doses every 2 to 3 hrs as needed

➤ *ORAL / INTRAVENOUS / INTRAMUSCULAR (PO/IV/IM)*

Pediatric

≤ 6 mos: 0.01 – 0.05 mg/kg/dose once daily or every other day

> 6 mos: 0.015 – 0.1 mg/kg/dose once or 4x daily

MAX daily dose: 10 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 1 mg, 5 mg
  - **Oral solution:** 1 mg/5mL
  - **Solution for Injection, ampule/vial:** 500 mcg/mL (4 mL)
- **CONTRAINDICATIONS** Anuria | Hepatic coma | Severe electrolyte depletion | Hypersensitivity to bumetanide | Concomitant use with Lithium, Indomethacin, Aminoglycosides, and other ototoxic or nephrotoxic agents
- **PRECAUTIONS** Patient with sulfonamide allergy | Renal and hepatic impairment | Lactation
  - Pregnancy: Bumetanide should not be used to treat gestational hypertension because of the maternal hypovolemia associated with this condition

BLACK BOX WARNING

If given in excess amounts can lead to profound diuresis with water and electrolyte depletion.

- **ADVERSE EFFECTS** Dehydration | Hypotension | Skin reactions | Hyperuricemia | Hypochloremia | Hypokalemia | Azotemia
- **COSTS**
  - 1 mg Tablet (₱20.85)

Candesartan cilexetil

- **MOA** An angiotensin-receptor blocker

- **INDICATIONS AND DOSE**

HFpEF, stable IHD, and hypertension, and persistent hypertension after management of volume overload[1]

➤ *ORAL*

Adult: Initially 8 mg once daily, *uptitrate at intervals of 4 weeks*
MAX daily dose: 32 mg

Hypertension with intravascular volume depletion[10]

➤ *ORAL*

Adult: Initially 4 mg once daily, *uptitrate at intervals of 4 weeks*
MAX daily dose: 32 mg

Initial prescription of children with chronic hypertension[3] | First-line agent for a child with hypertension associated with diabetes mellitus and microalbuminuria, or with CKD and proteinuria[5] | Suggested as first-line agent for children with obesity-linked hypertension[5]

➤ *ORAL*

Pediatric

1–6 yrs: Initially 0.2 mg/kg once or 2x daily (up to 4 mg)
MAX daily dose: 0.4 mg/kg (up to 16 mg)

≥ 6 yrs

<50 kg: 4 mg once or 2x daily (up to 16 mg)
≥ 50kg: 8 mg once or 2x daily (up to 32)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 4 mg, 8 mg, 16 mg, 32 mg
  - **Extemporaneous liquid:** 1 mg/mL
- **CONTRAINDICATIONS** Cholestasis | Severe hepatic impairment | Children < 1 yr | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | Angioedema | Primary hyperaldosteronism
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Increased risk of infection | Flushing | Fatigue | GI symptoms
- **COSTS**
  - 8 mg Tablet (₱25.89)
  - 16 mg Tablet (₱34.00)

Captopril⋆

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor

- **INDICATIONS AND DOSE**

Uncomplicated hypertension as monotherapy or combination with CCBs or Thiazide/Thiazide-like diuretics[4] | Stable IHD and hypertension[1]

➤ *ORAL*

Adult

< 65 yrs: Initially 12.5–25 mg 2x daily
≥ 65 yrs: Initially 6.25 mg 2x daily

Uptitrate at 2-wk intervals
MAX daily dose: 150 mg in 2 divided doses

Essential hypertension if used in volume depletion, cardiac decompensation, or renovascular hypertension[10] | Management of mild-to-moderate essential hypertension (alone, or with thiazide-diuretic therapy) and severe hypertension resistant to other treatment[6]

➤ *ORAL*

Adult: 6.25–12.5 mg once or 2x daily
Uptitrate at 2-wk intervals
MAX daily dose: 100 mg in 1–2 divided doses

May be used as initial treatment for children 1–13 years[4] | Initial prescription of infants and children with chronic hypertension[3] | First-line agent for a child with hypertension associated with diabetes mellitus and microalbuminuria, or with CKD and proteinuria[4,5] | Suggested as first-line agent for children with obesity-linked hypertension[5] | For pediatric hypertensive emergencies and urgencies[5]

➤ *ORAL*

Pediatric

< 1 mo: 10–50 mcg/kg 2x to 3x daily;
MAX daily dose: 2 mg/kg in divided doses
< 1 yr: 0.05 mg/kg/dose 1 to 4x daily;
MAX daily dose: 6 mg/kg
1–17 yrs: 0.3 - 0.5 mg/kg/dose 3x daily;
MAX daily dose: 6 mg/kg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitors
- **PRECAUTIONS** Renal and hepatic impairment | Significant hyperkalemia
  - Concomitant use with lithium
  - Children and elderly
  - Pregnancy (1st trimester) and lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Rash | Hyperkalemia | Taste disorder | Insomnia | Peptic ulcer | Dry cough | Angioedema
- **COSTS**
  - 25 mg Tablet (₱3.00)†
  - 50 mg Tablet (₱12.00)

Carvedilol★

- **MOA** A non-selective β-blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity

- **INDICATIONS AND DOSE**

  Initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and pregnant women; and for those with congestive heart failure, along with beta-blockers Bisoprolol, Metoprolol succinate, and Nebivolol[4] | Hypertensive patients with HFrEF[1]

  ➤ *ORAL*

  Adult: 12.5 mg once daily for 2 days; then increased to 25 mg once daily
  MAX daily dose: 50 mg in single or divided doses

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 6.25 mg, 12.5 mg, 25 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block | Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema) | Severe hepatic impairment
- **PRECAUTIONS** May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
  - Patients with peripheral vascular disease
  - May worsen renal function in heart failure patients
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 6.25 mg FC Tablet (₱8.75)
  - 12.5 mg Tablet (₱10.50)
  - 12.5 mg FC Tablet (₱12.32)
  - 25 mg Tablet (₱7.26)†
  - 25 mg FC Tablet (₱14.00)

Clonidine hydrochloride★

- **MOA** A selective α_2-adrenoceptor agonist

- **INDICATIONS AND DOSE**

  Alternative for spironolactone as 4th line agent for resistant hypertension in those whose serum potassium is < 4.5 mmol/L and whose eGFR is > 45 mL/min/1.73m² to achieve BP targets[7] | Hypertension as monotherapy or used concomitantly with other antihypertensive agents[6]

  ➤ *ORAL*

  Adult: 10–80 mcg daily in 2 divided doses

  Hypertensive urgencies[6]

  ➤ *INTRAVENOUS*

  Adult: 150–300 mcg, given via slow IV injection, over 10–15 mins; dose may be repeated up to MAX 750 mg over 24 hrs

  Useful for severely hypertensive children and adolescents with less significant symptoms[3,5]

  ➤ *ORAL*

  Pediatric: 2–5 mcg/kg per dose up to 10 mcg/kg per dose given every 6–8 hrs; MAX daily dose: 1.2 mg

  ➤ *SLOW IV INJECTION*

  Pediatric: 2–6 mcg/kg for 1 dose; MAX per dose: 300 mcg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 75 mcg, 150 mcg
  - **Solution for Injection, ampule:** 150 mcg/mL
- **CONTRAINDICATIONS** Bradyarrhythmia secondary to second- or third- degree AV block or sick sinus syndrome | Active bleeding | Concomitant use with anticoagulant agents
- **PRECAUTIONS** Cerebrovascular effects particularly in elderly | Heart failure | Depression | Raynaud's syndrome or other occlusive peripheral vascular disease | Renal impairment
  - Avoid abrupt cessation which may induce hypertensive crisis
  - Must be tapered to avoid rebound hypertension
  - Children | Pregnancy and lactation
- **ADVERSE EFFECTS** Hypotension | GI symptoms | Drowsiness/somnolence | Fatigue | Dry mouth | Dizziness | Headache
- **COSTS**
  - 75 mcg Tablet (₱52.50)†
  - 150 mcg Tablet (₱13.09)†
  - 150 mcg/mL, 1 mL Solution for Injection Ampule (₱183.15)†

Diltiazem hydrochloride★

- **MOA** A non-dihydropyridine calcium-channel blocker

- **INDICATIONS AND DOSE**

  Mild to moderate hypertension[10] | Hypertensive patients with high ventricular rate and AF[2]

  ➤ *ORAL*

  Adult

  Extended-release tablet 120–360 mg once daily
  MAX daily dose: 540 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 30 mg, 60 mg, 90 mg
  - **MR Capsule/Tablet:** 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block | Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS** Severe bradycardia | 1st degree AV block | Significantly impaired left ventricular function | Hepatic and renal impairment
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers

- Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | Constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 30 mg Tablet (₱18.00)
  - 60 mg Tablet (₱18.50)†
  - 90 mg Tablet (₱84.25)

Enalapril maleate⋆

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  Stable IHD and hypertension[1]

  ➤ *ORAL*

  Adult: 5–40 mg daily in a single or 2 divided doses

  Initial treatment for children 1–13 yrs[4] | First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[4,5] | Initial prescription of infants ≥ 1 mo[3] | Suggested as first-line agent for children with obesity-linked hypertension[5]

  ➤ *ORAL*

  Pediatric: 0.08 mg/kg once or 2x daily (up to 5 mg)
  MAX daily dose: 0.6 mg/kg (up to 40 mg)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 5 mg, 10 mg, 20 mg
  - **Oral Solution:** 1 mg/mL
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitor | History of angioedema | Bilateral renal artery stenosis
- **PRECAUTIONS** Renal impairment and K-sparing diuretic increase the risk of hyperkalemia
  - May exacerbate hypotension if with concomitant diuretic, hyponatremia and hypovolemia
  - Patients younger than 5 mos are more prone to experience renal dysfunction; titrate carefully
  - Avoid in breastfeeding women during first few weeks after delivery (risk of profound neonatal hypotension)
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Hyperkalemia | Cough | Headache | Dizziness | Hypotension | Asthenia
- **COSTS**
  - 5 mg Tablet (₱8.70)†
  - 10 mg Tablet (₱9.82)
  - 20 mg Tablet (₱12.00)†

Eplerenone

- **MOA** A selective aldosterone antagonist by binding to the mineralocorticoid receptor. Virtually inactive on androgen or progesterone receptors compared to Spironolactone
- **INDICATIONS AND DOSE**

  CKD patients with resistant hypertension not meeting blood pressure targets[4] | Appropriate therapy for monogenic hypertension like apparent mineralocorticoid excess disorder and congenital adrenal hyperplasia[5]

  ➤ *ORAL*

  Adult: 50–100 mg daily in a single or 2 divided doses
  Titration preferably within 4 weeks; adjust based on serum potassium levels
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 25 mg, 50 mg
- **CONTRAINDICATIONS** Hyperkalemia | Severe renal impairment | Concomitant use with a strong CYP3A4 inhibitors or other K-sparing diuretics
- **PRECAUTIONS** Diabetic patient w CHF post-MI | Metabolic and respiratory acidosis
  - Moderate renal and moderate to severe hepatic impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Dizziness | Headache | Chest pain | Arrhythmia | Electrolyte imbalance | Muscle spasm | Fatigue | Gynecomastia
- **COSTS**
  - 50 mg FC Tablet (₱43.75)

Eprosartan mesylate

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Stable IHD and hypertension[1] | HFpEF and persistent hypertension after management of volume overload[1]

  ➤ *ORAL*

  Adult: 600–800 mg daily in single or 2 divided doses
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 600 mg
- **CONTRAINDICATIONS** Bilateral renal artery stenosis | Severe hepatic impairment | Concomitant use with ACEIs in patients with diabetic nephropathy
- **PRECAUTIONS** Severe CHF | DM | Renal and mild to moderate hepatic impairment
  - Concomitant use with Lithium (Li) is not generally recommended due to increased risk of Li toxicity
  - Elderly | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible.
- **ADVERSE EFFECTS** Cough and respiratory infection | Myalgia | Fatigue | Abdominal pain
- **COSTS**
  - 600 mg FC Tablet (₱41.00)

Esmolol hydrochloride★

- **MOA** A short-acting cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

  First line treatment for hypertensive emergencies requiring immediate BP lowering presented as Acute Aortic Disease e.g., aortic dissection[2,7] | Alternative drug treatment for severe hypertension (BP > 170 mmHg systolic and/ or > 110 mmHg diastolic) in pregnant women[7]

  Cardioselective beta blockers are preferred in patients with bronchospastic airway disease requiring a beta blocker

  ➤ *INTRAVENOUS*

  Adult: Loading dose 500–1000 mcg/kg/min, by IV bolus, over 1 min; followed by a 50 mcg/kg/min IV infusion;
  If necessary, the bolus dose is repeated, and the infusion increased in 50 mcg/kg/min increments as needed
  MAX: 200 mcg/kg/min

  Severely hypertensive children and adolescents with life-threatening symptoms[3,5]

  ➤ *INTRAVENOUS*

  Pediatric: Loading dose 100–500 mcg/kg/min, then maintain at 50–250 mcg/kg/min;
  Uptitrate by 50–100 mcg/kg/min every 5–10 mins

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial:** 10 mg/mL (10 mL, 250 mL), 100 mg/mL (10 mL)
- **CONTRAINDICATIONS** Cardiogenic shock | Decompensated heart failure | Pulmonary hypertension | 2nd- or 3rd-degree AV block | Sick sinus syndrome | Severe sinus bradycardia | Concomitant use with IV CCB
- **PRECAUTIONS** Avoid infusion into small veins or use of butterfly catheters
  - Abrupt withdrawal may precipitate thyrotoxicosis
  - Sudden discontinuation may exacerbate angina
  - Renal impairment
  - Elderly | Pregnancy and lactation
  - Pediatric: Profound bradycardia
- **ADVERSE EFFECTS** Hypotension | Profound bradycardia | Decreased appetite | Drowsiness | Sweating | Headache | Fatigue | Dizziness | Anxiety
- **COSTS**
  - 10 mg/mL, 10 mL Solution for Injection Vial (₱410.30)†
  - 100 mg/mL, 10 mL Solution for Injection Vial (₱475.20)†

Felodipine★

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**

  Initial hypertensive treatment in black patients[2] | Initial therapy in combination with RAS blocker for hypertensive patients with T2DM and/or CKD[2] | Symptomatic angina[2]

  ➤ *ORAL*

  Adult: 2.5–10 mg once daily

  Initial prescription of children ≥ 6 yrs with chronic hypertension[3] | For children with hypertension and migraine or where hypertension persisted after coarctation repair[5]

  ➤ *ORAL*

  Pediatric: 2.5–10 mg, once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablet:** 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Cardiac outflow obstruction | Significant cardiac valvular obstruction | Unstable angina | Recent MI | Pregnancy
- **PRECAUTIONS** Predisposition to reflex tachycardia | Uncontrolled heart failure | Severe left ventricular dysfunction | Hepatic impairment | Elderly | Lactation
- **ADVERSE EFFECTS** Peripheral edema | Flushing | Tachycardia | Dizziness | Headache | Indigestions | URI | Hypotension | Tachycardia
- **COSTS**
  - 2.5 mg ER Tablet (₱23.17)
  - 5 mg ER Tablet (₱12.00)†
  - 10 mg ER Tablet (₱12.10)†

Fosinopril sodium

- **MOA** A specific and competitive angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  Stable IHD and hypertension[1]

  ➤ *ORAL*

  Adult: 10 mg, once daily for 4 wks; MAX daily dose: 40 mg

  Initial prescription of children with chronic hypertension[3] | First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[5] | Suggested as first-line agent for children with obesity-linked hypertension[5]

  ➤ *ORAL*

  Pediatric: 0.1 mg/kg once daily (up to 5–10 mg)
  MAX daily dose: 0.6 mg/kg (40 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 10 mg, 20 mg
- **CONTRAINDICATIONS** Hypersensitivity to ACE inhibitors | Angioedema | Bilateral renal artery stenosis | Concomitant use with neprilysin inhibitor | Pregnancy and lactation
- **PRECAUTIONS** Black patients are more at risk for angioedema
  - Hypovolemia | Electrolyte imbalance | Severe aortic stenosis | Renal and hepatic impairment
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Cough | Hyperkalemia | Headache | Hypotension | Sexual dysfunction | Visual impairment
- **COSTS**
  - 10 mg Tablet (₱20.85)
  - 20 mg Tablet (₱25.50)

Furosemide★

- **MOA** A potent loop diuretic inhibiting Na and Cl absorption in the proximal distal tubules and loop of Henle

- **INDICATIONS AND DOSE**

Hypertension due to volume overload[7] | Preferred diuretics in patients with symptomatic HF; preferred over thiazides in patients with moderate-to-severe CKD (e.g., GFR < 30 mL/min)[1]

➤ *ORAL*

Adult: 20–80 mg 2x to 4x daily every 6–12 hrs
MAX daily dose: 600 mg

➤ *INTRAVENOUS / INTRAMUSCULAR*

Adult: 20–40 mg/day divided in every 6–12 hrs doses
MAX daily dose: 200mg

➤ *INTRAVENOUS*

Adult: 40–100 mg IV bolus, followed by 10–40 mg/hr IV infusion and titrate to effect

Corticosteroid-induced hypertension[5] | Pediatric hypertensive emergencies and urgencies[5]

➤ *ORAL*

Pediatric
< 1 mo: 1–3 mg/kg/dose once to 2x daily
< 1 yr & 1–17 yrs: Start at 2 mg/kg/dose; may increase by 1–2 mg/kg/dose no sooner than 6–8 hr following the previous dose; MAX daily dose: 6 mg/kg/dose

➤ *INTRAVENOUS / INTRAMUSCULAR*

Pediatric (< 1 mo): 0.5–1 mg/kg/dose every 8 to 24 hrs
MAX daily dose: 2 mg/kg/dose

➤ *INTRAVENOUS*

Pediatric (< 1 yr & 1–17 yrs): 0.1 mg/kg IV bolus followed by 0.05–0.4 mg/kg/hr infusion and titrate to effect

➤ *INTRAMUSCULAR*

Pediatric (< 1 yr & 1–17 yrs): 1–2 mg/kg/dose every 6 to 12 hrs
MAX daily dose: 6 mg/kg/dose not to exceed 200 mg/dose

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 20 mg, 40 mg, 80 mg
  - **Solution for Injection, ampule:** 10 mg/mL (2 mL, 4 mL, 10 mL)
  - **Oral solution**: 10 mg/mL (60 mL, 120 mL), 40 mg/5 mL (500 mL)
- **CONTRAINDICATIONS** Anuria | Renal failure | Addison's disease | Hepatic cirrhosis | Hypersensitivity to sulfonamides | Concomitant use with aminoglycosides | Lactation
- **PRECAUTIONS** DM | Hepatorenal syndrome | Renal and hepatic impairment
  - Hypoproteinemia may reduce diuretic effect and increase risk of side-effects
  - Not recommended in patients at high risk for radiocontrast nephropathy
  - Children and elderly | Pregnancy

BLACK BOX WARNING

When given in excess amounts can lead to profound diuresis with water and electrolyte depletion. Careful medical supervision is required with dosage intervals adjusted to the patient's needs.

- **ADVERSE EFFECTS** Photosensitivity | Electrolyte imbalance | Hypokalemia | Asymptomatic hyperuricemia | Nephrotoxicity | Ototoxicity | Decreased glucose tolerance | Syncope | Dehydration
- **COSTS**
  - 20 mg Tablet (₱1.90)†
  - 40 mg Tablet (₱2.50)†
  - 10 mg/mL, 2 mL Solution for Injection Ampule (₱20.00)†

Hydralazine hydrochloride★

- **MOA** A direct-acting peripheral vasodilator

- **INDICATIONS AND DOSE**

Moderate to severe hypertension[9] | Alternative drug treatment for severe hypertension (BP > 170 mmHg systolic and/ or > 110 mmHg diastolic) in pregnant women[7] | Adjunct use for moderate to severe hypertension[10] | Hypertension with renal complications[10]

➤ *ORAL*

Adult: 10–50 mg 4x daily
MAX daily dose: 300 mg

Hypertensive crisis including pregnant women at birthing facilities[6,10]

➤ *INTRAVENOUS / INTRAMUSCULAR*

Adult: 10–20 mg, by IM or IV injection, every 4 to 6 hrs PRN
MAX dose: 40 mg

Hypertensive crisis | Useful for severely hypertensive children and adolescents with life-threatening symptoms[3]

➤ *INTRAVENOUS / INTRAMUSCULAR*

Pediatric: 0.1–0.2 mg/kg/dose, by IM or IV injection, every 4 to 6 hrs PRN; MAX dose: 20 mg
Usual IV/IM dosage range is 1.7–3.5 mg/kg/24 hr

Chronic hypertension[11]

➤ *ORAL*

Pediatric: Start at 0.75–1 mg/kg/day divided in 2–4 doses, every 6–12 hr; MAX: 10 mg/dose
If necessary, increase dose over 3–4 wks up to MAX dose of 5 mg/kg/24 hr **for infants** and 7.5 mg/kg/24 hr **for children**;
MAX daily dose: 200 mg

Severely hypertensive children and adolescents with less significant symptoms[3] | Adjunct to resistant hypertension[12]

➤ *ORAL*

Pediatric: 0.25 mg/kg per dose up to 25 mg per dose given every 6–8 hr

➤ *INTRAVENOUS / INTRAMUSCULAR*

Pediatric: 0.1–0.2 mg/kg per dose up to 0.4 mg/kg per dose

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 25 mg, 50 mg
  - **Solution for Injection, ampule:** 20 mg/mL (1 mL)
  - **Oral liquid:** 4 mg/mL

Some dosage forms may contain tartrazines or sulfites

- **CONTRAINDICATIONS** High output heart failure | MI due to mechanical obstruction | CAD | RHD of the mitral valve | Severe tachycardia
- **PRECAUTIONS** Hypotension | Peripheral neuropathy | Hematologic dyscrasias | Renal and hepatic impairment
  - Avoid abrupt withdrawal
  - Use with caution in patients with pulmonary hypertension
  - May provoke angina
  - May induce SLE
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Angina pectoris | Diarrhea | Dizziness | GI disorders | Lupus-like syndromes | Nasal congestion
- **COSTS**
  - 25 mg Tablet (₱18.30)
  - 20 mg/mL, 1 mL Solution for Injection Ampule (₱232.00)†

Hydrochlorothiazide★

- **MOA** A thiazide diuretic that affects electrolyte reabsorption at the distal renal tubule
- **INDICATIONS AND DOSE**

Mild hypertension (alone), or in moderate or severe hypertension in combination with other drugs[6] | Monogenic hypertension like apparent mineralocorticoid Gordon Syndrome (adult/child)[5] | Adjunct to other antihypertensive agents in patients with stable IHD and hypertension[1] | For adults who experienced stroke or transient ischemic attack[1] | Initial treatment for black adults with hypertension but without HF or CKD[1]

➤ *ORAL*

Adult: 25–50 mg once daily

Initial prescription of children with chronic hypertension[3] | For children with corticosteroid-induced hypertension[5]

➤ *ORAL*

Pediatric: 1–2 mg/kg daily in 1 or 2 divided doses
< 6 mos: MAX 3 mg/kg in 2 divided doses
6 mos – 2 yrs: MAX daily dose 37.5 mg
2–12yrs: MAX daily dose 100 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 12.5 mg, 25 mg, 50 mg
- **CONTRAINDICATIONS** Anuria | Hypersensitivity to sulfa drugs
- **PRECAUTIONS** Competitive athletes | Electrolyte disturbance | Male sexual dysfunction | Hepatic and severe renal impairment
  - May precipitate gout attacks, latent diabetes
  - Avoid exposure to UV light
  - May induce SLE
  - May exacerbate hypercholesterolemia, hyperuricemia
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hyperuricemia | Hypotension | Phototoxicity | Vertigo | Risk of non-melanoma skin cancer (long-term use) | Metabolic alkalosis | Electrolyte imbalance | Dizziness | Hypokalemia
- **COSTS**
  - 12.5 mg Tablet (₱5.25)
  - 25 mg Tablet (₱6.45)

Imidapril hydrochloride

- **MOA** A competitive angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

Essential hypertension and in patients with heart failure, angina or cerebrovascular disease[10]

➤ *ORAL*

Adult: 5–10 mg daily doses to be increased at intervals of at least 3 wks; MAX daily dose: 20 mg
Elderly: 2.5–10 mg daily doses to be increased at intervals of at least 3 wks

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 5 mg, 10 mg
- **CONTRAINDICATIONS** Angioedema | Renal failure with or without hemodialysis | Pregnancy
- **PRECAUTIONS** Cardiac failure | IHD | Angina | Aortic or mitral valve stenosis | DM | Renal and hepatic impairment
  - Elderly | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Symptomatic hypotension with or without syncope | Dry and nonproductive cough | Hematologic effects | SJS-like symptoms
- **COSTS**
  - 5 mg Tablet (₱14.75)
  - 10 mg Tablet (₱18.75)

Indapamide★

- **MOA** A thiazide-like diuretic with vasodilation effects more prominent than diuresis at lower doses; diuresis is more apparent at higher doses
- **INDICATIONS AND DOSE**

Management of mild-to-moderate hypertension in combination with other anti-hypertensive agents[9] | Adjunct to other antihypertensive agents in patients with stable IHD and hypertension[1] | Adults who experienced stroke or transient ischemic attack[1] | Initial treatment for black adults with hypertension but without HF or CKD[1]

➤ *ORAL*

Adult: 1.25–2.5 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **SR Tablet:** 1.5 mg

- **CONTRAINDICATIONS** Anuria | Hypersensitivity to sulfa-drugs | Hypokalemia | Severe renal and hepatic impairment
- **PRECAUTIONS** Hypovolemia and electrolyte imbalance | Acute angle-closure glaucoma with or without acute myopia | Acute porphyria | Renal and hepatic impairment
  - Concomitant use with lithium
  - May exacerbate hyperuricemia and gout
  - May induce latent diabetes and SLE
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity | Hypokalemia | Muscle cramps | Dizziness | Fatigue | Malaise | Flu-like symptoms | Weight loss | Hypotension | Palpitations
- **COSTS**
  - 1.5 mg SR Tablet (₱40.25)

Irbesartan⋆

- **MOA** A selective angiotensin-II receptor type 1 (AT_1) blocker
- **INDICATIONS AND DOSE**

  Hypertension in patients receiving hemodialysis[10] | Renal disease in hypertensive T2DM[10] | Renal disease in hypertensive T2DM in patients receiving hemodialysis[10] | Treatment of hypertension alone or in combination with other antihypertensive agents[9] | Stable IHD and hypertension[1] | HFpEF and persistent hypertension after management of volume overload[1]

  ➤ *ORAL*

  Adult: 150–300 mg once daily

  Initial prescription of children for outpatient management of chronic hypertension[3] | First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[5] | Suggested as first-line agent for children with obesity-linked hypertension[5]

  ➤ *ORAL*

  Pediatric

  6 – 12 yrs: 75–150 mg once daily

  ≥ 13 yrs: 150–300 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 75 mg, 150 mg, 300 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Hypersensitivity | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | Significant aortic or mitral valve stenosis | HF | DM | Angioedema | Renal impairment, including acute renal failure
  - Not recommended in patients with primary aldosteronism
  - Concomitant use with ACE inhibitor
  - Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Diarrhea | Heartburn | Headache | Fatigue | Hyperkalemia | Hypotension | Dizziness | Musculoskeletal pain
- **COSTS**
  - 150 mg Tablet (₱3.79)†
  - 300 mg Tablet (₱10.03)†

Labetalol hydrochloride

- **MOA** A mixed adrenoceptor blocker; a non-selective β-blocker with α_1-adrenergic blocking activity
- **INDICATIONS AND DOSE**

  Among the first choices of drug treatment for mild and severe hypertension in pregnant women[2,7] | First line treatment for hypertensive emergencies requiring immediate BP lowering[2,7]

  ➤ *ORAL*

  Adult: 200–800 mg daily in divided doses

  Hypertensive emergencies[12]

  ➤ *INTRAVENOUS*

  Pediatric (< 1 mo): Initially 0.5 mg/kg/hour
  MAX per dose: 4 mg/kg/hour
  Dose to be adjusted according to response at intervals of at least 15 mins

  Severely hypertensive children and adolescents with life-threatening symptoms[3,5]

  ➤ *INTRAVENOUS*

  Pediatric

  IV Bolus 0.20–1.0 mg/kg per dose up to 40 mg per dose

  IV Infusion 0.25–3.0 mg/kg/h

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial:** 5 mg/mL (100 mg/20 mL)
- **CONTRAINDICATIONS** Bronchospastic disease including asthma | Cardiogenic shock | Overt cardiac failure | 2nd or 3rd degree AV block | Severe bradycardia | Sick sinus syndrome
- **PRECAUTIONS** 1st degree heart block | Pheochromocytoma | DM | Thyroid disease | Hepatic or renal impairment
  - Abrupt withdrawal may exacerbate angina and/or MI
  - Use with caution in patients using CCB and cardiac glycosides
  - Elderly | Pregnancy and lactation
- **WARNINGS** Interferes with laboratory tests for catecholamines
  - Labetalol IV infusion should not be used to control hypertensive episodes after MI when peripheral vasoconstriction suggests low cardiac output
- **ADVERSE EFFECTS** Drug fever | Urinary disorders | Hypersensitivity | Tingling of skin | Hypoglycemia unawareness | Fetal bradycardia | Bronchoconstriction | Dizziness and lightheadedness | Hypotension | Failure to ejaculate
- **COSTS**
  - 5 mg/mL (100 mg/20 mL) Solution for Injection (₱2,700.00)

Lacidipine

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**
  Hypertension[10]
  ➤ *ORAL*
  Adult: 2 mg once daily; may increase in increments of 2 mg every 3–4 weeks according to response MAX daily dose: 6 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 2 mg, 4 mg, 6 mg
- **CONTRAINDICATIONS** Acute porphyria | Aortic stenosis | Recent MI | Cardiogenic shock | Unstable angina
- **PRECAUTIONS** Poor cardiac reserve | Cardiac conduction abnormalities | Hepatic impairment
  - Avoid abrupt withdrawal
  - Elderly | Pregnancy and lactation
  - May inhibit labor
- **ADVERSE EFFECTS** Abdominal discomfort | Asthenia | Polyuria
- **COSTS**
  - 2 mg FC Tablet (₱32.75)
  - 4 mg FC Tablet (₱44.75)

Lercanidipine hydrochloride

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**
  Mild to moderate hypertension[10]
  ➤ *ORAL*
  Adult: 10 mg once daily, increased if necessary to 20 mg daily *Dose can be adjusted after 2 weeks*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg
- **CONTRAINDICATIONS** Aortic stenosis | Uncontrolled heart failure | Unstable angina | Recent MI | Severe hepatic and renal impairment | Concomitant use with Cyclosporine and strong CYP3A4 inhibitors
- **PRECAUTIONS** Left ventricular dysfunction | Sick sinus syndrome (without pacemaker) | Mild to moderate renal and hepatic impairment
- **ADVERSE EFFECTS** Angina pectoris | Hypotension | Palpitation | Leg Edema
- **COSTS**
  - 10 mg Tablet (₱30.75)
  - 20 mg Tablet (₱41.70)

Lisinopril

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  Hypertension, when used in addition to diuretic, in cardiac decompensation or in volume depletion[10] | **Short-term treatment following MI in hemodynamically stable patients**[10] | **Stable IHD and hypertension**[1]
  ➤ *ORAL*
  Adult: 10–40 mg once daily

  First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[5] | **Suggested as first-line agent for children with obesity-linked hypertension**[5]
  ➤ *ORAL*
  Pediatric: 0.07 mg/kg (up to 5 mg) once daily MAX daily dose: 0.6 mg/kg | 20 mg (< 50 kg) | 40 mg (> 50 kg)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitors | Angioedema | Hypersensitivity
- **PRECAUTIONS** Renal and hepatic impairment | Hematologic disturbance e.g., Agranulocytosis | Severe aortic stenosis | Hypertrophic cardiomyopathy
  - Children | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Symptomatic hypotension with or without syncope | Chest pain | Hematologic effects | Dry cough | Hyperkalemia | Dizziness | Azotemia
- **COSTS**
  - 5 mg Tablet (₱53.75)
  - 10 mg Tablet (₱67.00)
  - 20 mg Tablet (₱74.50)

Losartan potassium*

- **MOA** A competitive angiotensin-II receptor blocker
- **INDICATIONS AND DOSE**
  Uncomplicated hypertension as monotherapy or combination with CCBs or Thiazide/Thiazide-like diuretics[4] | **Hypertension including reduction of stroke risk in hypertension with left ventricular hypertrophy**[10] | **Stable IHD and hypertension**[1]
  ➤ *ORAL*
  Adult: 50–100 mg daily in 1 or 2 divided doses

  May be used as initial treatment for children 1–13 yrs with chronic hypertension[4] | **Initial prescription of children ≥ 6 yrs with chronic hypertension**[3] | **First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria**[4,5] | **Suggested as first-line agent for children with obesity-linked hypertension**[5]
  ➤ *ORAL*
  Pediatric: 0.7 mg/kg (up to 50 mg) once daily MAX daily dose: 1.4 mg/kg (up to 100 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 50 mg, 100 mg also available as film-coated tablet
  - **Extemporaneous liquid:** 2.5 mg/mL
- **CONTRAINDICATIONS** Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Severe heart failure | Hypotension (volume- or salt-depleted patients) | Renal impairment and mild to moderate hepatic impairment
  - Hyperkalemia; concomitant use with Potassium-containing agents
  - Children and elderly | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury or death to the developing fetus
- **ADVERSE EFFECTS** Anemia | Hypoglycemia | Postural disorders | Nasal congestion | Dizziness | Headache
- **COSTS**
  - 50 mg Tablet (₱9.00)†
  - 100 mg Tablet (₱8.50)†

Methyldopa⋆

- **MOA** A potent α_2-adrenoceptor agonist
- **INDICATIONS AND DOSE**

  Among the first choices of drug treatment for mild hypertension and severe hypertension in pregnant women[2,7] | Among the recommended treatment for hypertensive crisis[2]

  ➤ *ORAL*

  Adult: 250 mg 2x to 3x daily; *Uptitrate PRN every 2 days*
  MAX daily dose: 3 g

  Pediatric: 10 mg/kg/day divided every 6–12 hrs; *Uptitrate PRN every 2 days*
  MAX daily dose: 65 mg/kg or 3 g whichever is less

  Not recommended for postpartum hypertension since it causes postpartum depression
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 125 mg, 250 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Active liver disease | Pheochromocytoma | Depression | Concomitant use with MAOI therapy
- **PRECAUTIONS** Cerebrovascular disease | Renal or hepatic impairment
  - Not recommended as routine treatment for hypertension
  - Direct Coombs' positive hemolytic anemia
  - Abrupt discontinuation may result to rebound hypertension
  - Children and elderly | Pregnancy and lactation
  - Pregnancy category B (PO), C (IV)
- **ADVERSE EFFECTS** Orthostatic hypotension | Lightheadedness | Dryness of mouth | Depression
- **COSTS**
  - 250 mg Tablet (₱19.00)†

Metolazone

- **MOA** A long-acting thiazide-like diuretic that blocks Na reabsorption in the distal convoluted tubules
- **INDICATIONS AND DOSE**

  Hypertension[1] | Adjunct to other antihypertensive agents in patients with stable IHD and hypertension[1] | Initial treatment for black adults with hypertension but without HF or CKD[15,8]

  ➤ *ORAL*

  Adult: 2.5–5 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg
- **CONTRAINDICATIONS** Anuria | Hepatic coma or precoma | Known allergy or hypersensitivity
- **PRECAUTIONS** Prediabetes or diabetes | Acute porphyria | Renal and hepatic impairment
  - Concomitant use with Lithium
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Orthostatic hypotension | Electrolyte changes | Dizziness | Fatigue
- **COSTS**
  - 5 mg Tablet (₱25.85)

Metoprolol succinate

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**

  Suitable as initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and pregnant women; and for those with congestive heart failure[4] | First-line agent when the hypertensive patient has IHD or HF[1]

  Cardioselective beta blockers are preferred in patients with bronchospastic airway disease requiring a beta blocker

  ➤ *ORAL*

  Adult

  Extended-Release Tablet Start at 25–100 mg once daily
  If needed, increase dosage at weekly intervals to desired blood pressure
  MAX daily dose: 200 mg

  Pediatric

  ≥ 6 yr and adolescent

  Extended-Release Tablet 1 mg/kg/dose (up to 50 mg) once daily;
  MAX daily dose: 2 mg/kg or 200 mg, *whichever is lower*

  For children with hypertension[12] and migraine or where hypertension persisted after coarctation repair[5,8]

  ➤ *ORAL*

  Pediatric

  Modified-Release Tablet 1 mg/kg (up to 50 mg) once daily
  MAX daily dose: 2 mg/kg up to 200 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablets**: 23.75 (25) mg, 45.5 (50) mg, 95 (100) mg
  - **Oral liquid**: 10 mg/mL
- **CONTRAINDICATIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery | May mask symptoms of hypoglycemia and thyrotoxicosis | Dose adjustment may be considered depending on CYP2D6 phenotype | Elderly | Pregnancy and lactation
- **WARNINGS** Patients should be warned against interruption or discontinuation of therapy without physician's advice

BLACK BOX WARNING

Ischemic Heart Disease

Do NOT abruptly discontinue in patients with coronary artery disease. Dosage should be gradually reduced over a period of 1 to 2 weeks.

- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - 47.5 mg ER Tablet (₱6.25)

Metoprolol tartrate★

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**

Alternative treatment for hypertensive emergencies requiring immediate BP lowering presented as Acute Aortic Disease[2,7] | Treatment of hypertension, alone or in combination with other agents[6] | Initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and pregnant women[4] | First-line agent when the hypertensive patient has IHD or HF[1]

Cardioselective beta blockers are preferred in patients with bronchospastic airway disease requiring a beta blocker

➤ *ORAL*

Adult: 100–200 mg daily in 2 divided doses

Immediate-Release Tablet 50–100 mg daily in 1 or 2 divided doses; *If needed, increase dosage at weekly intervals to desired blood pressure.*
MAX daily dose: 200 mg

Patients with bronchospastic diseases should receive the lowest possible daily dose divided TID

For children with hypertension[12] and migraine or where hypertension persisted after coarctation repair[5,8]

➤ *ORAL*

Pediatric

Immediate-Release Tablet 1 mg/kg (up to 50 mg) once daily MAX daily dose: 400 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 50 mg, 100 mg

Check Metoprolol succinate for other product information on Metoprolol

Minoxidil

- **MOA** A vasodilating potassium channel opener
- **INDICATIONS AND DOSE**

Severe hypertension, in addition to a diuretic and a beta-blocker[10]

➤ *ORAL*

Adult: 5 mg once daily; *dose may be gradually increased at 3-day intervals*
Usual effective range: 10–40 mg/day divided in 1 to 3 doses
MAX daily dose: 100 mg

Hypertension | Useful for severely hypertensive children and adolescents with less significant symptoms[3] | For pediatric hypertensive emergencies and urgencies[5]

➤ *ORAL*

Pediatric

< 12 yrs: 0.1–0.2 mg/kg daily in 1 to 3 divided doses; *dose may be gradually increased at 3-day intervals*
Usual effective range: 0.25–1 mg/kg/day divided in 1 to 3 doses
MAX daily dose: 50 mg

≥ 12 yrs: 5 mg once daily, *dose may be gradually increased at 3-day intervals*; Usual effective range: 10–40 mg/day, divided in 1 to 3 doses
MAX daily dose: 100 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 10 mg
- **CONTRAINDICATIONS** Pheochromocytoma
- **PRECAUTIONS** Pulmonary hypertension | Recent MI | Angina | Acute porphyria | Renal impairment
  - Children and elderly | Pregnancy and lactation
- **WARNINGS** Should be reserved for hypertensive patients not responding adequately to maximum therapeutic doses of diuretic and two other antihypertensive agents
  - Should be administered under close supervision
- **ADVERSE EFFECTS** Fluid retention | Hair changes or hirsutism | Edema | Pericardial disorders | Pericarditis | Tachycardia

Nebivolol hydrochloride

- **MOA** A long-acting cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

Essential hypertension and in patient with renal impairment[10] | Suitable as initial therapy in hypertensive patients with CAD, ACS, high sympathetic drive, and pregnant women; and for those with congestive heart failure, along with beta-blockers Carvedilol, Bisoprolol, Metoprolol succinate[4]

Cardioselective beta blockers are preferred in patients with bronchospastic airway disease requiring a beta blocker

➤ *ORAL*

Adult: 5–40 mg once daily; *Adjust at 2-wk interval*

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Severe bradycardia | 2nd and 3rd degree AV block | Cardiogenic shock | Sick sinus syndrome without permanent pacemaker | Severe hepatic impairment
- **PRECAUTIONS** Bronchospastic disease | DM | Hyperthyroidism | Severe renal and hepatic impairment
  - Avoid abrupt withdrawal, especially in CAD patients
  - Pre-treatment with alpha-blockers is recommended for patients with known or suspected pheochromocytoma
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Edema | Postural hypertension | GI symptoms | Dizziness | Headache
- **COSTS**
  - 2.5 mg Tablet (₱13.25)
  - 5 mg Tablet (₱20.95)

Nicardipine hydrochloride⋆

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**

First line treatment for hypertensive emergencies requiring immediate BP lowering[7] | Suitable alternative to manage hypertensive emergency if intoxication with amphetamines, sympathomimetics or cocaine is suspected[7] | Among the first choices of drug treatment for mild hypertension and severe hypertension in pregnant women[2,7]

➤ *INTRAVENOUS*

Adult: Start at 5 mg/hr, increase dose as needed by 2.5 mg/hr every 5–15 min up to a MAX dose of 15 mg/hr. Following attainment of desired BP, decrease infusion to 3 mg/hr and adjust rate as needed to maintain desired response

Severely hypertensive children and adolescents with life-threatening symptoms[3] | Post-operative hypertension[12] | Treatment of hypertensive crisis causing acute heart failure in children[5]

➤ *INTRAVENOUS*

Pediatric:

IV Bolus 30 mcg/kg up to 2 mg per dose

IV Infusion 0.5–4 mcg/kg/min

1–17 yrs: Start at 0.5–1 mcg/kg/min, dose may be increased as needed every 15–30 mins up to a MAX of 4–5 mcg/kg/min

< 1 mo: Initially 500 nanograms/kg/min; MAX per dose 5 mcg/kg/minute adjusted according to response;
Maintenance dose: 1–4 mcg/kg/min

Safety and efficacy not established in pediatric patients. Reported use in children has been limited to a small number of preterm infants, infants, and children.

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 1 mg/mL (2 mL, 10 mL)
- **CONTRAINDICATIONS** Acute porphyrias | Cardiogenic shock | Severe aortic stenosis | Recent MI
- **PRECAUTIONS** Pulmonary edema | Angina | Congestive heart failure | Pheochromocytoma | Significant left ventricular dysfunction | Mild to moderate renal and hepatic impairment
  - Avoid systemic hypotension in patients with sustained acute cerebral infarction or hemorrhage
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypotension | Flushing | Exacerbation of angina | Reflex tachycardia | Phlebitis
- **COSTS**
  - 1 mg /mL, 10 mL Solution for Injection Ampule (₱660.00)†
  - 1 mg /mL, 2 mL Solution for Injection Ampule (₱389.90)†

Nifedipine⋆

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**

Treatment for mild hypertension and severe hypertension in pregnant women[2,7] | Initial hypertensive treatment in black patients[2] | Initial therapy in combination with RAS blocker for hypertensive patients with T2DM and/or CKD[2] | Symptomatic angina[2]

➤ *ORAL*

Adult

Extended-release tablet 30–60 mg once daily
MAX daily dose: 90–120 mg

Initial prescription of children with chronic hypertension[3] | Children with hypertension and migraine or where hypertension persisted after coarctation repair[5] | Pediatric hypertensive emergencies and urgencies[5]

➤ *ORAL*

Pediatric

Extended-release tablet 0.25–0.5 mg/kg (30–60 mg) daily divided in 1 or 2 doses; MAX daily dose: 3 mg/kg or 120 mg

Hypertensive crisis[11]

➤ *ORAL*

Pediatric

Immediate-release tablet 250–500 mcg/kg
MAX per dose: 10 mg, then repeat once if necessary

- **DOSAGE FORMS AND PREPARATIONS**
  - **ER Tablets:** 20 mg 30 mg, 60 mg
  - **Softgel (IR) capsule:** 5 mg, 10 mg
- **CONTRAINDICATIONS** Cardiogenic shock | Unstable angina | Recent MI | Concomitant use with strong CYP450 inducers (like Rifampicin)
- **PRECAUTIONS** Hypotension | DM | HF | Hypertrophic cardiomyopathy | Aortic stenosis
  - Concomitant use with CYP3A inducers
  - Avoid abrupt withdrawal
  - Elderly | Pregnancy and lactation
- **WARNINGS** Short-acting (intermedial release) Nifedipine is no longer considered acceptable in the initial treatment of hypertensive crisis because it can cause excessive falls in BP[6]; not recommended for angina or long-term management of hypertension[2]
- **ADVERSE EFFECTS** Flushing | Peripheral edema (dose-related) | Transient hypotension (dose-related) |

Light-headedness | Mood changes | Tremors | Bradycardia | Gum hyperplasia | Constipation

- **COSTS**
  - 10 mg Capsule (₱7.00)†
  - 30 mg MR Tablet (₱45.38)†

Nitroglycerin⋆

(Glyceryl trinitrate)

- **MOA** A nitrate vasodilator
- **INDICATIONS AND DOSE**

Specifically useful in hypertensive emergencies including the heart and the aorta[7] | First line treatment for hypertensive emergencies requiring immediate BP lowering presented as: (1) Acute coronary event, (2) Acute cardiogenic pulmonary edema (with loop diuretic), (3) Acute aortic disease[2,7] | Used in conjunction with other antihypertensive drugs for severe hypertension in pregnant women complicated with pulmonary edema[2,7]

➤ *INTRAVENOUS*

Adult: 5 mcg/min IV, then increase every 3–5 mins PRN by 5 mcg/min up to 20 mcg/min;
If no response, increase by 10 mcg/min every 3–5 mins PRN up to a MAX of 400 mcg/min

Pediatric hypertensive emergencies and urgencies[5,11]

➤ *INTRAVENOUS*

Pediatric: 0.25–0.5 mcg/kg/min; may increase by 0.5–1 mcg/kg/min every 3–5 min PRN; Usual dose: 1–5 mcg/kg/min
MAX dose: 20 mcg/kg/min

The IV dosage units for children are in mcg/kg/min, compared with mcg/min for adults.

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 1 mg/mL (10 mL)
  - **Transdermal patch**: 5 mg/24 hr
- **CONTRAINDICATIONS** Hypertrophic obstructive cardiomyopathy | Acute circulatory failure or shock | Allergy to corn or corn products | Increased intracranial pressure | Severe anemia | Pericardial effusion with tamponade | Concomitant use with PDE-5 inhibitors (Sildenafil, Tadalafil)
- **PRECAUTIONS** Withdrawal symptoms | Overt or subclinical DM | Severe renal and hepatic impairment
  - Tolerance may occur with excessive use
  - Marked hypotension with calcium channel blocker use and beta blockers
  - Elderly | Pregnancy and lactation
- **WARNINGS** May interfere with anticoagulant at high doses
- **ADVERSE EFFECTS** Blurry vision | Hypotension | Flushing | Throbbing headache | Lightheadedness
- **COSTS**
  - 1 mg/mL, 10 mL Solution for Injection Ampule (₱440.00)†

Olmesartan medoxomil

- **MOA** A competitive and selective angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

Stable IHD and hypertension[1] | HFpEF and persistent hypertension after management of volume overload[1]

➤ *ORAL*

Adult: 10–40 mg once daily

Initial prescription of children ≥ 6 yrs with chronic hypertension[3]

➤ *ORAL*

Pediatric (≥ 6 yrs):
< 35 kg: 10–20 mg once daily
≥ 35 kg: 20–40 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg 20 mg, 40 mg
    also available in film-coated tablet
  - **Extemporaneous liquid**: 2 mg/mL
- **CONTRAINDICATIONS** Biliary obstruction | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | DM | Primary aldosteronism | Angioedema | Renal and hepatic impairment
  - Gradual decrease dose to avoid withdrawal symptoms
  - Children: Use in pediatric patients less than 1 yr for treatment of hypertension is not recommended due to potential effects on developing kidneys
  - Elderly | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Arthritis | Bone pain | Chest pain | Hematuria | Hyperuricemia | Flu-like symptoms | Dizziness | Headache | Hyperglycemia | Hypertriglyceridemia
- **COSTS**
  - 10 mg FC Tablet (₱47.50)
  - 20 mg Tablet (₱56.00)
  - 40 mg Tablet (₱22.25)

Perindopril

(as Perindopril arginine and Perindopril erbumine)

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

Hypertension, if used in addition to diuretic, or in cardiac decompensation or volume depletion[10]

➤ *ORAL*

Adult:
Perindopril arginine 5 mg once daily
MAX daily: 10 mg
Perindopril erbumine 4 mg once daily; *uptitrate if necessary;* MAX daily dose: 16 mg

Hypertension, if used in addition to diuretic, or in cardiac decompensation or volume depletion[10] | Stable IHD and hypertension[1]

➤ *ORAL*

Adult:

Perindopril erbumine 4 mg once daily
Maintenance dose: 8 mg once daily; MAX daily dose: 16 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - *Perindopril arginine*
    FC Tablets: 2.5mg, 5mg, 10 mg
  - *Perindopril erbumine*
    Tablet: 2 mg, 4 mg, 8 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitor | Angioedema | Bilateral or unilateral renal stenosis | Pregnancy and lactation
- **PRECAUTIONS** Severe congestive heart failure | Hyperkalemia | Renal and hepatic impairment
  - Increased risk of angioedema in black patients
  - Concomitant use with Potassium-containing agents, NSAIDs
  - Elderly
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hyperkalemia | Muscle cramps | Headache | Visual impairment | Cough
- **COSTS**

Perindopril arginine
- 5 mg FC Tablet (₱33.00)
- 10 mg FC Tablet (₱56.00)

Propranolol hydrochloride*

- **MOA** A nonselective β-blocker
- **INDICATIONS AND DOSE**

Hypertension[7,10,12]

➤ *ORAL*

Adult: 80–160 mg daily in 2 divided doses

Pediatric (< 1 mo): 250 mcg/kg 3x daily, then increased if necessary up to 2 mg/kg 3x daily

Children with hypertension and migraine or where hypertension persisted after coarctation repair[5]

➤ *ORAL*

Pediatric: 0.5–1 mg/kg/day divided into 2–4 doses every 6 to 12 hrs; *May increase dose every 5– 7 days*
MAX daily dose: 8 mg/kg (320 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 10 mg, 40 mg
- **CONTRAINDICATIONS** BP < 50/30 mmHg | Bronchial asthma/COPD | Cardiogenic shock | HR < 80 bpm | Overt HF | Pheochromocytoma | 2nd- or 3rd-degree heart block | Sick sinus syndrome (without pacemaker) | Infants < 2kg | Diabetes | Psoriasis| Competitive athletes
- **PRECAUTIONS** Concomitant use with non-DHP CCBs, Digoxin, Clonidine increases risk of severe bradycardia
  - Abrupt withdrawal may precipitate thyroid storm
  - May worsen bradycardia and hypotension
  - May increase risk of hypoglycemia
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Diarrhea | Vomiting | Dizziness | Hypertension | Sleep disorder | Fatigue | Bradycardia | Depression | Hyperlipidemia
- **COSTS**
  - 10 mg Tablet (₱6.35)†
  - 40 mg Tablet (₱24.00)†

Quinapril hydrochloride

- **MOA** An angiotensin converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

Essential hypertension if used in addition to diuretic[10] | Adults with stable IHD and hypertension[1]

➤ *ORAL*

Adult: 5 mg once daily; MAX daily dose: 80 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg, 40 mg
- **CONTRAINDICATIONS** Angioedema | Concomitant use with neprilysin inhibitors | Pregnancy
- **PRECAUTIONS** Diarrhea | Agranulocytosis | Unilateral or bilateral renal artery stenosis | Renal and hepatic impairment
  - Increased risk of angioedema in black patients
  - Risk of profound neonatal hypotension
  - Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Chest pain | Dizziness | Elevated BUN and serum creatinine | Cough | Fatigue
- **COSTS**
  - 10 mg Tablet (₱20.00)
  - 20 mg Tablet (₱33.40)

Ramipril

- **MOA** An angiotensin converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**

  Hypertension[10] | Adults with stable IHD and hypertension[1]

  ➤ *ORAL*

  Adult: 2.5–20 mg daily in single or in 2 divided doses
  Dose to be increased at intervals of 2 to 4 weeks

  First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[5]

  ➤ *ORAL*

  Pediatric: 1.6 mg/m^2 once daily
  MAX daily dose: 6 mg/m^2
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1.25 mg, 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitors | History of angioedema | renal artery stenosis | Pregnancy and lactation
- **PRECAUTIONS** Renal and hepatic impairment | Reduction in RBC and hemoglobin | Hyperkalemia in patients with renal dysfunction
  - Increased risk of angioedema in black patients
  - Elderly
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Asthenia | Headache | Dizziness | Cough | Fatigue | GI disorder
- **COSTS**
  - 2.5 mg Tablet (₱13.50)
  - 5 mg Tablet (₱15.60)
  - 10 mg Tablet (₱23.20)

Spironolactone⋆

- **MOA** A renal competitive aldosterone antagonist
- **INDICATIONS AND DOSE**

  Considered in CKD patients with resistant hypertension not meeting blood pressure targets[4] | Appropriate therapy for monogenic hypertension like Apparent mineralocorticoid excess disorder[5]

  ➤ *ORAL*

  Adult: 25–100 mg once daily

  Children with corticosteroid-induced hypertension[5] | Appropriate therapy for monogenic hypertension like Congenital adrenal hyperplasia[5]

  ➤ *ORAL*

  Pediatric: 1–3 mg/kg daily divided into 2–4 doses
  MAX daily dose: 100 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg, 50 mg, 100 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Addison's disease | Anuria | Hyperkalemia | Severe renal impairment | Concomitant use with Eplerenone, and K supplements | Lactation
- **PRECAUTIONS** Acute porphyria | Acute renal insufficiency | Hyperuricemia | Hyperglycemia and electrolyte disturbance | Metabolic acidosis | Renal and hepatic impairment
  - Children and elderly | Pregnancy
- **ADVERSE EFFECTS** Gynecomastia | Diarrhea | Confusion | Menstrual changes | Erectile dysfunction | Ataxia | Electrolyte imbalance
- **COSTS**
  - 25 mg Tablet (₱145.00)†
  - 50 mg Tablet (₱27.46)†
  - 100 mg Tablet (₱34.41)†

Telmisartan⋆

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Uncomplicated hypertension as monotherapy or combination with CCBs or Thiazide/Thiazide-like diuretics[4] | Adults with stable IHD and hypertension[1] | Adults with HFpEF and persistent hypertension after management of volume overload[1]

  ➤ *ORAL*

  Adult: 20–80 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg, 80 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Cholestasis | Biliary obstructive disorders | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Hyperkalemia in patient with renal impairment | Mild to moderate renal impairment
  - Increased serum creatinine or blood urea nitrogen from renal artery stenosis
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
  - Increases Digoxin peak plasma concentration
- **ADVERSE EFFECTS** Cough and URI | Peripheral edema | Myalgia | Diarrhea
- **COSTS**
  - 40 mg Tablet (₱14.46)†
  - 80 mg Tablet (₱34.00)†

Valsartan⋆

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Uncomplicated hypertension as monotherapy or combination with CCBs or Thiazide/Thiazide-like diuretics[4] | Stable IHD and hypertension[1] | HFpEF and persistent hypertension after management of volume overload[1]

  ➤ *ORAL*

  Adult: 80–320 mg once daily

May be used as initial treatment for children 1–13 years[4] | Initial prescription of children ≥ 6 yrs[3] | First-line agent for a child with hypertension associated with DM and microalbuminuria, or with CKD and proteinuria[4,5] | Suggested as first-line agent for children with obesity-linked hypertension[5]

➤ *ORAL*

Pediatric

> 6 yrs: 1.3 mg/kg daily (up to 40 mg)
MAX daily dose: 2.7 mg/kg (up to 160 mg)

< 35 kg: 1.3 mg/kg (20 mg) once daily
MAX daily dose: 2.7 mg/kg (up to 80 mg)

> 35 kg: 1.3 mg/kg (40 mg) once daily
MAX daily dose: 2.7 mg/kg (up to 160 mg)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 40 mg, 80 mg, 160 mg, 320 mg
    also available as film-coated tablet
  - **Capsule**: 80 mg, 160 mg
  - **Extemporaneous liquid:** 4 mg/mL
- **CONTRAINDICATIONS** Biliary cirrhosis | Cholestasis | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Renal impairment and mild to moderate hepatic impairment | Hyperkalemia in patients with renal dysfunction | Symptomatic hypotension (patients with HF or post-MI)
  - Children | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Dizziness | Hypotension | Headache | Elevated serum BUN, creatinine | Cough
- **COSTS**
  - 80 mg Tablet (₱11.64)†
  - 160 mg Tablet (₱22.00)†

Verapamil hydrochloride⋆

- **MOA** A non-DHP L-type calcium channel blocker

- **INDICATIONS AND DOSE**

Mild to moderate hypertension[10] | Antihypertensive agents for patients with high ventricular rate with AF[2]

➤ *ORAL*

Adult

Immediate release tablet 120–360 mg daily in 3 divided doses

Sustained release tablet 120–360 mg daily in 1 to 2 divided doses

Delayed onset extended-release tablet 100–300 mg once daily in the evening

Pediatric

≤ 2 yrs: 20 mg 2x to 3x daily

> 2 yrs: 40–120 mg 2x to 3x daily, depending on age and response

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 40 mg, 80 mg
  - **Sugar-coated Tab**: 40 mg
  - **SR Tablet**: 180 mg, 240 mg
  - **Solution for Injection, ampule**: 2.5 mg/mL (2 mL)
- **CONTRAINDICATIONS** Atrial flutter or fibrillation associated with accessory conducting pathways (e.g. WPW syndrome) | Bradycardia | Cardiogenic shock | HFrEF | Sick sinus syndrome (without pacemaker) | Acute porphyria | Concomitant use with beta-blockers, Ivabradine, Quinidine
- **PRECAUTIONS** Renal and hepatic impairment | Severe aortic stenosis | 1st degree AV block | Exacerbation of angina | Atrial fibrillation/flutter
  - Children: Avoid in children younger than 1 yr due to risk of asystole
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Hypotension | Constipation | Headache | Flu-like symptoms
- **COSTS**
  - 2.5 mg/mL, 2mL Ampule (₱127.94)†
  - 80 mg Tablet (₱20.63)†

REFERENCES

[1] Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/apha/ash/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: Executive summary: A report of the american college of cardiology/american heart association task force on clinical practice guidelines. *Hypertension*. 2018;71(6):1269-1324. doi:10.1161/hyp.0000000000000066

[2] Williams B, Mancia G, Spiering W, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. *European Heart Journal*. 2018;39(33):3021-3104. doi:10.1093/eurheartj/ehy339

[3] Flynn JT, Kaelber DC, Baker-Smith CM, et al. Clinical practice guideline for screening and management of high blood pressure in children and adolescents. *Pediatrics*. 2017;140(3). doi:10.1542/peds.2017-1904

[4] Ona DI, Jimeno CA, Jasul GV, et al. Executive summary of the 2020 clinical practice guidelines for the management of hypertension in the Philippines. *The Journal of Clinical Hypertension*. 2021;23(9):1637-1650. doi:10.1111/jch.14335

[5] Lurbe E, Agabiti-Rosei E, Cruickshank JK, et al. 2016 European Society of Hypertension Guidelines for the management of high blood pressure in children and adolescents. *Journal of Hypertension*. 2016;34(10):1887-1920. doi:10.1097/hjh.0000000000001039

[6] PNF PHC Core Group. *Philippine National Formulary Manual for Primary Care Providers*. 9th ed. Department of Health; 2021

[7] Unger T, Borghi C, Charchar F, et al. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension*. 2020;75(6):1334-1357. doi:10.1161/hypertensionaha.120.15026

[8] Chu PY, Campbell MJ, Miller SG, Hill KD. Anti-hypertensive drugs in children and adolescents. *World Journal of Cardiology*. 2014;6(5):234. doi:10.4330/wjc.v6.i5.234

[9] Formulary Executive Council. *Philippine National Formulary*. 8th ed. Department of Health; 2019

[10] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[11] Kleinman K, McDaniel L, Molloy M, eds. *The Harriet Lane Handbook: A Manual for Pediatric House Officers*. 22nd ed. Elsevier; 2021.

[12] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.

Table 6. Available Fixed-Dose Combinations for Hypertension

DRUG COMBINATION	PREPARATION	DOSE
Amlodipine + Hydrochlorothiazide	**Tablet** (Amlodipine/HCTZ) 5 mg/12.5mg (₱21.00) 10 mg/12.5 mg (₱35.00)	➤ *ORAL* **Adult:** 1 tab (5 mg/12.5 mg) once daily; May be increased to 10 mg/12.5 mg once daily
Amlodipine + Losartan	**FC Tablet** (Amlodipine + Losartan) 5 mg/25 mg 5 mg/50 mg (₱19.50) 5 mg/100 mg 10 mg/100 mg	➤ *ORAL* **Adult:** 1 tab once daily, *dose based on previous monotherapy dose;* *May be titrated as needed after 1 or 2 wks*
Amlodipine + Valsartan	**FC Tablet** (Amlodipine/Valsartan) 5 mg/80 mg Tablet (₱35.28) 5 mg/160 mg Tablet (₱45.90) 10 mg/160 mg Tablet (₱53.00) **Powder for Injection:** 500 mg 1 g	➤ *ORAL* **Adult:** 1 tab once daily, *dose based on previous monotherapy dose; May be titrated as needed* MAX daily dose: 10 mg Amlodipine and 320 mg Valsartan
Amlodipine + Valsartan + Hydrochlorothiazide	**FC Tablet** (Amlodipine/Valsartan/HCTZ) 5 mg/160 mg/12.5 mg (₱25.50) 5 mg/160 mg/25 mg (₱27.50) 10 mg/160 mg/12.5 mg (₱25.85) 10 mg/160 mg/25 mg (₱29.30) 10 mg/320 mg/25mg (₱34.50)	➤ *ORAL* **Adult:** 1 tab once daily, *dose based on previous monotherapy dose; May be titrated after 2 wks* MAX daily dose: 10 mg Amlodipine, 320 mg Valsartan, 25 mg HCTZ
Atenolol + Chlorthalidone	**Tablet** (Atenolol/Chlorthalidone): 50 mg/12.5 mg	➤ *ORAL* **Adult:** 1 tab (50 mg/12.5 mg) once daily MAX daily dose: 100 mg Atenolol and 25 mg Chlorthalidone
Bisoprolol fumarate + Amlodipine	**Tablet** (Bisoprolol/Amlodipine) 5 mg/5 mg (₱22.75) 5 mg/10 mg 10 mg/5 mg 10 mg/10 mg (₱44.25)	➤ *ORAL* **Adult:** 1 tab (5 mg/5 mg) once daily*;* *May be titrated as needed at 6 wk interval*
Bisoprolol fumarate + Hydrochlorothiazide	**FC Tablet** (Bisoprolol/HCTZ) 2.5 mg/6.25 mg 5 mg/6.25 mg 10 mg/6.25 mg	➤ *ORAL* **Adult:** 1 tab (2.5 mg/6.25 mg) once daily; *Titrate dose at 2 wk interval* MAX daily dose: 20 mg Bisoprolol and 12.5 mg HCTZ
Candesartan cilexetil + Hydrochlorothiazide	**Tablet** (Candesartan/HCTZ) 16 mg/12.5 mg	➤ *ORAL* **Adult:** 1 tab once daily ***Patients with intravascular volume depletion*** Initial dose of 4 mg Candesartan may be considered MAX daily dose: 32 mg Candesartan and 50 mg HCTZ
Enalapril maleate + Hydrochlorothiazide⋆	**Tablet** (Enalapril/HCTZ): 20 mg/12.5 mg	➤ *ORAL* **Adult:** 10–25 mg Enalapril with 12.5–50 mg HCTZ, daily in 1 to 2 divided doses
Eprosartan mesylate + Hydrochlorothiazide	**FC Tablet** (Eprosartan/HCTZ) 600 mg/12.5 mg	➤ *ORAL* **Adult:** 1 tab (600 mg/12.5 mg) once daily If additional BP control is required, or to maintain a 2x daily regimen, Eprosartan 300 mg may be added
Felodipine + Metoprolol succinate	**ER Tablet** (Felodipine/Metoprolol) 5 mg/47.5 mg	➤ *ORAL* **Adult:** 1 tab (5 mg/47.5 mg) once daily, may be increased to 2x daily as necessary

Imidapril HCl + Hydrochlorothiazide	**Tablet** 10 mg/12.5 mg	➤ *ORAL* **Adult:** 1 tab (10 mg/12.5 mg) once daily; *May be titrated as needed*
Irbesartan + Hydrochlorothiazide⋆	**Tablet** (Irbesartan/HCTZ): 300 mg/25 mg 150 mg/12.5 mg (₱10.49)	➤ *ORAL* **Adult:** 150 mg/12.5 mg once daily; *Titrate dose after 1-2 wk* MAX daily dose: 300 mg Irbesartan and 25 mg HCTZ
Lisinopril dihydrate + Hydrochlorothiazide	**Tablet** (Lisinopril/HCTZ): 10 mg/12.5 mg (₱1.75)	➤ *ORAL* **Adult:** 10–20 mg Lisinopril with 12.5 mg HCTZ once daily MAX daily dose: 80 mg Lisinopril and 50 mg HCTZ
Losartan + Hydrochlorothiazide⋆	**FC Tablet** (Losartan/HCTZ): 50 mg/12.5 mg (₱6.00) 100 mg/12.5 mg 100 mg/25 mg	➤ *ORAL* **Adult:** 50 mg/12.5 mg once daily; *Titrate after 3 weeks as needed based on blood pressure response.* MAX daily dose: 100 mg Losartan and 25 mg HCTZ
Losartan + Hydrochlorothiazide + Amlodipine	**FC Tablet** (Losartan/HCTZ/Amlodipine) 50 mg/12.5 mg/5 mg 100 mg/12.5 mg/5 mg 100 mg/12.5 mg/10 mg	➤ *ORAL* **Adult:** 1 tab once daily, *dose based on previous monotherapy dose; May be titrated as needed* MAX daily dose: 100 mg Losartan, 25 mg HCTZ, 10 mg Amlodipine
Nebivolol + Amlodipine	**Tablet** (Nebivolol/Amlodipine) 5 mg/5mg 5 mg/10mg (₱24.50)	➤ *ORAL* **Adult:** 1 tab (5 mg/5 mg) once daily; *May be titrated as needed* **Elderly:** 1 tab (2.5 mg/5 mg) once daily MAX daily dose: 5 mg Nebivolol and 10 mg Amlodipine
Olmesartan + Amlodipine	**FC Tablet** (Olmesartan/Amlodipine): 20 mg/5 mg (₱59.74) 20 mg/10 mg 40 mg/5 mg 40 mg/10 mg	➤ *ORAL* **Adult:** 20 mg/5 mg once daily, may increase in 1 to 2 weeks MAX daily dose: 40 mg Olmesartan and 10 mg Amlodipine
Olmesartan + Amlodipine + Hydrochlorothiazide	**FC Tablet** (Olmesartan/Amlodipine/HCTZ): 20 mg/5 mg/12.5 mg 40 mg/5 mg/12.5 mg 40 mg/10 mg/25 mg	➤ *ORAL* **Adult:** 20 mg/5 mg/12.5 mg once daily; may increase dosage at 2 week intervals MAX daily dose: 40 mg Olmesartan, 10 mg Amlodipine, 12.5 mg HCTZ
Olmesartan medoxomil + Hydrochlorothiazide	**FC Tablet** (Olmesartan/HCTZ): 20 mg/12.5 mg 20 mg/25 mg 40 mg/12.5 mg 40 mg/25 mg	➤ *ORAL* **Adult:** 20 mg/12.5–40 mg/25 mg once daily
Perindopril arginine + Amlodipine	**Tablet** (Perindopril/Amlodipine): 5 mg/5 mg 5 mg/10 mg 10 mg/5 mg 10 mg/10 mg	➤ *ORAL* **Adult:** 3.5 mg Perindopril arginine / 2.5 mg Amlodipine once daily; *Titrate as needed every 7 to 14 days* MAX daily dose: 14 mg Perindopril arginine and 10 mg Amlodipine
Perindopril arginine + Indapamide	**Tablet** (Perindopril/Indapamide): 2 mg/625 mcg 4 mg/1.25 mg 10 mg/2.5 mg	➤ *ORAL* **Adult:** Initially, 1 tab once daily, preferably in the morning. *Dose titrations may be given as fixed combinations (when available) or with individual components, if necessary. Dosage is individualized and adjusted according to patient response*
Quinapril hydrochloride + Hydrochlorothiazide	**Tablet** (Quinapril/HCTZ): 20 mg/12.5 mg	➤ *ORAL* **Adult:** 10 mg/12.5 or 20 mg/12.5 mg once daily, may be adjusted after 2–3 weeks to 20 mg/25 mg once daily according to clinical response *For elderly, initiate at lowest possible effective dose*

Telmisartan + Amlodipine	**Tablet** (Telmisartan/Amlodipine): 40 mg/5 mg 40 mg/10 mg 80 mg/5 mg 80 mg/10 mg	➤ *ORAL* **Adult:** 40 mg/5 mg once daily; *Titrate if necessary at least 2 weeks after therapy initiation* MAX daily dose: 80 mg Telmisartan and 10 mg Amlodipine
Telmisartan + Hydrochlorothiazide⋆	**Tablet** (Telmisartan/HCTZ): 40 mg/12.5 mg (₱19.80) 80 mg/12.5 mg also available as film-coated tablet	➤ *ORAL* **Adult:** 40 mg/12.5 mg once daily; May titrate up to 80 mg/25 mg once daily if BP is inadequately controlled or up to 160 mg/25 mg daily if BP remains uncontrolled after 2 to 4 weeks
Valsartan + Hydrochlorothiazide⋆	**FC Tablet** (Valsartan/HCTZ): 80 mg/12.5 mg (₱13.18) 80 mg/25 mg 160 mg/12.5 mg 320 mg/25 mg	➤ *ORAL* **Adult:** 160 mg/12.5 mg once daily; *titrate as needed according to response after 1-2 weeks of therapy* MAX daily dose: 320 mg Valsartan and 25 mg HCTZ

8 DRUGS FOR Peripheral Vascular Disease

Alteplase⋆

(rt-PA / Tissue-type plasminogen)

- **MOA** A thrombolytic agent; a recombinant human tissue-type plasminogen activator
- **INDICATIONS AND DOSE**
  Acute limb ischemia (ALI)[1]
  ➤ *INTRA-ARTERIAL*
  Adult: 1–2 mg bolus, followed by 0.05 mg/kg/h
- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for injection, vial:** 20 mg, 50 mg
- **CONTRAINDICATIONS** Active bleeding | Severe uncontrolled hypertension | Recent trauma, stroke, surgery | Hyperglycemia or hypoglycemia | Severe hepatic impairment
- **PRECAUTIONS** Hypertensive patients | Thrombocytopenia | Small recent trauma | High risk of hemorrhage
  - Avoid non-compressible arterial, internal jugular, subclavian punctures or IM injection
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hemorrhage | Pulmonary edema | Angioedema | Pleural effusion
- **COSTS**
  - 20 mg Powder (₱25,245.00)
  - 50 mg Powder (₱30,536.02)†

Aspirin⋆

(Acetylsalisylic acid)

- **MOA** A non-selective irreversible cyclooxygenase COX1 and COX2 inhibitor
- **INDICATIONS AND DOSE**
  Antiplatelet monotherapy for symptomatic peripheral arterial disease (PAD)[2] | For patients who undergone revascularization[2] | After infra-inguinal bypass surgery[2] | Reduce the risk of stroke and other CV events[2] | Symptomatic carotid artery stenosis[2]
  ➤ *ORAL*
  Adult: 75–100 mg once daily

  In combination with Rivaroxaban **for lower extremity artery disease[3] | May be considered in symptomatic PAD[4]**
  ➤ *ORAL*
  Adult: 100 mg once daily
  Used in combination with Rivaroxaban (2.5 mg 2x daily)
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 80 mg, 100 mg, 300 mg, 325 mg, 500 mg
  - **FC Tablet & MR Tablet**: 80 mg
  - **EC Tablet**: 80 mg, 100 mg
- **CONTRAINDICATIONS** Active peptic ulceration | Bleeding disorders | Severe cardiac failure
  - Lactation (long-term use and/or high dose)
  - Children under 16 years and those with flu-like symptoms
  - Concomitant use with Methotrexate ≥ 15 mg
- **PRECAUTIONS** Anemia | Asthma | Dehydration | G6PD deficiency | Hypertension | Thyrotoxicosis | Mild to moderate hepatic impairment
  - May mask symptoms of infection
  - Patients undergoing surgical procedures (including tooth extractions)
  - Concomitant use with anticoagulants, other antiplatelets, thrombolytics, oral corticosteroids
  - Elderly
- **ADVERSE EFFECTS** Dyspepsia | Hemorrhage or prolonged bleeding time | Reduced uric acid excretion (low dose) | Salicylism (large repeated doses) | Melena
- **COSTS**
  - 80 mg Tablet (₱4.00)†

Atorvastatin calcium ⋆

- **MOA** A selective and competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering therapy in PADs[2] | Abdominal aortic aneurysm (AAA) and evidence of aortic atherosclerosis using moderate or high-intensity dose[5]
  ➤ *ORAL*
  Adult: 2.5–10 mg once daily; *Uptitrate if necessary*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg, 20 mg, 40 mg, 80 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver failure or decompensated cirrhosis | ALT > 5x UNL | Concomitant use with Cyclosporine, Gemfibrozil, Ritonavir, Grapefruit Juice | Pregnancy and lactation
- **PRECAUTIONS** Increased HbA1c and serum glucose levels have been reported
  - Patients with known SLCO1B1 gene polymorphism
  - Rhabdomyolysis | Hemorrhagic stroke | Renal impairment
  - Children and elderly
- **ADVERSE EFFECTS** Hyperglycemia | Joint disorders | Muscle pain
- **COSTS**
  - 10 mg Tablet (₱10.00)†
  - 20 mg Tablet (₱14.00)†
  - 40 mg Tablet (₱17.00)†
  - 80 mg Tablet (₱21.12)†

Bisoprolol fumarate⋆

- **MOA** A cardioselective β_1-blocker
- **INDICATIONS AND DOSE**
  To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | Thoracic aortic aneurysm (TAA) and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]
  ➤ *ORAL*
  Adult: 5–10 mg once daily; MAX daily dose: 20 mg
  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 5 mg, 10 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | 2nd- or 3rd-degree AV block | Cardiogenic shock | Sinus bradycardia | Right ventricular failure secondary to pulmonary hypertension
- **PRECAUTIONS** DM | History or recent psoriasis | Thyrotoxicosis | Hepatic and renal impairment
  - Ensure heart failure not worsening before increasing dose
  - Abrupt withdrawal may exacerbate angina, MI, or VA
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 2.5 mg Tablet (₱18.25)
  - 5 mg Tablet (₱19.60)
  - 10 mg Film-coated Tablet (₱43.00)

Bivalirudin

- **MOA** A hirudin analogue; a specific and reversible direct thrombin inhibitor
- **INDICATIONS AND DOSE**
  Perioperative PAD[6] | Short- and long-term therapy in patients with PAD undergoing endovascular or surgical interventions[6]
  ➤ *INTRAVENOUS*
  Adult: 0.75 mg/kg IV bolus, followed by 1.75 mg/kg/hr IV infusion
  Drug product for emergency use only
- **DOSAGE FORMS AND PREPARATIONS**
  - **Lyophilized powder, vial**: 250 mg
- **CONTRAINDICATIONS** Active bleeding | Severe uncontrolled hypertension | Subacute bacterial endocarditis | Dialysis patients
- **PRECAUTIONS** Recent surgery | Renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Procedural complications | Bleeding | Skin reactions | Hypotension | Nausea | Back pain | General pain

Candesartan cilexetil

- **MOA** An angiotensin-receptor blocker
- **INDICATIONS AND DOSE**
  Hypertension associated with unilateral renal artery disease[2] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2] | To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome), and in Loeys-Dietz syndrome[2] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[2] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[2] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[2]
  ➤ *ORAL*
  Adult: 8–32 mg once daily; MAX daily dose: 32 mg
  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 4 mg, 8 mg, 16 mg, 32 mg
- **CONTRAINDICATIONS** Cholestasis | Severe hepatic impairment | Children < 1 year | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | Angioedema | Primary hyperaldosteronism
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 8 mg Tablet (₱25.89)
  - 16 mg Tablet (₱34.00)

Captopril⋆

- **MOA** An angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  Hypertension associated with unilateral renal artery disease[2] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]
  ➤ *ORAL*
  Adult: 6.25–25 mg 2x to 3x daily
  MAX daily dose: 150 mg in 2 divided doses
  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 25 mg, 50 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Angioedema | Significant bilateral renal artery stenosis | Concomitant use with neprilysin inhibitors
- **PRECAUTIONS** Renal and hepatic impairment | Significant hyperkalemia
  - Concomitant use with lithium
  - Children and elderly | Pregnancy (1st trimester) and lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Hypotension | Rash | Hyperkalemia | Taste disorder | Insomnia | Peptic ulcer | Dry cough | Angioedema
- **COSTS**
  - 25 mg Tablet (₱3.00)†
  - 50 mg Tablet (₱12.00)

Carvedilol⋆

- **MOA** A non-selective β-blocker with α_1-adrenergic blocking activity and no intrinsic sympathomimetic activity
- **INDICATIONS AND DOSE**

  To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP <120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]

  ➤ *ORAL*

  Adult: 12.5 mg once daily for 2 days; then increase to 25 mg once daily
  MAX daily dose: 50 mg in 1 or 2 divided doses
  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 6.25 mg, 12.5 mg, 25 mg

    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Bronchospasm (active asthma and COPD) | Cardiogenic shock | Sick sinus syndrome | Severe bradycardia | 2nd or 3rd degree AV block | Serious hypersensitivity (SJS-TEN, Anaphylactic reaction, Angioedema) | Severe hepatic impairment
- **PRECAUTIONS** May provoke chest pain in patients with Prinzmetal variant angina
  - Avoid abrupt withdrawal in patients with pre-existing CV conditions
  - Patients with peripheral vascular disease
  - May worsen renal function in heart failure patients
- **ADVERSE EFFECTS** Hypotension with or without syncope | Bradycardia | Peripheral edema | Weight gain | Hyper- or hypoglycemia | Fatigue | Fluid imbalance | Bronchospasm/ bronchoconstriction | Anemia
- **COSTS**
  - 6.25 mg Tablet (₱5.00)†
  - 25 mg Tablet (₱7.26)†

Cilostazol⋆

- **MOA** A phosphodiesterase III (PDE3) inhibitor
- **INDICATIONS AND DOSE**

  Intermittent claudication in patients without rest pain and no peripheral tissue necrosis[7] | To reduce symptoms of intermittent claudication[8] | To improve symptoms and increase walking distance in patients with intermittent claudication[9]

  ➤ *ORAL*

  Adult: 100 mg 2x daily, 30 min before or 2 hrs after meals
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg
  - **MR Tablet**: 200 mg
  - **MR Capsule**: 100 mg
  - **Sachet Powder**: 50 mg, 100 mg
- **CONTRAINDICATIONS** Active peptic ulcer | Congestive heart failure | History of stroke, severe tachyarrhythmia, MI | Poorly controlled hypertension | Unstable angina | Severe renal and moderate to severe hepatic impairment | Pregnancy and lactation
- **PRECAUTIONS** Atrial fibrillation, flutter | DM | Stable CAD | Concomitant use with strong or moderate CYP3A4 and CYP2C19 inhibitors

BLACK BOX WARNING

Cilostazol is contraindicated in congestive heart failure of any severity. Cilostazol and many of its metabolites inhibit phosphodiesterase III. Several drugs with this pharmacologic effect have resulted in decreased survival compared with placebo in patients with class III to IV congestive heart failure.

- **ADVERSE EFFECTS** Decreased appetite | Diarrhea | Dizziness | GI discomfort | Edema | Palpitations | Vomiting
- **COSTS**
  - 50 mg Tablet (₱11.40)†
  - 100 mg Tablet (₱22.50)†

Clopidogrel⋆

- **MOA** A selective and irreversible platelet $P2Y_{12}$ receptor antagonist
- **INDICATIONS AND DOSE**

  Antiplatelet alternative in symptomatic PAD patients with aspirin intolerance[2]

  ➤ *ORAL*

  Adult: 75 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 75 mg

- **CONTRAINDICATIONS** Active bleeding | Hypersensitivity | Severe hepatic impairment
- **PRECAUTIONS** Patients with impaired CYP2C19 function may experience diminished effectiveness
  - Concomitant use with omeprazole or esomeprazole, CYP2C19 inducers
  - Interrupt use 5 days prior surgery
  - Renal and moderate hepatic impairment
  - Elderly | Pregnancy and lactation
- **WARNINGS** Tests are available to identify patients who are CYP2C19 poor metabolizers. Consider use of another platelet P2Y12 inhibitor in patients identified as CYP2C19 poor metabolizers
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Hemorrhage | Chest pain | Flu-like symptoms | Urticaria
- **COSTS**
  - 75 mg Tablet (₱18.50)†

Dalteparin sodium

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa
- **INDICATIONS AND DOSE**

  For perioperative PAD, or for short- and long-term therapy in patients with PAD undergoing endovascular or surgical interventions[6]

  ➤ *SUBCUTANEOUS*

  Adult:

  Prophylactic dose 5000 units once daily

  Therapeutic dose 100 units/kg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, prefilled syringe:** 2500 IU/0.2 mL
- **CONTRAINDICATIONS** HIT or HITT | Active bleeding | Recent stroke
- **PRECAUTIONS** Gasping syndrome | Bleeding complication | Hyperkalemia | Prosthetic heart valves | Renal and severe hepatic impairment
  - Elderly | Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention.

- **ADVERSE EFFECTS** Epidural hematoma | Hypoaldosteronism | Intracranial hemorrhage | Epistaxis | Local irritation

Diltiazem hydrochloride*

- **MOA** A non-dihydropyridine calcium-channel blocker
- **INDICATIONS AND DOSE**

  Reasonable to use in patients with acute aortic syndromes with contraindication to beta-blockers to target heart rate of 60 to 80 bpm[5]

  ➤ *ORAL*

  Adult: *check drugs for hypertension*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 30 mg, 60 mg, 90 mg
  - **MR Capsule / Tablet:** 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block | Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS** Severe bradycardia | 1st degree AV block | Significantly impaired left ventricular function
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 60 mg Tablet (₱18.50)†

Diosmin + Hesperidin

(Micronized purified flavonoid fraction /MPFF)

- **MOA** A mixture of flavonoids with venotonic and vasoprotective activity; blocks PG and TXA_2
- **INDICATIONS AND DOSE**

  Venous leg ulceration[5,10]

  ➤ *ORAL*

  Adult: 500 mg two tabs daily
  Alternatively, 1000 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet** (Diosmin/Hesperidin): 450 mg/50 mg, 900 mg/100 mg
- **CONTRAINDICATIONS** Hypersensitivity
  - **PRECAUTIONS** Special precaution on pregnancy and lactation
- **ADVERSE EFFECTS** Diarrhea | Dyspepsia | Angioedema
- **COSTS**
  - 450 mg/50 mg FC Tablet (₱47.00)
  - 900 mg/100 mg FC Tablet (₱85.50)

Dipyridamole★

- **MOA** A phosphodiesterase III (PDE_3) inhibitor
- **INDICATIONS AND DOSE**
  Recently symptomatic carotid stenosis patients who are intolerant or allergic to Aspirin and Clopidogrel[11] | Asymptomatic carotid stenosis who are intolerant or allergic to Aspirin and Clopidogrel[11]
  ➤ *ORAL*
  Adult
  Modified-release tablet 200 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 25 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Hypersensitivity
- **PRECAUTIONS** Increased risk of severe MI in patients with unstable angina | Hypotension, may cause peripheral vasodilation | Bronchospasm | Coagulation disorder | aortic stenosis | Decompensated heart failure | Hepatic impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Orthostatic hypotension | Headache | Rashes | Abdominal discomfort | Dizziness | Dyspnea

Edoxaban

- **MOA** A direct and reversible factor Xa inhibitor
- **INDICATIONS AND DOSE**
  All patients with PADs and atrial fibrillation[2] | PADs and atrial fibrillation when CHA2DS2-VASc score is ≥ 2[2] | Patients with PADs with another indication for OAC (e.g. AF or mechanical prosthetic valve)[2] | Monotherapy if the bleeding risk is high after endovascular revascularization compared with risk of stent/graft occlusion[2]
  ➤ *ORAL*
  Adult: 60 mg once daily
  Patients taking P-gp inhibitors
  30 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 30 mg, 60 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Hepatic disease | Prosthetic heart valve | Uncontrolled severe hypertension | Pregnancy and lactation
- **PRECAUTIONS** Body weight < 60 kg | Moderate to severe mitral stenosis | Renal and hepatic impairment
  - Concomitant use with P-gp inhibitors (Erythromycin, Ketoconazole, Cyclosporin)

BLACK BOX WARNING

Premature discontinuation increases risk of ischemic events; Resulting epidural or spinal hematomas may result in long-term paralysis.

Reduced efficacy in nonvalvular AF with CrCl > 95 mL/min

- **ADVERSE EFFECTS** Abdominal pain | Anemia | Dizziness | Hemorrhage | Headache | Nausea | Rash | Abnormal liver function tests
- **COSTS**
  - 30 mg Tablet (₱147.00)

Enalapril maleate★

- **MOA** A long-acting angiotensin-converting enzyme (ACE) inhibitor
- **INDICATIONS AND DOSE**
  Hypertension associated with unilateral renal artery disease[2] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]
  ➤ *ORAL*
  Adult: 5–10 mg once daily
  MAX daily dose: 40 mg in 1 to 2 divided doses
  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet** 2.5 mg, 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** Concomitant use with neprilysin inhibitor | History of angioedema | Significant bilateral renal artery stenosis
- **PRECAUTIONS** Renal impairment and K-sparing diuretic increase the risk of hyperkalemia
  - May exacerbate hypotension if with concomitant diuretic, hyponatremia and hypovolemia
  - Patients younger than 5 mos are more prone to experience renal dysfunction; titrate carefully
  - Avoid in breastfeeding women during first few weeks after delivery (risk of profound neonatal hypotension)
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Hyperkalemia | Cough | Headache | Dizziness | Hypotension | Asthenia
- **COSTS**
  - 5 mg Tablet (₱8.70)†
  - 20 mg Tablet (₱12.00)†

Enoxaparin sodium★

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa
- **INDICATIONS AND DOSE**
  Perioperative PAD, or for short- and long-term therapy in patients with PAD undergoing endovascular or surgical interventions[6]
  ➤ *SUBCUTANEOUS*
  Adult:
  Prophylactic dose 40 mg once daily
  Therapeutic dose 1 mg/kg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, single dose prefilled syringe:** 100 mg/mL (0.2 mL, 0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Recent stroke, GI ucer, surgery | Neonates, infants
- **PRECAUTIONS** Low body weight (increased risk of bleeding)
  - Obesity (increased risk of thromboembolism)
  - Renal and hepatic impairment
  - Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention in patients anticoagulated or to be anticoagulated for thromboprophylaxis.

- **ADVERSE EFFECTS** Hemorrhagic anemia | Headache | Confusion | Hypersensitivity | Thrombocytopenia | Thrombocytosis
- **COSTS**
  - 100 mg/mL, 0.4 mL Solution for Injection Prefilled Syringe (₱794.00)†
  - 100 mg/mL, 0.6 mL Solution for Injection Prefilled Syringe (₱778.00)†

Eprosartan mesylate⋆

- **MOA** An angiotensin (II) receptor blocker
- **INDICATIONS AND DOSE**

  Hypertension associated with unilateral renal artery disease[2] | To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP <120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]

  ➤ *ORAL*

  Adult: 600 mg once daily, *titrate dose after 1 week to achieve desired heart rate*
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 600 mg
- **CONTRAINDICATIONS** Bilateral renal artery stenosis | Severe hepatic impairment | Concomitant use with ACEIs in patients with diabetic nephropathy
- **PRECAUTIONS** Severe CHF | DM Renal and mild to moderate hepatic impairment
  - Concomitant use with Lithium is not generally recommended due to increased risk of Li toxicity
  - Elderly | Lactation
- **WARNINGS** Drugs acting directly on the renin-angiotensin system can cause injury and death to the developing fetus. When pregnancy is detected, discontinue as soon as possible
- **ADVERSE EFFECTS** Cough and respiratory infection | Myalgia | Fatigue | Abdominal pain
- **COSTS**
  - 600 mg Tablet (₱41.00)

Esmolol hydrochloride⋆

- **MOA** A short-acting cardioselective β-blocker
- **INDICATIONS AND DOSE**

  To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥130 mm Hg or an average diastolic BP (DBP) of ≥80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP <120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]

  ➤ *INTRAVENOUS*

  Adult: Loading dose 0.5 mg/kg IV over 2 to 5 mins, followed by 0.1–0.2 mg/kg/minute IV infusion
  MAX: 0.3 mg/kg/minute
  Target SBP: 100 to 120 mmHg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 10 mg/mL (10 mL, 250 mL), 100 mg/mL (10 mL)
- **CONTRAINDICATIONS** Cardiogenic shock | Decompensated heart failure | Pulmonary hypertension | 2nd- or 3rd-degree AV block | Sick sinus syndrome | Severe sinus bradycardia | Concomitant use with IV CCB
- **PRECAUTIONS** Avoid infusion into small veins or use of butterfly catheter
  - Abrupt withdrawal may precipitate thyrotoxicosis
  - Sudden discontinuation may exacerbate angina
  - Renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hypotension | Profound bradycardia | Decreased appetite | Drowsiness | Sweating | Headache | Fatigue | Dizziness | Anxiety
- **COSTS**
  - 10 mg/mL, 10 mL Solution for Injection Vial (₱410.30)†
  - 100 mg/mL, 10 mL Solution for Injection Vial (₱475.20)†

Evolocumab

- **MOA** A humanized monoclonal antibody that inhibits the binding of PCSK9 to LDL receptors on hepatocytes and reduces LDLR degradation. Increased LDLRs results in increased uptake of LDL-C from the blood.

- **INDICATIONS AND DOSE**

  To reduce major limb events as monotherapy or in combination with statins and other lipid-lowering drugs[1,2]

  ➤ *SUBCUTANEOUS*

  Adult: 140 mg once every 2 wks
  Alternatively, 420 mg once a month

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, prefilled autoinjector**: 140 mg/mL
- **CONTRAINDICATIONS** Hypersensitivity
- **PRECAUTIONS** Renal and hepatic impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Arthralgia | Back pain | Increased risk of infection | Skin reactions
- **COSTS**
  - 140 mg/mL Solution for Injection (₱18,700.00)
  - 140 mg/mL Solution for Injection Prefilled Syringe (₱27,034.25)

Ezetimibe

- **MOA** Selectively inhibits intestinal absorption of cholesterol and phytosterols

- **INDICATIONS AND DOSE**

  As adjunct in PAD in the event that after treatment with the maximum tolerated statin dose LDL-C levels remains ≥70 mg/dL[1,2]

  ➤ *ORAL*

  Adult: 10 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 10 mg
- **CONTRAINDICATIONS** Active liver disease or severe hepatic impairment
- **PRECAUTIONS** ALT ≥ 3x ULN | Hypersensitivity (anaphylaxis, angioedema, rash, urticaria) | Myopathy or rhabdomyolysis | Renal and moderate hepatic impairment
  - Pregnancy and lactation
- **WARNINGS** Serious warning includes hepatitis, pancreatitis, myopathy/rhabdomyolysis, myalgia, anaphylaxis
- **ADVERSE EFFECTS** Diarrhea | GI discomfort | Arthralgia | URI | Headache
- **COSTS**
  - 10 mg Tablet (₱53.75)

Heparin sodium (unfractionated)⋆

- **MOA** A glycosaminoglycan anticoagulant targeting Xa and IIa equally, then VIIa, IXa, and XIa clotting factors; complexes with ATIII

- **INDICATIONS AND DOSE**

  As soon as possible **for the management of patients presenting with acute limb ischemia**[2]

  ➤ *INTRAVENOUS*

  Adult:

  Follow RASCHKE protocol in drip dose adjustment
  Loading dose 60–80 units/kg IV bolus, followed by a continuous infusion of 12–18 units/kg/hr, to adjust infusion rate to maintain target based on institutional protocol

  Periprocedural anticoagulation in endovascular and surgical procedures[6]

  ➤ *INTRAVENOUS*

  Adult: 100–150 units/kg by intraoperative IV

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial:** 5000 IU/mL (5 mL), 1000 IU/mL (5 mL)
- **CONTRAINDICATIONS** Neonates or infants (for products containing benzyl alcohol) | Severe thrombocytopenia | Uncontrolled active bleeding
- **PRECAUTIONS** HIT / HITT | uncontrolled severe HPN | DM | Hepatic and renal impairment
  - Avoid IM use; hematomas frequently occur at injection site
  - Elderly, particular women, are at higher risk of bleeding
  - Pregnancy and lactation
- **ANTIDOTE** **Protamine sulfate:** 1–1.5 mg of Protamine per 100 units of Heparin
- **ADVERSE EFFECTS** Hypersensitivity reactions | Osteoporosis (long-term doses) | Thrombocytopenia | Elevated liver enzymes | Chest pain | Chills | Rebound hyperlipidemia | Bruising
- **COSTS**
  - 1000 IU/mL, 5 mL Solution for Injection Vial (₱135.00)†
  - 5000 IU/mL, 5 mL Solution for Injection Vial (₱228.07)†

Irbesartan⋆

- **MOA** A selective angiotensin-II receptor type 1 (AT_1) blocker

- **INDICATIONS AND DOSE**

  Treatment of hypertension associated with unilateral renal artery disease[2] | **To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome**[5] | **TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events**[5] |

Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]

➤ *ORAL*

Adult: 150–300 mg once daily
Titrate dose after 1 week to achieve desired heart rate

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 75 mg, 150 mg, 300 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Hypersensitivity | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | Significant aortic or mitral valve stenosis | HF | DM | Angioedema | Renal impairment, including acute renal failure
  - Not recommended in patients with primary aldosteronism
  - Concomitant use with ACE inhibitor
  - Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Diarrhea | Heartburn | Headache | Fatigue | Hyperkalemia | Hypotension | Dizziness | Musculoskeletal pain
- **COSTS**
  - 150 mg Tablet (₱3.79)†
  - 300 mg Tablet (₱10.03)†

Labetalol hydrochloride

- **MOA** A mixed adrenoceptor blocker; a non-selective β-blocker with α_1-adrenergic blocking activity
- **INDICATIONS AND DOSE**

To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]

➤ *ORAL*

Adult: 200–800 mg daily in 2 divided doses
Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 5 mg/mL (100 mg/20 mL)
- **CONTRAINDICATIONS** Bronchospastic disease including asthma | Cardiogenic shock | Overt cardiac failure | 2nd or 3rd degree AV block | Severe bradycardia | Sick sinus syndrome
- **PRECAUTIONS** 1st degree heart block | Pheochromocytoma | DM | Thyroid disease | Hepatic or renal impairment
  - Abrupt withdrawal may exacerbate angina and/or MI
  - Use with caution in patients using CCB and cardiac glycosides
  - Elderly | Pregnancy and lactation
- **WARNINGS** Interferes with laboratory tests for catecholamines
  - Labetalol IV infusion should not be used to control hypertensive episodes after MI when peripheral vasoconstriction suggests low cardiac output
- **ADVERSE EFFECTS** Drug fever | Urinary disorders | Hypersensitivity | Tingling of skin | Hypoglycemia unawareness | Fetal bradycardia | Bronchoconstriction | Dizziness and lightheadedness | Hypotension | Failure to ejaculate
- **COSTS**
  - 5 mg/mL (100 mg/20 mL) Solution for Injection (₱2,700.00)

Losartan potassium★

- **MOA** A competitive angiotensin-II receptor blocker
- **INDICATIONS AND DOSE**

Treatment of hypertension associated with unilateral renal artery disease[2] | Recommended to reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]

➤ *ORAL*

Adult: 25–100 mg daily in 1 to 2 divided doses
Titrate dose after 1 week to achieve desired heart rate

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 50 mg, 100 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Severe heart failure | Hypotension (volume- or salt-depleted patients) | Renal impairment and mild to moderate hepatic impairment
  - Hyperkalemia; concomitant use with Potassium-containing agents
  - Children and elderly | Lactation
- **WARNING** Drugs that act directly on the renin-angiotensin system can cause injury or death to the developing fetus
- **ADVERSE EFFECTS** Bradycardia | Constipation or diarrhea | Headache | Fatigue | Hypotension
- **COSTS**
  - 50 mg Tablet (₱9.00)†
  - 100 mg Tablet (₱8.50)†

Metoprolol

(as Metoprolol succinate or Metoprolol tartrate ⋆)

- **MOA** A selective β_1-blocker
- **INDICATIONS AND DOSE**

  To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome)[5] | Recommended for patients with TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]

  ➤ *ORAL*

  Adult

  Metoprolol tartrate 50–100 mg once to 2x daily

  Metoprolol succinate 25–100 mg once daily

  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - *Metoprolol tartrate*

    FC Tablet: 50 mg, 100 mg
  - *Metoprolol succinate*

    ER Tablet: 23.75 mg (25 mg), 45.5 mg (50 mg), 95 mg (100 mg)
- **CONTRAINDICATIONS** Sinus bradycardia, overt cardiac failure, cardiogenic shock, and sick sinus syndrome (without pacemaker) in patients with hypertensive and angina | 1st-degree heart block in patients with MI | Decompensated heart failure
  - Should not be used for hypertension with presence of drug-induced tachycardia for psychiatric patients taking antidepressant, antipsychotic drugs
- **PRECAUTIONS** DM | Bronchospastic disease including asthma | Hepatic impairment | Patient undergoing surgery
  - May mask symptoms of hypoglycemia and thyrotoxicosis
  - Dose adjustment may be considered depending on CYP2D6 phenotype
  - Elderly | Pregnancy and lactation
- **WARNINGS** Patients should be warned against interruption or discontinuation of therapy without physician's advice

BLACK BOX WARNING
Ischemic Heart Disease
Do NOT abruptly discontinue in patients with coronary artery disease. Dosage should be gradually reduced over a period of 1 to 2 weeks.

- **ADVERSE EFFECTS** Bradyarrhythmia | Pruritus | Diarrhea | Depression | Dyspnea | Withdrawal symptom
- **COSTS**
  - *Metoprolol succinate*

    47.5 mg ER tablets (₱6.25)
  - *Metoprolol tartrate*

    50 mg Tablet (₱3.00)†

    100 mg Tablet (₱4.50)†

Nebivolol hydrochloride

- **MOA** A long-acting cardioselective β_1-blocker
- **INDICATIONS AND DOSE**

  To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome)[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5]

  ➤ *ORAL*

  Adult: 5–40 mg once daily

  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Acute or decompensated heart failure requiring IV inotropes | Severe bradycardia | 2nd and 3rd degree AV block | Cardiogenic shock | Sick sinus syndrome without permanent pacemaker | Severe hepatic impairment
- **PRECAUTIONS** Bronchospastic disease | DM | Hyperthyroidism | Severe renal and hepatic impairment
  - Avoid abrupt withdrawal, especially in CAD patients
  - Pre-treatment with alpha-blockers is recommended for patients with known or suspected pheochromocytoma
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Bradycardia | Edema | Postural hypertension | GI symptoms | Dizziness | Headache
- **COSTS**
  - 2.5 mg Tablet (₱13.25)
  - 5 mg Tablet (₱20.95)

Olmesartan medoxomil

- **MOA** A competitive and selective angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Treatment of hypertension associated with unilateral renal artery disease[2] | To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] |

Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]

➤ *ORAL*

Adult: 10–20 mg once daily
Titrate dose after 1 week to achieve desired heart rate

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 10 mg, 20 mg, 40 mg
- **CONTRAINDICATIONS** Biliary obstruction | Pregnancy
- **PRECAUTIONS** Renal artery stenosis | DM | Primary aldosteronism | Angioedema | Renal and hepatic impairment
  - Gradual decrease dose to avoid withdrawal symptoms
  - Children: Use in pediatric patients less than 1 yr for treatment of hypertension is not recommended due to potential effects on developing kidneys
  - Elderly | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Arthritis | Bone pain | Chest pain | Hematuria | Hyperuricemia | Flu-like symptoms | Dizziness | Headache | Hyperglycemia | Hypertriglyceridemia
- **COSTS**
  - 10 mg FC Tablet (₱47.50)
  - 20 mg Tablet (₱56.00)
  - 40 mg Tablet (₱22.25)

Pentoxifylline / Oxpentifylline

- **MOA** A methylxanthine derivative; a non-specific phosphodiesterase inhibitor

- **INDICATIONS AND DOSE**

Peripheral vascular disease[7] | Venous leg ulcer (adjunct)[7,10]

➤ *ORAL*

Adult: 400 mg 3x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet & MR Tablet:** 400 mg
- **CONTRAINDICATIONS** Cerebral hemorrhage | Acute MI | Serious cardiac arrhythmia | Hypersensitivity to other methyl xanthines
- **PRECAUTIONS** Severe hypotension | CAD | DM | Severe renal and hepatic impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Transient hypotension | Angina | Nausea | Vomiting

Pravastatin sodium

- **MOA** A reversible HMG-CoA reductase inhibitor

- **INDICATIONS AND DOSE**

Lipid-lowering therapy in all patients with PADs[2] | AAA and evidence of aortic atherosclerosis using moderate or high-intensity dose[5]

➤ *ORAL*

Adult: 40–80 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 20 mg, 40 mg
- **CONTRAINDICATIONS** Acute liver disease, decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity | Pregnancy and lactation
- **PRECAUTIONS** DM | Chronic alcoholism | Myopathy and rhabdomyolysis | Preexisting amyotrophic lateral sclerosis (ALS) | Renal impairment
- **ADVERSE EFFECTS** GI discomfort | Headache | Musculoskeletal pain | Skin rash | URI
- **COSTS**
  - 20 mg Tablet (₱17.50)
  - 40 mg Tablet (₱21.50)

Rivaroxaban

- **MOA** A selective direct factor Xa inhibitor

- **INDICATIONS AND DOSE**

PADs and atrial fibrillation when CHA_2DS_2-VASc score is ≥ 2[2] | All patients with PADs and atrial fibrillation[2] | Patients with PADs with another indication for OAC (e.g., AF or mechanical prosthetic valve)[2] | Monotherapy if the bleeding risk is high after endovascular revascularization compared with risk of stent/graft occlusion[2]

➤ *ORAL*

Adult: 15–20 mg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 2.5 mg, 10 mg, 15 mg, 20 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Severe hypersensitivity | Severe renal impairment or undergoing dialysis | Moderate to severe hepatic impairment
- **PRECAUTIONS** Patients with bleeding risk | Severe hypertension | rheumatic heart disease | prosthetic heart valves
  - Concomitant use with CYP3A4 inducers and CYP3A4 inhibitors, HIV protease inhibitors
  - Avoid in pediatric patients > 1 yr with moderate or severe renal impairment
- **WARNINGS** Avoid abrupt discontinuation in the absence of alternative treatment

BLACK BOX WARNING

Premature discontinuation increases the risk of thrombotic events

Patients treated with Rivaroxaban who are receiving neuraxial anesthesia or undergoing spinal puncture are at risk for long-term or permanent paralysis; monitor frequently for neurological impairment

- **ADVERSE EFFECTS** Hemorrhage including epistaxis | Anemia (prolonged use) | Gastroenteritis | Vomiting | Cough
- **COSTS**
  - 15 mg FC Tablet (₱152.00)
  - 20 mg FC Tablet (₱156.00)

Rosuvastatin⋆

- **MOA** A long-acting, selective, and competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering therapy in all patients with PADs[2] | AAA and evidence of aortic atherosclerosis using moderate or high-intensity dose[5]
  ➤ *ORAL*
  Adult: 5–40 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg, 40 mg
    also available as film-coated tablet
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Severe renal impairment | Hypersensitivity | Concomitant use with Cyclosporine, Gemfibrozil | Pregnancy and lactation
- **PRECAUTIONS** Increased HbA1c and fasting glucose | Myopathy and rhabdomyolysis | Proteinuria and hematuria
  - Patients with known SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** Abdominal pain | Constipation | Headache | Myalgia | Asthenia
- **COSTS**
  - 10 mg Tablet (₱14.55)†
  - 20 mg Tablet (₱22.34)†

Rutoside / Rutin

- **MOA** A flavonoid that targets PG-E2 reductase activity; used as capillary stabilizing agent
- **INDICATIONS AND DOSE**
  Active venous leg ulceration[10]
  ➤ *ORAL*
  Adult: 500 mg 2x daily
- **DOSAGE FORMS AND PREPARATIONS**
  Available in combination with Ascorbic Acid 500mg
  - **Chewable Tablet**: 250 mg, 500 mg
- **CONTRAINDICATIONS** Hypersensitivity
- **PRECAUTIONS** May interfere with blood sugar control
- **ADVERSE EFFECTS** Decrease in hematocrit, RBC count | Increase in PT | Abdominal discomfort | Palpitations | Muscle stiffness
- **COSTS**
  - 250 mg Rutoside (with 500 mg Vit C) (₱13.11)
  - 500 mg Rutoside (with 500 mg Vit C) (₱21.09)

Simvastatin⋆

- **MOA** A competitive HMG-CoA reductase inhibitor
- **INDICATIONS AND DOSE**
  Lipid-lowering therapy in all patients with PADs[2] | AAA and evidence of aortic atherosclerosis using moderate or high-intensity dose[5]
  ➤ *ORAL*
  Adult: 20–80 mg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 5 mg, 10 mg, 20 mg, 40 mg, 80 mg
    also available as film-coated
- **CONTRAINDICATIONS** Acute liver disease or decompensated cirrhosis | ALT > 5x UNL | Hypersensitivity | Concomitant use with Cyclosporine, Gemfibrozil, strong CYP3A4 inhibitors, Danazol
- **PRECAUTIONS** Myopathy and rhabdomyolysis (with higher risk for Chinese patients)
  - Proteinuria and hematuria | Renal impairment
  - 80 mg dose is only recommended in patients at high risk of CV complications
  - Patients with SLCO1B1 gene polymorphism
  - Children and elderly
- **ADVERSE EFFECTS** GI discomfort | Headache | URI | Increased HbA1c and fasting glucose
- **COSTS**
  - 20 mg Tablet (₱4.00)†
  - 40 mg Tablet (₱6.00)†

Streptokinase⋆

- **MOA** A fibrinolytic; activates plasminogen to form plasmin which degrades fibrin
- **INDICATIONS AND DOSE**
  Acute limb ischemia[1]
  ➤ *INTRA-ARTERIAL*
  Adult: 50,000–120,000 IU over 4 hrs, followed by 1,000–8,000 IU/h
- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for Injection, vial**: 1.5M IU
- **CONTRAINDICATIONS** Recent streptococcal infection | Severe uncontrolled hypertension | Recent trauma or surgery within 2 months | Recent internal bleeding | Recent stroke | Intracranial or intraspinal surgery or head trauma (within 2 months) | Major or invasive operation (within 6–10 days) | Severe renal and hepatic impairment | Pregnancy
- **PRECAUTIONS** Previous Streptokinase administration (within 5 to 12 months) | Diabetic retinopathy | Patients currently on oral anticoagulation

- Elderly | lactation
- **ADVERSE EFFECTS** Arrhythmia | Asthenia | Diarrhea | Epigastric pain | Malaise | Headache | Fever | Hypotension
- **COSTS**
  - 1,500,000 IU Powder for Injection Vial (₱3,980.00)†

Sulodexide

- **MOA** A mixture of LMW Heparin and Dermatan sulfate; potentiates ATIII and heparin cofactor II with anti-IIa and anti-Xa activity
- **INDICATIONS AND DOSE**

  Venous leg ulceration[10]

  ➤ *INTRAVENOUS / INTRAMUSCULAR*

  Adult: 600 LSU once daily for 15–20 days
  Continue with the oral form for 30–40 days

  ➤ *ORAL*

  Adult: 250–500 LSU 2x daily for 30–40 days
  Repeat the treatment cycle at least twice yearly. Dosage quantity and frequency may vary according to the physician's evaluation
- **DOSAGE FORMS AND PREPARATIONS**
  - **Softgel capsule:** 250 LSU
  - **Solution for Injection, ampule**: 300 LSU/mL (2 mL)
- **CONTRAINDICATIONS** Hypersensitivity to heparin and heparinoids | Bleeding | Pregnancy
- **PRECAUTIONS** Hemocoagulative parameters should be monitored periodically
- **ADVERSE EFFECTS** Diarrhea | Epigastric pain | Vomiting
- **COSTS**
  - 250 LSU Softgel Capsule (₱54.00)
  - 300 LSU/mL, 2mL Solution for Injection (₱280.00)

Telmisartan⋆

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Treatment of hypertension associated with unilateral renal artery disease[2] **| To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome**[5] **| TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events**[5] **| Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm | To reduce the aortic wall stress in uncomplicated type B aortic dissection**[5] **| May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney**[2]

➤ *ORAL*

Adult: 20–80 mg once daily
Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60-80 bpm

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 20 mg, 40 mg, 80 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Cholestasis | Biliary obstructive disorders | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Hyperkalemia in patient with renal impairment | Mild to moderate renal impairment
  - Increased serum creatinine or blood urea nitrogen from renal artery stenosis
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
  - Increases Digoxin peak plasma concentration
- **ADVERSE EFFECTS** Cough and URI | Peripheral edema | Myalgia | Diarrhea
- **COSTS**
  - 40 mg Tablet (₱14.46)†
  - 80 mg Tablet (₱34.00)

Tinzaparin sodium⋆

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective activity against factor Xa
- **INDICATIONS AND DOSE**

  Perioperative PAD[6] **| Short- and long-term therapy in patients with PAD undergoing endovascular or surgical interventions**[6]

  ➤ *SUBCUTANEOUS*

  Adult: 175 units/kg once daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, prefilled syringe:** 10 000 IU/mL (0.35 mL, 0.45 mL, 2 mL)
- **CONTRAINDICATIONS** Active major bleeding
  - Current or history of heparin-induced thrombocytopenia
  - Mechanical prosthetic heart valve
  - Hypersensitivity to Tinzaparin, Heparin, sulfites, benzyl alcohol, or pork products
  - Concomitant use with NSAIDs, anticoagulants, thrombolytics
  - Severe hemodynamic instability
- **PRECAUTIONS** Uncontrolled arterial hypertension | Diabetic retinopathy
  - Premature neonates are at risk for fatal gasping syndrome
- **ADVERSE EFFECTS** Anemia | Erythema | Elevated liver function test | Local pain and irritation

BLACK BOX WARNING

Epidural or spinal hematomas resulting in long-term paralysis may occur. Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary.

- **COSTS**
  - 10,000 anti-Xa IU/mL, 0.35 mL Prefilled Syringe (₱312.13)†
  - 10,000 anti-Xa IU/mL, 0.45 mL Prefilled Syringe (₱238.31)†
  - 10,000 anti-Xa IU/mL, 2 mL Prefilled Syringe (₱711.57)†

Valsartan⋆

- **MOA** An angiotensin II receptor blocker
- **INDICATIONS AND DOSE**

  Treatment of hypertension associated with unilateral renal artery disease[2] | To reduce the rate of aortic dilatation in aortic aneurysm (atherosclerotic, Marfan syndrome) and in Loeys-Dietz syndrome[5] | TAA and AAA with average SBP of ≥ 130 mm Hg or an average diastolic BP (DBP) of ≥ 80 mm Hg to reduce the risk of cardiovascular events[5] | Acute aortic syndromes to target SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to a target heart rate of 60 to 80 bpm[5] | To reduce the aortic wall stress in uncomplicated type B aortic dissection[5] | May be considered in bilateral severe RAS and in the case of stenosis in a single functioning kidney[2]

  ➤ *ORAL*

  Adult: 80–320 mg once daily

  Titrate dose after 1 week to achieve SBP < 120 mm Hg or to lowest BP that maintains adequate end-organ perfusion, as well as to target HR 60–80 bpm
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 40 mg, 80 mg, 160 mg, 320 mg also available as film-coated tablet
- **CONTRAINDICATIONS** Biliary cirrhosis | Cholestasis | Severe hepatic impairment | Pregnancy
- **PRECAUTIONS** Renal impairment and mild to moderate hepatic impairment | Hyperkalemia in patients with renal dysfunction | Symptomatic hypotension (patients with HF or post-MI)
  - Children | Lactation
- **WARNINGS** Drugs that act directly on the renin-angiotensin system can cause injury and death to the developing fetus
- **ADVERSE EFFECTS** Dizziness | Hypotension | Headache | Elevated serum BUN, creatinine | Cough
- **COSTS**
  - 80 mg FC Tablet (₱11.64)†
  - 160 mg FC Tablet (₱22.00)†

Verapamil hydrochloride⋆

- **MOA** A non-DHP L-type calcium channel blocker
- **INDICATIONS AND DOSE**

  Reasonable to use in patients with acute aortic syndromes with contraindication to beta-blockers to target heart rate of 60 to 80 bpm. Initial management with an intravenous non-dihydropyridine calcium channel blocker is reasonable for heart rate control[5]

  ➤ *INTRAVENOUS*

  Adult: Initial dose 0.075–0.15 mg/kg IV bolus over 2 mins; may give an additional 10 mg after 30 mins if no response, then 0.005 mg/kg/min infusion
- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, ampule/vial**: 2.5 mg/mL (2 mL)
- **CONTRAINDICATIONS** Atrial flutter or fibrillation associated with accessory conducting pathways (e.g. WPW syndrome) | Bradycardia | Cardiogenic shock | HFrEF | Sick sinus syndrome (without pacemaker) | Acute porphyria | Concomitant use with beta-blockers, Ivabradine, Quinidine
- **PRECAUTIONS** Renal and hepatic impairment | Severe aortic stenosis | 1st degree AV block | Exacerbation of angina | Atrial fibrillation/flutter
  - Children: Avoid in children younger than 1 yr due to risk of asystole
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Edema | Hypotension | Constipation | Headache | Flu-like symptoms
- **COSTS**
  - 2.5 mg/mL, 2mL Solution for Injection, ampule (₱127.94)†

Warfarin sodium⋆

- **MOA** An anticoagulant; Vitamin K antagonist
- **INDICATIONS AND DOSE**

  Monotherapy for patients with LEAD requiring long-term oral anticoagulation[2] | Treatment of acute and recurrent limb ischemia[13] | Prophylaxis and treatment of arterial embolism from atrial fibrillation[13] | May be considered after autologous vein infra-inguinal bypass in lower extremity artery disease[2]

  ➤ *ORAL*

  Adult: Initial 5 mg once daily *to adjust dose to target INR*
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg, 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Malignant hypertension | Recent or potential surgery
  - Pregnancy, except in pregnant women with mechanical heart valves, who are at high risk of thromboembolism
  - Concomitant use with Amiodarone, Ciprofloxacin, Macrolides, NSAIDs, fibrinolytics
- **PRECAUTIONS** Vitamin K deficiency | Hepatic and renal impairment | HIT

- Postpartum (delay Warfarin until risk of bleeding is low; 5–7 days after delivery)
- CYP2C9 and VKORC1 genetic variation influences patient response to initial and maintenance therapy and increases risk of bleeding
- Elderly | Lactation

BLACK BOX WARNING

Warfarin can cause major or fatal bleeding. Instruct patients about preventive measures to minimize risk of bleeding and to report signs and symptoms of bleeding.

- **ADVERSE EFFECTS** Abnormal hepatic function | Calciphylaxis | Alopecia | Acute kidney injury | Hypersensitivity reactions
- **ANTIDOTE** **Vitamin K**
- **COSTS**
  - 2.5 mg Tablet (₱15.79)†
  - 5 mg Tablet (₱17.91)†

REFERENCES

[1] Olinic D-M, Stanek A, Tătaru D-A, Homorodean C, Olinic M. Acute limb ischemia: An update on diagnosis and management. *Journal of Clinical Medicine*. 2019;8(8):1215. doi:10.3390/jcm8081215

[2] Aboyans V, Ricco J-B, Bartelink M-LE, et al. 2017 ESC guidelines on the diagnosis and treatment of peripheral arterial diseases, in collaboration with the European Society for Vascular Surgery (ESVS). *European Heart Journal*. 2017;39(9):763-816. doi:10.1093/eurheartj/ehx095

[3] Frank U, Nikol S, Belch J, et al. ESVM guideline on peripheral arterial disease. *Vasa*. 2019;48(Supplement 102):1-79. doi:10.1024/0301-1526/a000834

[4] Abola MT, Golledge J, Miyata T, et al. Asia-Pacific Consensus Statement on the management of peripheral artery disease: A report from the Asian Pacific Society of Atherosclerosis and vascular disease asia-pacific peripheral artery disease consensus statement project committee. *Journal of Atherosclerosis and Thrombosis*. 2020;27(8):809-907. doi:10.5551/jat.53660

[5] Isselbacher EM, Preventza O, Hamilton Black J, et al. 2022 ACC/AHA guideline for the diagnosis and management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *Circulation*. 2022;146(24). doi:10.1161/cir.0000000000001106

[6] Cannavale A, Santoni M, Cannavale G, Fanelli F. Anticoagulation in peripheral artery disease: Are we there yet? *Vascular and Endovascular Review*. 2020;3. doi:10.15420/ver.2019.10

[7] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[8] Formulary Executive Council. *Philippine National Formulary*. 8th ed. Department of Health; 2019

[9] Kithcart AP, Beckman JA. ACC/AHA versus ESC guidelines for diagnosis and management of peripheral artery disease. *Journal of the American College of Cardiology*. 2018;72(22):2789-2801. doi:10.1016/j.jacc.2018.09.041

[10] De Maeseneer MG, Kakkos SK, Aherne T, et al. Editor's Choice – European Society for Vascular Surgery (ESVS) 2022 clinical practice guidelines on the management of chronic venous disease of the lower limbs. *European Journal of Vascular and Endovascular Surgery*. 2022;63(2):184-267. doi:10.1016/j.ejvs.2021.12.024

[11] Naylor R, Rantner B, Ancetti S, et al. Editor's Choice – European Society for Vascular Surgery (ESVS) 2023 clinical practice guidelines on the management of atherosclerotic carotid and vertebral artery disease. *European Journal of Vascular and Endovascular Surgery*. 2023;65(1):7-111. doi:10.1016/j.ejvs.2022.04.011

[12] Jansen-Chaparro S, López-Carmona MD, Cobos-Palacios L, Sanz-Cánovas J, Bernal-López MR, Gómez-Huelgas R. Statins and peripheral arterial disease: A narrative review. *Frontiers in Cardiovascular Medicine*. 2021;8. doi:10.3389/fcvm.2021.777016

[13] Björck M, Earnshaw JJ, Acosta S, et al. Editor's Choice – European Society for Vascular Surgery (ESVS) 2020 clinical practice guidelines on the management of acute limb ischaemia. *European Journal of Vascular and Endovascular Surgery*. 2020;59(2):173-218. doi:10.1016/j.ejvs.2019.09.006

Table 7. Available Fixed-Dose Combinations for Peripheral Vascular Disease

DRUG COMBINATION	PREPARATION	DOSE
Aspirin + Clopidogrel*	**Capsule** (Aspirin/Clopidogrel) 75 mg/75 mg **FC Tablet** (Aspirin/Clopidogrel) 75 mg/75 mg (₱52.75) 100 mg/75 mg (₱69.00)	**Before carotid artery stenting and at least 1 month after carotid artery stenting[2]** ➤ *ORAL* **Adult:** *Initiation Dose* ≥ 48 hrs before procedure 325 mg Aspirin + 75 mg Clopidogrel 2x daily < 48 hrs before procedure 650 mg Aspirin + 450 mg Clopidogrel once daily *Maintenance Dose* 75–325 mg Aspirin + 75 mg Clopidogrel, once daily for one month, then 75–325 mg Aspirin once daily indefinitely

For other combination drugs, please check Table 4 under the chapter on Dyslipidemia

9 DRUGS FOR Pulmonary Hypertension

Amlodipine*

(as Amlodipine besylate / Amlodipine camsylate)

- **MOA** A long-acting dihydropyridine-type calcium-channel blocker
- **INDICATIONS AND DOSE**

  Responders to acute vasoreactivity testing (AVT)[1,2]

  ➤ *ORAL*

  Adult: Starting dose: 5 mg in 1–2 divided doses daily;
  Target dose: 15–30 mg per day in 1–2 divided doses daily

  Children >1 yr of age responding to AVT[2]

  ➤ *ORAL*

  Pediatric: 0.1–0.3 mg/kg (2.5–7.5 mg) once daily;
  always uptitrate from a lower dose
  MAX dose per day: 10 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** No AVT or nonresponsive to AVT, with right-sided heart dysfunction | Cardiogenic shock | Unstable angina | Hypotension | Significant aortic stenosis | Recent MI with heart failure or poor LV function
- **PRECAUTIONS** Severe hepatic impairment | CHF
  - Concurrent use with Sildenafil
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Angioedema (severe) | Headache | Fatigue | Palpitations | Dizziness | GI disorders | Rash | Muscle cramps | Sleep disturbances | Flushing
- **COSTS**
  - 5 mg Tablet (₱3.00)
  - 10 mg Tablet (₱4.80)†

Beraprost sodium

- **MOA** A synthetic Prostacyclin analogue that causes vasodilation and prevents platelet aggregation
- **INDICATIONS AND DOSE**

  Pulmonary hypertension[1]

  ➤ *ORAL*

  Adult: 20 mcg 3x daily
  MAX dose: 40 mcg 3x a day
- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 20 mcg
- **CONTRAINDICATIONS** Hemorrhage | Pregnancy and lactation
- **PRECAUTIONS**
  - Patients on anticoagulants, antiplatelet, or fibrinolytic agents
  - Menstruating women or patients with bleeding tendencies
- **ADVERSE EFFECTS** Headache | Flushing | Nausea | Diarrhea | Increased liver enzymes, triglycerides, and bilirubin

Bosentan

- **MOA** A dual competitive endothelin receptor antagonist (ETA and ETB)
- **INDICATIONS AND DOSE**

  Pulmonary arterial hypertension initiated under specialist supervision[1,3] | **Pulmonary hypertension secondary to heart failure[4]**

  ➤ *ORAL*

  Adult: 62.5 mg 2x daily
  Target dose: 125 mg 2x daily

  Non-responders to AVT[1,2,5] | Most applicable in IPAH[5]

  ➤ *ORAL*

  Pediatric: *Starting dose is half the maintenance dose*
  Maintenance dose:
  <10 kg: 2 mg/kg 2x daily
  10–20 kg: 31.25 mg 2x daily
  >20–40 kg: 62.5 mg 2x daily
  >40 kg: 125 mg 2x daily
  MAX dose per day: 250 mg
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 62.5 mg, 125 mg
- **CONTRAINDICATIONS** Acute porphyrias | AST, ALT > 3x UNL | Total bilirubin > 2x UNL | Moderate to severe hepatic impairment
  - Concomitant use with Cyclosporine or Glibenclamide
  - Moderate to severe hepatic impairment
- **PRECAUTIONS** Fluid retention and peripheral edema
  - Moderate or severe hepatic impairment
  - Monthly LFTs required due to risk for hepatotoxicity
  - May render hormonal contraceptives unreliable, lower serum levels of warfarin, sildenafil, tadalafil
  - HCG and pregnancy test required monthly
  - Children | Lactation
- **ADVERSE EFFECTS** Anemia | Diarrhea | GERD | Flushing | Headache | Nasal congestion | Fluid retention | Teratogenicity| Male infertility | Incidence of AST/ALT elevation is less in children compared with adult
- **COSTS**
  - 125 mg Film-coated Tablet (₱595.00)

Diltiazem hydrochloride*

- **MOA** A non-dihydropyridine calcium-channel blocker
- **INDICATIONS AND DOSE**

  Responders to AVT[1,2]

  ➤ *ORAL*

  Adult: 60 mg 2x daily
  Target dose: 120–360 mg 2x daily

Children >1 yr of age responding to AVT[2]

➤ *ORAL*

Pediatric:
Starting dose: 0.5 mg/kg 3x daily; Dose range: 3 – 5 mg/kg/day
MAX dose per day: 360 mg
Always uptitrate from a lower dose

If possible, use extended release preparations

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 30 mg, 60 mg, 90 mg
  - **MR Tablet/Capsule:** 60 mg, 120 mg, 180 mg
- **CONTRAINDICATIONS** Acute MI | Cardiogenic shock | HFrEF | Sick sinus syndrome | Symptomatic hypotension | Ventricular tachycardia | Pre-excitation and sinus node dysfunction | 2nd and 3rd degree AV block | Newborns (IV preparations contain benzyl alcohol)
- **PRECAUTIONS** Severe bradycardia | 1st degree AV block | Significantly impaired left ventricular function
  - Use with caution in hypertrophic obstructive cardiomyopathy
  - Concomitant use with beta blockers
  - Hepatic and renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Cardiac conduction disorders | constipation / GI discomfort | Headache | Dizziness | Edema | Hypotension
- **COSTS**
  - 30 mg Tablet (₱18.00)
  - 60 mg Tablet (₱18.50)†
  - 90 mg Tablet (₱84.25)

Felodipine⋆

- **MOA** A dihydropyridine calcium channel blocker
- **INDICATIONS AND DOSE**

  Responders to AVT[1,2]

  ➤ *ORAL*

  Adult:
  Starting dose: 5 mg in 1 or 2 divided doses daily
  Target dose: 15–30 mg, in 1 or 2 divided doses daily
- **DOSAGE FORMS AND PREPARATIONS**
  - **MR Tablet:** 2.5 mg, 5 mg, 10 mg
- **CONTRAINDICATIONS** Cardiac outflow obstruction | Significant cardiac valvular obstruction | Unstable angina | Recent MI | Pregnancy
- **PRECAUTIONS** Predisposition to reflex tachycardia | Uncontrolled heart failure | Severe left ventricular dysfunction | Hepatic impairment
  - Elderly | Lactation
- **ADVERSE EFFECTS** Peripheral edema | Flushing | Indigestion | Headache | Dizziness | URI | Hypotension | Tachycardia
- **COSTS**
  - 5 mg MR Tablet (₱12.00)†
  - 10 mg MR Tablet (₱12.10)†

Iloprost

- **MOA** A synthetic prostacyclin analog
- **INDICATIONS AND DOSE**

  Idiopathic or familial pulmonary arterial hypertension initiated under specialist supervision[1,3]

  ➤ *INHALATION*

  Adult:
  Starting dose: 2.5 mcg, 6–9 inhalations per day
  Target dose: 5 mcg, 6–9 inhalations per day

  Pediatric: 2.5 mcg dose, uptitrate to 5 mcg dose as tolerated; Pediatric dosing has not been determined 6–9 inhalations per day are required, each lasting 10–15 mins
- **DOSAGE FORMS AND PREPARATIONS**
  - **Inhalation solution, ampule**: 10 mcg/mL (2 mL)
- **CONTRAINDICATIONS** Decompensated heart failure | Severe arrhythmia | Severe coronary heart disease | Unstable angina | Pulmonary edema | Recent MI or stroke
- **PRECAUTIONS** Hypotension | Bronchospasm in patients with hyperreactive airways | Renal and hepatic impairment | Pregnancy and lactation
- **WARNING** STOP immediately if signs and symptoms of pulmonary edema occur
- **ADVERSE EFFECTS** Cough | Diarrhea | Dizziness | Dyspnea | Hemorrhage | Hypotension | Palpitations | Syncope | Vomiting | Rash | Tachycardia | Throat complaints | Vasodilation | Flushing | Headaches
- **COSTS**
  - 10 mcg/mL, 2mL Respiratory Solution Ampule (₱1,587.48)

Macitentan

- **MOA** A dual endothelin receptor antagonist blocking E_A and E_B receptors
- **INDICATIONS AND DOSE**

  Pulmonary arterial hypertension initiated under specialist supervision[3] | **Non-responsive to AVT[1,5]**

  ➤ *ORAL*

  Adult: 10 mg once daily

  Safety and efficacy not established in pediatric patients
- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 10 mg
- **CONTRAINDICATIONS** Severe anemia | Severe hepatic impairment | ALT, AST > 3x UNL | Concomitant use with strong CYP3A4 inducers (e.g., Rifampin)
- **PRECAUTIONS** Use with caution in patients > 75 years
  - Pulmonary veno-occlusive disease
  - Exclude pregnancy before treatment and ensure effective contraception during and for one month after stopping treatment. Monthly pregnancy tests advised.
- **ADVERSE EFFECTS** Anemia | Headache | Increased risk of infection | Nasal congestion

Milrinone lactate

- **MOA** A phosphodiesterase-3 inhibitor resulting to positive inotropic property and vasodilator activity

- **INDICATIONS AND DOSE**
  Used with Nitric Oxide **for Postoperative pulmonary hypertension**[7,8]
  ➤ *INTRAVENOUS*
  Pediatric: 50 mcg/kg, followed by 0.5 mcg/kg/min continuous IV infusion
  Off-label dosage
  Safety and efficacy not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Concentrate Solution for Injection, ampule/vial**: 1 mg/mL (10 mL)
- **CONTRAINDICATIONS** Severe hypovolemia
- **PRECAUTIONS**
  - Correct hypokalemia
  - Heart failure associated with hypertrophic cardiomyopathy
- **ADVERSE EFFECTS** Supraventricular arrhythmia | Hypotension | Headache

Nifedipine⋆

- **MOA** A dihydropyridine calcium-channel blocker

- **INDICATIONS AND DOSE**
  Responders to AVT[1,2]
  ➤ *ORAL*
  Adult:
  Starting dose: 10 mg 3x daily
  Target dose: 20–60 mg 2x to 3x daily

  Children >1 yr of age responding to AVT[2]
  ➤ *ORAL*
  Pediatric:
  Starting dose: 0.1–0.2 mg/kg 3x daily
  Dose range: 2–3 mg/kg/day
  MAX dose per day: 180 mg
  Always uptitrate from a lower dose
  If possible, use extended release preparations

- **DOSAGE FORMS AND PREPARATIONS**
  - **MR Tablet:** 20, 30, 60mg
  - **Softgel capsule**: 5, 10mg
- **CONTRAINDICATIONS** Cardiogenic shock | Unstable angina | Recent MI | Concomitant use with strong CYP450 inducers (like Rifampicin)
- **PRECAUTIONS** Hypotension | DM | HF | Hypertrophic cardiomyopathy | Aortic stenosis
  - Concomitant use with CYP3A inducers
  - Avoid abrupt withdrawal
  - Elderly | Pregnancy and lactation (Should be avoided during breastfeeding)
- **WARNINGS** Short-acting (intermedial release) Nifedipine is no longer considered acceptable in the initial treatment of hypertensive crisis because it can cause excessive falls in BP[6]; not recommended for angina or long-term management of hypertension[2]
- **ADVERSE EFFECTS** Flushing | Peripheral edema (dose-related) | Transient hypotension (dose-related) | Light-headedness | Mood changes | Tremors | Bradycardia | Decreased cardiac output | Peripheral edema | Rash | Gum hyperplasia | Constipation
- **COSTS**
  - 10 mg capsule (₱7.00)†
  - 30 mg Modified Release Tablet (₱45.38)†

Nitric oxide
(Nitrogen oxide / Nitrogen monoxide)

- **MOA** A free radical gas; endothelium-dependent relaxing factors; binds to heme moiety of cytosolic guanylate cyclase

- **INDICATIONS AND DOSE**
  Vasoreactivity testing of patients with idiopathic, heritable, or drug-induced pulmonary arterial hypertension[8]
  ➤ *INHALATION*
  Adult: 10–20 ppm for 10 mins

  Pulmonary hypertension and persistent pulmonary hypertension of the newborn[2]
  ➤ *INHALATION*
  Pediatric: 20–80 ppm

- **DOSAGE FORMS AND PREPARATIONS**
  - **Inhalation**
- **CONTRAINDICATIONS** Methemoglobinemia | Left HF | Congenital heart defect requiring open PDA
- **PRECAUTIONS** Pulmonary edema | Systemic hypotension | Bradycardia
- **WARNING** Abrupt discontinuation may worsen oxygenation and increase pulmonary artery pressure (rebound pulmonary hypertension syndrome)
- **ADVERSE EFFECTS** Hypotension

Selexipag

- **MOA** A non prostanoid IP prostacyclin receptor agonist

- **INDICATIONS AND DOSE**
  Pulmonary arterial hypertension either as combination therapy (if insufficiently controlled with an endothelin receptor antagonist and/or a phosphodiesterase type-5 inhibitor), or as monotherapy initiated under specialist supervision[3]
  ➤ *ORAL*
  Adult: 200 mcg 2x daily
  MAX daily dose: 1.6 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 200 mcg, 400 mcg, 600 mcg, 800 mcg, 1 mg, 1.2 mg, 1.4 mg, 1.6 mg
- **CONTRAINDICATIONS** Cerebrovascular event in the last 3 months, valvular defects with myocardial function disorders, decompensated cardiac failure
  - Concomitant use of strong inhibitors of CYP2C8 (e.g., Gemfibrozil)
- **PRECAUTIONS** Moderate hepatic impairment

- Pulmonary edema may occur in patients with pulmonary veno-occlusive disease
- Pregnancy and lactation

- **ADVERSE EFFECTS** Abdominal pain | Anemia | Decreased appetite | Hyperthyroidism

Sildenafil citrate

- **MOA** A phosphodiesterase-5 inhibitor

- **INDICATIONS AND DOSE**

Pulmonary arterial hypertension initiated under specialist supervision[4]

➤ *ORAL*

Adult: 20 mg 3x daily
MAX daily dose: 80 mg 3x daily

Non-responders to AVT[1,2,6]

➤ *ORAL*

Age

<1 yr: 0.5–1 mg/kg 3x daily; MAX dose per day: 30 mg
May start with 250–500 mcg/kg every 4–8 hrs, *adjusted according to response, start with the lower dose and frequency, especially if used with other vasodilators*
< 20 kg: 10 mg 3x daily
≥ 20 kg: 20 mg 3x daily
Avoid higher dosing in children (> 3 mg/kg/day)

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 25 mg, 50 mg, 100 mg
  - **Orodispersible Tablet:** 100 mg
  - **Chewable Tablet:** 100 mg
  - **Orally disintegrating strip:** 100 mg
- **CONTRAINDICATIONS** Hereditary degenerative retinal disorders | Recent history of MI or stroke | Severe hepatic impairment
  - Concurrent regular or intermittent use of organic nitrates
  - Concomitant use with HIV protease inhibitors, guanylate cyclase stimulator
- **PRECAUTIONS** Use with caution in patients on other antihypertensives
  - Delay use in extremely preterm infants until retinal vascularization is established
  - Children (chronic use) | Pregnancy and lactation
- **ADVERSE EFFECTS** Alopecia | Agitation | Anxiety | Cough | Hypotension | GI discomfort | Nasal congestion | Headache | Flushing | Vision disorders | Hearing loss | Priapism
- **COSTS**
  - 100 mg Tablet (₱250.75)
  - 50 mg Film-coated Tablet (₱86.00)
  - 25 mg Film-coated Tablet (₱620.25)

Tadalafil

- **MOA** A phosphodiesterase-5 inhibitor

- **INDICATIONS AND DOSE**

Pulmonary arterial hypertension initiated under specialist supervision[3]

➤ *ORAL*

Adult: 20–40 mg once daily

Non-responders to AVT[1,2,5]

➤ *ORAL*

Pediatric: 0.5–1 mg/kg once daily; MAX daily dose: 40 mg

Evaluated only in children aged > 3 years

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 2.5 mg, 5 mg, 10 mg, 20 mg
- **CONTRAINDICATIONS** Recent MI or stroke | Hypotension (avoid if SBP < 90 mmHg) | Concurrent use with any form of organic nitrates
- **PRECAUTIONS** Anatomical deformation of the penis | Aortic and mitral valve disease | Congestive cardiomyopathy | Coronary artery disease | Uncontrolled hypertension | Renal and mild to moderate hepatic impairment
  - Pregnancy | Lactation
- **ADVERSE EFFECTS** Flushing | GI discomfort | Nasal congestion | Pain | Headache | Agitation | Hypotension | Vision and hearing loss | Priapism | Nosebleeds
- **COSTS**
  - 20 mg Film-coated Tablet (₱958.00)
  - 5 mg Film-coated Tablet (₱269.50)

REFERENCES

[1] Humbert M, Kovacs G, Hoeper MM, et al. 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. *European Heart Journal*. 2022;43(38):3618-3731. Doi:10.1093/eurheartj/ehac237

[2] Abman SH, Hansmann G, Archer SL, et al. Pediatric pulmonary hypertension. *Circulation*. 2015;132(21):2037-2099. doi:10.1161/cir.0000000000000329

[3] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[4] Padeletti M, Caputo M, Zacà V, et al. Effect of bosentan on pulmonary hypertension secondary to systolic heart failure. *Pharmacology*. 2013;92(5-6):281-285. doi:10.1159/000355875

[5] Rosenzweig EB, Abman SH, Adatia I, et al. Paediatric pulmonary arterial hypertension: Updates on definition, classification, diagnostics and Management. *European Respiratory Journal*. 2019;53(1):1801916. doi:10.1183/13993003.01916-2018

[6] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.

[7] Cai J, Su Z, Shi Z, et al. Nitric oxide and milrinone: Combined effect on pulmonary circulation after Fontan-type procedure: A prospective, randomized study. *The Annals of Thoracic Surgery*. 2008;86(3):882-888. doi:10.1016/j.athoracsur.2008.05.014

[8] Prajapati M, Patel J, Patel H, Gandhi H, Singh G, Patel P. Assessment of the effect of two regimens of Milrinone Infusion in paediatric patients with pulmonary artery hypertension undergoing corrective cardiac procedure: A prospective observational study. *Annals of Pediatric Cardiology*. 2022;15(4):358. doi:10.4103/apc.apc_230_21

[9] Fernandes CJ, Calderaro D, Assad APL, et al. Update on the Treatment of Pulmonary Arterial Hypertension. Atualização no Tratamento da Hipertensão Arterial Pulmonar. *Arquivos Brasileiros de Cardiologia*. 2021;117(4):750-764. doi:10.36660/abc.20200702

Alteplase⋆
(rt-PA / Tissue-type plasminogen activator)

- **MOA** A thrombolytic agent; a recombinant human tissue-type plasminogen activator

- **INDICATIONS AND DOSE**

Acute VTE[1] and catheter-directed thrombolysis (CTD)[1]

➤ *INTRAVENOUS*

Adult: 100 mg over 2 hrs

➤ *CATHETER-DIRECTED INFUSION*

Adult: 0.5–2 mg/hr continue for 2–15 hrs
Total dose range 4–24 hrs

Intravascular thrombosis[2]

➤ *INTRAVENOUS*

Pediatric: 100–500 mcg/kg/hr for 3–6 hrs

Use ultrasound assessment to monitor effect before considering a second course of treatment

Pediatric pulmonary embolism[3]

➤ *INTRAVENOUS*

Off-label dosage; In addition to Heparin

Pediatric: 0.5 mg/kg/hr for a MAX of 6 hrs

- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for injection, vial**: 20 mg, 50 mg
- **CONTRAINDICATIONS** Active bleeding | Severe uncontrolled hypertension | Recent trauma, stroke, surgery | Hyperglycemia or hypoglycemia | Severe hepatic impairment
- **PRECAUTIONS** Hypertensive patients | Thrombocytopenia | Small recent trauma | High risk of hemorrhage
  - Avoid non-compressible arterial, internal jugular, subclavian punctures or IM injection
  - Children and elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Hemorrhage | Pulmonary edema | Angioedema | Pleural effusion
- **COSTS**
  - 20 mg Powder (₱25,245.00)
  - 50 mg Powder (₱30,536.02)†

Apixaban

- **MOA** A reversible and selective direct factor Xa inhibitor

- **INDICATIONS AND DOSE**

Prophylaxis of VTE following knee replacement surgery, VTE following hip replacement surgery, and recurrent DVT / PE[4]

➤ *ORAL*

Adult: 2.5 mg 2x daily

Acute DVT and PE[1]

➤ *ORAL*

Adult: 10 mg 2x daily for 7 days, then reduce to 5 mg 2x daily for 3–6 months or indefinitely *depending on existing risk factors and risk of thrombosis*

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet**: 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Concomitant use with other anticoagulant (except under specific circumstances)
- **PRECAUTIONS** Low body weight | Renal and severe hepatic impairment
  - Concomitant use with strong CYP3A4 inducers/inhibitors
  - Elderly | Pregnancy and lactation
- **WARNINGS** Monitor patients for signs and symptoms of neurologic impairment and treat urgently

BLACK BOX WARNING

Premature discontinuation of any oral anticoagulant, including apixaban, increases the risk of thrombotic events.

- **ADVERSE EFFECTS** Anemia | Hemorrhage | Nausea | Contusion | Hemoptysis | Skin reactions
- **COSTS**
  - 2.5 mg FC Tablet (₱90.00)
  - 5 mg FC Tablet (₱90.00)

Aspirin⋆
(Acetylsalisylic acid)

- **MOA** A non-selective irreversible cyclooxygenase COX1 and COX2 inhibitor

- **INDICATIONS AND DOSE**

Prevention of thrombus formation after cardiac surgery[2]

➤ *ORAL*

Pediatric

<1 mo: 1 mg/kg once daily

1 mo – 11yrs: 1–5 mg/kg once daily;
MAX daily dose: 57 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 80 mg, 100 mg, 300 mg, 325 mg, 500 mg
  - **FC Tablet & MR Tablet**: 80 mg
  - **EC Tablet**: 80 mg, 100 mg
- **CONTRAINDICATIONS** Active peptic ulceration | Bleeding disorders | Severe cardiac failure
  - Lactation (long-term use and/or high dose)
  - Children under 16 years and those with flu-like symptoms
  - Concomitant use with Methotrexate ≥ 15 mg
- **PRECAUTIONS** Anemia | Asthma | Dehydration | G6PD deficiency | Hypertension | Thyrotoxicosis | Mild to moderate hepatic impairment | Elderly

- Patients undergoing surgical procedures (including tooth extractions)
- Concomitant use with anticoagulants, antiplatelets, thrombolytics, oral corticosteroids
- Pregnancy category C (1st and 2nd trimester), D (3rd trimester)

- **ADVERSE EFFECTS** Dyspepsia | Hemorrhage or prolonged bleeding time | Reduced uric acid excretion (low dose) | Salicylism (large repeated doses) | Melena
- **COSTS**
  - 80 mg Tablet (₱4.00)†

Bemiparin sodium

- **MOA** An ultra-LMW Heparin with anti-Xa and anti-IIa activity

- **INDICATIONS AND DOSE**

Prophylaxis of DVT in general or orthopedic surgery[4]

➤ *SUBCUTANEOUS*

Adult:
Initial dose: 2500–3500 units 2 hrs before or 6 hrs after surgery
Subsequent dose: 2500–3500 units every 24 hrs

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for injection, prefilled syringe:** 2500 IU/0.2 mL, 3500 IU/0.2 mL, 5000 IU/0.2 mL, 7500 IU/0.3 mL, 10000 IU/0.4 mL
- **CONTRAINDICATIONS** Recent ear surgery | HIT history | Active bleeding | Severe pancreatic and hepatic impairment | Hypersensitivity to Heparins
- **PRECAUTIONS** Uncontrolled hypertension | Thrombocytopenia | DM | Active bleeding | Hepatic and mild to moderate renal impairment
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Epidural hematoma | Reversible hyperkalemia | Severe bleeding

Bivalirudin

- **MOA** A hirudin analogue; a specific and reversible direct thrombin inhibitor

- **INDICATIONS AND DOSE**

Pediatric thromboembolic disorder[5]

Off-label use

➤ *INTRAVENOUS*

Pediatric: 0.125 mg/kg IV bolus followed by 0.125 mg/kg/h IV infusion

Drug product for emergency use only
Safety and efficacy not established in pediatric patients

- **DOSAGE FORMS AND PREPARATIONS**
  - **Lyophilized Powder**: 250 mg
- **CONTRAINDICATIONS** Active bleeding | Severe uncontrolled hypertension | Subacute bacterial endocarditis | Dialysis patients
- **PRECAUTIONS** Recent surgery | Renal impairment
  - Elderly | Pregnancy and lactation
- **ADVERSE EFFECTS** Procedural complications | Bleeding | Skin reactions | Hypotension | Nausea | Back pain | General pain

Dabigatran etexilate

- **MOA** A rapid-acting direct thrombin inhibitor

- **INDICATIONS AND DOSE**

Prophylaxis of VTE and VTE following total knee replacement surgery[4]

➤ *ORAL*

Adult: Initially 110 mg 2x daily; then 220 mg once daily for 10 days
CrCl 30–49 mL/min: 75 mg initial dose, 150 mg once a day

Prophylaxis of VTE following total hip replace surgery[4]

➤ *ORAL*

Adult: Initially 110 mg 2x daily; then 220 mg once daily for 28 to 35 days
CrCl 30–49 mL/min: 75 mg initial dose, 150 mg once a day

Treatment or prophylaxis of DVT/PE or recurrent DVT/PE[4]

➤ *ORAL*

Adult: 150 mg 2x daily
Elderly (≥ 80 yo): 110 mg 2x daily
8 yrs (11–12 kg): 75 mg 2x daily
8–13 yrs (13–20 kg): 110 mg 2x daily
8–17 yrs (21–30 kg): 150 mg 2x daily
8–17 yrs (31–40 kg): 185 mg 2x daily
8–17 yrs (41–50 kg): 220 mg 2x daily
8–17 yrs (51–60 kg): 260 mg 2x daily
8–17 yrs (> 61 kg): 300 mg 2x daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Capsule**: 75 mg, 110 mg, 150 mg
  - **CONTRAINDICATIONS** Active bleeding | Mechanical prosthetic heart valve | Recent GI ulcer, surgery | Severe renal impairment | Concomitant use with other anticoagulants, strong P-gp inhibitors
- **PRECAUTIONS** Body weight < 50 kg | Recent biopsy | Thrombocytopenia | Hepatic and moderate renal impairment
  - Avoid abrupt discontinuation
  - Pregnancy and lactation

BLACK BOX WARNING

Premature discontinuation increases risk of thrombosis. There is a risk of epidural or spinal hematomas and paralysis during neuraxial anesthesia or spinal puncture.

- **ADVERSE EFFECTS** Hemorrhage | GERD | Abnormal hepatic function
- **ANTIDOTE** **Idarucizumab**
- **COSTS**
  - 110mg Capsule (₱ 81.25)
  - 150mg Capsule (₱ 78.75)

Dalteparin sodium

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa
- **INDICATIONS AND DOSE**

Prophylaxis of VTE (DVT & PE), DVT in medical patients, DVT in surgical patients at moderate or high risk[4]

➤ *SUBCUTANEOUS*

Adult: 5000 units once daily

Prophylaxis of thrombotic episodes[2]

➤ *SUBCUTANEOUS*

Pediatric

< 1 mo: 100 units/kg once daily

1 mo – 11 yrs: 100 units/kg once daily

12–17 yrs: 2500–5000 units once daily

Treatment of VTE, DVT or PE (in patients at increased risk of hemorrhage), and VTE in pregnancy[4]

➤ *SUBCUTANEOUS*

Adult: 200 units/kg once daily
MAX per dose: 18 000 units, until adequate oral anticoagulation

Pediatric (pregnant teenagers): *Use body weight in early pregnancy to calculate the dose*

Hospitalized patients with cancer (GI malignancies) with acute medical illness in the absence of contraindications[12] |
Extended treatment of VTE and prevention of recurrence in patients with solid tumors[12]

➤ *SUBCUTANEOUS*

Adult:

Initial treatment: 100 units/kg every 12 hrs or 200 units/kg once daily

Long term treatment: 200 units/kg once daily for one month, then 150 units/kg once daily

BMI ≥ 40: 7500 units daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, prefilled syringe:** 2500 IU/0.2 mL
- **CONTRAINDICATIONS** HIT or HITT | Active bleeding | Recent stroke
- **PRECAUTIONS** Gasping syndrome | Bleeding complication | Hyperkalemia | Prosthetic heart valves | Renal and severe hepatic impairment
  - Elderly | Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention.

- **ADVERSE EFFECTS** Epidural hematoma | Hypoaldosteronism | Intracranial hemorrhage | Epistaxis | Local irritation

Edoxaban

- **MOA** A direct and reversible factor Xa inhibitor
- **INDICATIONS AND DOSE**

DVT and PE[4] | Prophylaxis of recurrent DVT and recurrent PE[4]

➤ *ORAL*

Adult

< 61 kg: 30 mg once daily

≥ 61 kg: 60 mg once daily

Adjust duration according to risk factors; Treatment should follow initial use of parenteral anticoagulant for at least 5 days

For patients taking P-gp inhibitors

MAX daily dose: 30 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 15 mg, 30 mg, 60 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Hepatic disease | Prosthetic heart valve | Uncontrolled severe hypertension | Pregnancy and lactation
- **PRECAUTIONS** Body weight < 60 kg | Moderate to severe mitral stenosis | Renal and hepatic impairment
  - Concomitant use with P-gp inhibitors (Erythromycin, Ketoconazole, Cyclosporin)

BLACK BOX WARNING

Premature discontinuation increases risk of ischemic events; Resulting epidural or spinal hematomas may result in long-term paralysis.

Reduced efficacy in nonvalvular AF with CrCl > 95 mL/min

- **ADVERSE EFFECTS** Abdominal pain | Anemia | Dizziness | Hemorrhage | Headache | Nausea | Rash | Abnormal liver function tests
- **COSTS**
  - 30 mg Tablet (₱147.00)

Enoxaparin sodium⋆

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa
- **INDICATIONS AND DOSE**

Prophylaxis of VTE[4]

➤ *SUBCUTANEOUS*

Adult: 40 mg once daily (regardless of weight)

Treatment of DVT/PE[6]

➤ *SUBCUTANEOUS*

Adult: 1 mg/kg every 12 hrs
CrCl < 30 mL/min: 1 mg/kg once daily

Prophylaxis of DVT, especially in surgical patients who are at moderate to high risk (orthopedic surgery)[4]

➤ *SUBCUTANEOUS*

Adult:
Initial dose: 30 mg every 12 hrs within 12–24 hrs after surgery
Subsequent doses: 30 mg every 12 hrs for at least 10 days or until risk of DVT is reduced

DVT in uncomplicated patients with low risk of recurrence[4] | VTE in pregnancy[4] | PE in uncomplicated patients with low risk of recurrence[4] | DVT in patients with risk factors such as obesity, cancer, recurrent VTE, or proximal thrombosis[4] | PE in patients with risk factors such as obesity, symptomatic PE, cancer, or recurrent VTE[4]

➤ *SUBCUTANEOUS*

Adult: 1 mg/kg per dose every 12 hrs or 1.5 mg/kg every 24 hrs

Thrombophylaxis for COVID-19 patients with mild to moderate clinical symptoms, including pregnant women, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult: 40 mg every 24 hrs
CrCl 15–29 mL/min: 30 mg every 24 hrs
Avoid use if fluctuating renal function;
Adjust accordingly based on BMI, severity of clinical symptoms

Thrombophylaxis for COVID-19 patients with severe to critical clinical symptoms, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult:
Prophylactic Intermediate dose 0.5 mg/kg (up to 40 mg) every 12 hrs
Therapeutic dose 1 mg/kg/dose every 12 hrs

Hospitalized patients with cancer with acute medical illness in the absence of contraindications[8]

➤ *SUBCUTANEOUS*

Adult: 40 mg every 24 hrs

Prophylaxis of pediatric thrombotic episodes[2]

➤ *ORAL*

Pediatric
<1 mo: 750 mcg/kg 2x daily
2 mos - 17 yrs: 500 mcg/kg 2x daily
MAX daily dose: 40 mg (1 mg equivalent to 100 units)

Treatment of pediatric thrombotic episodes[2]

➤ *ORAL*

Pediatric
<1 mo: 1.5–2 mg/kg 2x daily
2 mos - 17 yrs: 1 mg/kg 2x daily
MAX daily dose: 40 mg (1 mg equivalent to 100 units)

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, single dose pre-filled syringe:**
    100 mg/mL (0.2 mL, 0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Recent stroke, GI ulcer, surgery | Neonates, infants
- **PRECAUTIONS** Low body weight (increased risk of bleeding)
  - Obesity (increased risk of thromboembolism)
  - Renal and hepatic impairment
  - Pregnancy and lactation

BLACK BOX WARNING

Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary. Consider risks/benefits before neuraxial intervention in patients anticoagulated or to be anticoagulated for thromboprophylaxis.

- **ADVERSE EFFECTS** Hemorrhagic anemia | Headache | Confusion | Hypersensitivity | Thrombocytopenia | Thrombocytosis
- **COSTS**
  - 100 mg/mL, 0.4 mL Solution for Injection Pre-filled Syringe (₱794.00)†
  - 100 mg/mL, 0.6 mL Solution for Injection Pre-filled Syringe (₱778.00)†

Fondaparinux sodium ⋆

- **MOA** An antithrombotic agent; selectively binds to antithrombin III (ATIII)
- **INDICATIONS AND DOSE**

Prophylaxis of VTE in medical patients immobilized because of acute illness[4]

➤ *SUBCUTANEOUS*

Adult: 2.5 mg once daily

Prophylaxis of VTE in patients after undergoing major orthopedic surgery of the hip or leg, or abdominal surgery[4] | Prophylaxis for clotting in extracorporeal circuits[4] | Prophylaxis of acute arterial thrombosis[6]

➤ *SUBCUTANEOUS*

Adult
Initial dose: 2.5 mg to be given 6 hrs after surgery
Subsequent dose: 2.5 mg once daily

VTE[4]

➤ *SUBCUTANEOUS*

Adult: 7.5 mg once daily

DVT and PE[4]

➤ *SUBCUTANEOUS*

Adult: *Started together with Warfarin until INR ≥ 2 for at least 24 hrs*
< 50 kg: 5 mg once daily for at least 5 days
50–100 kg: 7.5 mg once daily for at least 5 days
> 100 kg: 10 mg once daily for at least 5 days

Superficial vein thrombosis[4]

➤ *SUBCUTANEOUS*

Adult (≥ 50 kg): 2.5 mg once daily for at least 30 days (MAX 45 days)

Superficial vein thrombosis[4]

➤ *SUBCUTANEOUS*

Adult (≥ 50 kg): 2.5 mg once daily for at least 30 days (MAX 45 days)

Thrombophylaxis for COVID-19 patients with mild to moderate clinical symptoms, including pregnant women, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult: 2.5 mg every 24 hrs
CrCl 30–50 mL/min: 1.25 mg every 24 hrs

Thrombophylaxis for COVID-19 patients with severe to critical clinical symptoms, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult
< 50 kg: 5 mg once daily
50–100 kg: 7.5 mg once daily
> 100 kg: 10 mg once daily

Heparin-induced thrombocytopenia[5]

➤ *SUBCUTANEOUS*

Pediatric (> 1 yr): 0.1 mg/kg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, pre-filled syringe**: 5 mg/mL (0.5 mL), 12.5 mg/mL (0.4 mL, 0.6 mL, 0.8 mL)
- **CONTRAINDICATIONS** Active major bleeding | Bacterial endocarditis | Serious hypersensitivity reaction (angioedema, anaphylaxis) | Severe renal impairment (CrCl < 20 mL/min) | Thrombocytopenia with anti-platelet antibody in presence of Fondaparinux
- **PRECAUTIONS** Active GI ulcer | Concomitant use with Vitamin K antagonists unless essential | Moderate renal and severe hepatic impairment
  - Discontinue if platelet < 1000
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Rash | Fever | Anemia | Hemorrhage | Hypokalemia
- **COSTS**
  - 2.5mg/0.5mL Solution for Injection Pre-filled Syringe (₱1,155.00)†

Heparin sodium (unfractionated)★

- **MOA** A glycosaminoglycan anticoagulant targeting Xa and IIa equally, then VIIa, IXa, and XIa clotting factors; complexes with ATIII

- **INDICATIONS AND DOSE**

Treatment for mild to moderate PE, severe PE[4] **and DVT**[4] |
Thromboprophylaxis for medical patients, surgical patients, and pregnant women[4]

➤ *INTRAVENOUS*

Adult:
Follow RASCHKE protocol
Loading dose: 80 units/kg IV,
Subsequent dose: 18 units/kg/hr IV infusion
Monitor aPTT every 6 hrs to target aPTT

Thromboprophylaxis for COVID-19 patients with mild to moderate clinical symptoms, including pregnant women, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult: 5000 units every 12 hrs
May escalate to a higher dose depending on the severity of COVID-19

Thromboprophylaxis for COVID-19 patients with severe to critical clinical symptoms, in the absence of contraindications[7]

➤ *SUBCUTANEOUS*

Adult:
Intermediate prophylactic dose: 7500 units every 8–12 hrs
Therapeutic dose Initially 80 units/kg bolus, then 18 units/kg/hr

Pediatric thrombotic episodes[2]

➤ *INTRAVENOUS*

<1 yr: Initially 75 units/kg, followed by 28 units/kg/hr by continuous infusion
1 – 17 yrs: Initially 75 units/kg, followed by 20 units/kg/hr by continuous infusion

➤ *SUBCUTANEOUS*

Prophylactic dose: 100 units/kg 2x daily
Therapeutic dose: 250 units/kg 2x daily
Adjust dose according to APTT

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, vial**: 5000 IU/mL (5 mL), 1000 IU/mL (5 mL)
- **CONTRAINDICATIONS** Neonates or infants (for products containing benzyl alcohol) |Severe thrombocytopenia | Uncontrolled active bleeding
- **PRECAUTIONS** HIT / HITT | uncontrolled severe HPN | DM | Hepatic and renal impairment
  - Avoid IM use; hematomas frequently occur at injection site
  - Elderly, particular women, are at higher risk of bleeding
  - Pregnancy and lactation
- **ADVERSE EFFECTS** Hypersensitivity reactions | Osteoporosis (long-term doses) | Thrombocytopenia | Elevated liver enzymes | Chest pain | Chills | Rebound hyperlipidemia | Bruising
- **ANTIDOTE** **Protamine sulfate:** 1–1.5 mg of Protamine per 100 units of Heparin
- **COSTS**
  - 1000 IU/mL, 5 mL Solution for Injection Vial (₱135.00)†
  - 5000 IU/mL, 5 mL Solution for Injection Vial (₱228.07)†

Nadroparin calcium

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa

- **INDICATIONS AND DOSE**

Prophylaxis and treatment of VTE in nonsurgical patients[8,9]

➤ *SUBCUTANEOUS*

Adult: 90 IU aXa/kg 2x daily

DVT[9]

➤ *SUBCUTANEOUS*

Adult: 450 IU aXa/kg/day in 2 divided doses for at least 10 days

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, pre-filled syringe:** 2850 IU aXa (0.3 mL), 3800 IU aXa (0.4 mL), 5700 IU aXa (0.6 mL)
- **CONTRAINDICATIONS** Active bleeding | Cerebral aneurysm | Severe gastric or duodenal cancer | Diabetic retinopathy | Severe renal impairment
- **PRECAUTIONS** Recent childbirth | PUD | Severe arterial hypertension | Hepatic and moderate renal impairment
  - Concomitant use with Aspirin
  - Elderly | Pregnancy and lactation
- **WARNINGS** Potential risk of spinal hematoma and permanent paralysis if bleeding within spinal column occurs
  - Checking the platelet count is recommended prior to initiating treatment, during the first day of treatment and subsequently every 3 to 4 days, as well as at the end of treatment
- **ADVERSE EFFECTS** Hyperkalemia | Elevated liver enzymes

Rivaroxaban

- **MOA** A selective direct factor Xa inhibitor

- **INDICATIONS AND DOSE**

Acute DVT[1]

➤ *ORAL*

Adult: 15 mg 2x daily for 21 days; decrease to 20 mg once daily for 3 to 6 months or indefinitely depending on risk factors
After 6 months, assess individual risk

Treatment and prophylaxis of recurrent DVT or recurrent PE[4]

➤ *ORAL*

Adult: 10–20 mg once daily
CrCl 30–49 mL/min: 10 mg once daily

➤ *ORAL*

Pediatric

2.6–2.9 kg: 0.8 mg 3x daily every 8 hrs for at least 3 mos
3–3.9 kg: 0.9 mg 3x daily every 8 hrs for at least 3 mos
4–4.9 kg: 1.4 mg 3x daily every 8 hrs for at least 3 mos
5–6.9 kg: 1.6 mg 3x daily every 8 hrs for at least 3 mos
7–7.9 kg: 1.8 mg 3x daily every 8 hrs for at least 3 mos
8–8.9 kg: 2.4 mg 3x daily every 8 hrs for at least 3 mos
9–9.9 kg: 2.8 mg 3x daily every 8 hrs for at least 3 mos
10–11.9 kg: 3 mg 3x daily every 8 hrs for at least 3 mos
12–29.9 kg: 5 mg 2x daily every 12 hrs for at least 3 mos
30–49.9 kg: 15 mg once daily for at least 3 mos
≥ 50 kg: 20 mg once daily for at least 3 mos

Use not recommended in infants younger than 6 mos. Initiate at least 5 days after parenteral anticoagulation. May extend up to 12 mos if necessary

Prophylaxis of VTE following hip or knee replacement surgery4

➤ *ORAL*

Adult: 10 mg once daily (for 2 weeks if knee; 5 weeks if hip) started 6–10 hrs after surgery

Primary prophylaxis for ambulatory patients with cancer receiving chemotherapy at intermediate or high risk for thrombosis[8]

➤ *ORAL*

Adult: 10 mg once daily for up to 6 months

- **DOSAGE FORMS AND PREPARATIONS**
  - **FC Tablet:** 2.5 mg, 10 mg, 15 mg, 20 mg
- **CONTRAINDICATIONS** Active bleeding | Antiphospholipid syndrome | Severe hypersensitivity | Severe renal impairment or undergoing dialysis | Moderate to severe hepatic impairment
- **PRECAUTIONS** Patients with bleeding risk | Severe hypertension | rheumatic heart disease | prosthetic heart valves | Concomitant use with CYP3A4 inducers and CYP3A4 inhibitors, HIV protease inhibitors
  - Avoid in pediatric patients > 1 yr with moderate or severe renal impairment
- **WARNINGS** Avoid abrupt discontinuation in the absence of alternative treatment

BLACK BOX WARNING
Premature discontinuation increases the risk of thrombotic events
Patients treated with Rivaroxaban who are receiving neuraxial anesthesia or undergoing spinal puncture are at risk for long-term or permanent paralysis; monitor frequently for neurological impairment

- **ADVERSE EFFECTS** Hemorrhage including epistaxis | Anemia (prolonged use) | Gastroenteritis | Vomiting | Cough

Streptokinase⋆

- **MOA** A fibrinolytic; activates plasminogen to form plasmin which degrades fibrin

- **INDICATIONS AND DOSE**

DVT and PE[4,6]

➤ *INTRAVENOUS*

Adult: Loading dose: 250 000 IU over 30 mins
Subsequent dose: 100 000 IU/hr for 72 hrs

Intravascular thrombosis[2]

➤ *INTRAVENOUS*

Pediatric

1 mo – 11 yrs: Initially 2500–4000 units/kg, dose to be given over 30 mins, followed by continuous IV infusion 500–1000 units/kg/hr for up to 3 days until reperfusion occurs

12–17 yrs: Initially 250 000 units to be given over 30 mins, followed by continuous IV infusion 100 000 units/hr up to 3 days until reperfusion occurs

- **DOSAGE FORMS AND PREPARATIONS**
  - **Powder for Injection, vial**: 1.5M IU/vial
- **CONTRAINDICATIONS** Recent streptococcal infection | Severe uncontrolled hypertension | Recent trauma or surgery within 2 months | Recent internal bleeding | Recent stroke | Intracranial or intraspinal surgery or head trauma (within 2 months) | Major or invasive operation (within 6–10 days) | Severe renal and hepatic impairment | Pregnancy
- **PRECAUTIONS** Previous Streptokinase administration (within 5 to 12 months) | Diabetic retinopathy | Patients currently on oral anticoagulation
  - Elderly | Lactation
- **ADVERSE EFFECTS** Arrhythmia | Asthenia | Diarrhea | Epigastric pain | Malaise | Headache | Fever | Hypotension
- **COSTS**
  - 1,500,000 IU Powder for Injection Vial (₱3,980.00)†

Sulodexide

- **MOA** A mixture of LMW Heparin and Dermatan sulfate; potentiates ATIII and heparin cofactor II with anti-IIa and anti-Xa activity

- **INDICATIONS AND DOSE**

Prophylaxis of recurrent VTE[10]

➤ *INTRAVENOUS / INTRAMUSCULAR*

Adult: 600 LSU once daily for 15–20 days

➤ *ORAL*

Adult: 250 LSU 2x daily for 30–40 days

- **DOSAGE FORMS AND PREPARATIONS**
  - **Softgel capsule:** 250 LSU
  - **Solution for Injection, Pre-filled syringe:** 300 LSU/mL (2 mL)
- **CONTRAINDICATIONS** Hypersensitivity to heparin and heparinoids | Bleeding | Pregnancy
- **PRECAUTIONS** Hemocoagulative parameters should be monitored periodically
- **ADVERSE EFFECTS** Diarrhea | Epigastric pain | Vomiting
- **COSTS**
  - 250 LSU Softgel Capsule (₱54.00)
  - 300 LSU/mL, 2mL Solution for Injection (₱280.00)

Tinzaparin sodium⋆

- **MOA** A LMW Heparin that complexes with antithrombin III and irreversibly inactivates the coagulation factors thrombin and factor Xa; more selective against factor Xa

- **INDICATIONS AND DOSE**

VTE, DVT, and PE[4,6]

➤ *SUBCUTANEOUS*

Adult: 175 units/kg once daily for at least 6 days and until adequate oral anticoagulation is established

VTE in pregnancy[11]

➤ *SUBCUTANEOUS*

Adult: 175 units/kg once daily; *does not require anticoagulation monitoring*

Prophylaxis of postoperative VTE[4,6]

➤ *SUBCUTANEOUS*

Adult

Low or intermediate risk patients
3500 units given 2 hr before surgery, followed by 3500 units once daily

High risk patients
Initially, 50 units/kg given 2 hr before surgery, or a fixed dose of 4500 units given 12 hr before surgery followed by a once daily dose.
Alternatively, 75 units/kg once daily, started after surgery

Extended treatment of VTE and prevention of recurrence in patients with active cancer[4]

➤ *SUBCUTANEOUS*

Adult: 175 units/kg once daily for 6 months

Pediatric thrombotic episodes[2]

➤ *SUBCUTANEOUS*

Pediatric

Prophylactic dose 50 units/kg once daily

Therapeutic dose

0–2 mos: 275 units/kg once daily
2–11 mos: 250 units/kg once daily
1–4 yrs: 240 units/kg once daily
5–9 yrs: 200 units/kg once daily
10–17 yrs: 75 units/kg once daily

- **DOSAGE FORMS AND PREPARATIONS**
  - **Solution for Injection, pre-filled syringe:** 10 000 IU/mL (0.35 mL, 0.45 mL, 2 mL)
- **CONTRAINDICATIONS** Active major bleeding | Current or history of HIT | Mechanical prosthetic heart valve | Hypersensitivity to Tinzaparin, Heparin, sulfites, benzyl alcohol, or pork products | Severe hemodynamic instability | Concomitant use with NSAIDs, anticoagulants, thrombolytics
- **PRECAUTIONS** GI ulcer | Uncontrolled arterial hypertension | Diabetic retinopathy | BW < 45 kg or > 120 kg | Severe renal and hepatic impairment

- Premature neonates are at risk for fatal Gasping Syndrome
- Elderly | Pregnancy and lactation

BLACK BOX WARNING

Epidural or spinal hematomas resulting in long-term paralysis may occur. Monitor patients frequently for neurological impairment. If neurological compromise is noted, urgent treatment is necessary.

- **ADVERSE EFFECTS** Anemia | Erythema | Elevated liver function test | Local pain and irritation
- **COSTS**
  - 10,000 anti-Xa IU/mL, 0.35 mL Solution for Injection Pre-filled Syringe (₱312.13)†
  - 10,000 anti-Xa IU/mL, 0.45 mL Solution for Injection Pre-filled Syringe (₱238.31)†
  - 10,000 anti-Xa IU/mL, 2 mL Solution for Injection Pre-filled Syringe (₱711.57)†

Warfarin sodium★

- **MOA** An anticoagulant; Vitamin K antagonist
- **INDICATIONS AND DOSE**

DVT and PE[4,6]

➤ *ORAL*

Adult: *To target INR of 2.0–3.0*

Monitor INR depending on clinician

Pediatric thrombotic episodes[2]

➤ *ORAL*

Pediatric: *To target INR of 2.0–3.0*

In prosthetic mechanical heart valves and recurrent thrombotic episodes, target INR is 2.5–3.5

Loading dose: 0.2 mg/kg/dose
MAX loading dose: 7.5 mg

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet**: 1 mg, 2.5 mg, 5 mg
- **CONTRAINDICATIONS** Active bleeding | Malignant hypertension | Recent or potential surgery
  - Pregnancy, except in pregnant women with mechanical heart valves, who are at high risk of thromboembolism
  - Concomitant use with Amiodarone, Ciprofloxacin, Macrolides, NSAIDs, fibrinolytics
- **PRECAUTIONS** Vitamin K deficiency | Hepatic and renal impairment | HIT
  - Postpartum (delay Warfarin until risk of bleeding is low; 5–7 days after delivery)
  - CYP2C9 and VKORC1 genetic variation influences patient response to initial and maintenance therapy and increases risk of bleeding
  - Elderly | Lactation

BLACK BOX WARNING

Warfarin can cause major or fatal bleeding. Instruct patients about preventive measures to minimize risk of bleeding and to report signs and symptoms of bleeding.

- **ADVERSE EFFECTS** Abnormal hepatic function | Calciphylaxis | Alopecia | Acute kidney injury | Hypersensitivity reactions
- **ANTIDOTE** **Vitamin K**
- **COSTS**
  - 2.5 mg Tablet (₱15.79)†
  - 5 mg Tablet (₱17.91)†

REFERENCES

[1] Bartholomew JR. Update on the management of venous thromboembolism. *Cleveland Clinic Journal of Medicine*. 2017;84(12 suppl 3):39-46. doi:10.3949/ccjm.84.s3.04

[2] Paediatric Formulary Committee. *BNF for Children 2022 2023*. BMJ Group and the Pharmaceutical Press; 2023.

[3] Gupta AA, Leaker M, Andrew M, et al. Safety and outcomes of thrombolysis with tissue plasminogen activator for treatment of intravascular thrombosis in children. *The Journal of Pediatrics*. 2001;139(5):682-688. doi:10.1067/mpd.2001.118428

[4] Joint Formulary Committee. *British National Formulary: 84*. BMJ Group and the Royal Pharmaceutical Society of Great Britain 2022; 2022.

[5] Dabbous M, Malaeb D, Sakr F. Anticoagulant therapy in Pediatrics. *Journal of Basic and Clinical Pharmacy*. 2014;5(2):27. doi:10.4103/0976-0105.134947

[6] Formulary Executive Council. *Philippine National Formulary*. 8th ed. Department of Health; 2019

[7] Philippine Society of Vascular Medicine. *Updates on Coagulation Use in COVID-19 and Safety Protocols in the Performance of Vascular Procedures: An Update to the Previous Interim Guideline Ver 2.0.*; 2020.

[8] Streiff MB, Abutalib SA, Farge D, Murphy M, Connors JM, Piazza G. Update on guidelines for the management of cancer-associated thrombosis. *The Oncologist*. 2020;26(1). doi:10.1002/onco.13596

[9] Barradell LB, Buckley MM. Nadroparin calcium. A review of its pharmacology and clinical applications in the prevention and treatment of thromboembolic disorders. *Drugs*. 1992;44(5):858-888. doi:10.2165/00003495-199244050-00010

[10] Andreozzi GM, Bignamini AA, Davì G, et al. Sulodexide for the Prevention of Recurrent Venous Thromboembolism: The Sulodexide in Secondary Prevention of Recurrent Deep Vein Thrombosis (SURVET) Study: A Multicenter, Randomized, Double-Blind, Placebo-Controlled Trial. *Circulation*. 2015;132(20):1891-1897.

[11] Bates SM, Rajasekhar A, Middeldorp S, et al. American Society of Hematology 2018 Guidelines for management of venous thromboembolism: Venous thromboembolism in the context of pregnancy. *Blood Advances*. 2018;2(22):3317-3359. doi:10.1182/bloodadvances.2018024802

Special Cardiac Indications in Pediatric Patients

Alprostadil

Prostaglandin E_1 / PGE_1

- **MOA** A synthetic prostaglandin E1 with vasodilatory properties on vascular and ductus arteriosus smooth muscle

- **INDICATIONS AND DOSE**

Maintaining patency of ductus arteriosus in ductus-dependent congenital heart disease in the newborn period[1,2]

➤ *INTRAVENOUS*

Neonate:
Initial dose: 0.05–0.1 mcg/kg/min; Advance to 0.2 mcg/kg/min if necessary
When an increase in PaO2 is noted, titrate down to the lowest effective dose.
Usual dosage range: 0.01–0.4 mcg/kg/min;

Doses > 0.4 mcg/kg/min not likely to produce additional benefit

- **DOSAGE FORMS AND PREPARATIONS**

[Not FDA registered and not locally available]

- **Solution for Injection, ampule**: 500 mcg/mL (1 mL)

- **CONTRAINDICATIONS** Avoid in hyaline membrane disease | History of priapism, sickle cell anemia, multiple myeloma, leukemia, thrombocythemia, polycythemia
  - Concomitant use with PDE-5 inhibitors
  - Neonates with respiratory distress syndrome
- **PRECAUTIONS** History of hemorrhage, TIA, blood-borne and pulmonary diseases, CHF, CHD
  - Pregnancy | Not indicated for use in women
- **WARNINGS** During the infusion of a prostaglandin, the newborn requires careful monitoring of heart rate, blood pressure, respiratory rate, and core body temperature

BLACK BOX WARNING

Apnea generally occurs during the first hour of infusion and most often in neonates weighing < 2 kg at birth. Monitor respiratory status throughout treatment and use only where ventilatory assistance is immediately available.

- **ADVERSE EFFECTS** Apnea | Arrhythmia | Diarrhea | Fever | Hypotension | Seizure | Vasodilation

Ibuprofen⋆

- **MOA** A nonsteroidal anti-inflammatory drug (NSAID) that inhibits prostaglandin synthesis promoting closure of PDA. Known for its analgesic and antipyretic activities

- **INDICATIONS AND DOSE**

Closure of hemodynamically significant ductus arteriosus in the newborn period[1,2]

➤ *INTRAVENOUS*

< 32 wk of gestation and 0.5–1.5 kg (Premature Infants)
Initially 10 mg/kg/dose by IV, followed by two doses of 5 mg/kg/dose each, 24 and 48 hr after the initial dose
Hold second or third dose if urinary output is < 0.6 mL/kg/hr

Neonate:
Initially 10 mg/kg for 1 dose by slow IV injection, followed by 5 mg/kg every 24 hrs for 2 doses
The course may be repeated after 48 hrs if necessary

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet/Softgel Capsule:** 200 mg, 400 mg also available as film-coated
  - **Syrup/Suspension:** 100 mg/5 mL (60 mL), 200 mg/5 mL (60 mL)
    [FDA application under Monitored Release]
  - **Solution for Infusion:** 100 mg/mL (800 mg/8 mL)
- **CONTRAINDICATIONS** Active or recent intracerebral hemorrhage (< 48 h), thrombocytopenia (< 50,000/mm^3), bleeding disorder (e.g., INR > 1.5 and/or hematuria, blood in the stool and tracheal secretions, prolonged bleeding at injection site), sepsis, NEC, intestinal perforation, pulmonary hemorrhage, liver damage with severe hyperbilirubinemia, renal failure (oliguria <1 mL/kg/h also after adequate hydration, serum creatinine >110–140 μmol, and BUN > 14 mmol/L), and hypersensitivity to ibuprofen or other NSAIDS
  - Pregnancy (3rd trimester)
- **PRECAUTIONS** Dehydration | Patients with history of ulcer, ulcerative colitis, or Crohn's disease, bronchial asthma, chronic rhinitis
  - Use with caution in CYP2C9 intermediate or poor metabolizers; patients carrying *CYP2C9*1*, *CYP2C9*2*, or *CYP2C9*3* allele
  - Children
- **WARNINGS** Genetic testing may be considered for CYP2C9 polymorphisms
  - NSAIDs cause fetal ductus arteriosus premature closure, fetal renal impairment and persistent pulmonary hypertension. Avoid near term, else use the lowest dose for the shortest time.

BLACK BOX WARNING

NSAIDs increase the risk of serious CV thrombotic events, MI, and stroke, which can be fatal. NSAIDs also cause an increased risk of serious GI adverse events including bleeding, ulceration, and perforation of the stomach or intestines, which can be fatal.

- **ADVERSE EFFECTS** Intraventricular hemorrhage | Neutropenia | Renal impairment | Dizziness | Visual disturbances | Phototoxicity
- **COSTS**
  - 100 mg/5mL (60 mL) Oral Suspension (₱105.00)†
  - 200 mg/5mL (60 mL) Oral Suspension (₱104.00)†
  - 200 mg Tablet (₱3.80)†
  - 400 mg Tablet (₱3.10)†

Paracetamol*

Acetaminophen / APAP

- **MOA** A centrally acting analgesic and antipyretic, with minimal anti-inflammatory properties by inhibition of COX-2, COX-3, and PGE1 synthesis
- **INDICATIONS AND DOSE**

  May be used for treatment of patent ductus arteriosus when standard NSAID is contraindicated or insufficient[1]

  ➤ *ORAL / INTRAVENOUS*

  Off-label dosage

  Pediatric:

  15 mg/kg/dose orally or IV, 4x daily for 3 to 7 days
  Alternatively, 15 mg/kg/dose every 6 hrs for 3 days; may be given up to 7 days or with a repeated 3-day course

- **DOSAGE FORMS AND PREPARATIONS**
  - **Tablet:** 300 mg, 500 mg
  - **Drops:** 100 mg/mL (15 mL)
  - **Syrup / Suspension:** 120 mg/5 mL (30 mL, 60 mL, 120 mL) | 125 mg/ 5 mL (30 mL, 60 mL, 90 mL)
  - **Rectal Suppository:** 125 mg, 250 mg
  - **Solution for Injection, ampule/vial:** 150 mg/mL (2 mL)
  - **Solution for Infusion, vial:** 10 mg/mL (50 mL, 100 mL)
- **CONTRAINDICATIONS** Severe hepatic impairment or severe active liver disease
- **PRECAUTIONS** Patients with G6PD deficiency | Chronic alcoholism | Malnutrition | Renal and hepatic impairment | BW < 50 kg
  - Avoid large doses > 4 g daily
  - Pregnancy (Category B: PO; Category C: IV) and lactation (Small amount is present in milk, but too small to be harmful; short courses are safe in usual dosage)
- **WARNINGS** Liver damage and less frequently renal damage can occur following overdose. Nausea and vomiting, the only early features of poisoning, usually settle within 24 hours. Persistence beyond this time, often associated with the onset of right subcostal pain and tenderness, usually indicates development of hepatic necrosis.

BLACK BOX WARNING

Life-threatening cases of acute hepatic failure leading to liver transplant or death have been linked with APAP use. In most cases of hepatic injury, APAP doses exceeded maximum daily limits and often involved the use of more than 1 APAP-containing product.

- **ANTIDOTE** **N-Acetylcysteine**

  ➤ *ORAL*

  Loading dose of 140 mg/kg, followed by 70 mg/kg every 4 hrs for 17 doses
  Total doses: 18 (including loading dose)

  ➤ *INTRAVENOUS*

  Loading dose of 150 mg/kg NAC over 60 mins, followed by 50 mg/kg over 4 hrs, followed by 100 mg/kg over 16 hrs for a total infusion time of 21 hrs

- **ADVERSE EFFECTS** Nausea | Vomiting | Constipation | Pruritus | Agitation | Insomnia

REFERENCES

[1] Kleinman K, McDaniel L, Molloy M, eds. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 22nd ed. Elsevier; 2021.
[2] Paediatric Formulary Committee. BNF for Children 2022 2023. BMJ Group and the Pharmaceutical Press; 2023.
[3] Shaddy RE, Penny DJ, Feltes TF, et al. (eds.) Moss and Adams' Heart Diseases in Infants, Children, and Adolescents including the Fetus and Young Adults. 10th Edition. Philadelphia: Wolters Kluwer; 2022.
[4] Bardanzellu F, Neroni P, Dessì A, Fanos V. Paracetamol in Patent Ductus Arteriosus Treatment: Efficacious and Safe?. Biomed Res Int. 2017;2017:1438038. doi:10.1155/2017/1438038

ACKNOWLEDGEMENTS

The PHA formulary is a product of passion, will, faith, hard work, and indomitable spirit of the people involved in its making. And while it is a team effort, we would like to thank those who stood out and in one way or another, contributed to its beginning, continuation, and completion.

The unwavering support of the Philippine Heart Association and its board of directors was crucial to every aspect of making the formulary. We are especially grateful to past president Kuya Dr. Gibo Vilela, who ignited the passion and gave the inspiration and moral boost to take on a project bigger than ourselves; past president Dr. Erric Cinco, who granted swift and positive responses to our requests and made the journey of completing the formulary a little bit easier; and Dr. Ronald Cuyco, who wholeheartedly supported its making until its completion and launch.

To Ricky, friend, and past chair of the Pharmacotherapy council, who laid the groundworks in making the Pharmacotherapy council productive and relevant to the times, thank you for being our direct connection and advocate to the board of directors.

We would like to thank our research assistant turned copy editor, our expert pharmacist, Gabie, the heart of the formulary, for the tireless coordination, and amazing work from start to finish. Ikaw na!

Thank you, Kath, for facilitating our correspondences with the board, and the timely meeting links and meal allowances.

We personally thank each member of the PHA formulary committee, especially the members of the Pharmacotherapy council, for not buckling in the challenges and realization that there is much more to the formulary than passion and will to endure late night meetings and discussions. Well, we learned along the way. On to the next edition (haha)! Thank you for the encouragement that we have something special here and we must continue.

Thank you to our families and friends who loved us and provided respite from our stresses as we juggled our many roles and responsibilities, including the work in the formulary.

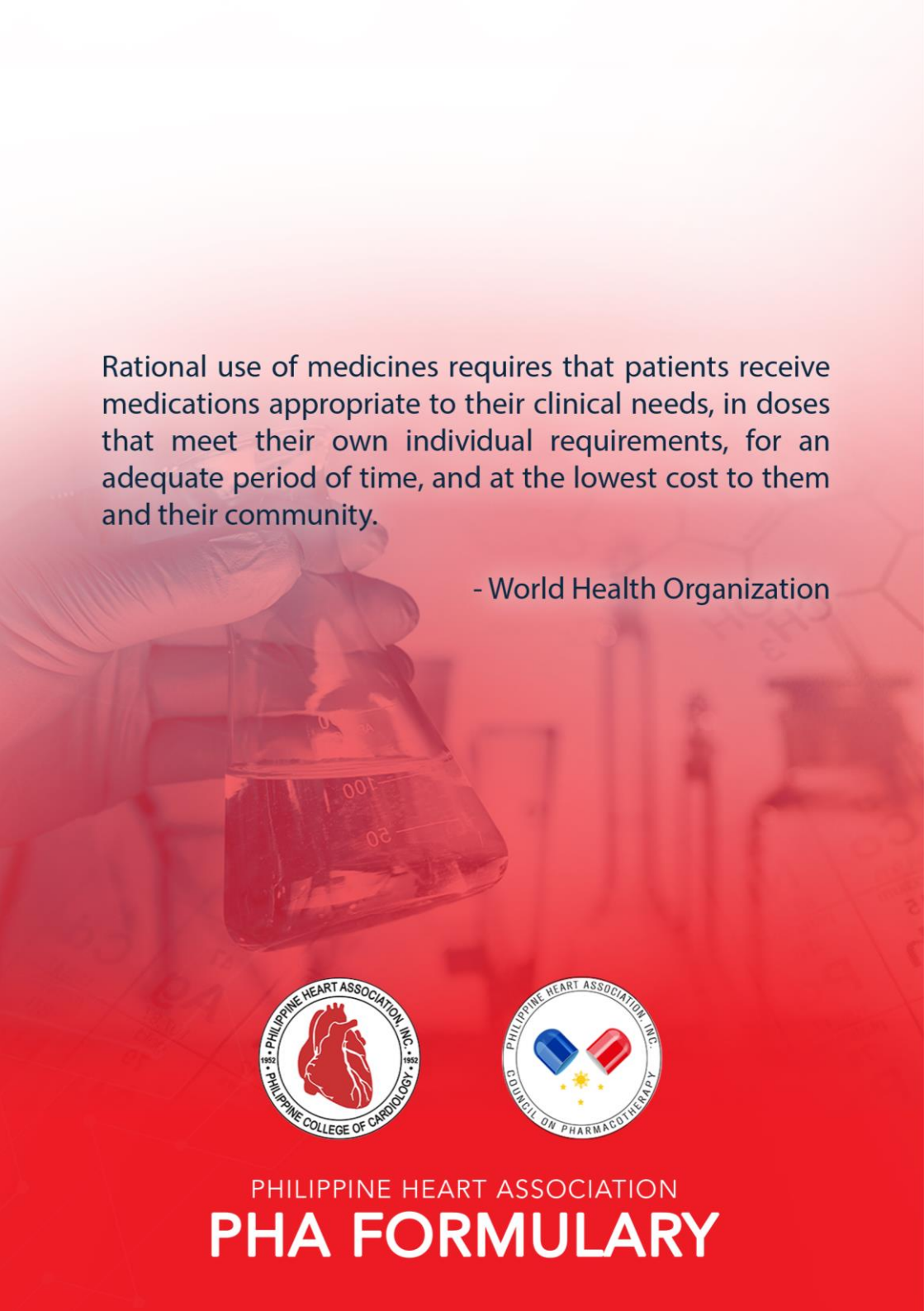
And to our gracious God who made everything work for good, and for whom nothing is impossible, all thanks, praises, and honor! May you be glorified in our lives and the lives of those who will use, and may they indeed benefit from, the PHA formulary.

Connie and Bjorn

INDEX

Rational use of medicines requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.

- World Health Organization



PHILIPPINE HEART ASSOCIATION

PHA FORMULARY