



**REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH**



ZAMBIA PAEDIATRIC ALGORITHMS

FIRST EDITION - 2024



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ACRONYMS

3TC – Lamivudine	CDD – Chronic Diarrhoea
ABG – Arterial Blood Gas	CFU – Colony forming unit
ACEIs – Angiotensin Converting Enzyme Inhibitors	CHD – Congenital Heart Disease
ACS – Acute Chest Syndrome	CKD – Chronic Kidney Disease
ACTH- Adrenocorticotrophic Hormone	CNS – Central Nervous System
ADD – Acute Diarrhoeal Disease	CO – Cardiac Output
ADH - Anti-Diuretic Hormone	CoA – Coarctation of Aorta
ADHD – Attention Deficit Hyperactive Disorder	CPAP – Continuous positive airway pressure
AEDs – Anti-Epileptic Drugs	CPP – Central precocious puberty
aEEG – Amplitude-integrated Electroencephalography	CRP – C Reactive Protein
AF – Atrial Fibrillation	CRT – Capillary Refill Time
AG – Anion Gap	CSA – Child Sexual Assault
AIS – Androgen Insensitivity Syndrome	CSF – Cerebral Spinal Fluid
AKI – Acute Kidney Injury	CT Scan – Computed Tomography scan
AKIN - Acute Kidney Injury Network	CTG – Cardiotocography
ANA – Antinuclear Antibodies	CVA – Cerebral Vascular Accident
anti-dsDNA – Anti-Double-Stranded DNA Antibodies	CVD - Cardiovascular Disease
APLA – Antiphospholipid Antibodies	CXR – Chest X-Ray
ARBs – Angiotensin Receptor Blockers	DAT – Direct Antiglobulin
ARF – Acute Rheumatic Fever	DCM – Dilated Cardiomyopathy
ART – Anti-retro viral therapy	DHTR – Delayed Haemolytic Tranfusion Reaction
ASA – Acetylsalicylic Acid (aspirin)	DIC – Disseminated intravascular coagulation Disease
ASD – Atrial Septal Defect	DKA – Diabetic ketoacidosis
ASD – Autism Spectrum Disorder	DM – Diabetes Mellitus
ASOT – Anti-streptolysin O titers	DMSA – Dimercapto succinic acid
ATV/r – Atazanavir/Ritonavir	DNS – Dextrose Normal Saline
AZT – Azidothymidine (also called Zidovudine ZDV)	DRTB - Drug resistance TB
BD – Twice a Day	DSD – Disorders of Sexual Differentiation
BMI – Body Mass Index	DST – Drug sensitivity testing
BMT Bone Marrow Transplant	DTG – Dolutegravir
BPD – Bronchopulmonary Dysplasia	EBM – Expressed Breast Milk
CAH – Congenital Adrenal Hyperplasia	ECG - Electrocardiography
CCBs – Calcium Channel Blockers	ECHO Echocardiography
CCF – Congestive Cardiac Failure	EEG - Electroencephalography
EMTCT – Elimination of Mother-To-Child Transmission (of HIV)	ELBW – Extremely low birth weight
	IBD – Inflammatory Bowel Disease
	IBMFSInherited Bone Marrow Failure Syndrome

EPTB – Extra pulmonary TB
 ESR – Erythrocyte Sedimentation Rate
 ESRD – End-stage Renal Disease
 EWS – Early Warning Score
 FBC Full Blood Count
 FFA – Free Fatty Acids
 FFP – Fresh Frozen Plasma
 FiO₂ – Fraction of Inspired Oxygen
 FSH – Follicle Stimulating Hormone
 FTT – Failure To Thrive
 G6PD – Glucose 6 Phosphate Dehydrogenase
 GAS - Group A β -Haemolytic Streptococcus
 GBV – Gender-Based Violence
 GCS – Glasgow Coma Scale
 GERD – Gastroesophageal Reflux Disease
 GFR – Glomerular Filtration Rate
 GGT - Gamma-Glutamyl Transferase
 GI – Gastrointestinal
 GnRH – Gonadotropin Releasing Hormone
 Hb – Haemoglobin
 HBsAg – Hepatitis B surface Antigen
 HbSS – Homozygous Sickled Haemoglobin
 HBV – Hepatitis B Virus
 HCO₃⁻ - Bicarbonate
 HDN – Haemolytic Disease of the Newborn
 HDU – High Dependency Unit
 HEU – HIV Exposed Uninfected
 HFNC – High Flow Nasal Cannula
 HHV – Human Herpes Virus
 HIE – Hypoxic Ischaemic Encephalopathy
 HIV – Human Immunodeficiency Virus
 HLA – Human Leukocyte Antigen
 HPS – Hypertrophic Pyloric Stenosis
 HPV – Human Papilloma Virus
 HSCT – Haematopoietic Stem Cell Transplant
 HSP – Henoch Schonlein Purpura
 HTN – Hypertension
 HUS – Haemolytic Uremic Syndrome
 MCUG – Micturating Cystourethrogram
 MDRTB – Multi-Drug Resistance TB
 MPO – Myeloperoxidase
 IBS – Inflammatory Bowel Syndrome
 ICP – Intracranial Pressure
 ICS – Inhaled Corticosteroid
 ICU – Intensive Care Unit
 IE – Infective Endocarditis
 IEC – Information, Education and Communication
 IEMs – Inborn Errors of Metabolism
 IgAN – Ig A Nephropathy
 IH – Infantile Haemangioma
 ILAE – International League Against Epilepsy
 IM – Intramuscular
 INR – International Normalization Ratio
 InSurE – Intubate-Surfactant-Extubate
 IO - Intraosseous
 IV – Intravenous
 IVH – Intraventricular Hemorrhage
 IVIG – Intravenous Immunoglobulin
 JVD = Jugular Venous Distension
 JVP – Jugular Venous Pressure
 KDIGO – Kidney Disease Improving Global Outcomes
 KMC – Kangaroo Mother Care
 KUB – Kidney, Ureter, and Bladder
 LABA – Long-Acting Beta Agonist
 LAM – Lipoarabinomannan
 LBW – Low Birth Weight
 LDH – Lactate Dehydrogenase
 LFTs – Liver Function Tests
 LH – Luteinizing Hormone
 LISA – Less Invasive Surfactant Administration
 LN – Lupus Nephritis
 LPA – Line Probe Assay
 LPV/r – Lopinavir/Ritonavir
 LTRA – Leukotriene Receptor Antagonist
 LVH – Left Ventricular Hypertrophy
 M/C/S – Microscopy, Culture and Sensitivity
 MCA - Middle Cerebral Artery
 PTH – Parathyroid Hormone
 PTT – Prothomboplastin Time
 PUD – Peptic Ulcer Disease

MRA/MRV - Magnetic Resonance Angiography/Magnetic Resonance Venography
MRI – Magnetic Resonance Imaging
MRI/MRA/MRV Magnetic Resonance Imaging/AngiographyVenography
MTB – Mycobacterium Tuberculosis
NAT – Nucleic Acid Test
NE – Neonatal Encephalopathy
NEC – Necrotizing Enterocolitis
NGT – Nasogastric Tube
NPO – Nil Per Oral
NRB – Non Rebreather Mask
NS – Nephrotic Syndrome
NSAIDs – Nonsteroidal Anti-Inflammatory Drugs
NVP – Nevirapine
OD - Once Daily
OGT – Oral Gastric Tube
ORS – Oral Rehydration Salt
OSC – One Stop Centre
PBS - Peripheral Blood Smear
PD - Persistent Diarrhoea
PDA – Patent Ductus Arteriosus
PDD – Persistent Diarrhoeal Disease
PDN - Prednisolone
PEF – Peak Expiratory Flow
PEG – Polyethylene Glycol
PEP – Post Exposure Prophylaxis
PIAGN – Post-infectious Acute Glomerulonephritis
PICU – Paediatric Intensive Care Unit
PO – Per Oral
PPIs – Proton Pump Inhibitors
PrPEP – Pre-Exposure Prophylaxis
TTP – Thrombotic Thrombocytopenic Purpura
ULN – Upper Limit Normal
UTI – Urinary Tract Infection
VCUG – Voiding cystourethrography
VDRL – Venereal disease research laboratory

PUV – Posterior Urethral Valve
QID – Four Times a Day
RAS – Renal Artery Stenosis
RBS – Random Blood Sugar
RDT – Rapid Diagnostic Test
RF – Rheumatic Fever
RHD – Rheumatic Heart Disease
ROM – Rupture of Membranes
RPGN – Rapidly Progressive Glomerulonephritis
RPR – Rapid Plasma Reagent
SABA – Long-Acting Beta Agonist
SAM – Severe Acute Malnutrition
SBE – Subacute Bacterial Endocarditis
SC – Subcutaneous
SCD Sickle Cell Disease
SIADH – Syndrome of Inappropriate Anti-Diuretic Hormone
SLE – Systemic Lupus Erythematosus
SPA – Suprapubic Bladder Aspiration
STAT – Right Now
STIs – Sexually Transmitted Infections
SVR – Systemic Vascular Resistance
TB – Tuberculosis
TBM – Tuberculous Meningitis
TBT – TB Preventive Therapy
TCAs – Tricyclic Antidepressants
TCB – Transcutaneous Bilirubin
TDF – Tenofovir Disoproxil Fumarate
TDS – Three Times a Day
TFT Thyroid Function Test
TIA – Transient Ischaemic Attack
TOF – Tetralogy of Fallot
TP-PA - Treponema Pallidum Particle Agglutination
TSH – Thyroid Stimulating Hormone
TST Tuberculin Skin Test
VLBW – Very Low Birth Weight
VMA – Vanillylmandelic Acid
VOC – vaso occlusive crisis
VSD – Ventricular Septal Defect
XFTC – Emtricitabine

The Ministry of Health prioritises the health of children and is committed to delivering improved quality healthcare services across the country. So far, there has been a significant reduction in the overall under-five mortality rate, from 197 per 1000 live births in 1996 to the current 61 per 1000 live births. However, if the current trajectory continues, Zambia may not attain the 2030 global target of reducing the Under 5 mortality to 25 per 1000 live births.

The Ministry of Health therefore welcomes the 2024 Zambia Paediatric Protocols that have been developed at a very critical stage. They will serve as an added tool in our quest to improve healthcare provided to our children. These protocols focus on triage, assessment and classification of illness severity, criteria for admission, and inpatient management of the major causes of childhood morbidity & mortality such as pneumonia, diarrhoea, malaria, severe acute malnutrition, meningitis, HIV, TB, Sickle Cell and neonatal conditions.

These protocols are the first edition and seek to streamline and standardize paediatric healthcare service delivery across the continuum of care in the country. They are aimed at doctors, clinical officers, nurses, pharmacists, laboratory scientists, and all healthcare workers who are responsible for the care of sick newborns and children. They are also intended to be a useful resource for students in medical schools and other Health training institutions. These protocols are meant to serve as a guide for clinical practice, based on the best available evidence at the time of development. They do not substitute the need to consult as necessary. Ultimately every healthcare worker is responsible for the management of their patient based on the clinical features presented by the patient and the management options available locally.

It is my expectation that the protocols shall provide drive to our mission to significantly reduce the morbidity and mortality in children and provide client and patient satisfaction.

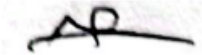


Dr Kennedy Lishimpi
Permanent Secretary – Technical Services
MINISTRY OF HEALTH

ACKNOWLEDGEMENTS

The development of this 1st Edition of the National Paediatric Protocols marks a significant landmark in the efforts of the health sector to standardize the care of sick children in Zambia, and an important step towards assuring quality healthcare services to children anytime and anyplace in Zambia.

I wish to thank all those who contributed towards the realisation of these protocols. Special gratitude goes to the partners and contributors.



Dr Lisulo Walubita
Director Clinical Care and Diagnostic Services
MINISTRY OF HEALTH



Ministry of Health



Zambia Paediatric Association



World Health Organization



United Nations Children's Fund



Program for Appropriate Technology in Health



Centre for Infectious Disease Research in Zambia



University of Zambia – School of Medicine



Clinton Health Access Initiative



Catholic Relief Services



University Teaching Hospital HIV/AIDS Program

DEDICATIONS

The following are paediatricians who devoted their lives to the health and well-being of children.

Their unwavering commitment to nurturing the smallest of patients, often during their most vulnerable moments, is nothing short of heroic. They were more than just doctors— they were healers, advocates, and champions for a brighter and healthier future. Their tireless work, compassionate care, and endless patience ensured that children everywhere can grow, thrive, and reach their fullest potential.

Though they are no longer with us, we thank them for their resilience, kindness, and dedication to making the world a better place, one child at a time.



Prof. Chifumbe Chintu: 08.12.1935 – 04.05.2017
Father of Paediatrics & Child Health in Zambia

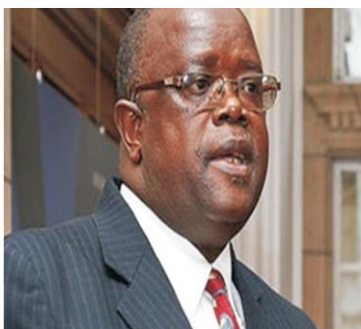
Prof. Chifumbe Chintu attained his medical degree at the University of Toronto in 1966. He returned to Zambia where he was posted to Kitwe General Hospital. He went back to Canada to pursue his postgraduate studies in paediatrics and in 1973 he became a Fellow of the Royal College of Physicians of Canada and a diplomate of the American Board of Paediatrics. And later, he became a Fellow of the Royal College of Physicians in London.

He returned to Zambia and became a consultant paediatrician in 1973 and later joined the University of Zambia, School of Medicine. He rose from senior lecturer to Associate Professor and became a full professor in 1980. He was Head of Department for Paediatrics and Child Health at the University Teaching Hospital (UTH) where he founded the Haematology and Oncology unit. He was a pioneer in Sickle Cell Disease care in children and adults. He set up the only combined paediatric and adult haematology clinic, living up to his motto of “paediatricians care for patients from the womb to the tomb”

Prof Chintu later became Dean of the School of Medicine. He was instrumental in founding the Post Graduate Training Programme (MMed) that birthed locally trained specialists. He also founded the Research Ethics Committee which is key in regulating research in the country. He lobbied for funding from the Japanese government to build the neonatal and paediatric surgical building (D-block) at UTH. In 1994, Prof Chintu and Alimuddin Zumla founded a collaborative research and training programme between the University of Zambia and University College London Medical School (UNZA–UCLMS). UNZA–UCLMS studies have changed global practice and WHO management guidelines for tuberculosis, tuberculosis–HIV co-infection, and respiratory infections.

Prof Chintu served in numerous associations and professional bodies such as the Zambia Paediatric Association, Zambia Medical Association, Zambia Medical Council (now Health Professions Council of Zambia) and others. He received numerous awards, among them, from World Health Organisation in 2006 World Health Day for his contributions in teaching, training, clinical care and research over a period of 40 years. He was also given the Grand Order of Distinguished Service First Division on 24th October 2007 by President Levy Mwanawasa. He also received Life Time Achievement Awards and Distinguished Service Awards from the Zambia Medical Association as well as the Zambia Paediatric Associations.

Prof Chintu was a great and dedicated clinician who was loved by his patients and their families. He taught and mentored generations of health care workers in Zambia and other countries and inspired many to specialise in Paediatrics and Child Health. The community of practice has fond memories of his teachings as well as the passionate care he had for his patients. His legacy lives on!



Prof. James Chipeta (01.03.1962 – 02.03.2020)

Prof Chipeta studied Medicine at the University of Zambia School of Medicine and graduated in 1990. He then joined the Department of Paediatrics and Child Health at the UTH in 1993. He was awarded the MonBosho Scholarship to study Paediatrics and Clinical Immunology from 1994 to 2000 at Mie University in Japan. He obtained his PhD in Paediatrics and Clinical Immunology in 2000. He joined the University of Zambia as Lecturer and in 2009 he was promoted to Senior Lecturer and in the same year he was appointed inaugural Assistant Dean Research. He was appointed Full Professor of the University of Zambia in 2018. He received numerous awards, amongst them, the National Science and Technology Council Merit Award for Research in 2013 and the meritorious award by the Zambia Medical Association in 2018.



Dr Samuel Phiri (23.12.1943 – 19.07.2023)

Dr Samuel Phiri graduated from UNZA in 1975, with a Bachelor's Degree in Medicine and surgery and had a Distinction in Paediatrics. He worked in Scotland at the Hospital for Sick Children. He was also Chief Medical Officer in Chililabombwe under ZCCM. He became a Consultant Paediatrician at Perirenyatwa and Mpilo Hospital in Zimbabwe. He served as consultant at UTH and lectured medical students as well as postgraduates at University of Zambia, School of Medicine. He also served as Deputy Director at UTH and later become Senior Medical Superintendent for Arthur Davison Children's hospital, from 2003 until he retired in 2015. He had special interest in cardiac conditions. He was awarded for dedicated service to the care of children by the Fellowship of Royal College of Physicians of Edinburg, Scotland and the Zambia Paediatric Association.



Prof. Ganapati Bhat (10.06.1945 – 13.03.2005)

Prof. Ganapati Bhat was a distinguished pediatrician who had a significant career at the University Teaching Hospital where he served as a head of department for Paediatrics and Child Health. He was also a lecturer at the University of Zambia, School of Medicine. His work focused on various aspects of child health, particularly in the context of infectious diseases. Prof. Bhat published extensively on topics such as HIV, human herpesvirus 8 (HHV-8), and anthropometric measurements in children. His research contributed to a deeper understanding of these conditions in the pediatric population, particularly in Zambia and the broader sub-Saharan African region.



Dr Sylvester Sinyangwe (29.11.1950-24.05.2021)

Dr Sylvester Sinyangwe graduated from the University of Zambia School of Medicine and later specialized in Paediatrics and Child Health. He served in the Zambia Army and pursued further training in the USA and Japan. His interests span from clinical care particularly in neonatology as well as administration and public health. He worked in Lesotho, before returning to Zambia where he served as medical director at the Zambia Sugar company. He later joined the University of Zambia, School of Medicine as a lecturer and served as head of the department of Paediatrics and Child Health. He also served as a honorary consultant at the UTH Children's Hospital.

CONTRIBUTORS

The process involved health workers from all provinces and representatives from major hospitals. This lengthy process came to fruition through the dedication and hard work of the clinicians who had to divide time between service delivery and gathering the practical information to come up with these protocols. The passion and willingness of these busy health workers has to be recommended as it has shown their dedication to providing quality health care to the Children of Zambia. We therefore encourage this spirit in our fraternity to continue as this will help foster improved health care for children. Special thanks to all who have made this edition possible among many others. The editorial team and list of contributors are included in the Zambia Paediatrics Protocols.

For feedback and suggestions, email to: zambipaediatricprotocols@gmail.com

Download this copy from <https://www.moh.gov.zm/> then Publications

DISCLAIMER

These protocols serve as a guideline for the management of some common childhood illnesses in Zambia. The guideline is not a substitute for clinical judgement.

Variation from the guideline, taking into account individual circumstances may be appropriate, depending on locally available resources and expertise, or with new evidence-based research findings.

PAEDIATRIC BASIC LIFE SUPPORT

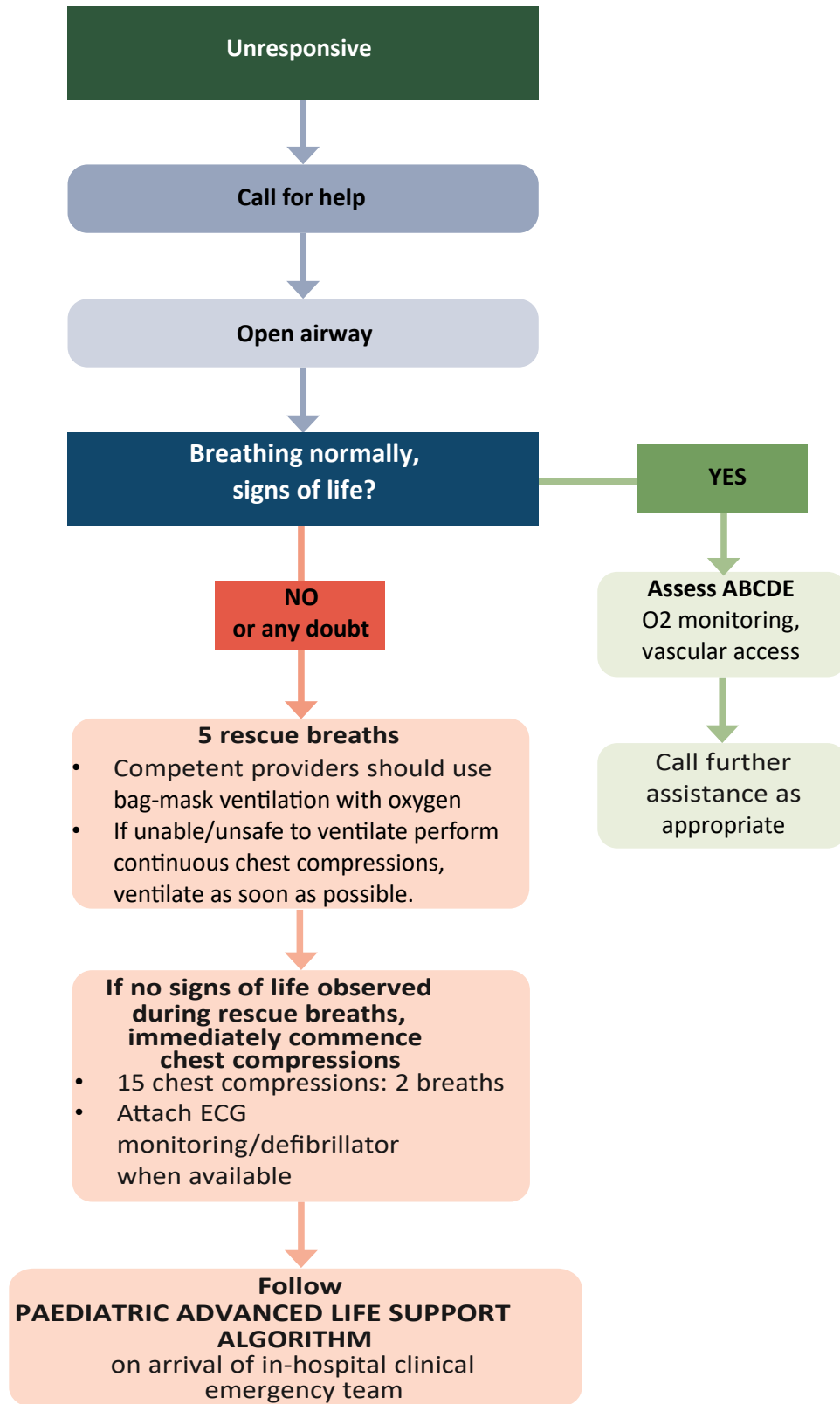
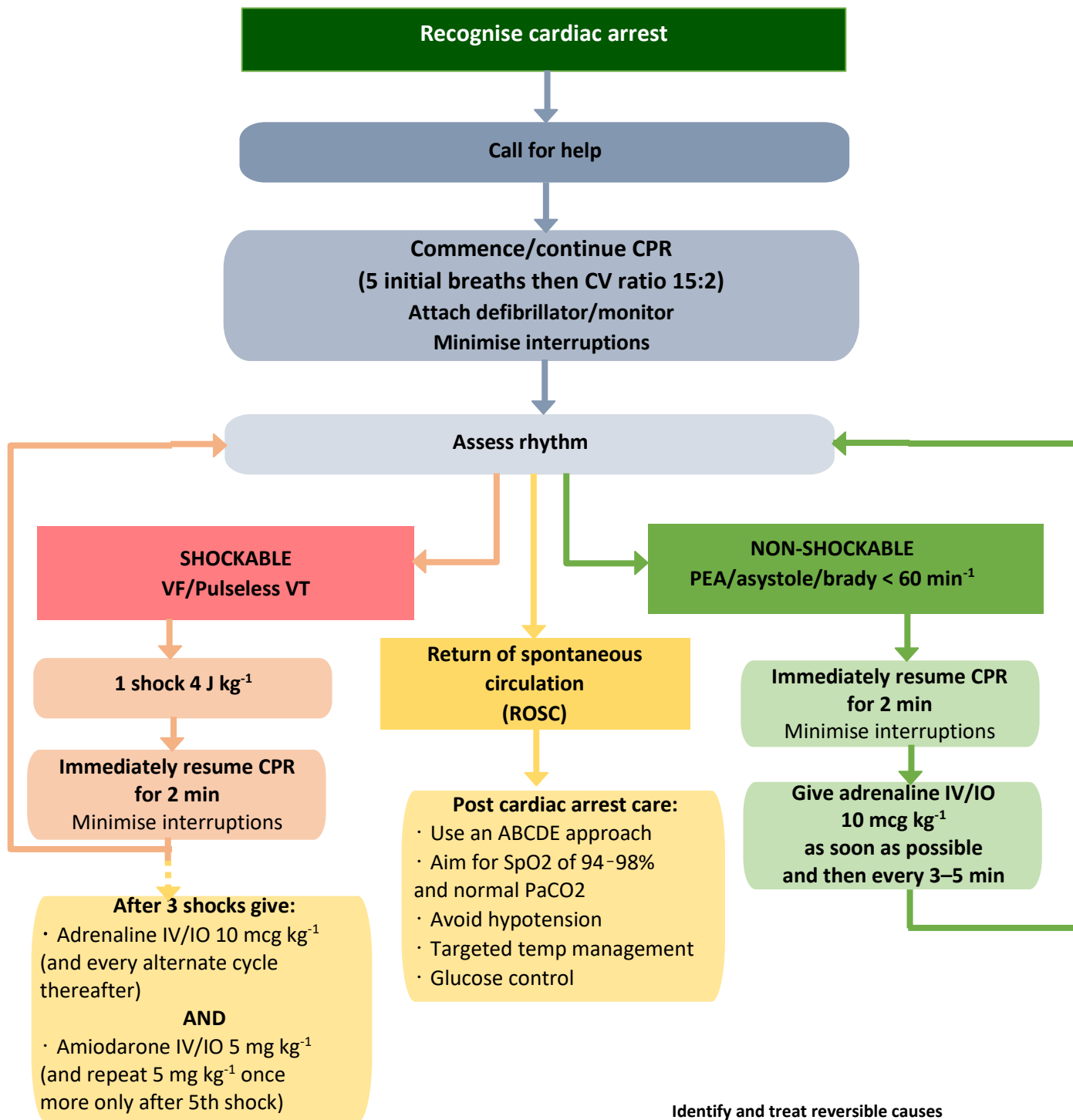


Fig 1. Adapted from resuscitation council UK guideline 2021

PAEDIATRIC ADVANCED LIFE SUPPORT



During CPR

• Ensure high quality chest compressions are delivered:

- Correct rate, depth and full recoil
- Provide BMV with 100% oxygen (2-person approach)
- Provide continuous chest compressions when a tracheal tube is in place.
- Competent providers can consider an advanced airway and capnography, and ventilate at a rate (breaths minute⁻¹) of:

Infants: 25	1–8 years: 20	8–12 years: 15	> 12 years: 10–12
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- Vascular access IV/IO
- Once started, give Adrenaline every 3-5 min
- Maximum single dose Adrenaline 1 mg
- Maximum single dose Amiodarone 300 mg

Identify and treat reversible causes

- Hypoxia
- Hypovolaemia
- Hyperkalaemia, hypercalcaemia, hypermagnesaemia, hypoglycaemia
- Hypo-/hyperthermia
- Thrombosis - coronary or pulmonary
- Tension pneumothorax
- Tamponade - cardiac
- Toxic agents

Adjust algorithm in specific settings (e.g. special circumstances)

Fig 2. Adapted from resuscitation council UK guideline 2021

PAEDIATRIC FOREIGN BODY AIRWAY OBSTRUCTION

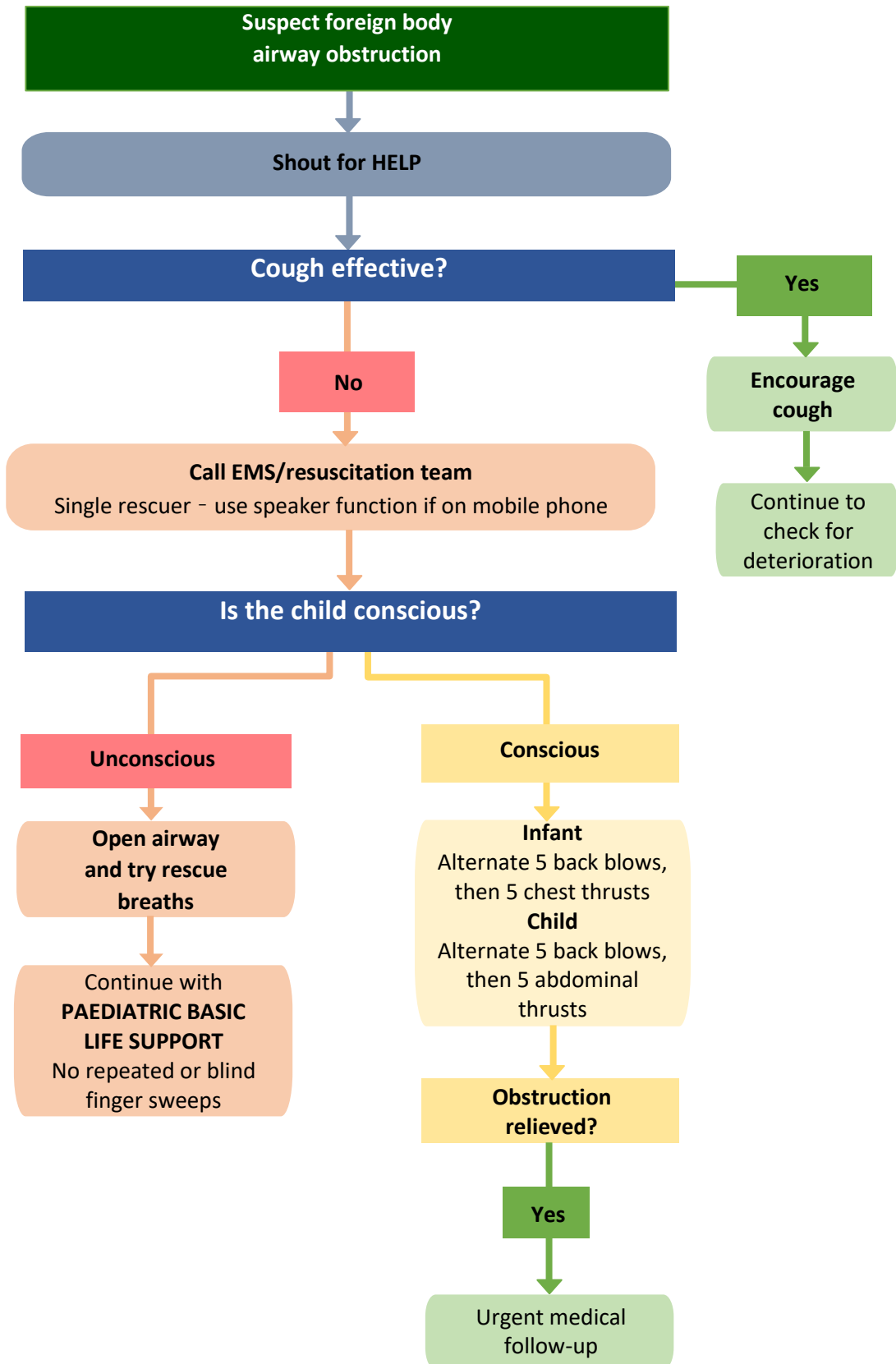


Fig 3. Adapted from resuscitation council UK guideline 2021

RESPIRATORY SUPPORT (OXYGEN) ESCALATION

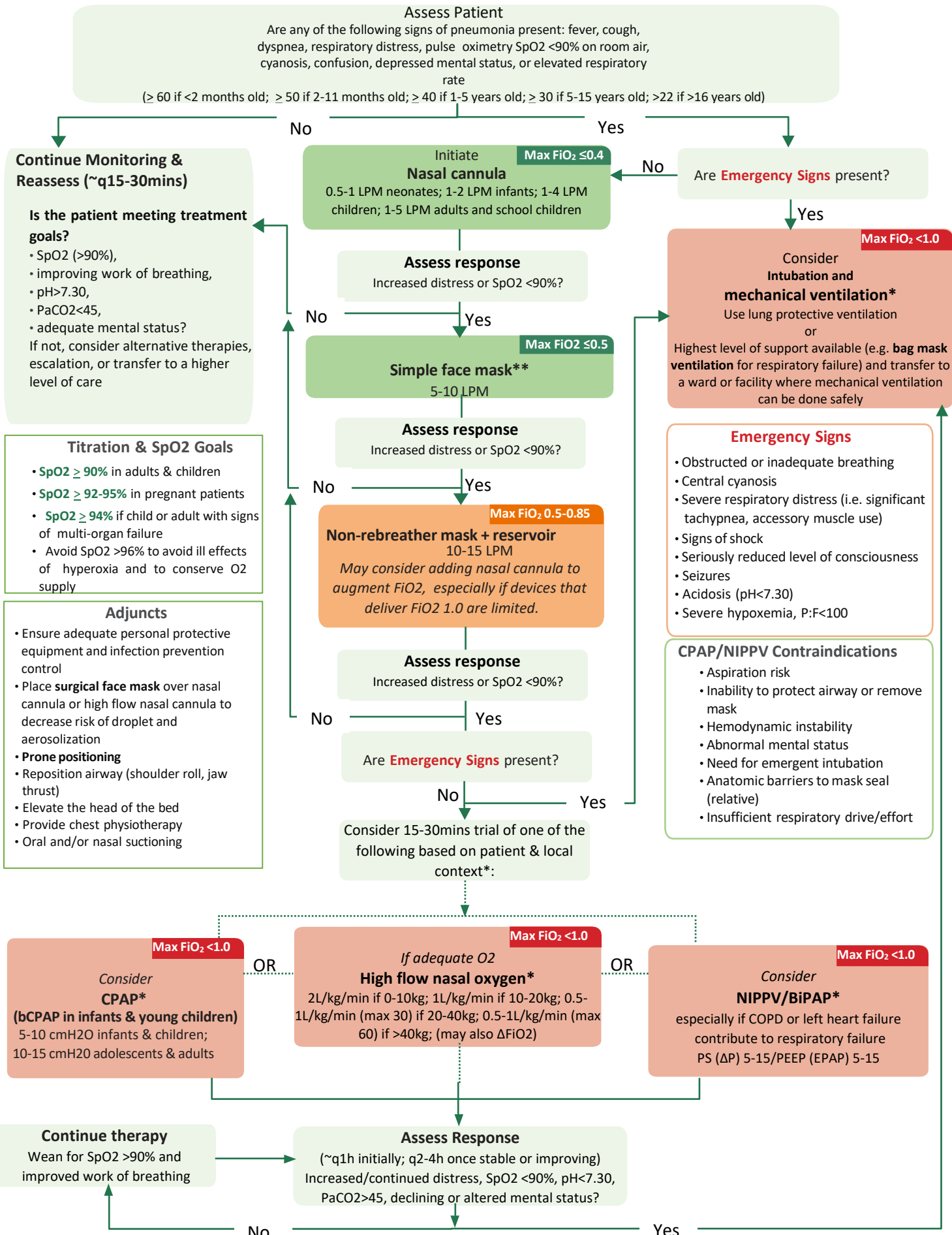


Fig 4. Respiratory support escalation

ACUTE EXACERBATION OF ASTHMA

Assessment and management of asthma severity

Moderate asthma	Acute severe asthma	Life-threatening asthma
Normal mental state	Agitated, distressed	Confused, drowsy, exhausted
Ability to talk in sentences or vocalise as normal	Can't complete sentences in one breath	Unable to talk
Some accessory muscle use	Moderate to marked accessory muscle use	Maximal accessory muscle use (poor respiratory effort is pre-terminal)
PEF \geq 50% of best or predicted	PEF 33–50% of best or predicted	Marked tachycardia (sudden fall in HR is pre-terminal)
O ₂ saturations $>$ 92% in air	O ₂ saturations $>$ 92% in air	PEF $<$ 33% of best or predicted
Moderate tachycardia	HR \leq 125 min ⁻¹ ($>$ 5 years)	O ₂ saturations $<$ 92% in air
HR \leq 125 min ⁻¹ ($>$ 5 years)	HR \leq 140 min ⁻¹ (2–5 years)	Silent chest
HR \leq 140 min ⁻¹ (2–5 years)	RR \leq 30 min ⁻¹ ($>$ 5 years)	Cyanosis
RR \leq 30 min ⁻¹ ($>$ 5 years)	RR \leq 40 min ⁻¹ (2–5 years)	Hypotension
RR \leq 40 min ⁻¹ (2–5 years)		Management
Management	Management	Continuous O ₂ saturation monitoring
Continuous O ₂ saturation monitoring	Continuous O ₂ saturation monitoring	High-flow O ₂ via NRB mask titrated to achieve O ₂ saturations 94–98%
High-flow O ₂ via NRB mask titrated to achieve O ₂ saturations 94–98%	High-flow O ₂ via NRB mask titrated to achieve O ₂ saturations 94–98%	Refer to PICU
β ₂ agonist 2–10 puffs via pMDI + spacer	β ₂ agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently	β ₂ agonist nebulised (salbutamol 2.5–5 mg) every 20 min with Ipratropium bromide (250 mcg) for first 2 h; review frequently
+/- face mask, repeat dose every 20 min reviewing effect; no improvement in 1 h treat as acute severe	Oral steroids: 20 mg prednisolone for children aged 2 to 5 years; 30 to 40 mg for children $>$ 5 years	Oral steroids: 20 mg prednisolone (2–5 years); 30 to 40 mg ($>$ 5 years). Repeat dose if vomiting or consider intravenous steroids (hydrocortisone 4 mg kg ⁻¹ every 4 h)
Ipratropium bromide given early via pMDI	Consider intravenous magnesium and aminophylline if the child is unresponsive to maximal doses of bronchodilators and steroids	Give bolus of intravenous magnesium.
+ spacer +/- face mask, particularly if poorly responsive to β ₂ agonist	Consider ABG if poor response to early treatment	Consider early single bolus dose of IV salbutamol where child has responded poorly to inhaled therapy followed by an infusion
Oral steroids: prednisolone 20 mg for children aged 2 to 5 years; 30 to 40 mg for children $>$ 5 years	Refer to PICU	Consider aminophylline if child unresponsive to maximal doses of bronchodilators and steroids
		Consider ABG if poor response to early treatment.

If no pulse oximeter is available, check for cyanosis.

MANAGEMENT OF SHOCK

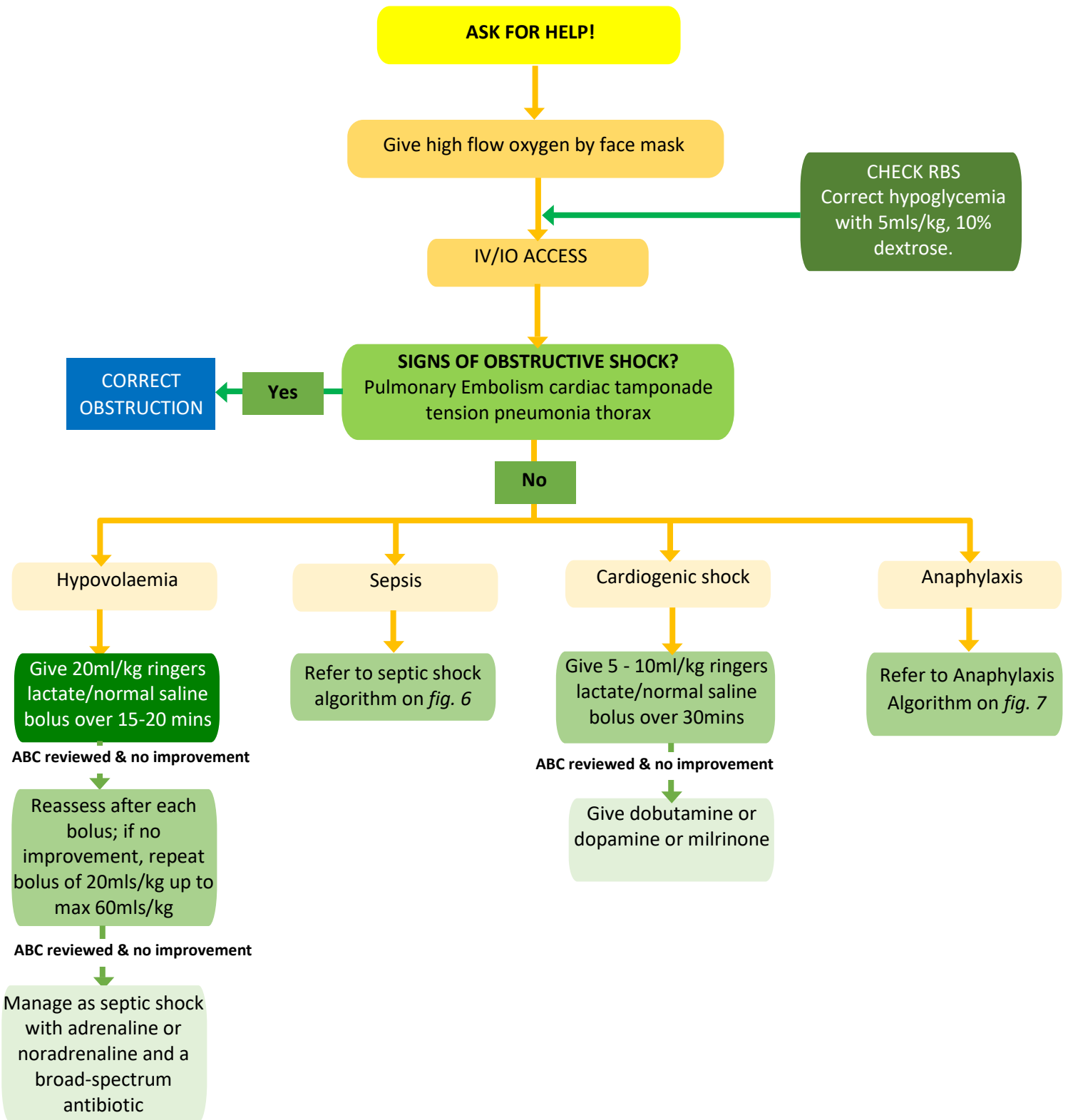
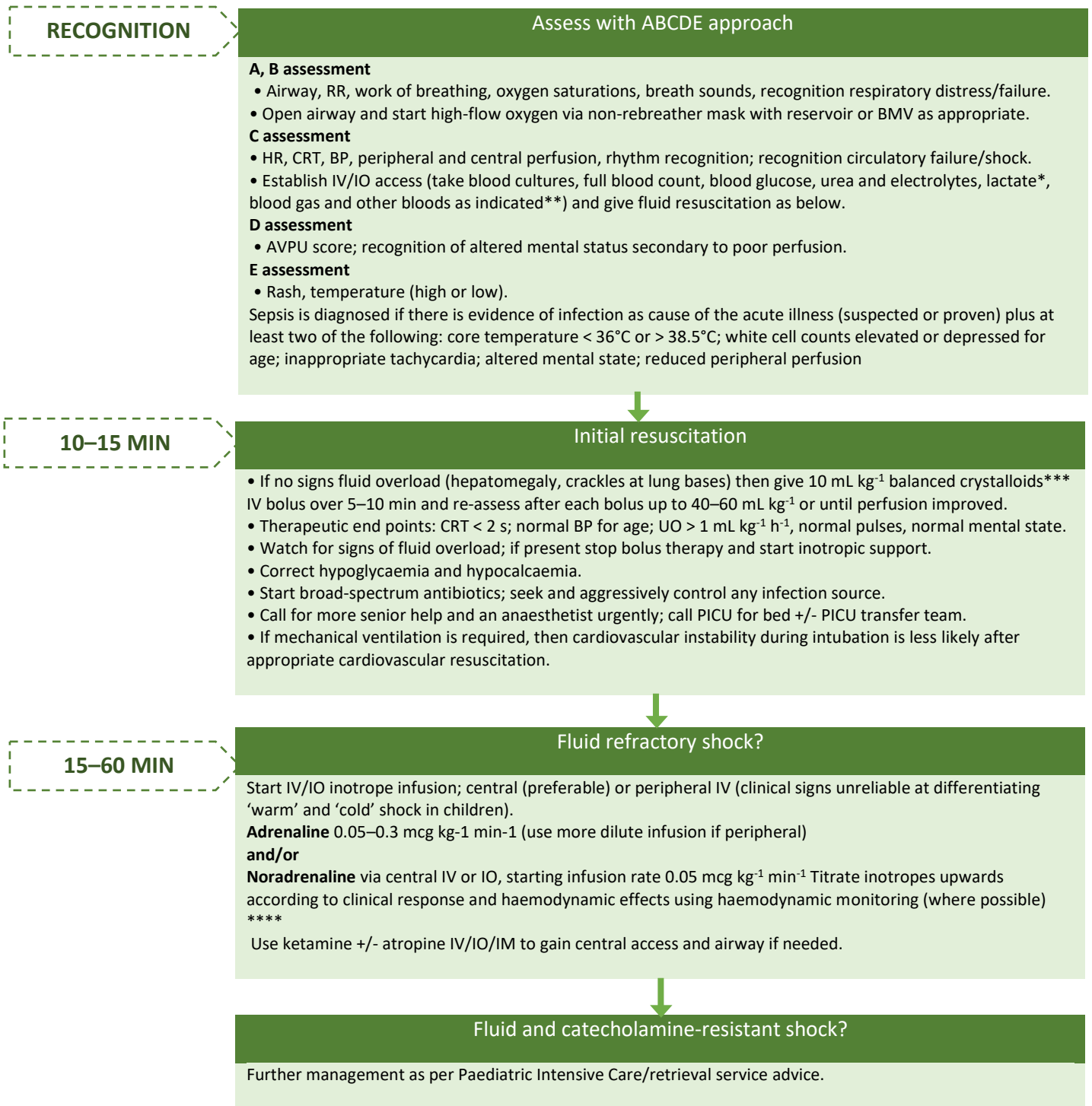


Fig 5. Management of shock

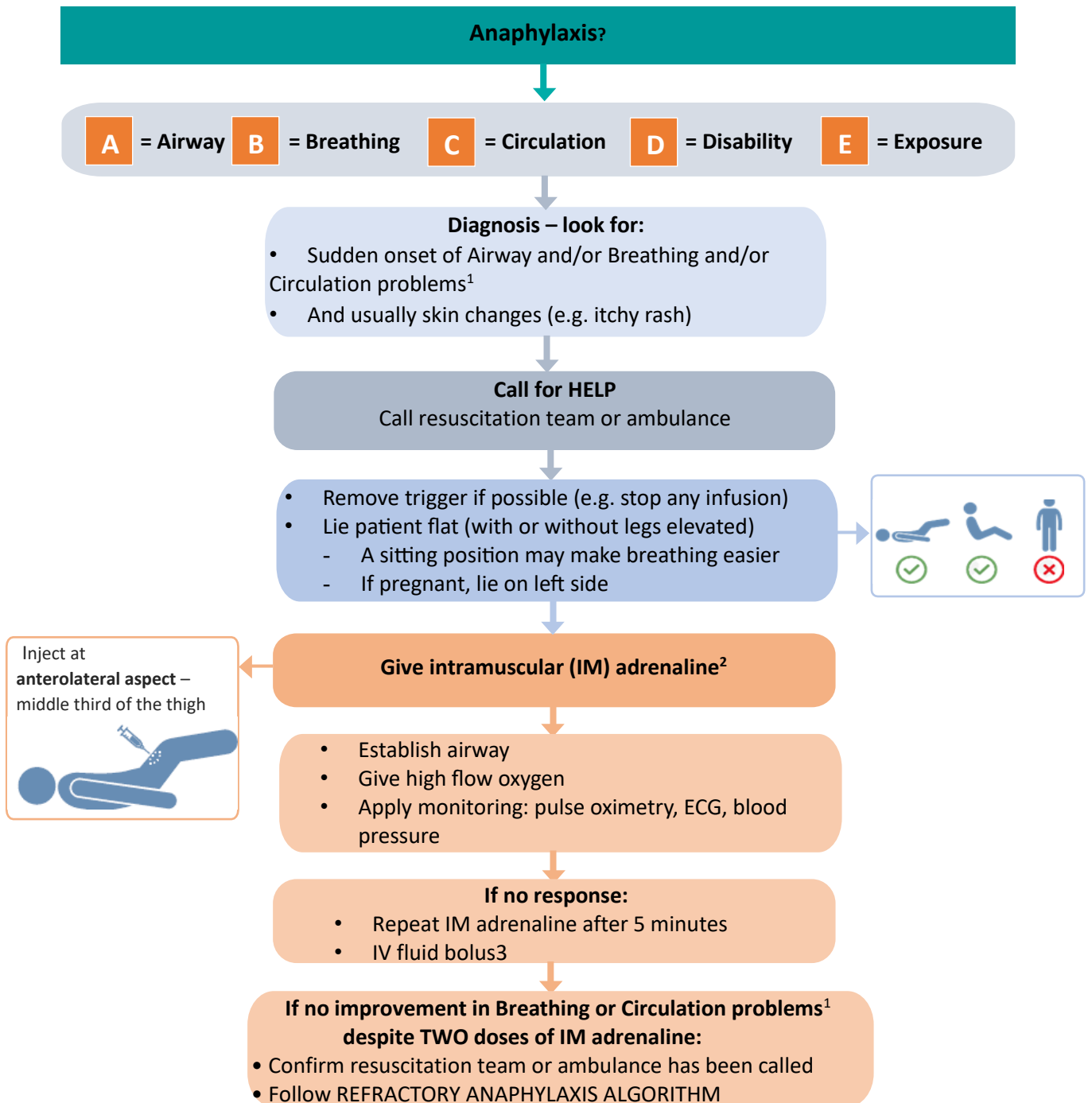
SEPTIC SHOCK AND SEPSIS-ASSOCIATED ORGAN DYSFUNCTION IN CHILDREN



Warm shock – high cardiac output with low systemic vascular resistance.	Cold shock – low cardiac output with high systemic vascular resistance.	Fluid in mL kg ⁻¹ should be dosed for ideal body weight (max bolus 500 mL)
<p>* lactate measurements are useful if available as they have prognostic ability if measured serially.</p> <p>** Other bloods that may be indicated: coagulation studies, liver function tests, magnesium levels or any others indicated by the child's clinical picture.</p>	<p>*** Balanced (buffered) fluids are used in preference to 0.9% sodium chloride, but if not available, 0.9% sodium chloride should be used.</p> <p>**** These are starting dose ranges for these inotropes, and increases may be necessary but should be guided by</p>	<p>PICU retrieval team/senior clinicians. Choice of inotropes is dictated by clinician preference, response to treatment and monitored parameters, and again decisions should be made in conjunction with PICU teams.</p>

Fig 6. Adapted from resuscitation council UK guideline 2021

ANAPHYLAXIS



1. Life-threatening problems

Airway

Hoarse voice, stridor

Breathing

↑work of breathing, wheeze, fatigue, cyanosis, SpO₂ <94%

Circulation

Low blood pressure, signs of shock, confusion, reduced consciousness

2. Intramuscular (IM) adrenaline

Use adrenaline at 1 mg/mL (1:1000) concentration

Adult and child >12 years: 500 micrograms IM (0.5 mL)

Child 6–12 years: 300 micrograms IM (0.3 mL)

Child 6 months to 6 years: 150 micrograms IM (0.15 mL)

Child <6 months: 100–150 micrograms IM (0.1–0.15 mL)

The above doses are for IM injection **only**.

Intravenous adrenaline for anaphylaxis to be given

only by experienced specialists in an appropriate setting.

3. IV fluid challenge

Use crystalloid

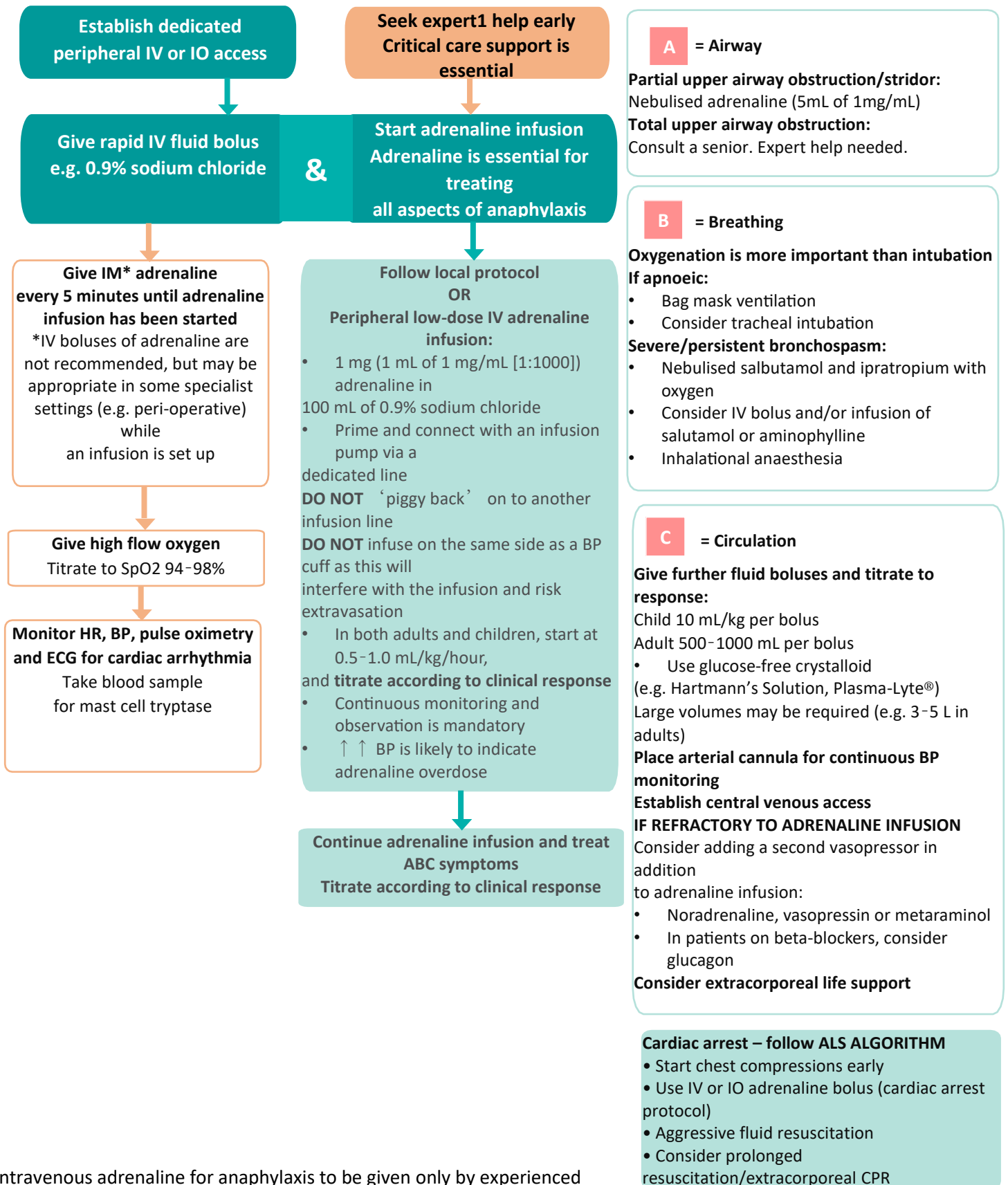
Adults: 500–1000 mL

Children: 10 mL/kg

Fig 7. Adapted from resuscitation council UK guideline 2021

REFRACTORY ANAPHYLAXIS

No improvement in respiratory or cardiovascular symptoms despite 2 appropriate doses of intramuscular adrenaline



¹Intravenous adrenaline for anaphylaxis to be given only by experienced specialists in an appropriate setting.

Fig 8. Adapted from resuscitation council UK guideline 2021

STATUS EPILEPTICUS

MANAGEMENT OF STATUS EPILEPTICUS

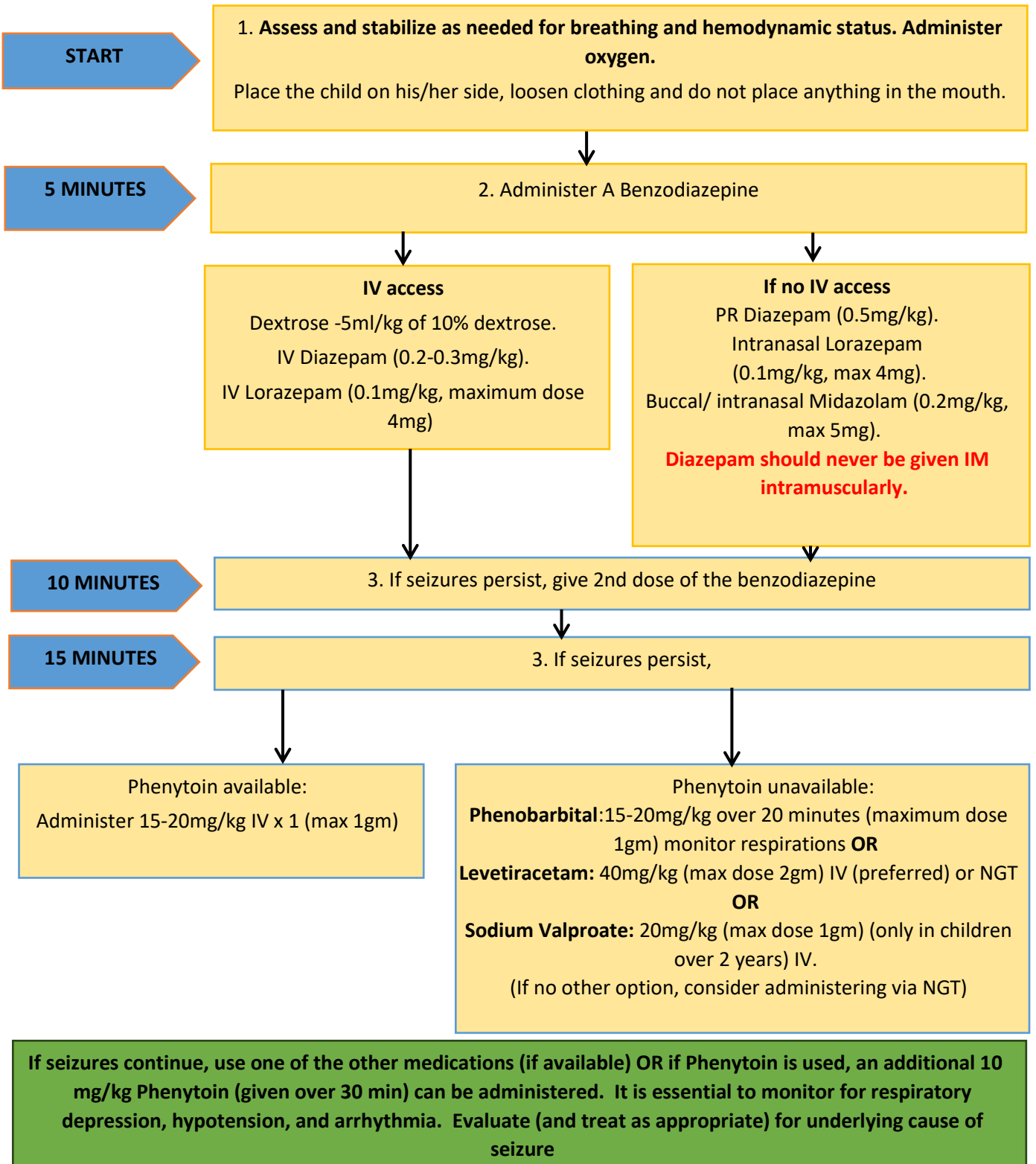


Fig 9. Guidelines for first line anti-seizure drug of choice

RAISED INTRACRANIAL PRESSURE

FLOWCHART FOR THE MANAGEMENT OF RAISED ICP

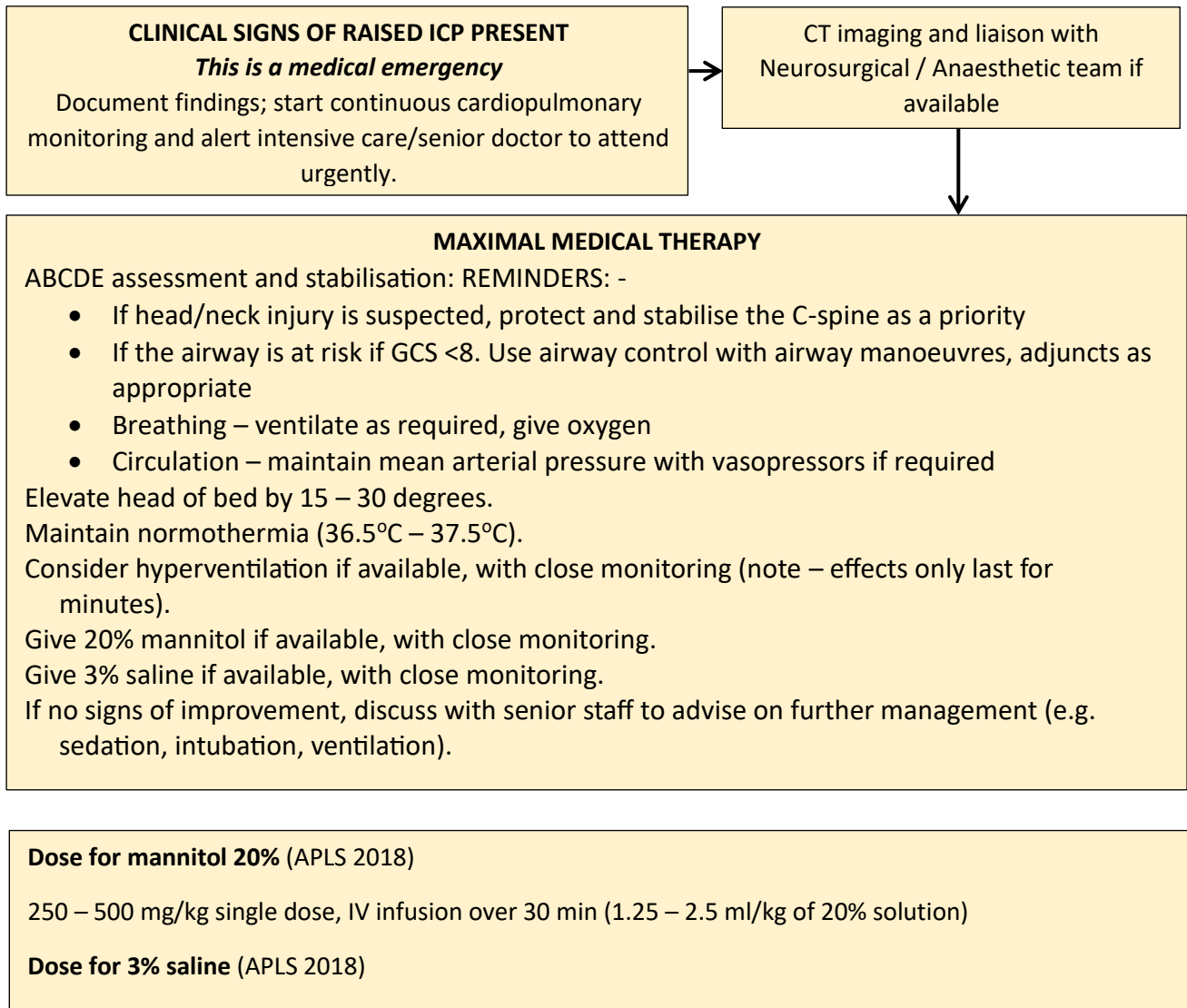


Fig 10. Management of raised ICP

QUICK GUIDE ON HOW TO CALCULATE INSULIN

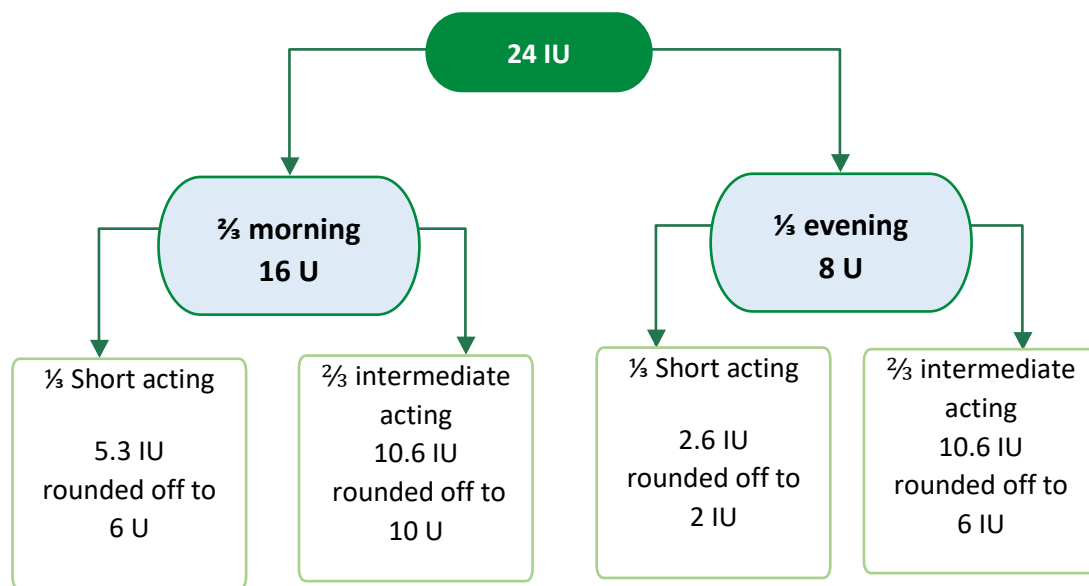
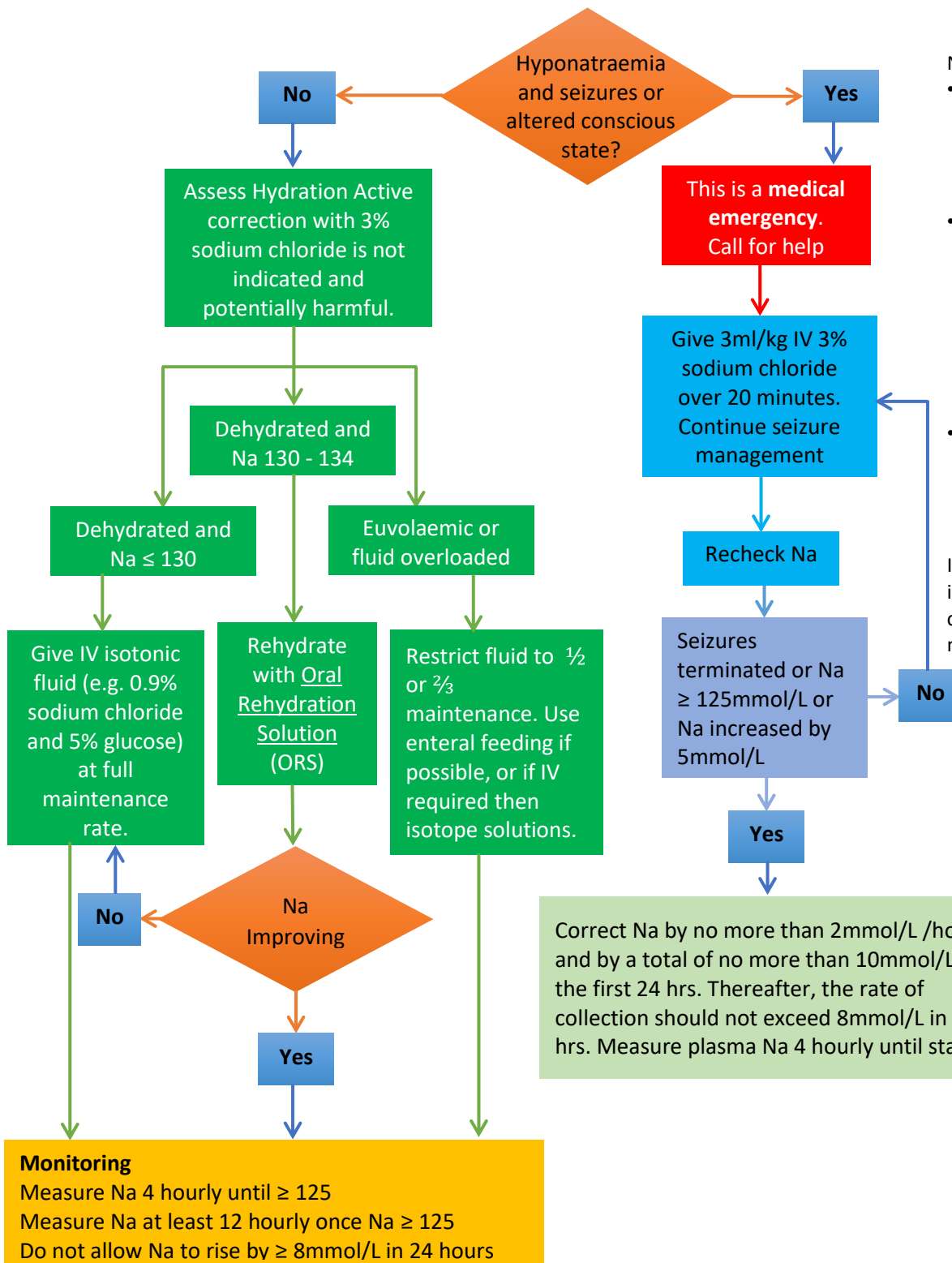


Fig 11. Guide to insulin calculation

EVALUATION OF HYPONATRAEMIA



Notes

- Hyponatraemic seizures may be refractory to anticonvulsant and sodium collection should not be delayed
- 3% sodium chloride should preferably be given via a central line, if given peripherally then administer via a more proximal vein and monitor regularly for extravasation
- Seek specialist advice for children with complex fluid requirements e.g. Parenteral nutrition

If ORS not tolerated, use intravenous fluid 0.9% sodium chloride +5% glucose at maintenance rate

NOTE: Osmotic Demyelination Syndrome

Brain injury due to too rapid correction of chronic hyponatraemia is often associated with delayed neurological deterioration (onset of symptoms 1 to 4 days after serum Na is increased by > 12 mmol/L in less than 24 hours).

Fig 12. Approach to hyponatraemia

HYPERNATRAEMIA

DIAGNOSIS AND MANAGEMENT OF HYPERNATRAEMIA

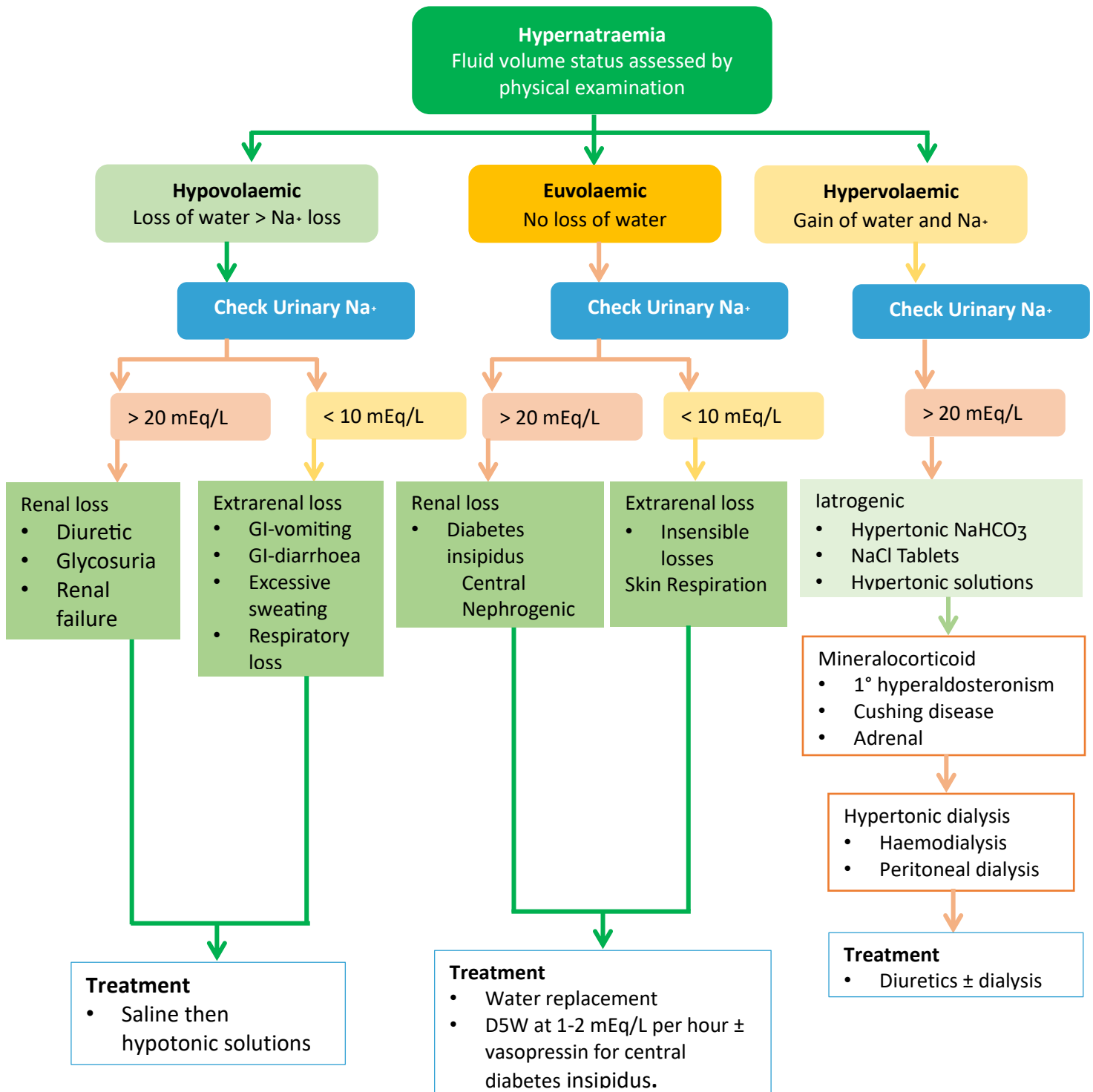


Fig 13. Diagnosis and management of Hypernatraemia.

D5W indicates 5% of dextrose in water; GI, gastrointestinal tract; Na, sodium; NaCl, sodium chloride; NaHCO₃, sodium bicarbonate.

HYPERKALAEMIA

APPROACH TO HYPERKALAEMIA

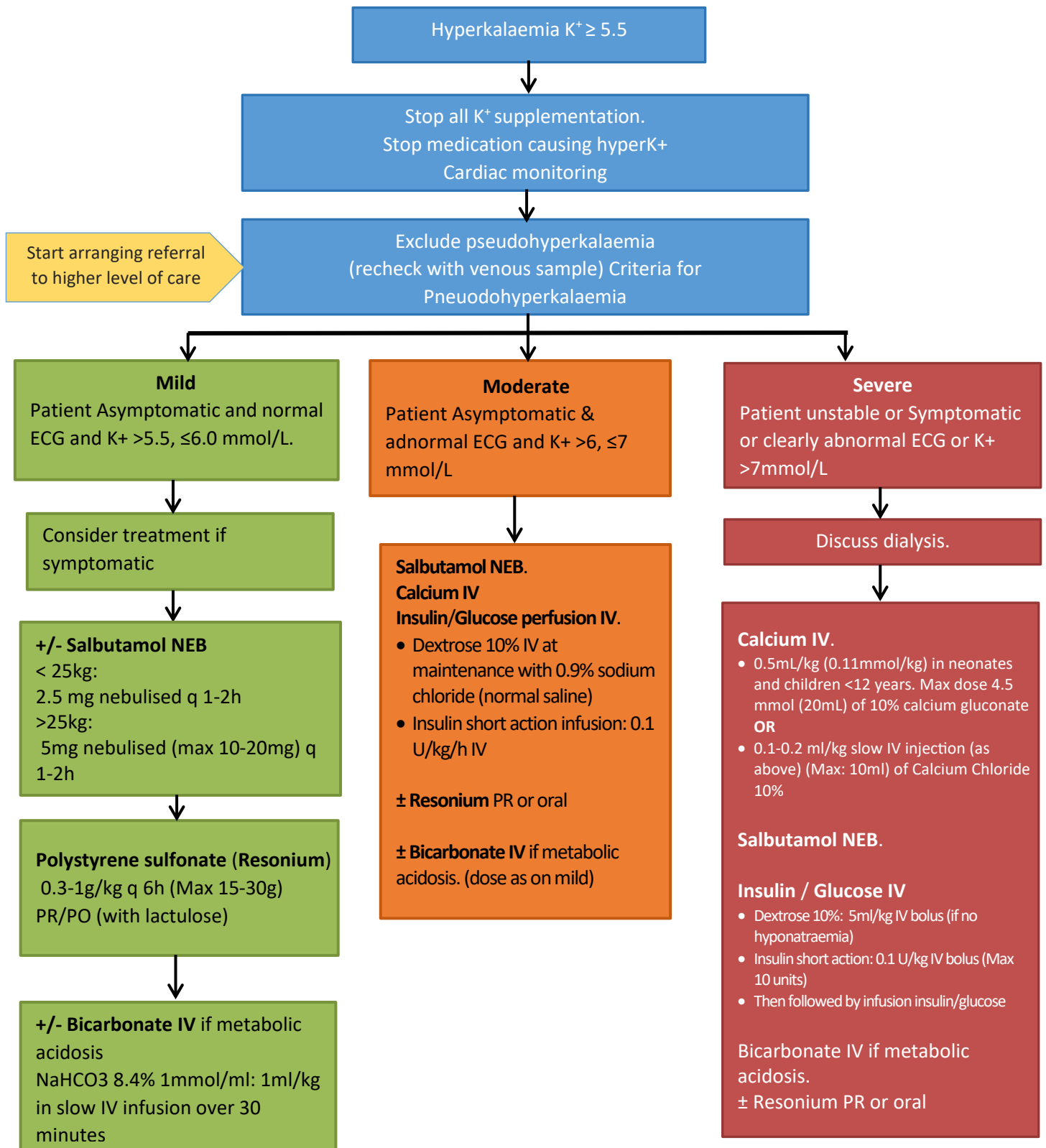


Fig 14. Approach to Hyperkalaemia adapted from the Royal Alexandra Children's Hospital

HYPOKALAEMIA

Management

Goals of treatment

- Prevent life threatening complications
- Replenish K⁺ stores
- Correct the underlying cause

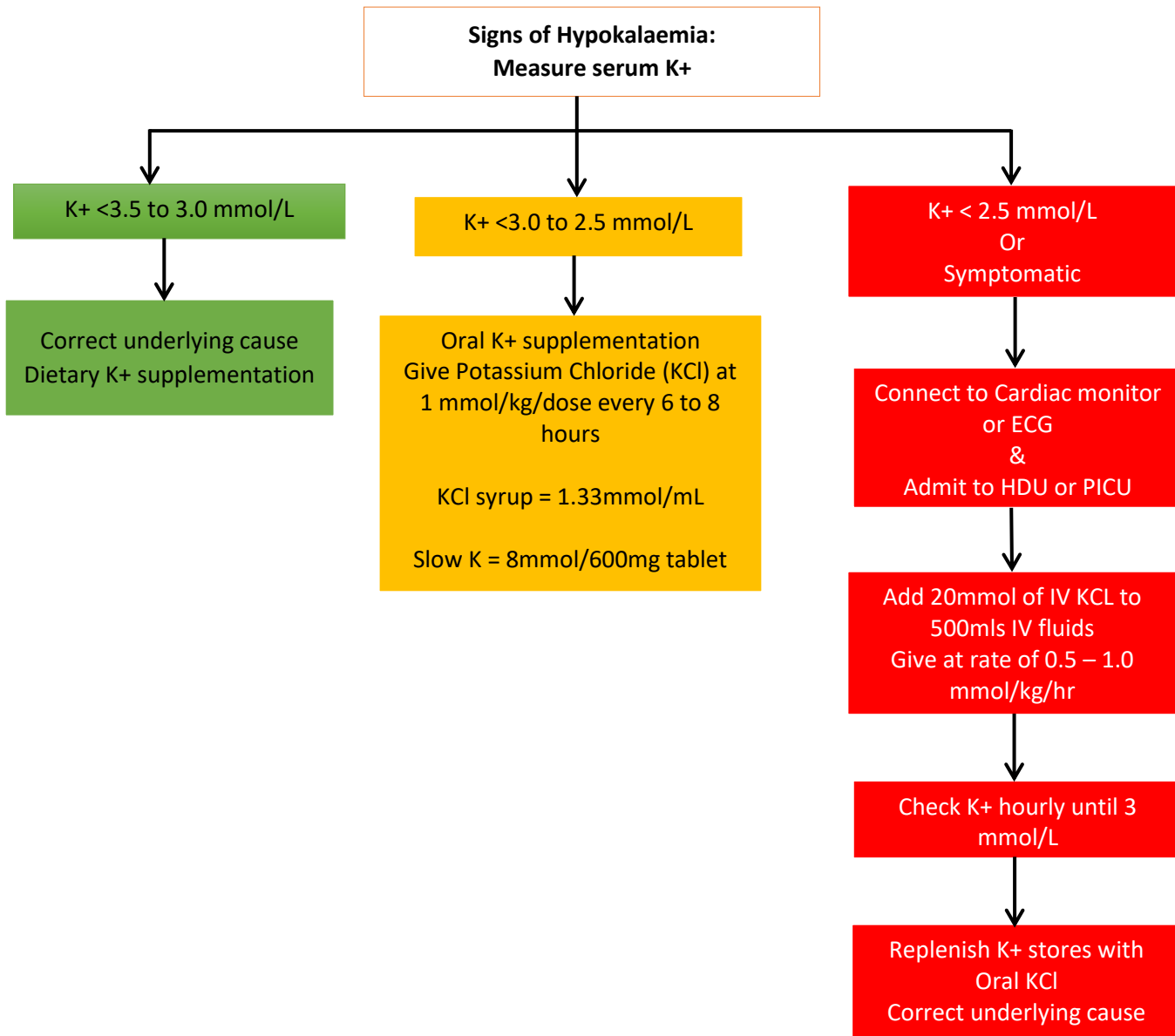


Fig 15. Management of hypokalaemia adapted the Royal Children's Hospital, Melbourne.

HYPOCALCEMIA

DIFFERENTIAL DIAGNOSIS OF HYPOCALCAEMIA

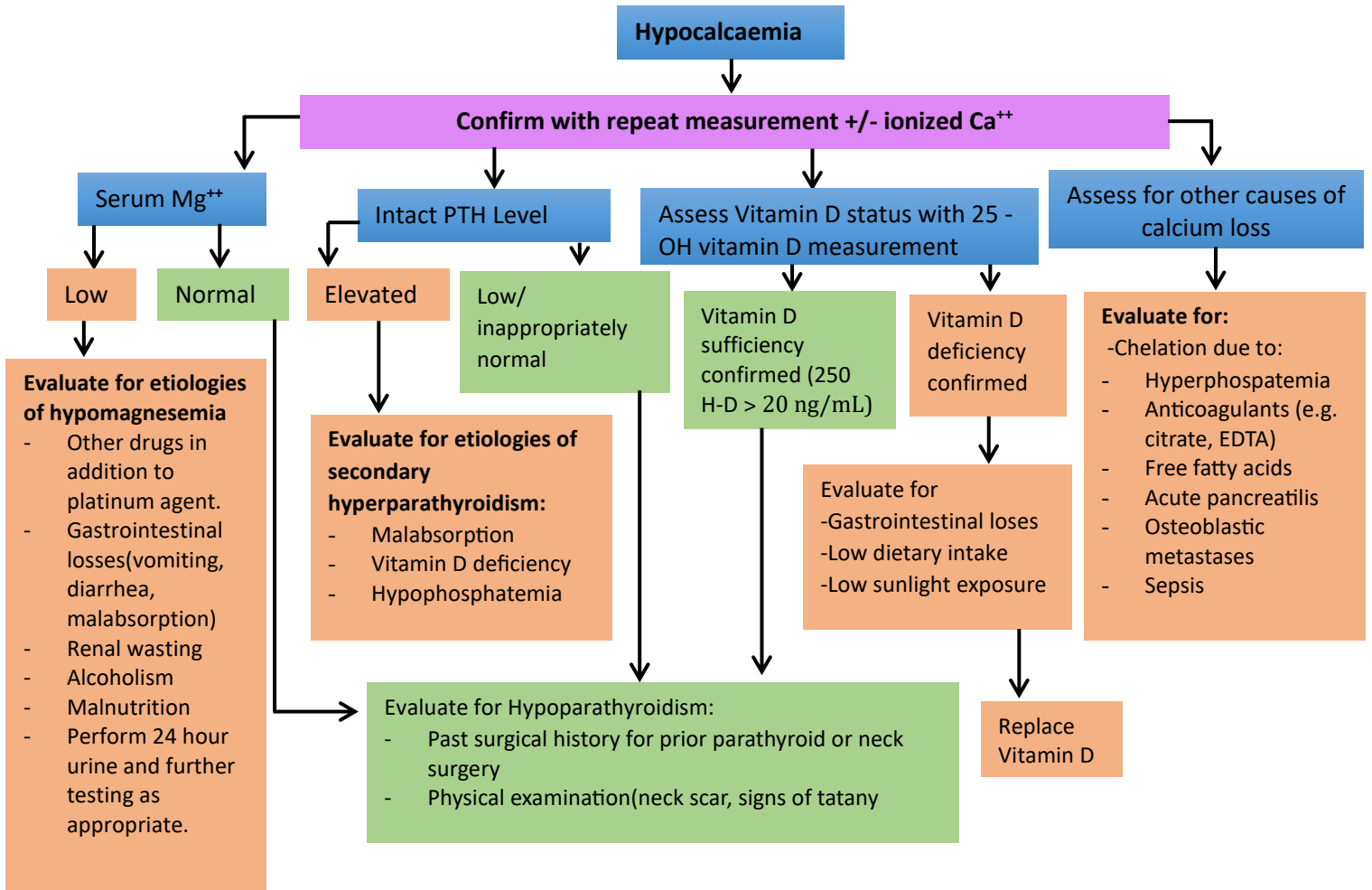
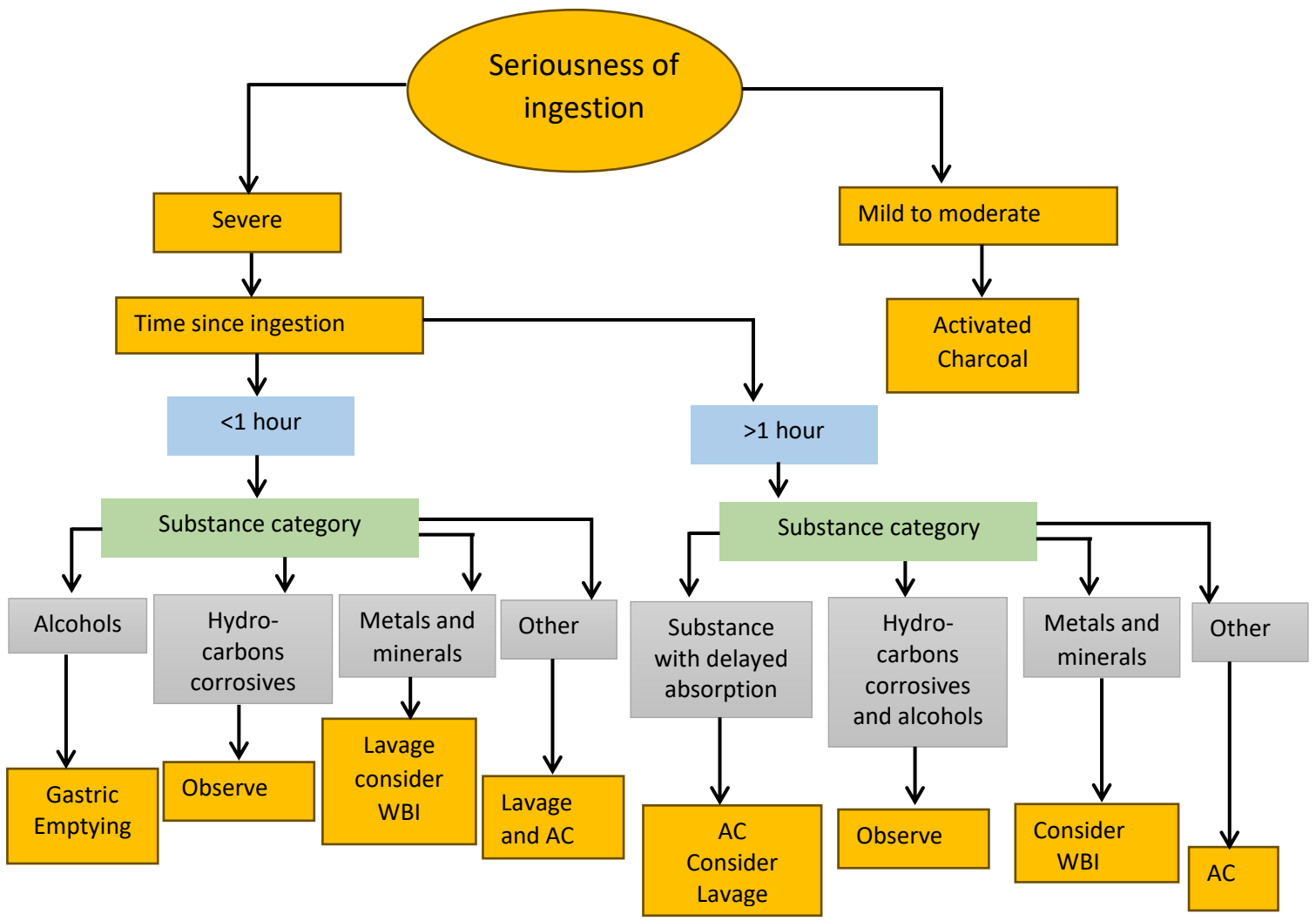


Fig 16. Differential diagnosis of hypocalcaemia.

APPROACH TO PAEDIATRIC POISONING



AC = Activated charcoal
 WBI = Whole bowel irrigation

NB:
 Lavage may not be beneficial after two hours after ingestion.

- Contraindications of activated charcoal:
- Acid and alkalis
 - Corrosives
 - Cyanide
 - Ethanol/methanol/glycols
 - Eucalyptus and essential oils
 - Fluoride
 - Hydrocarbons
 - Metals – including lithium, iron, compounds, potassium, lead
 - Mineral acids -boric acid

Fig 17. Approach to paediatric poisoning

ORGANOPHOSPHATE POISONING

Management:

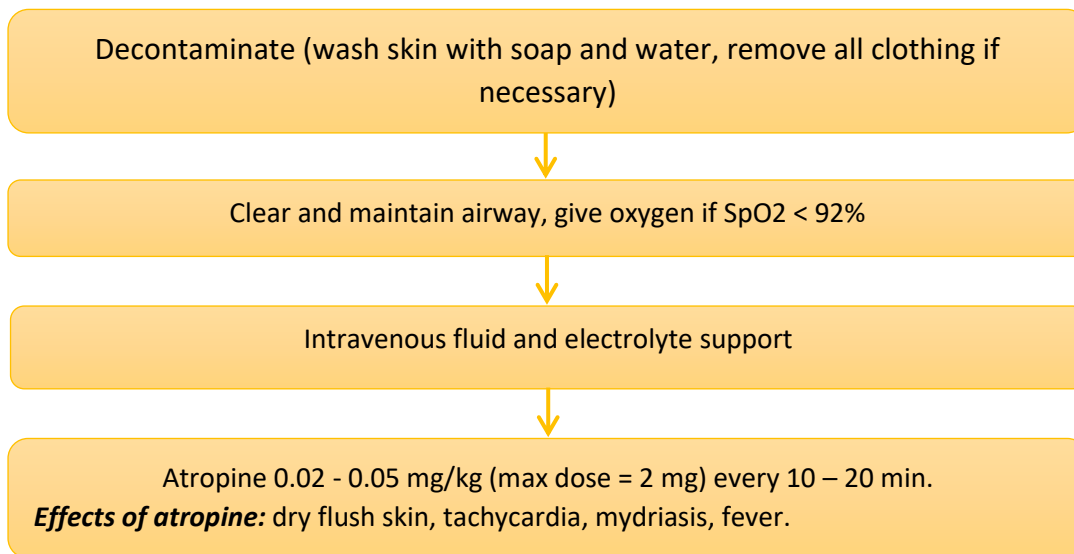


Fig 18. Management of organophosphate poisoning

CYANOTIC SPELL

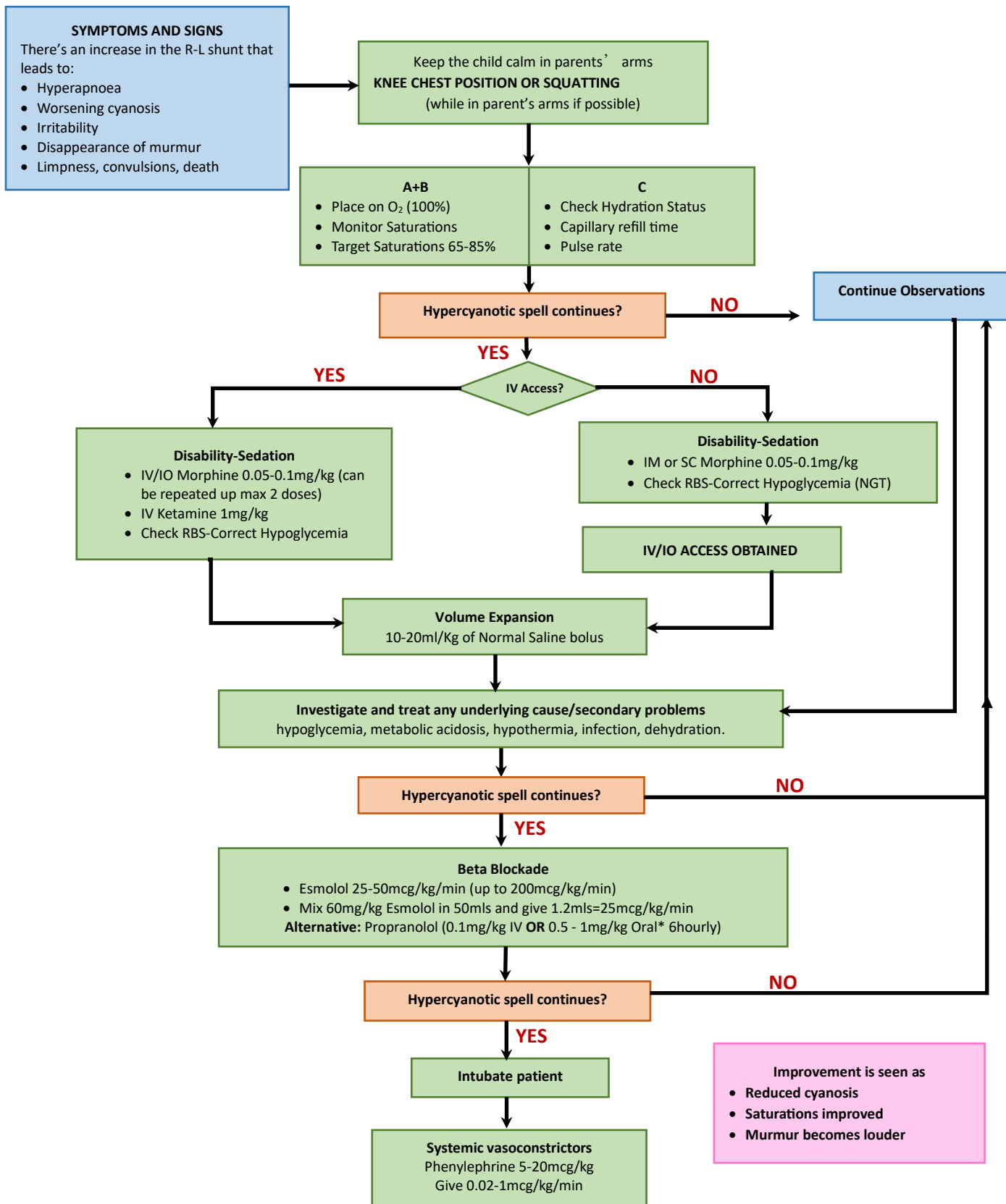
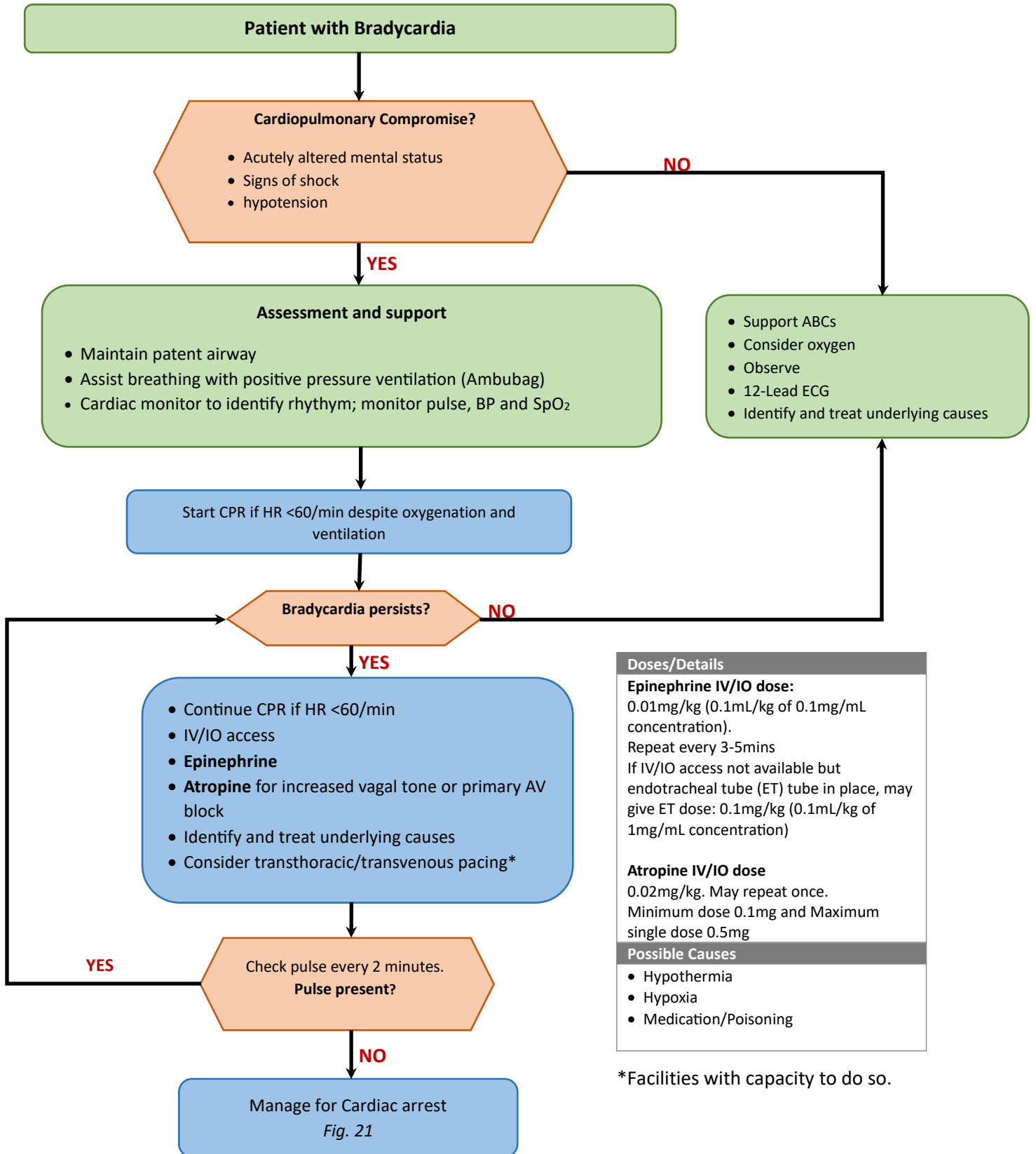


Fig 19. Cyanotic spell

APPROACH TO A CHILD WITH BRADYCARDIA



Doses/Details
Epinephrine IV/IO dose: 0.01mg/kg (0.1mL/kg of 0.1mg/mL concentration). Repeat every 3-5mins If IV/IO access not available but endotracheal tube (ET) tube in place, may give ET dose: 0.1mg/kg (0.1mL/kg of 1mg/mL concentration)
Atropine IV/IO dose 0.02mg/kg. May repeat once. Minimum dose 0.1mg and Maximum single dose 0.5mg
Possible Causes
<ul style="list-style-type: none"> • Hypothermia • Hypoxia • Medication/Poisoning

*Facilities with capacity to do so.

Fig 20. Adapted from American Heart Association

PATIENT WITH TACHYCARDIA AND A PULSE

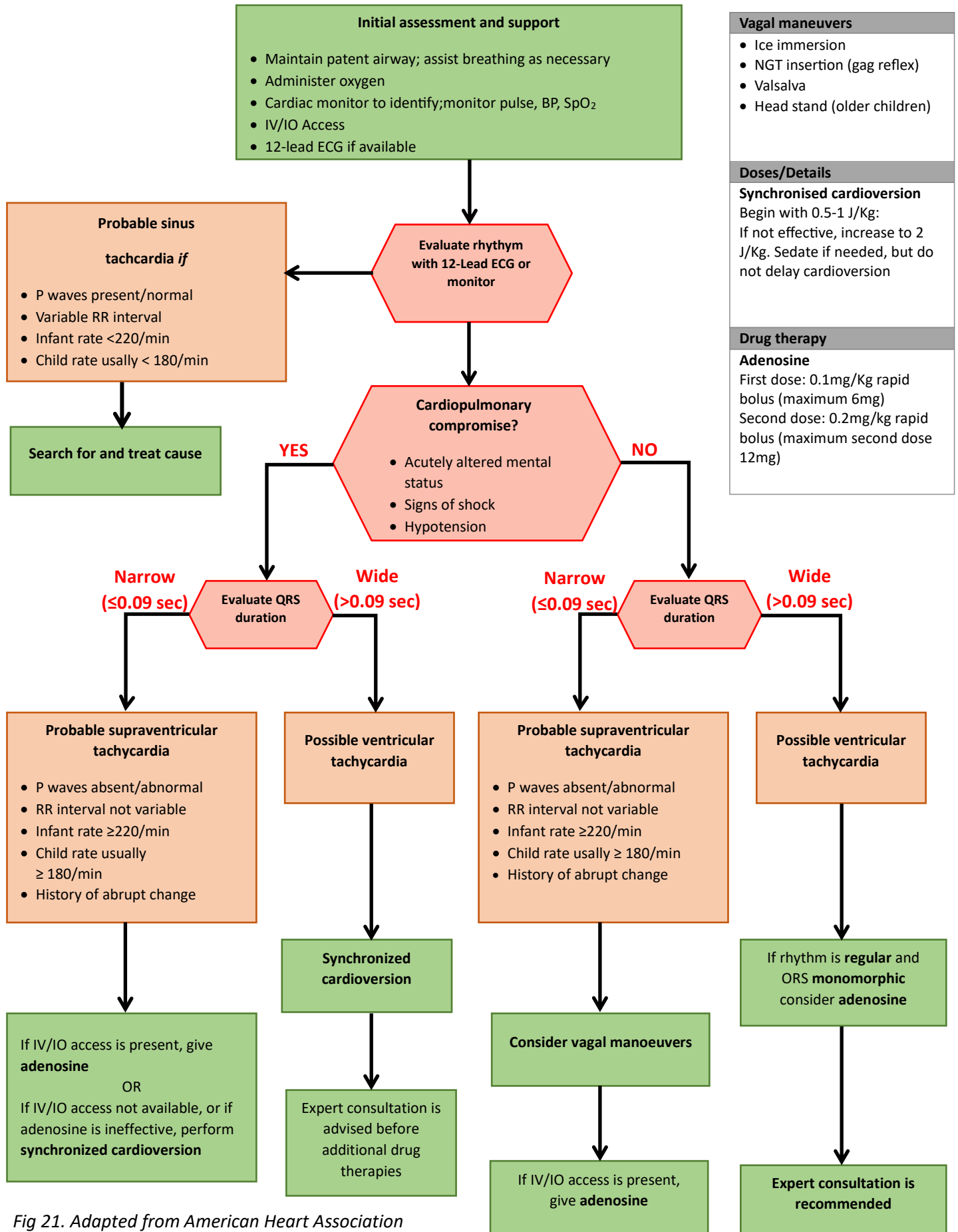
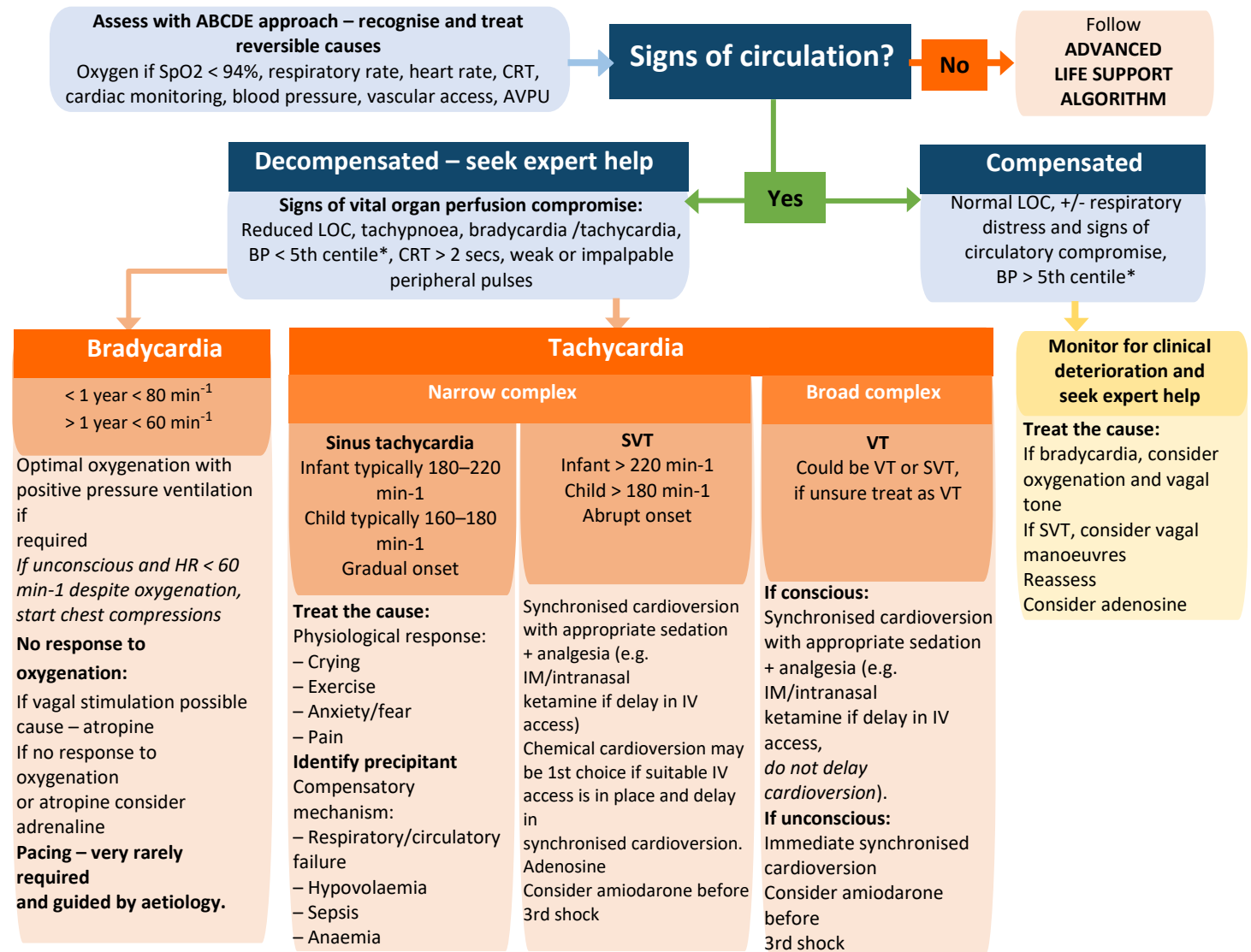


Fig 21. Adapted from American Heart Association

PAEDIATRIC CARDIAC ARRHYTHMIAS



Drug	Atropine	Adrenaline	Adenosine	Amiodarone	Synchronised cardioversion	Magnesium
Treatment	Up to 11 years: 20 mcg kg ⁻¹ . 12–17 years: 300–600 mcg, larger doses may be used in emergency.	For bradycardia: 10 mcg kg ⁻¹ repeat if necessary.	Up to 1 year: 150 mcg kg ⁻¹ , increase 50–100 mcg kg ⁻¹ every 1–2 min. Maximum single dose: Neonates 300 mcg kg ⁻¹ , Infants 500 mcg kg ⁻¹) 1–11 years: 100 mcg kg ⁻¹ increase 50–100 mcg kg ⁻¹ every 1–2 min. Maximum single dose: 500 mcg kg ⁻¹ (max. 12 mg) 12–17 years: 3 mg IV, if required increase to 6 mg after 1–2 min, then 12 mg after 1–2 min	5 mg kg ⁻¹ – by SLOW IV infusion (> 20 min) before 3rd cardioversion in discussion with paediatric cardiologist/expert	With appropriate sedation + analgesia (e.g. IM/intranasal Ketamine if delay in IV access + airway management) – IV access attempts must not delay cardioversion 1st shock: 1 J kg ⁻¹ 2nd shock: 2 J kg ⁻¹ , consider up to 4 J kg ⁻¹	25–50 mg kg ⁻¹ Maximum per dose 2 g to be given over 10–15 min, may be repeated once if necessary, in Torsades de pointes VT

Age	*Systolic BP 5th centile mmHg
1 month	50
1 year	70
5 years	75
10 years	80

Fig 22. Adapted from resuscitation council UK guideline 2021

VIRAL CROUP (LARYNGOTRACHEOBRONCHITIS)

Sign	Mild croup	Moderate croup	Severe croup
Stridor	Only when agitated	At rest	Severe, biphasic
Recession	Mild subcostal	Moderate tracheal tug	Use of accessory muscles
Level of consciousness	Restless when disturbed	Anxious, agitated	Lethargic, drowsy

Management

Keep the child on the mother's lap and handle gently.

Do not attempt to *forcefully* examine the oropharynx.

See flow chart below:

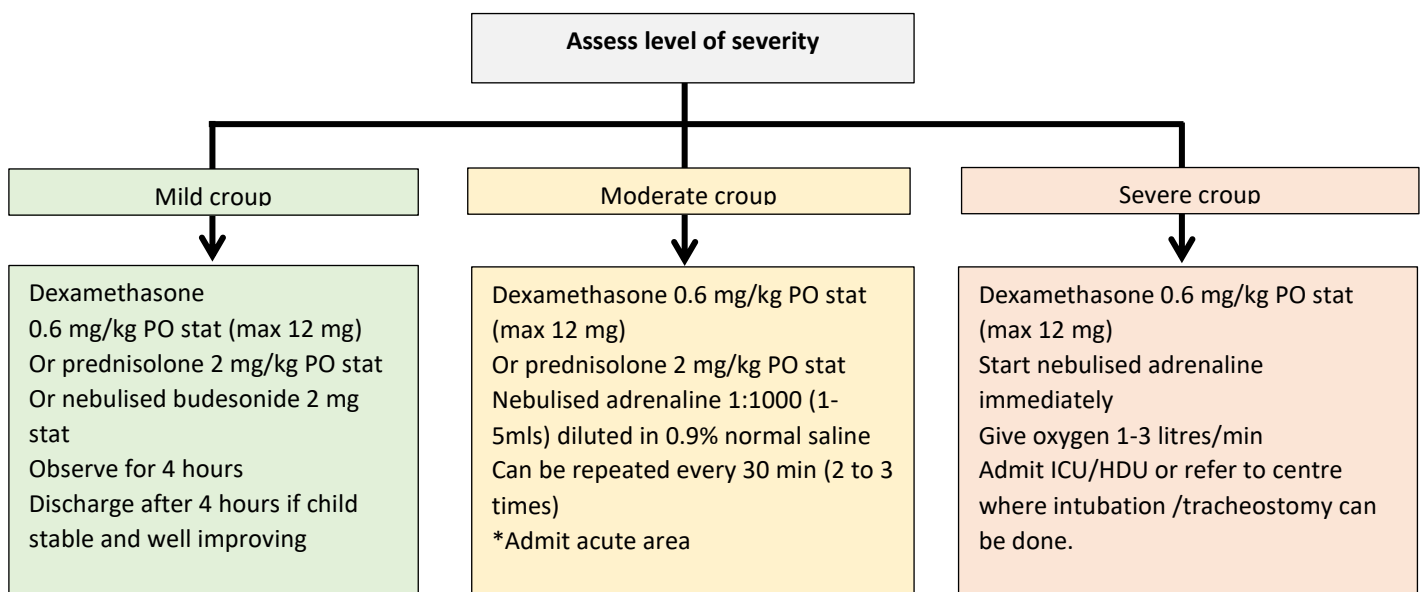


Fig 23. Injectable dexamethasone taken orally can be used if no oral dexamethasone is available.

* As airway obstruction can occur suddenly, ensure that facilities for an emergency intubation and/or tracheostomy are immediately available if required.

Caution

- Avoid using oxygen unless there is impending airway obstruction. Nasal prongs or a nasal or nasopharyngeal catheter can upset the child and precipitate obstruction of the airway.
- Do not use antibiotics or bronchodilators unless diagnosis is in doubt
- Do not give adrenaline nebulisations if baseline heart rate >200/min

THE WHEEZING CHILD

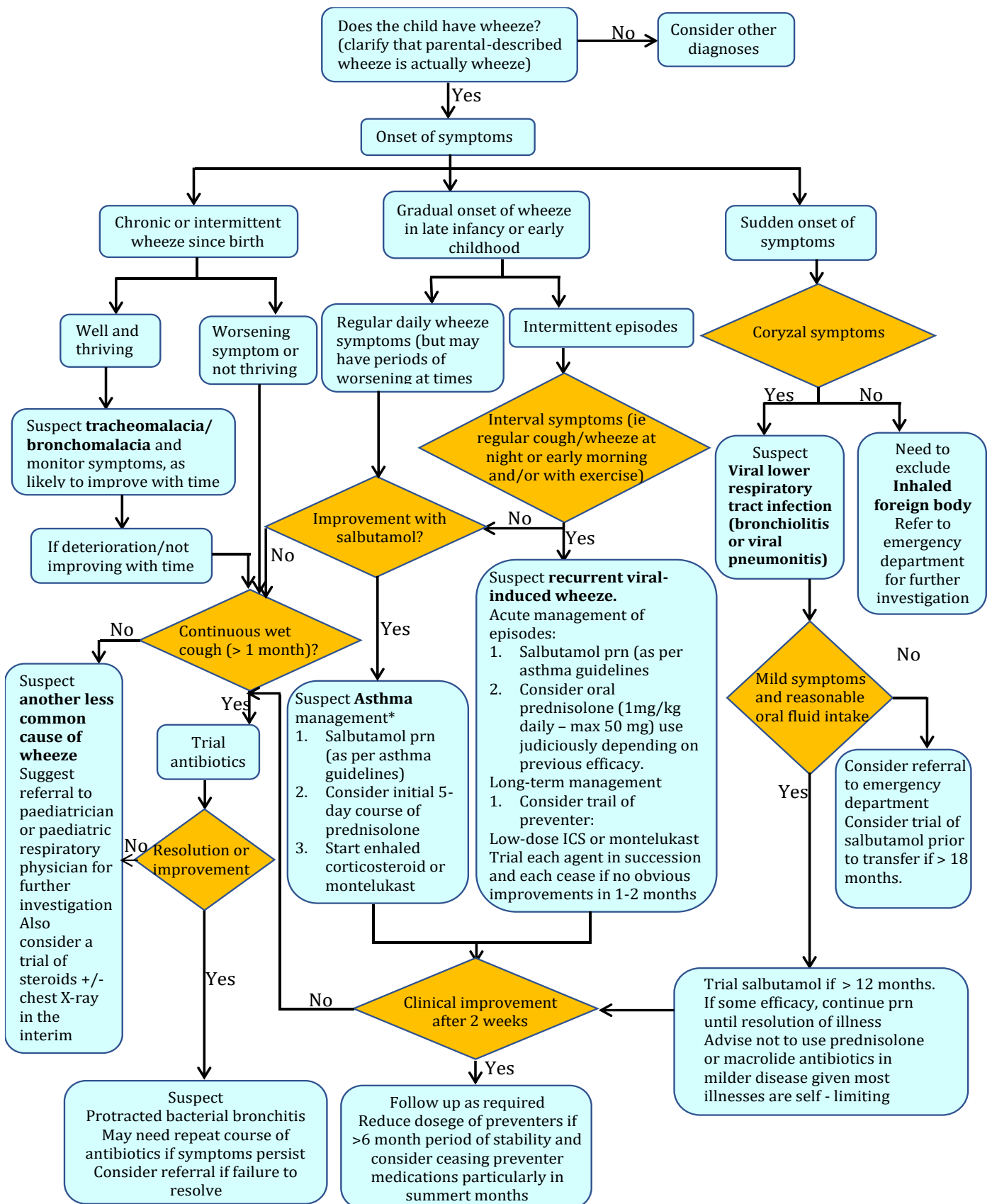


Fig 24. Most common primary presentations with wheeze

FIRST UNPROVOKED SEIZURE ALGORITHM

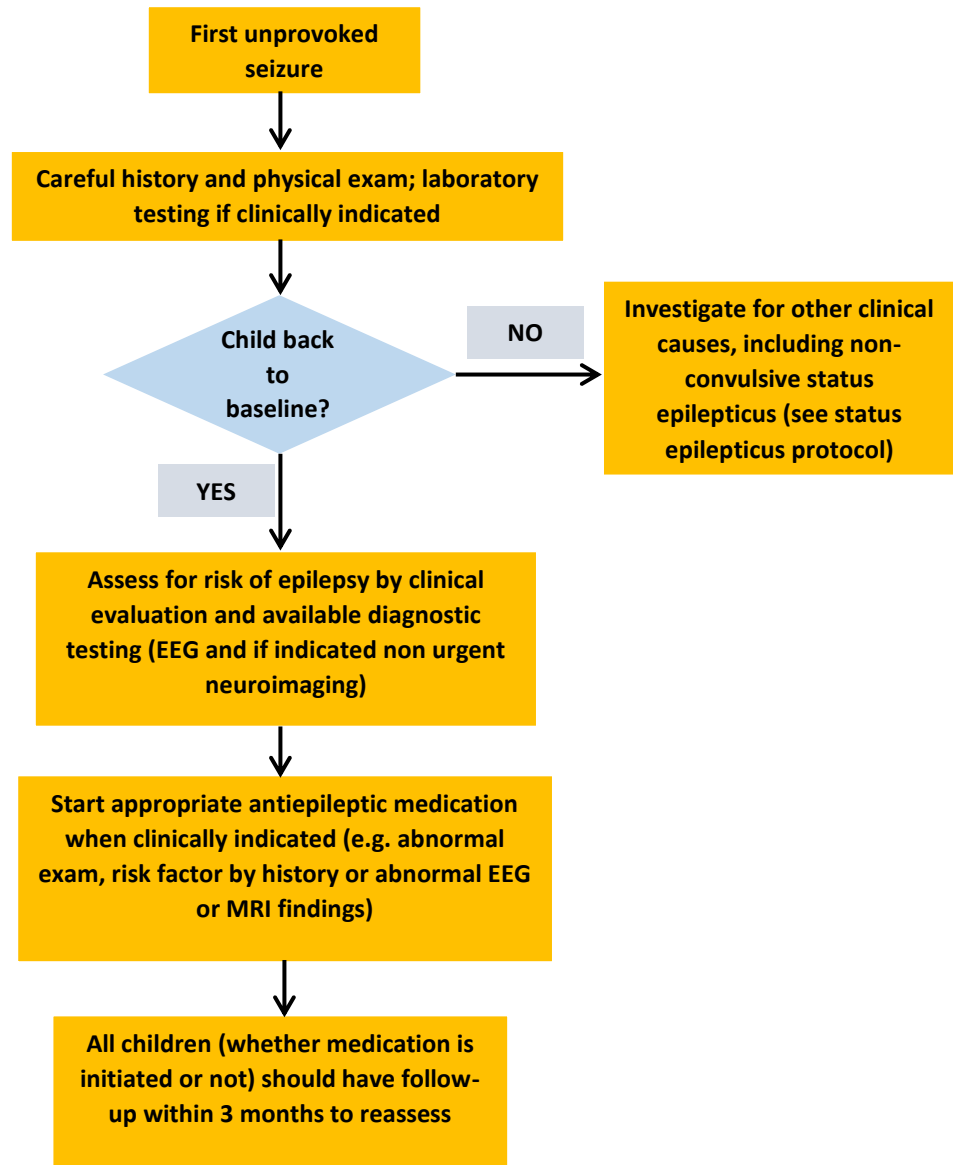
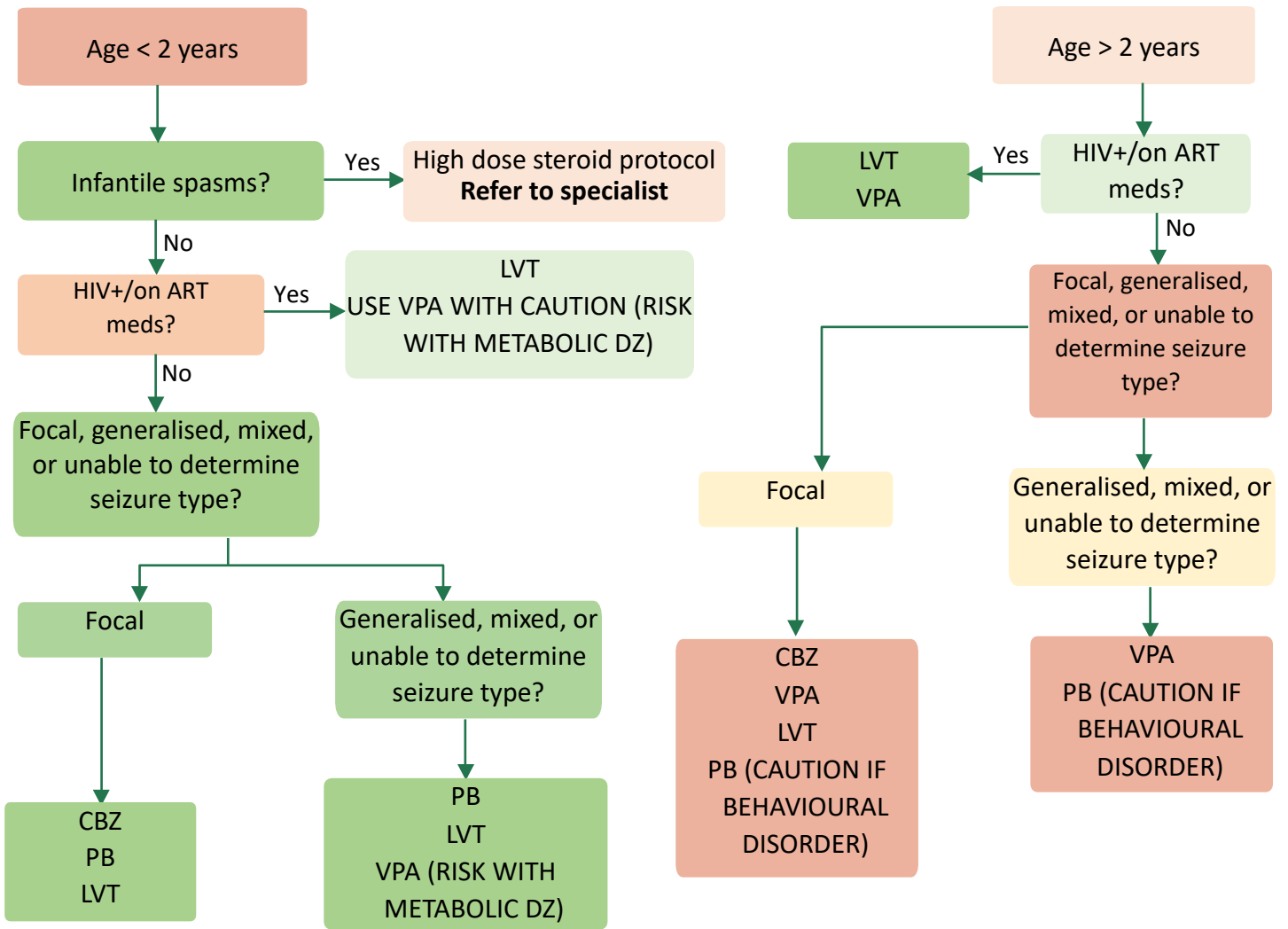


Fig 25. Treatment of unprovoked seizures

MANAGEMENT OF EPILEPSY – GUIDELINES FOR FIRST-LINE ANTISEIZURE MEDICATION



CBZ-CARBAMAZEPINE, PB-PHENOBARBITAL, VPA- VALPROIC ACID, PHT- PHENYTOIN, LVT-LEVETIRACETAM

Fig 26. Guidelines for first-line antiseizure medication

HEADACHE

Though children are often implicated as a cause of headache, it is less recognized that there are also real sufferers of headache. Headache is broadly classified into primary (headache without an underlying cause) and secondary (headache due to identifiable cause).

Clinical Features (Primary Headache)

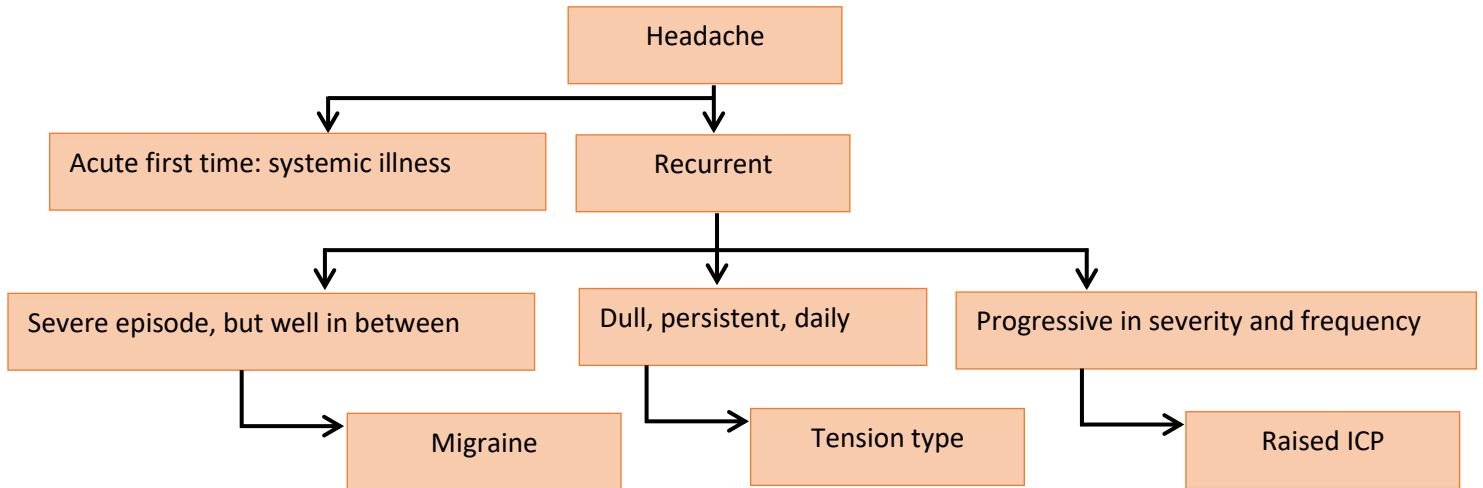


Fig 27. Clinical features of headache.

URINARY TRACT INFECTION

Treatment

Start empiric treatment with Quinolones but dependent on local susceptibility patterns then change according to culture results.

- Oral antibiotics 10 to 14 days or
- IV antibiotics for 3 days, then 10 days oral antibiotics.

ALGORITHM ON EVALUATION AND MANAGEMENT OF UTIS

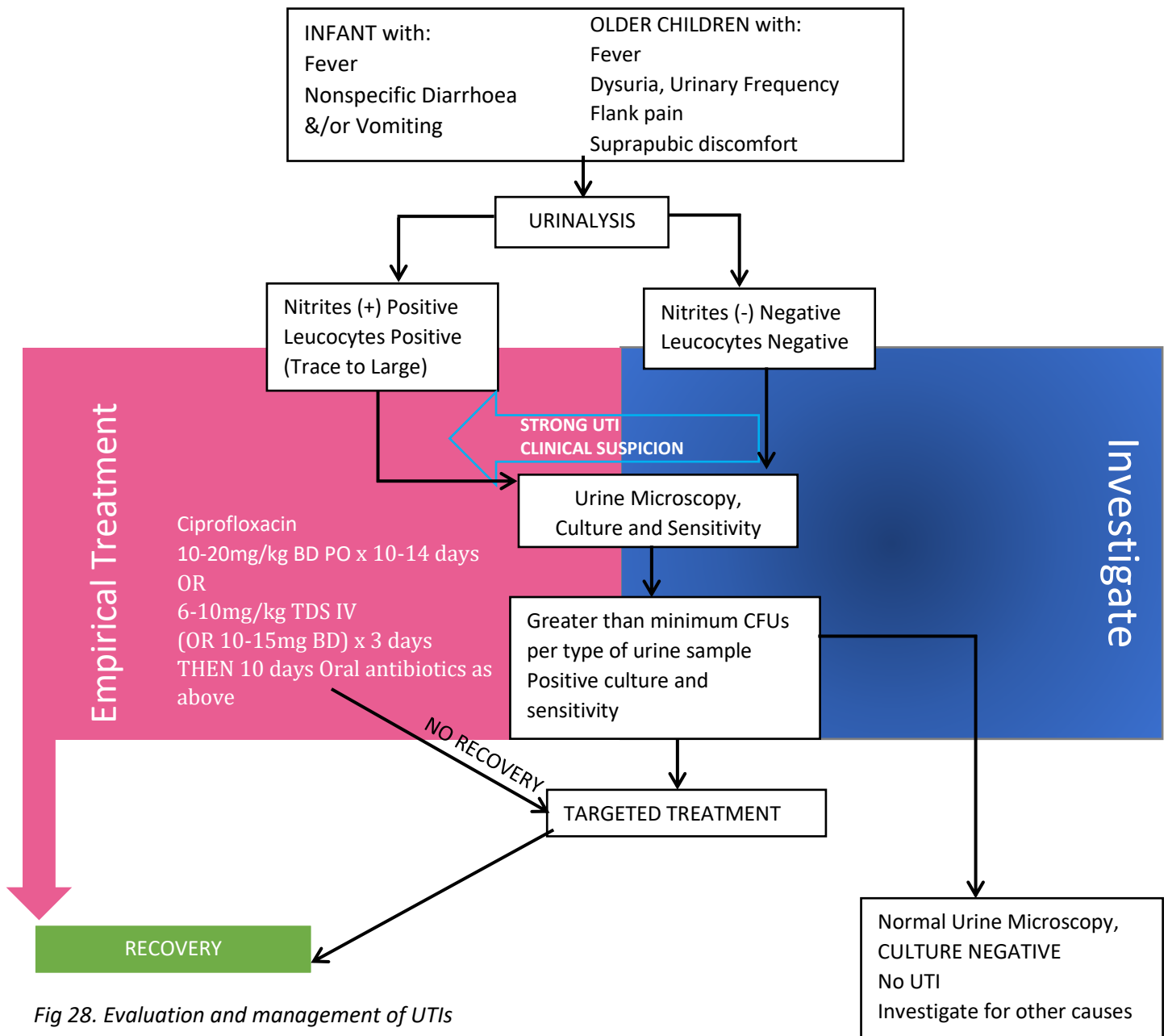


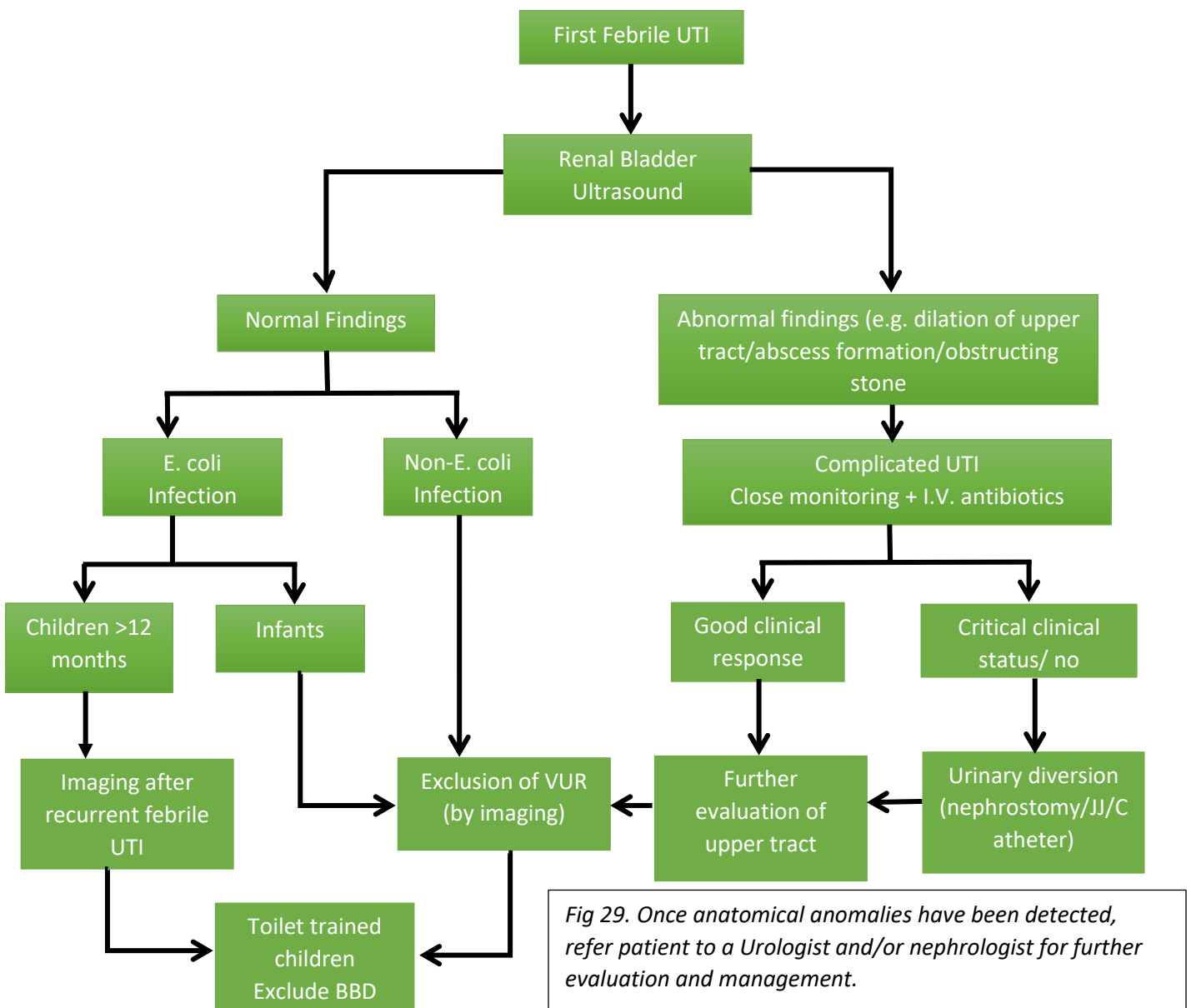
Fig 28. Evaluation and management of UTIs

Alternative drugs for empirical management of UTIs

Complicated	Uncomplicated
<ol style="list-style-type: none"> 1. Ciprofloxacin 10-15mg/kg BD IV 2. Ceftriaxone 50-80mg/kg OD IV 3. Cefotaxime 50mg/kg 6-8 hourly IV <p>*IV drugs to be given for 3 days followed by oral formulations for 10 days.</p>	<ol style="list-style-type: none"> 1. Ciprofloxacin 10-20mg/kg BD PO 2. Cefixime 8mg/kg OD 3. Nitrofurantoin 5-7 mg/kg/day PO divided q6hr 4. Cefpodoxime 5mg/kg PO 12hourly 5. Nalidixic acid 5-7mg/kg divided 6hourly PO <p>**Antibiotic therapy to be given for 10-14 days</p>

Once UTI Diagnosis has been Confirmed, evaluation for risk factors and complications is warranted and the following Algorithm should be followed:

APPROACH TO A FIRST FEBRILE UTI



HAEMATURIA

THE EVALUATION OF HAEMATURIA

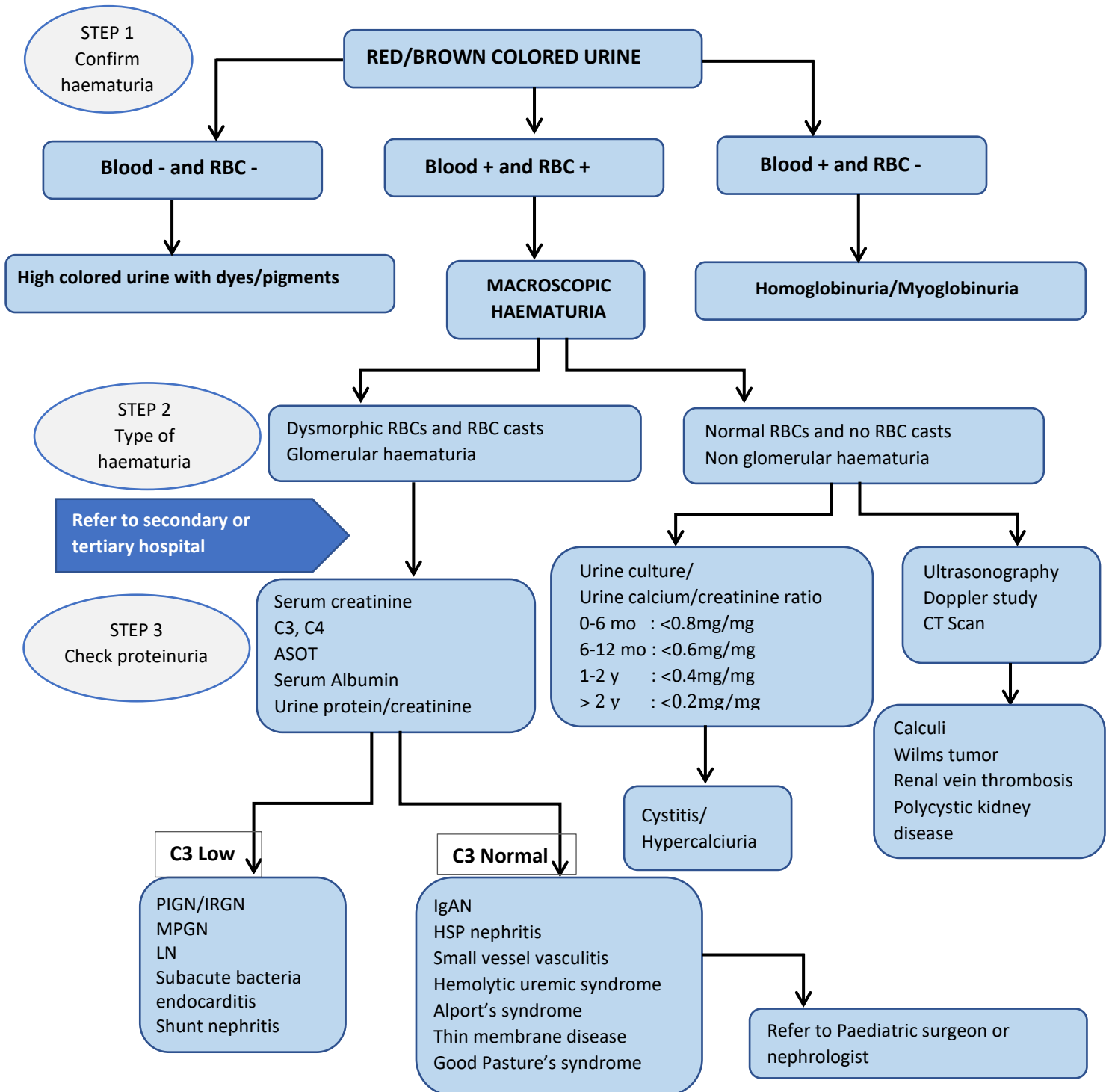


Fig 30. Approach to Diagnosis and Management of Haematuria, adopted from Ramya Vedula & Arpana A. Iyengar, *The Indian Journal of Pediatrics* (August 2020) 87(8):618–624.

NEPHROTIC SYNDROME

NEPHROTIC SYNDROME WORKUP

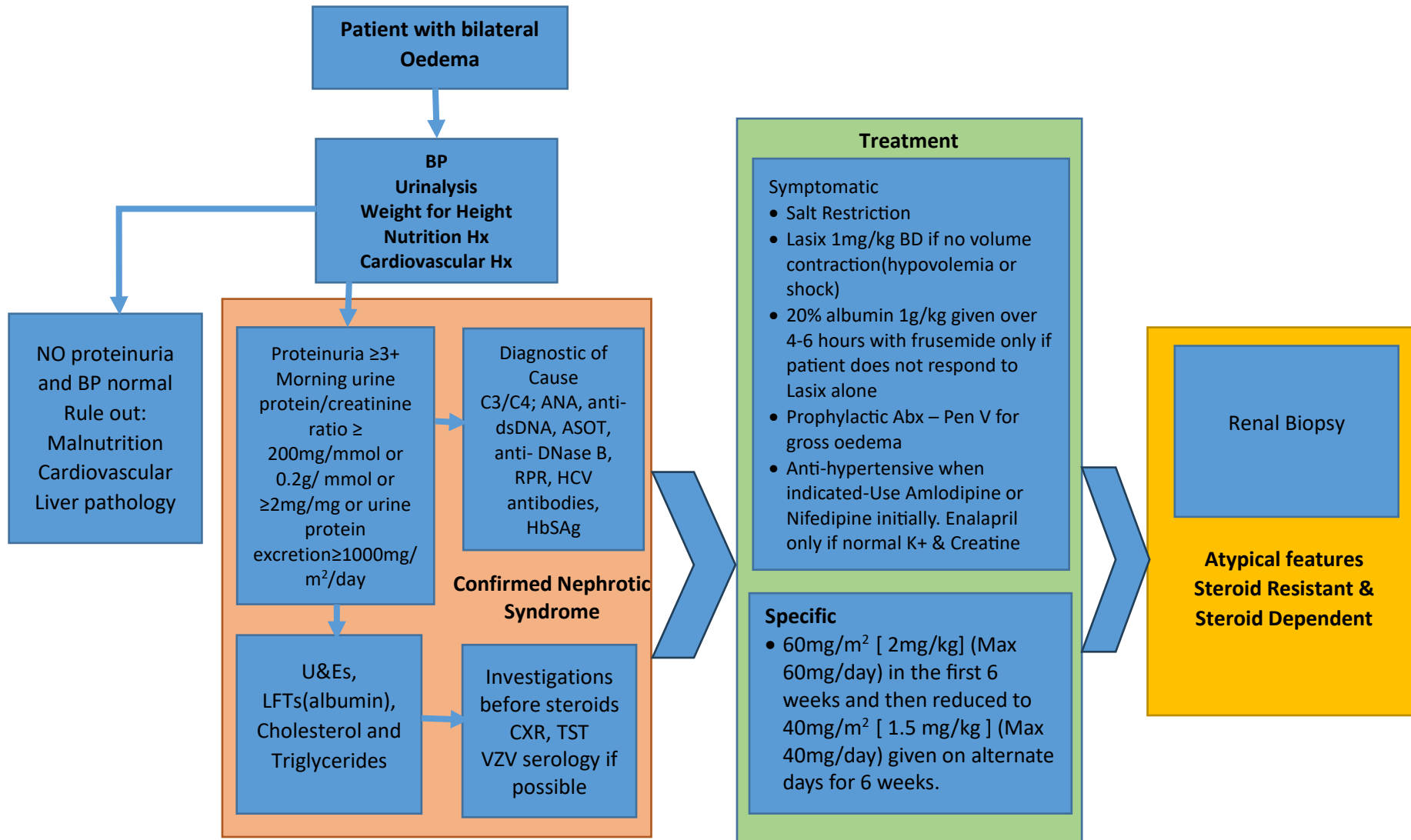


Fig 31. Nephrotic syndrome workup

ACUTE KIDNEY INJURY

ACUTE KIDNEY INJURY (AKI) ALGORITHM

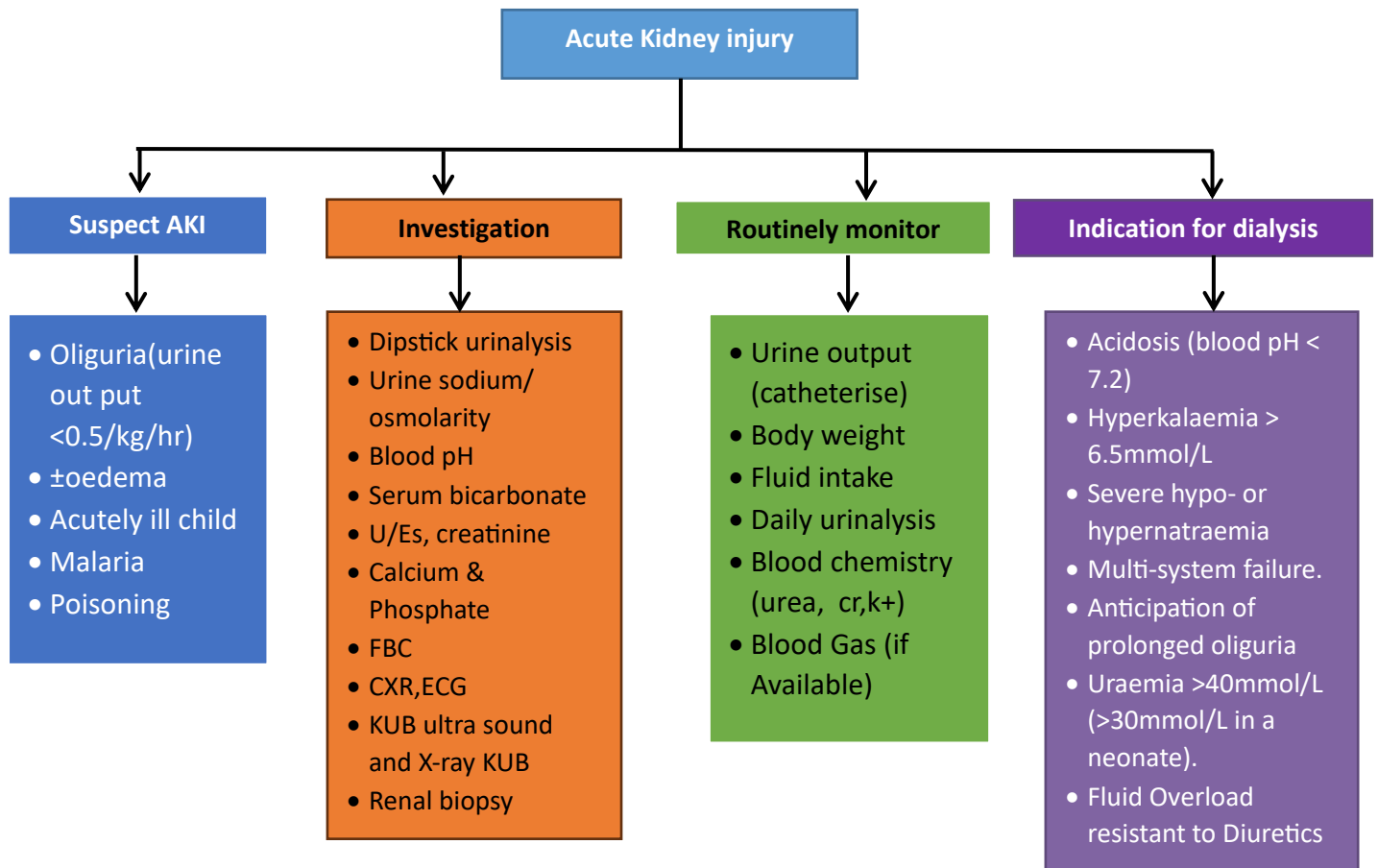


Fig 32. Management of paediatric AKI patients as per KDIGO AKI guidelines.

ACUTE KIDNEY INJURY (AKI) RECOMMENDATIONS

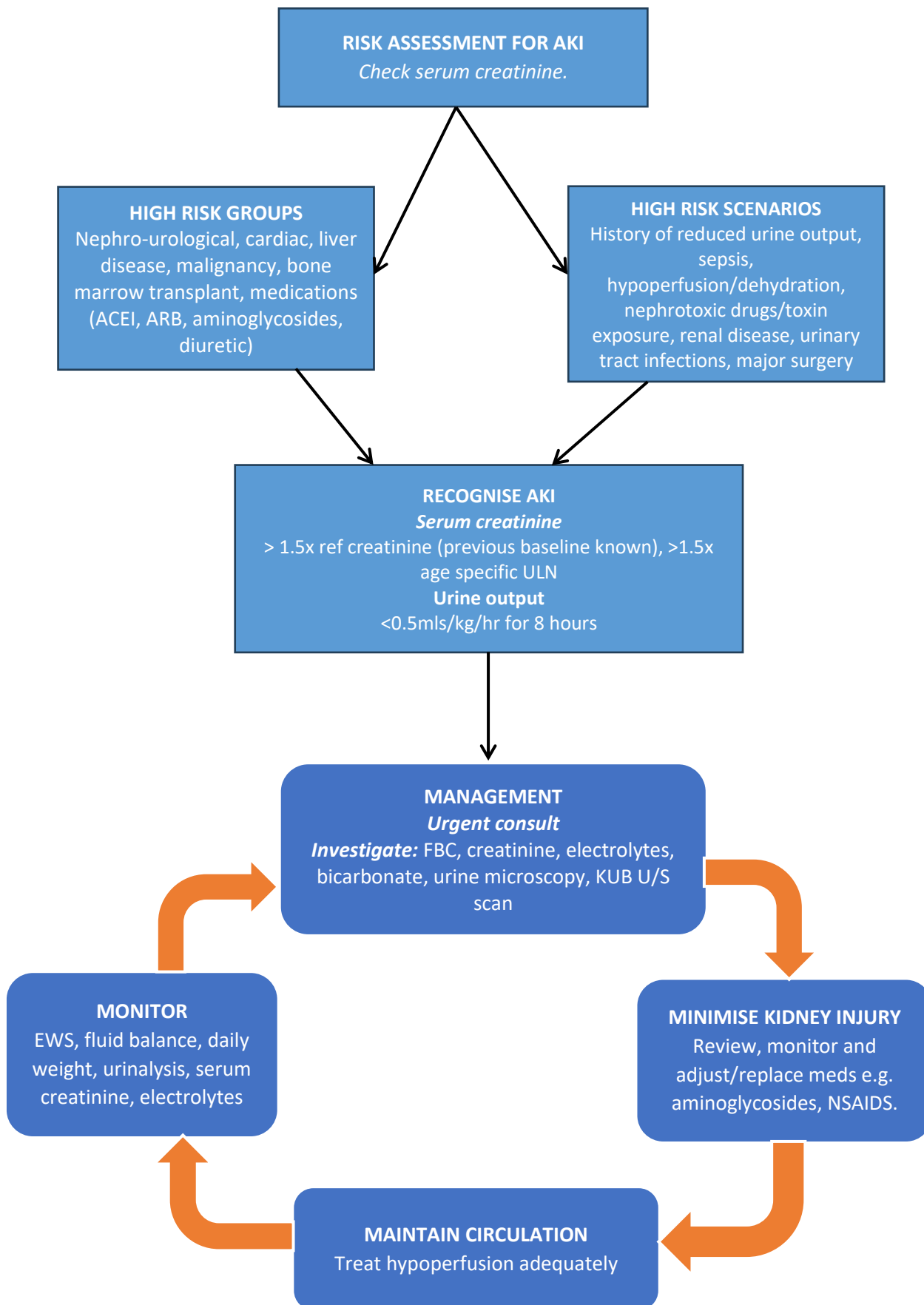


Fig 33. Acute Kidney Injury (AKI) Recommendations as per KDIGO guidelines

SHOCK IN MALNUTRITION ALGORITHM

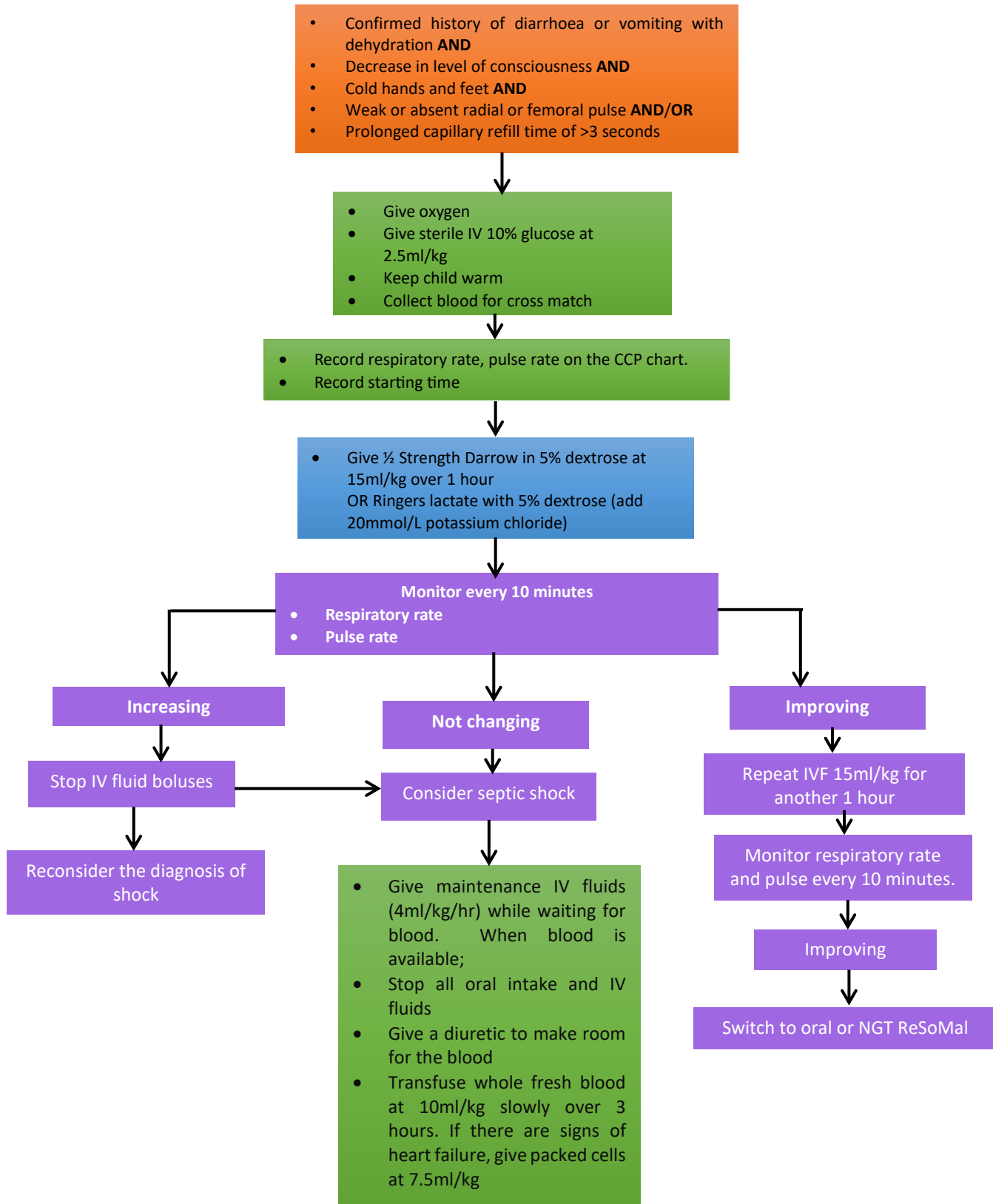


Fig 34. Shock in malnutrition

APPROACH TO NECROTISING ENTEROCOLITIS

APPROACH TO NECROTISING ENTEROCOLITIS (NEC)

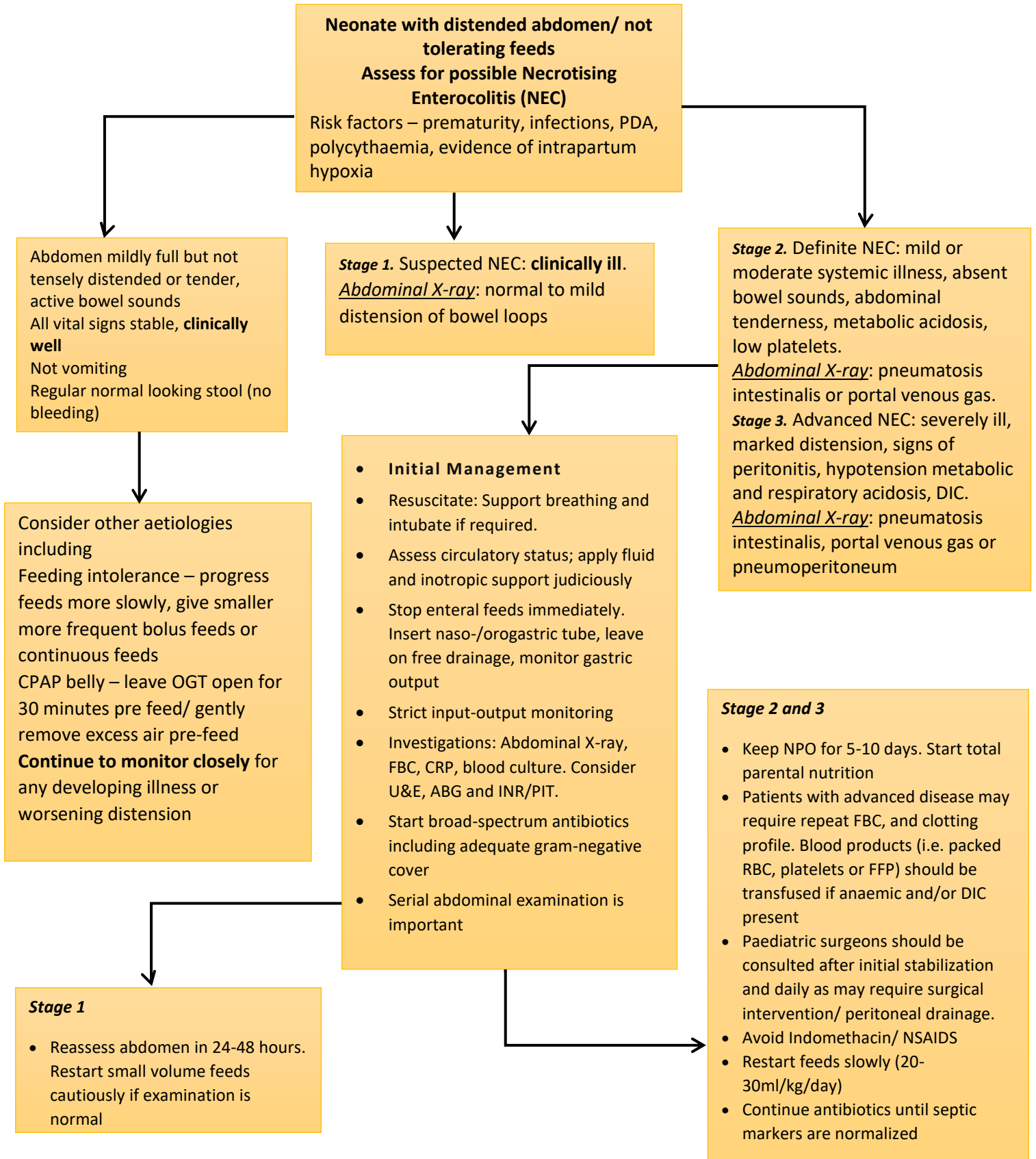


Fig 35. Approach to necrotising enterocolitis

SEPSIS IN NEONATES

Neonates are particularly susceptible to bacterial sepsis. The highest incidence being in the very low birth weight infants.

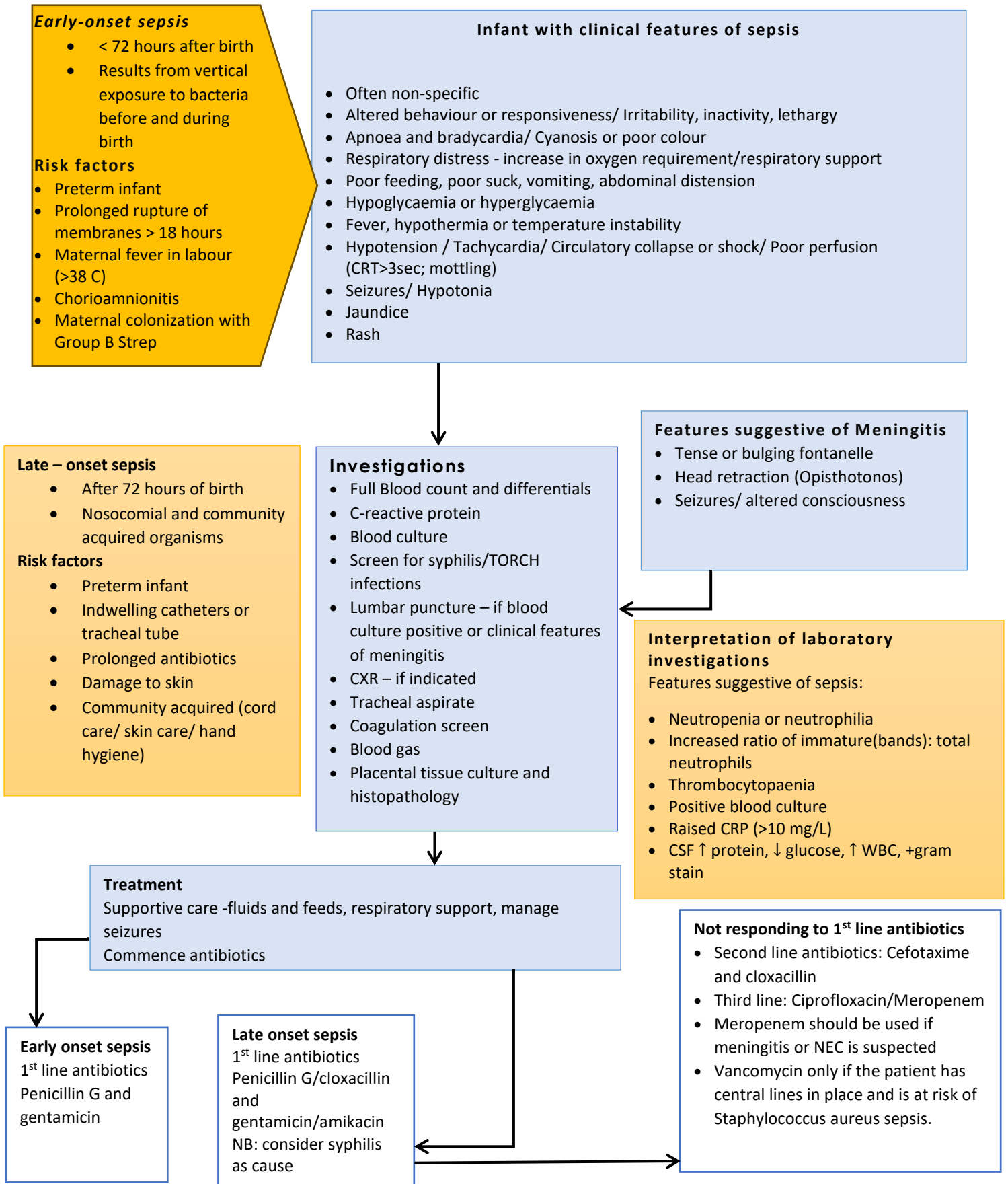


Fig 36. Sepsis in Neonates

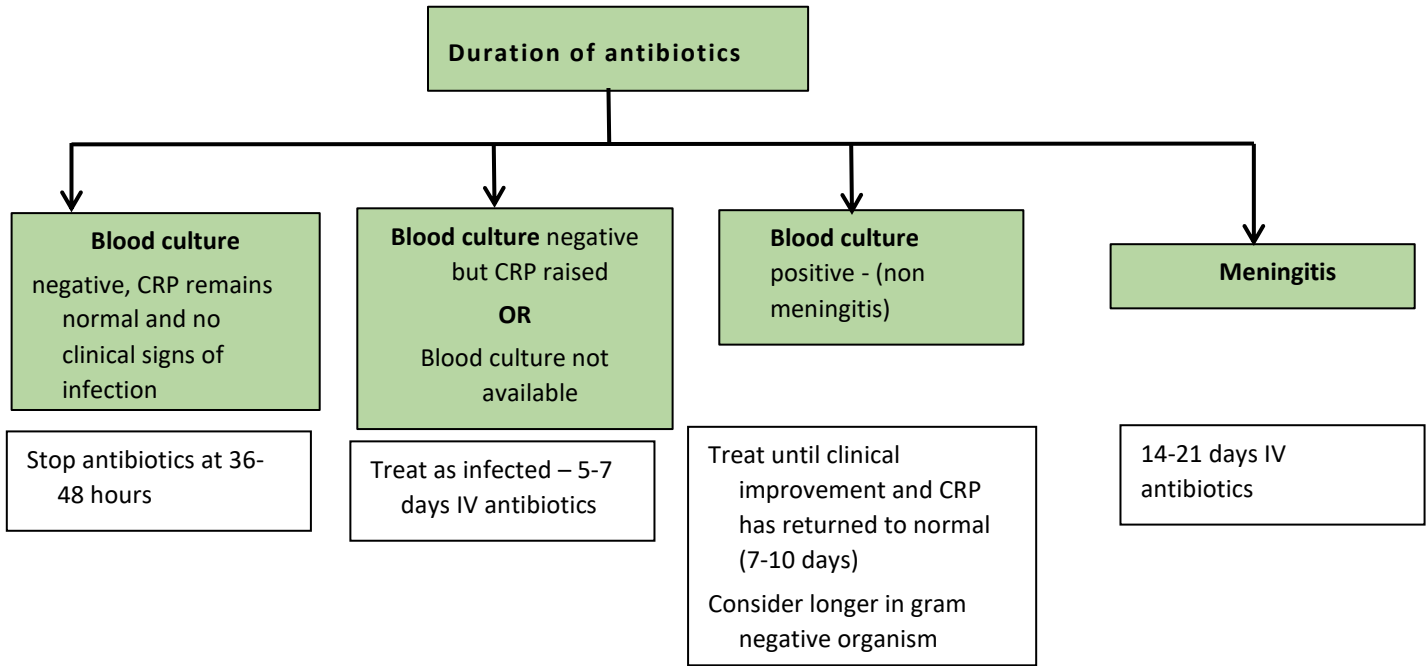


Fig 37. Criteria for commencing Empirical antibiotics in a baby with risk of having an early onset infection (who may appear clinically well)

NEONATAL SEIZURES

APPROACH TO NEONATAL SEIZURES

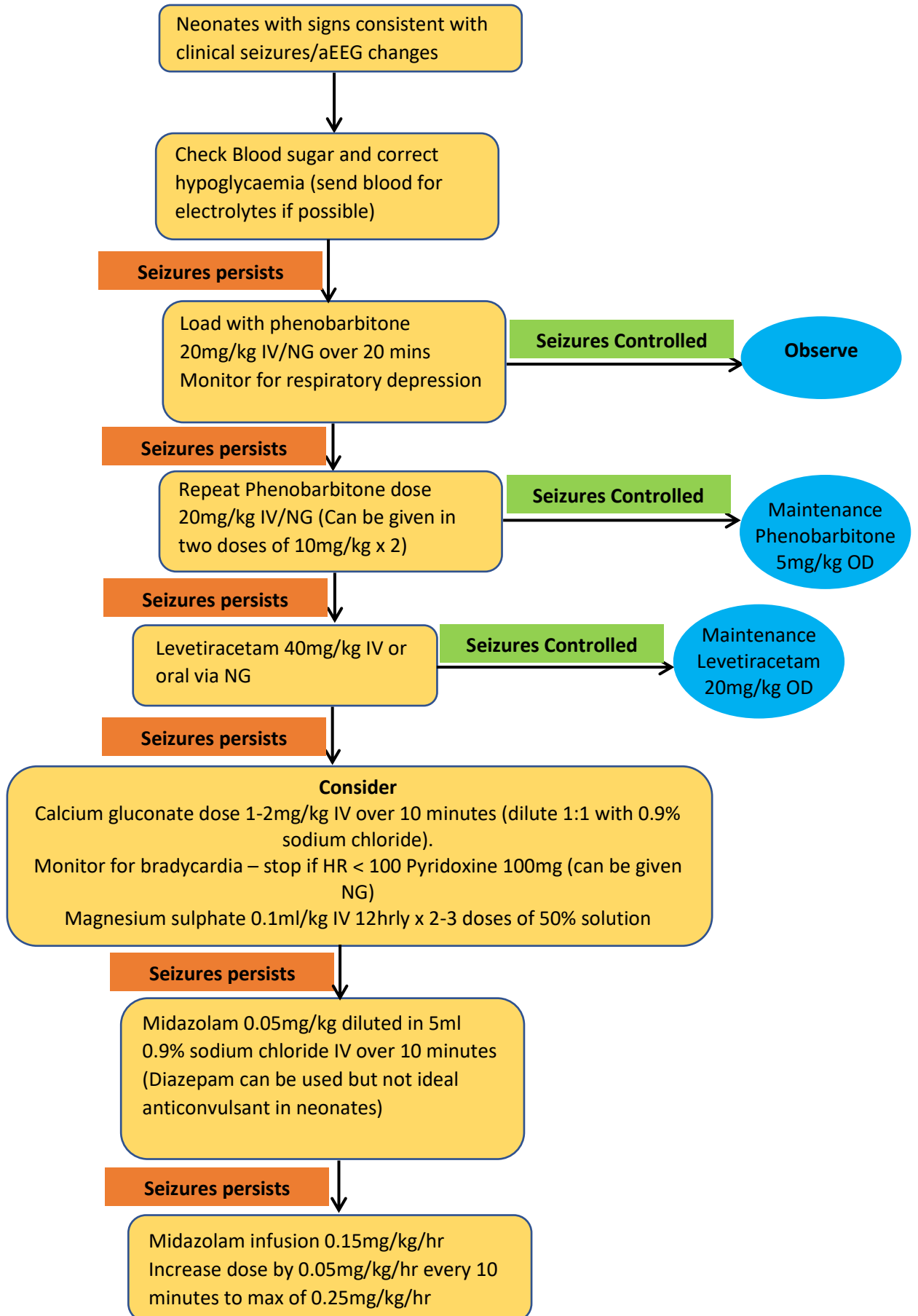


Fig 38. Approach to neonatal seizures

DISORDER OF SEXUAL DIFFERENTIATION (DSD)

ALGORITHM FOR EVALUATION OF DSD.

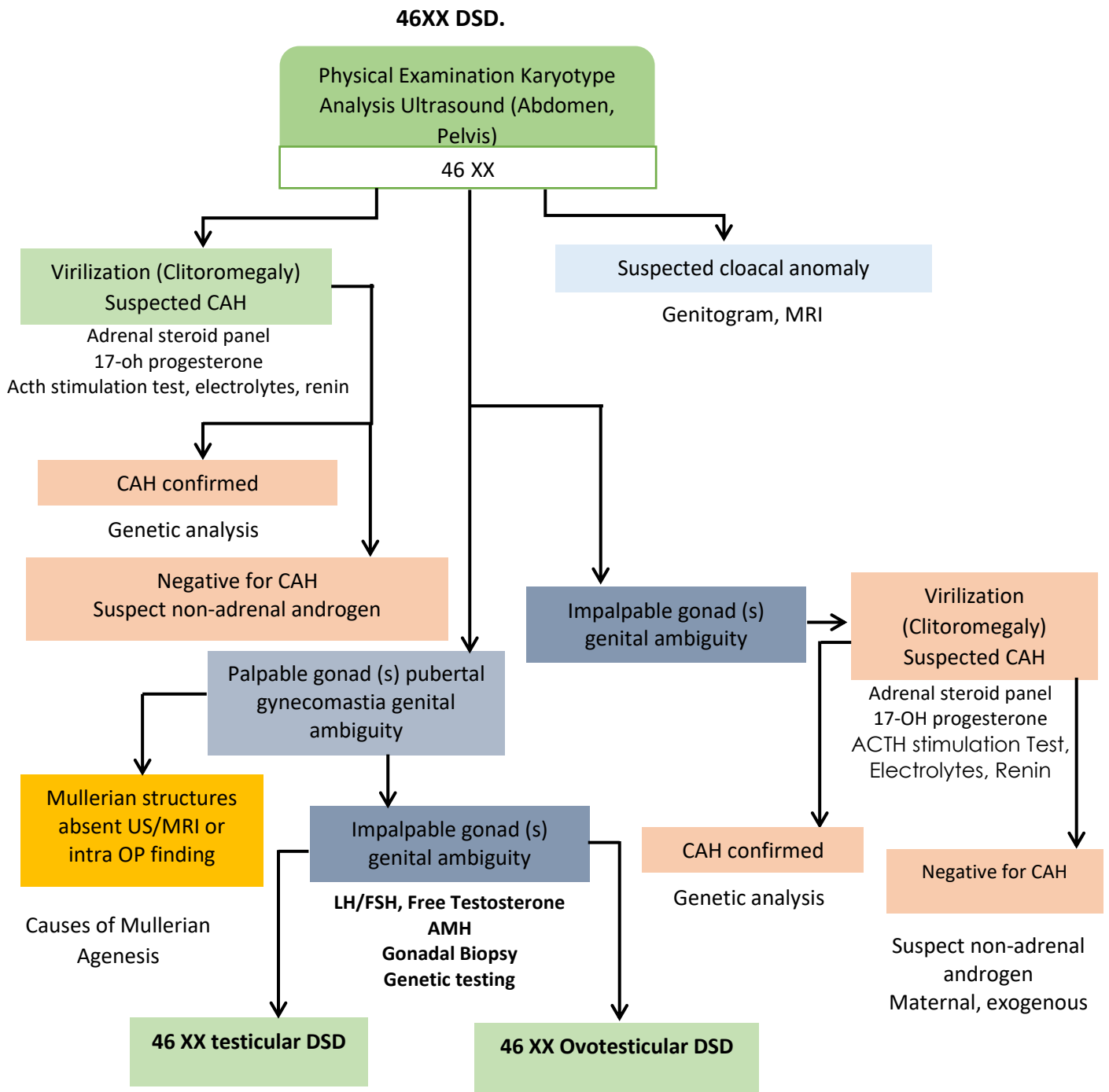


Fig 39. Evaluation of 46XX DSD, adapted from (Rawal AY and Austin P F 2015)

46 XY DSD

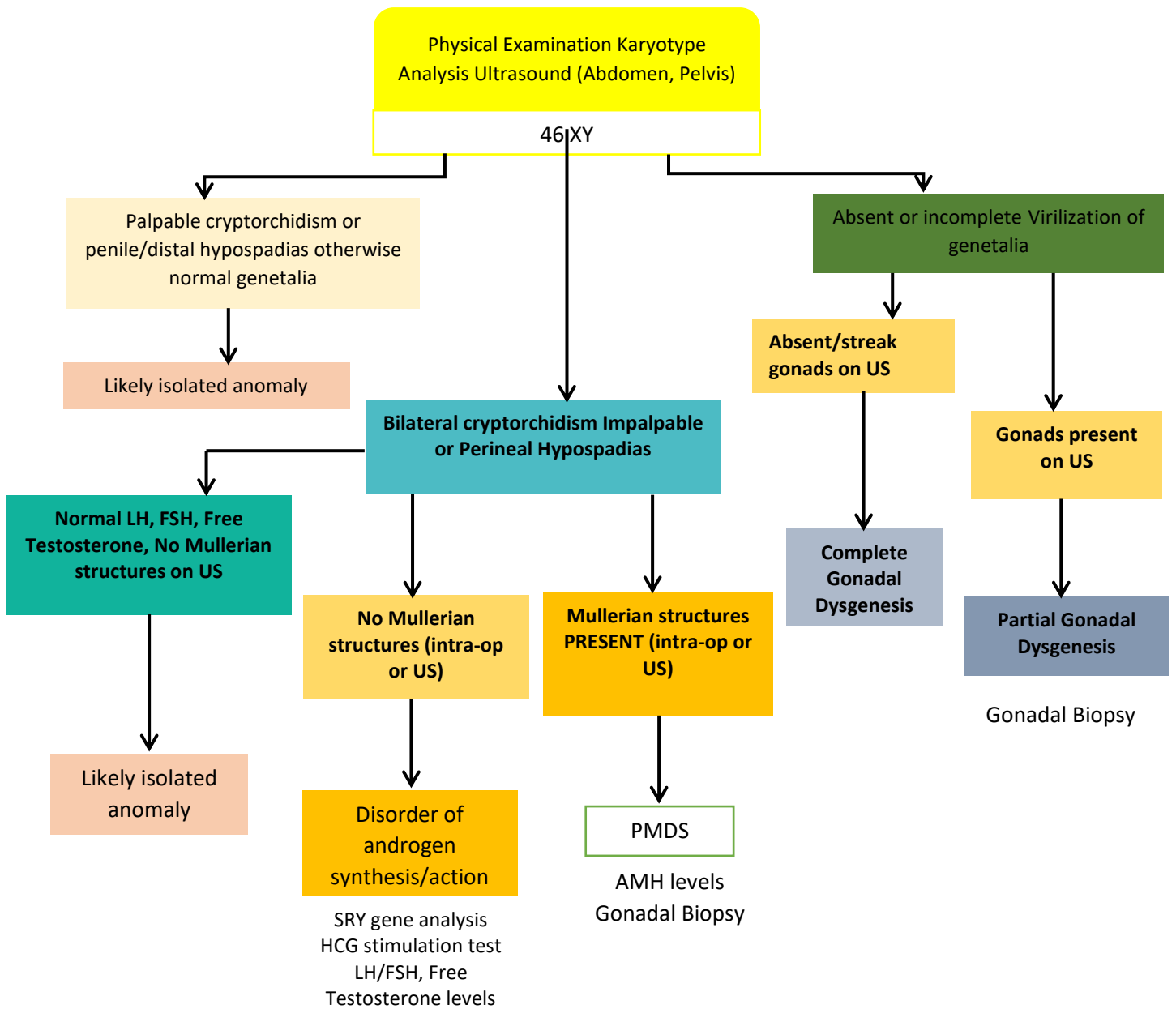


Fig 40. Evaluation of 46XY DSD, adapted from (Rawal AY and Austin P F 2015)

RICKETS

Definition

- Rickets is a heterogenous group of acquired and inherited diseases resulting in disturbances in calcium and/or phosphate homeostasis and thereby, affecting the growing skeleton.
- the abnormal serum calcium and phosphate levels may cause abnormalities in differentiation and maturation of chondrocytes resulting in defective mineralization of the growth plate.

AETIOLOGICAL CLASSIFICATION

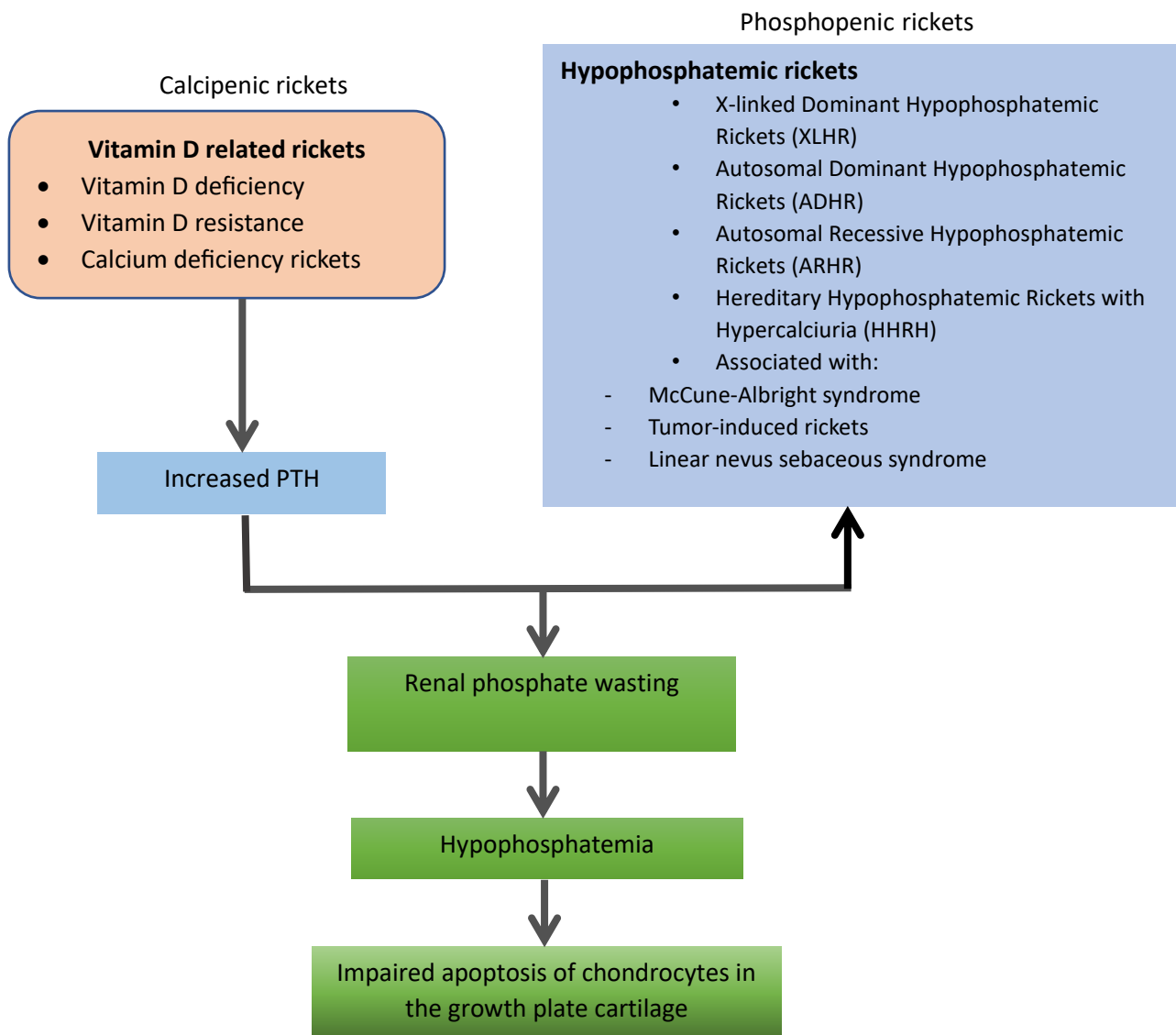
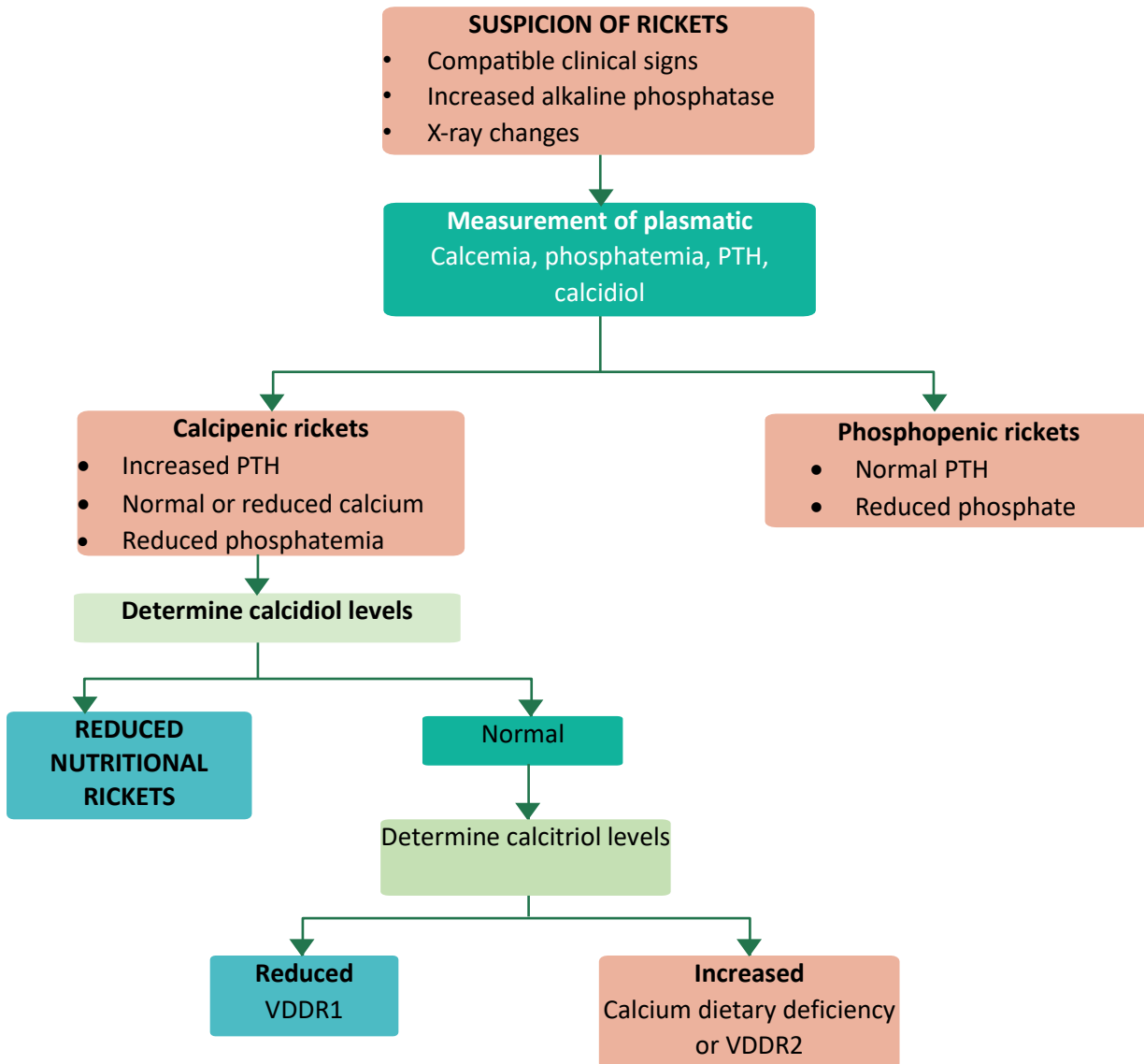


Fig 41. Showing aetiological classification of Rickets, adapted from(Gentile C and chiarelli F 2015)

APPROACH TO DIAGNOSIS OF RICKETS- FLOW CHART.



VDDR1: Vitamin D Dependent Rickets type 1; VDDR2: Vitamin D Dependent Rickets type 2.

Fig 42. Approach to diagnosis of Rickets, adapted from(Gentile C and chiarelli F 2015)

PRECOCIOUS PUBERTY EVALUATION FLOW CHART.

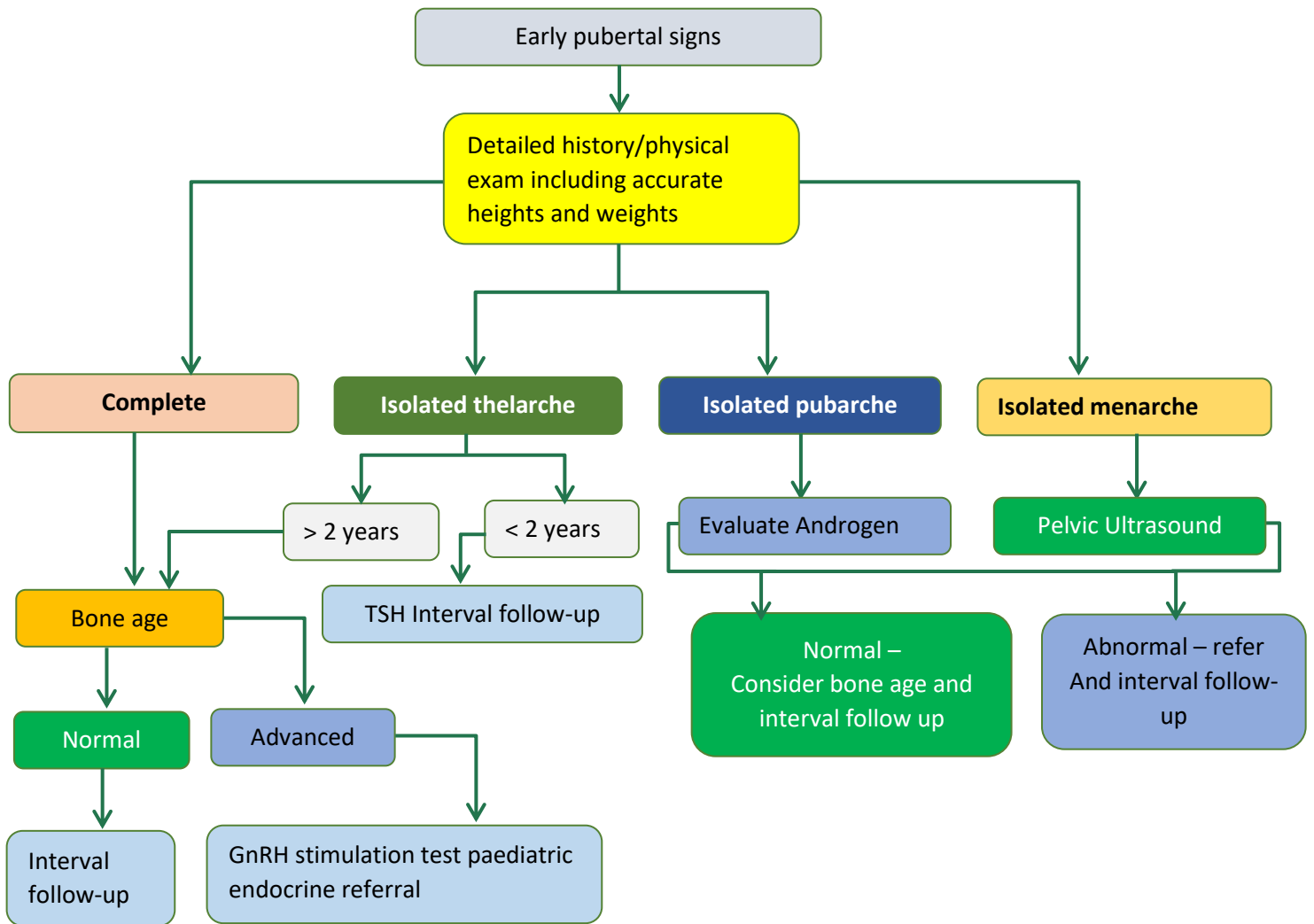


Fig 43. precocious puberty evaluation flow chart, adapted from clinical gynaecology, section 5, chapter 34, by Rowan P S and Murray J P.

IMAGING FOR PRECOCIOUS PUBERTY

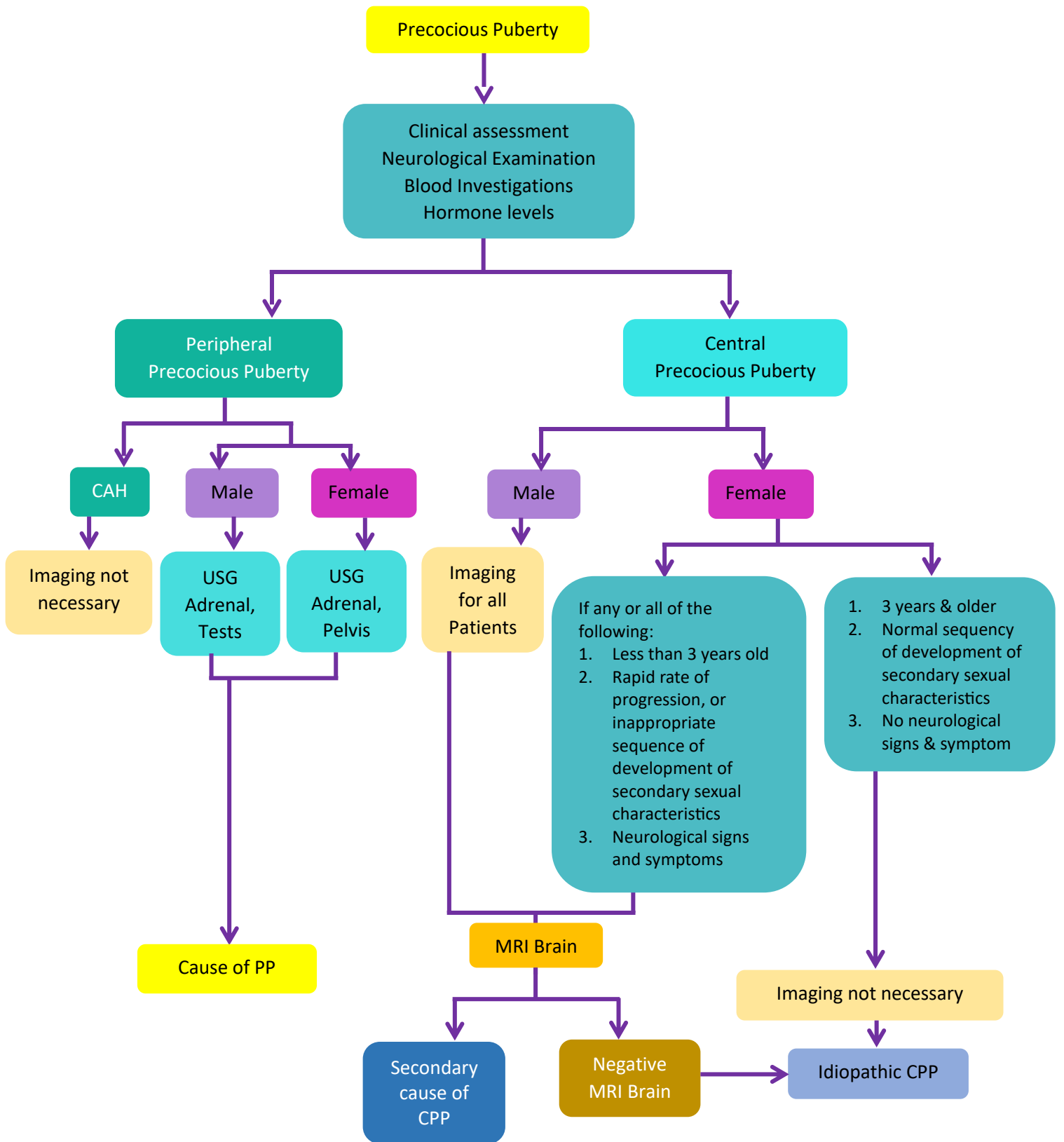


Fig 44. Imaging for precocious puberty adopted from (Faizah Mz et al 2012)

DIABETES MELLITUS

APPROACH TO HYPERGLYCAEMIA IN A KNOWN DIABETIC PATIENT

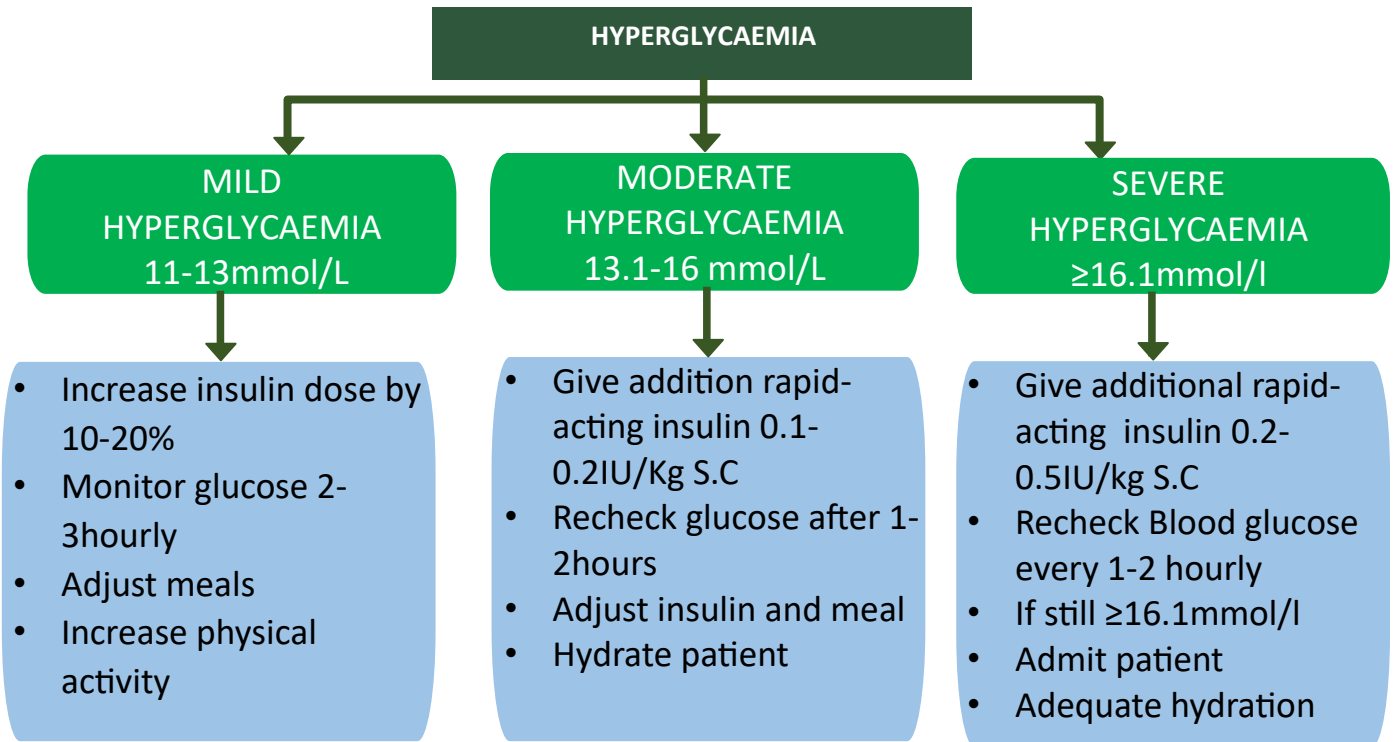


Fig 45. Approach to hyperglycaemia in a known diabetic patient

APPROACH TO HYPOGLYCAEMIA IN A KNOWN DIABETIC PATIENT

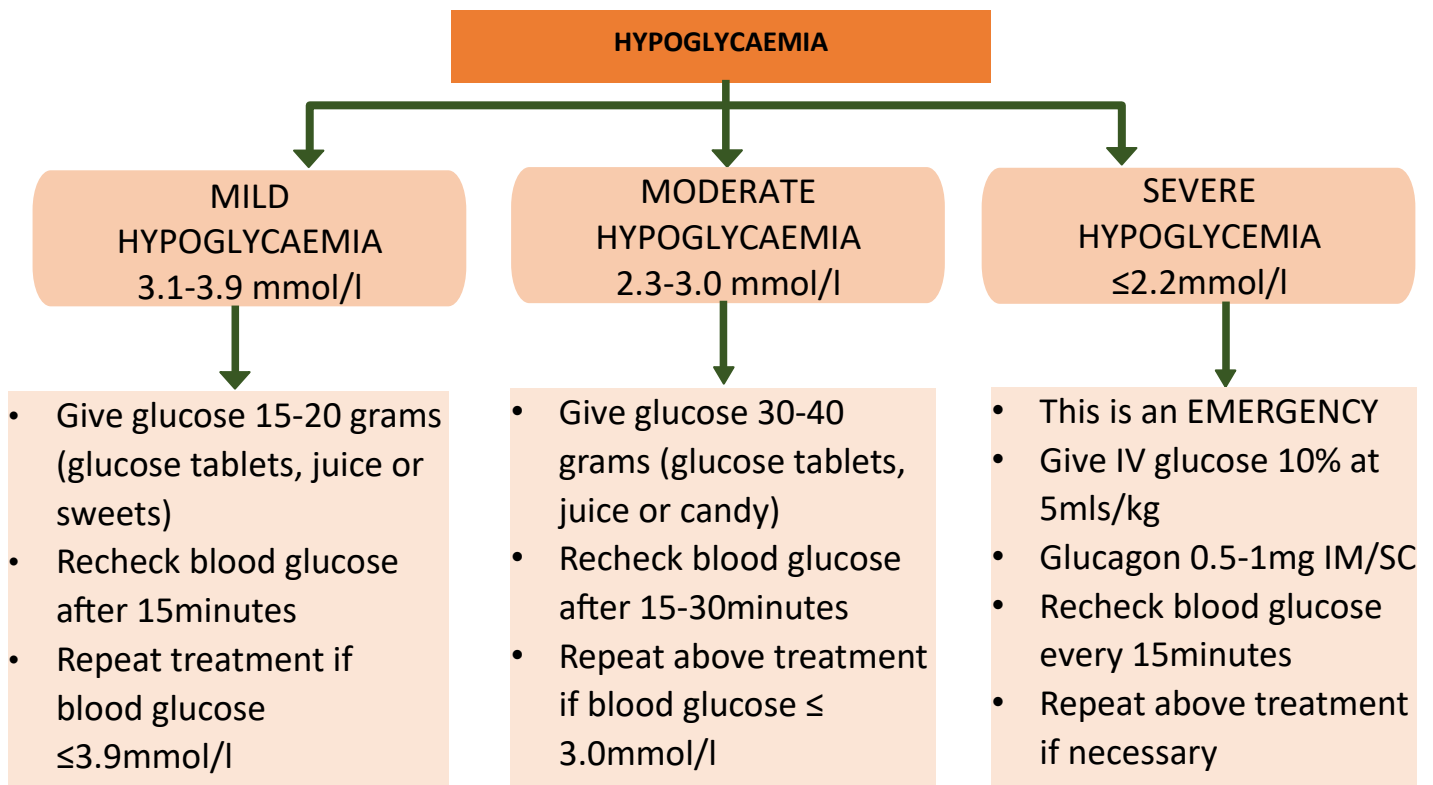


Fig 46. Approach to hypoglycaemia in a known diabetic patient

HYPOGLYCAEMIA IN CHILDREN AND ADOLESCENTS

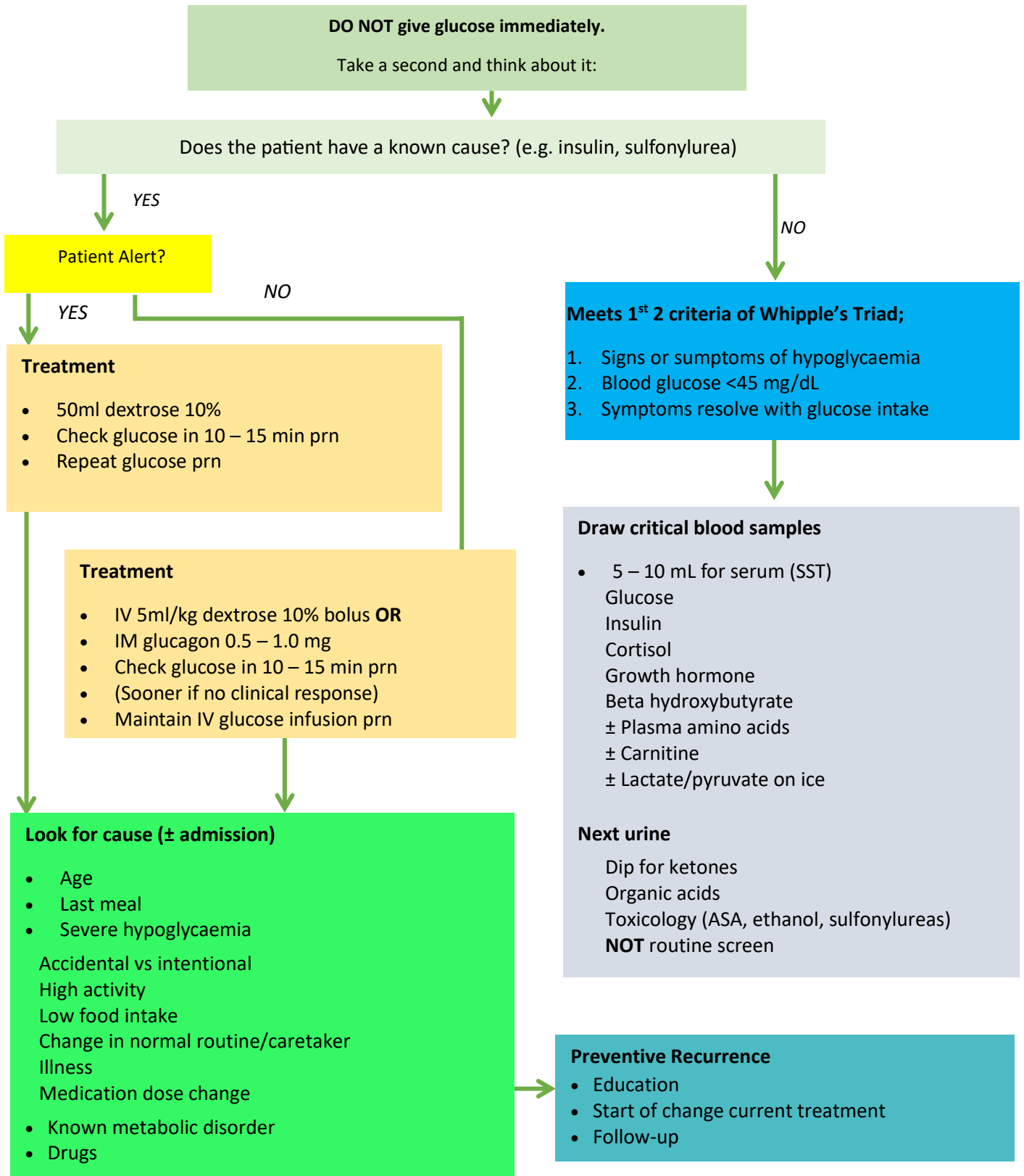


Fig 47. Emergency management of hypoglycaemia

GRAVE'S DISEASE

EVALUATION OF PATIENT WITH HYPERTHYROIDISM.

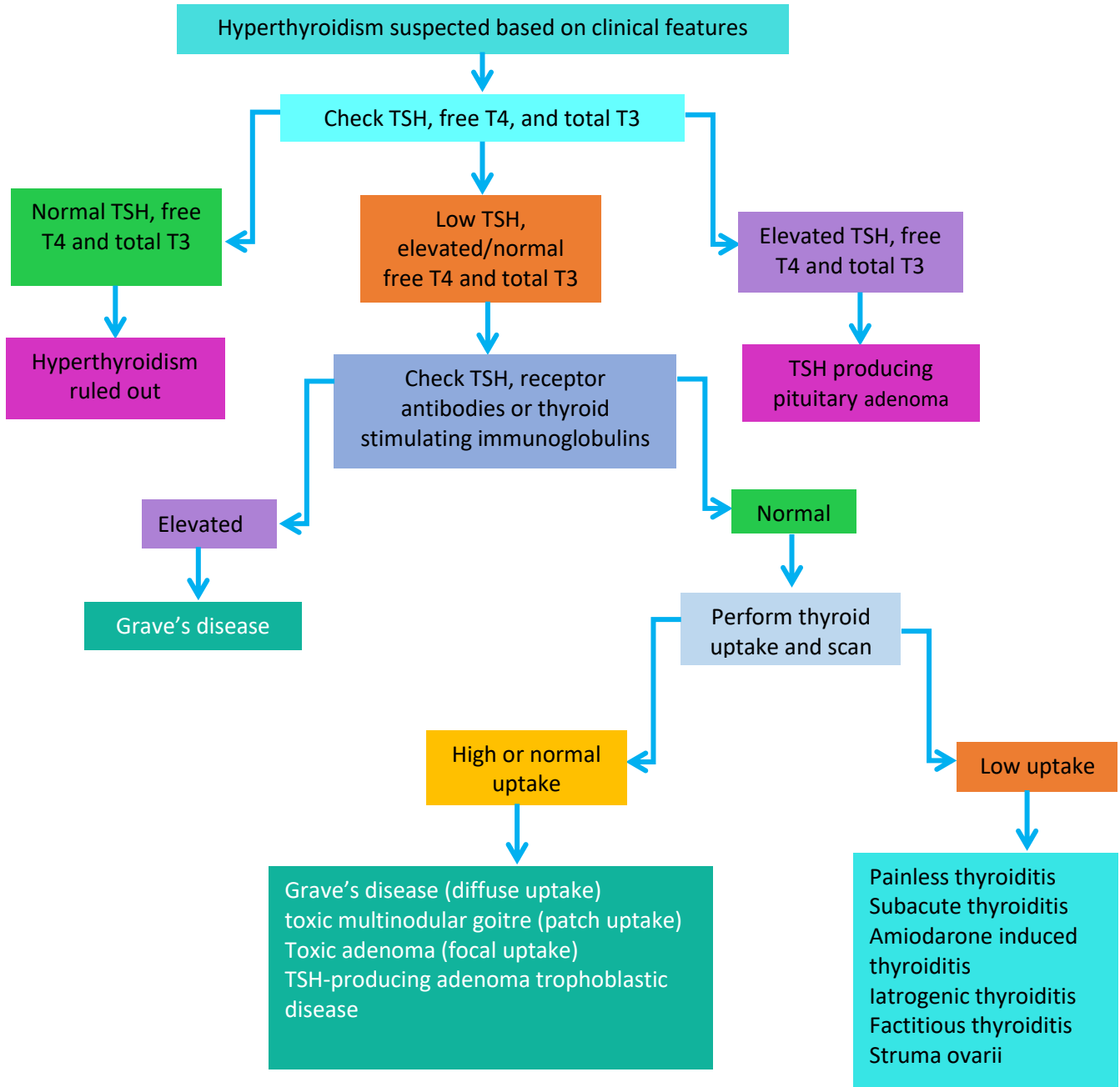


Fig 48. Evaluation of patients presenting with hyperthyroidism, adapted from (Mathew p, Kaur J, Rawla P 2023)

DIAGNOSTIC OF CONGENITAL HYPOTHYROIDISM

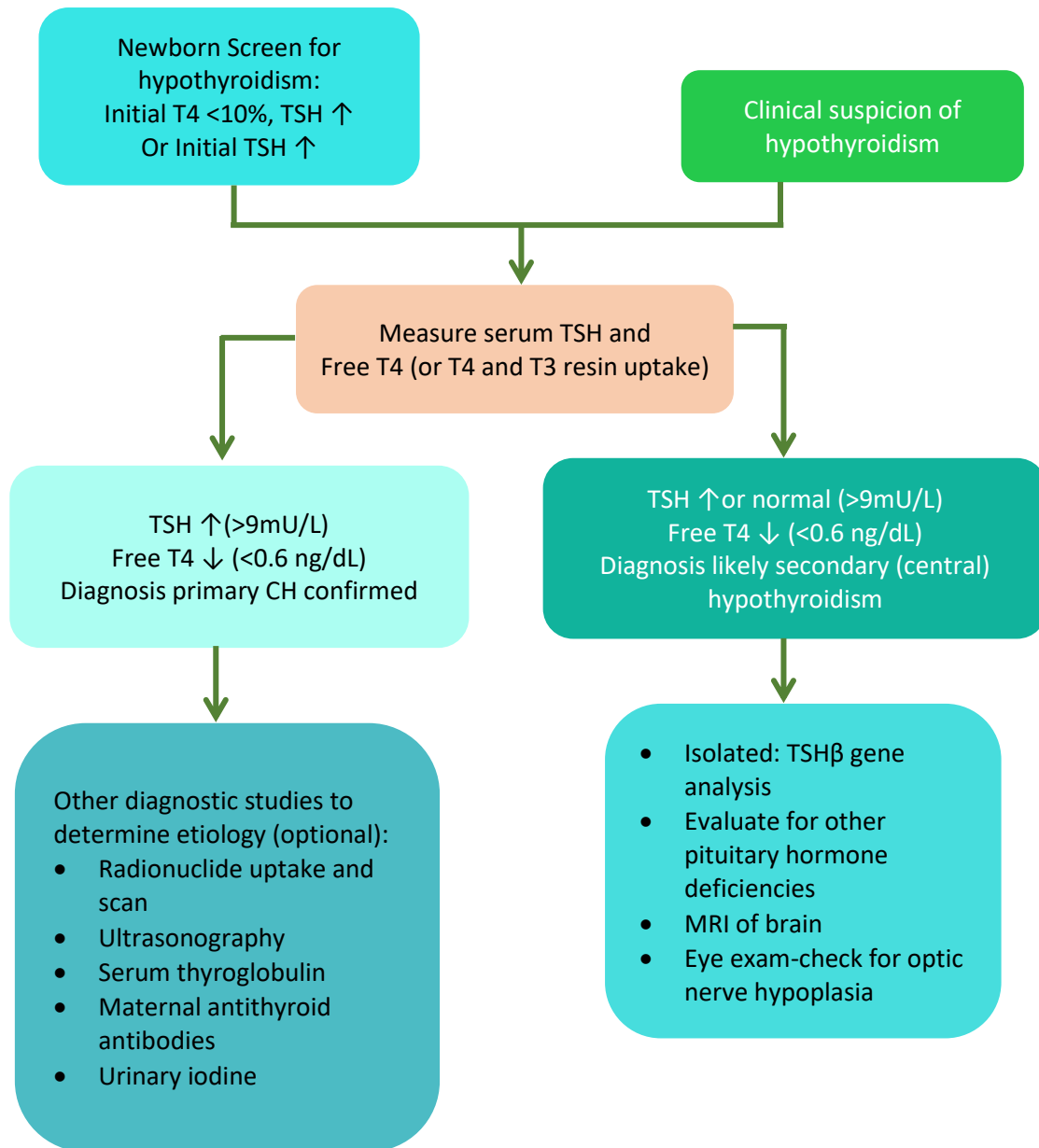


Fig 49. Congenital hypothyroidism, adopted from (Rastogi and LA Franchi 2010)

APPROACH TO DIAGNOSIS AND INVESTIGATION OF COMMON MALIGNANCIES

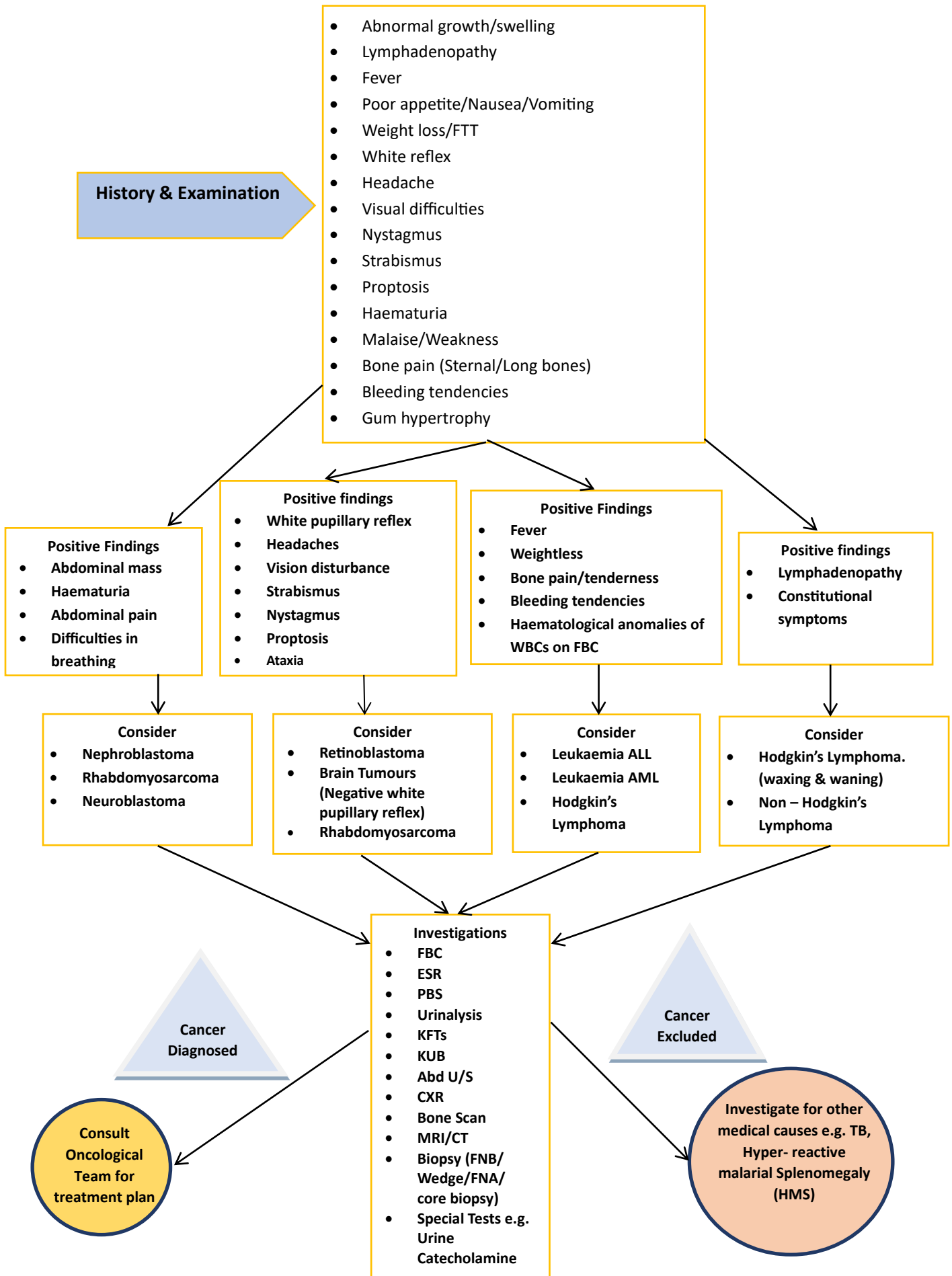


Fig 50. Approach to diagnosis and investigation of common malignancies

ADVANCED HIV DISEASE (AHD)

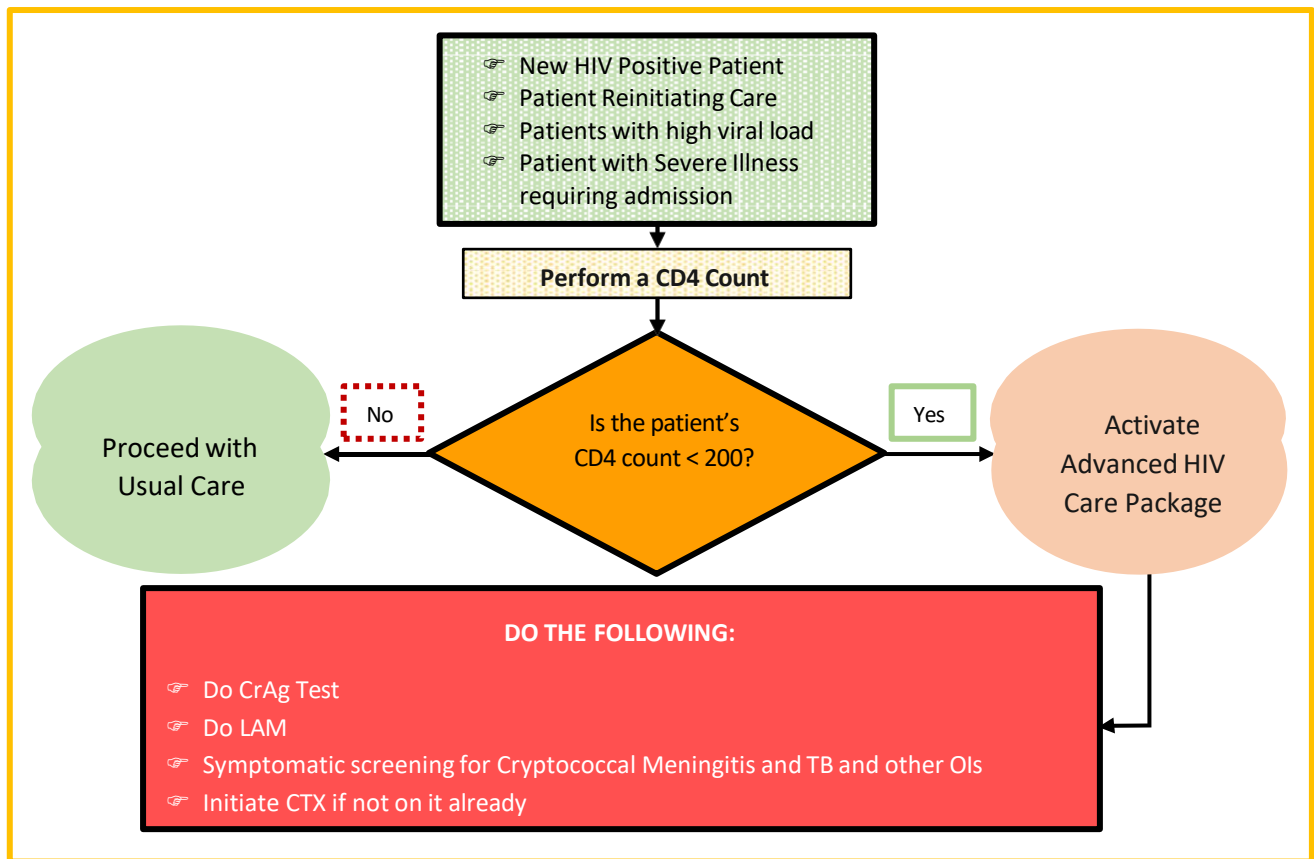


Fig 51. Advanced HIV Disease Package of Care

CHILD SEXUAL ASSAULT (CSA)

MEDICAL MANAGEMENT

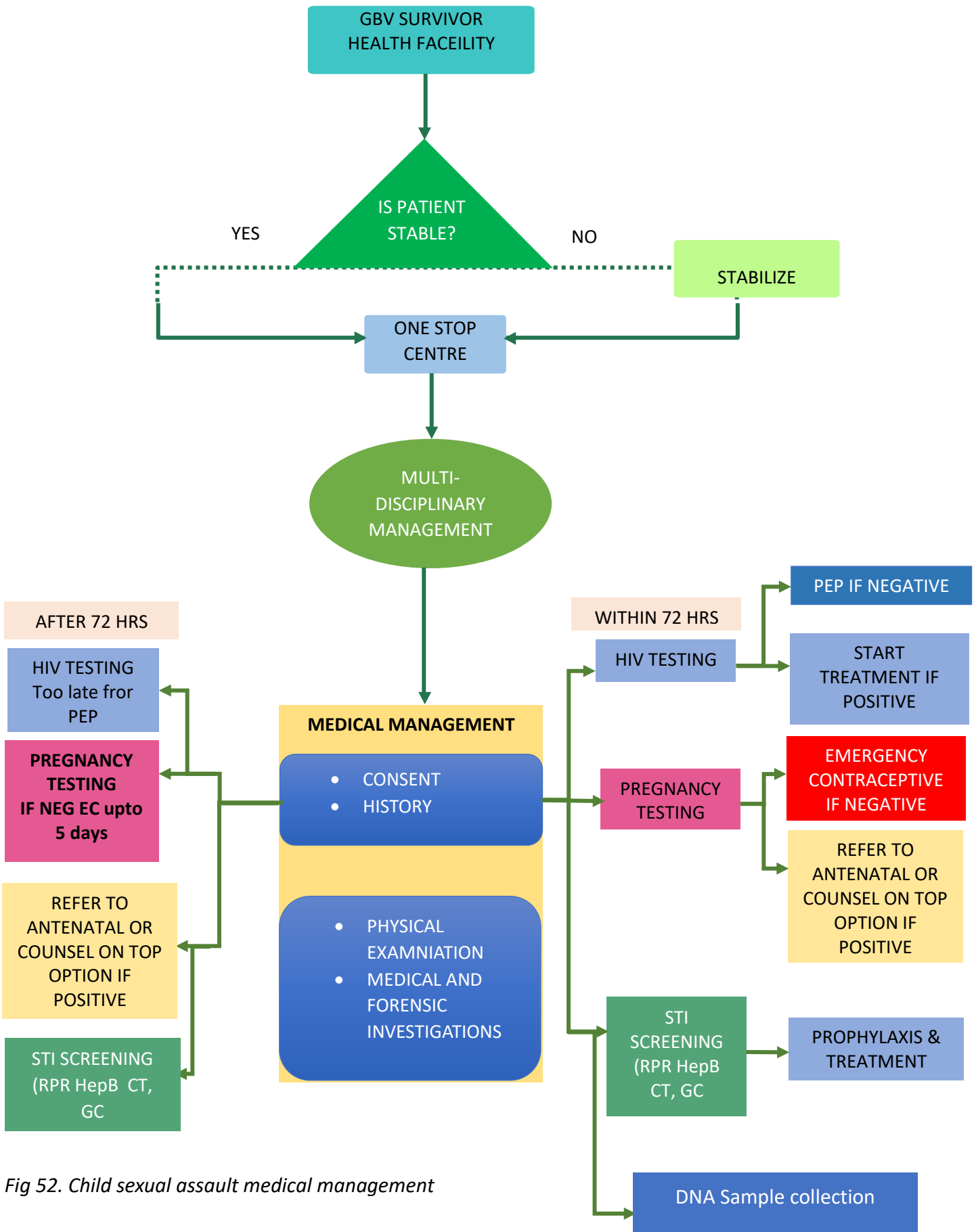
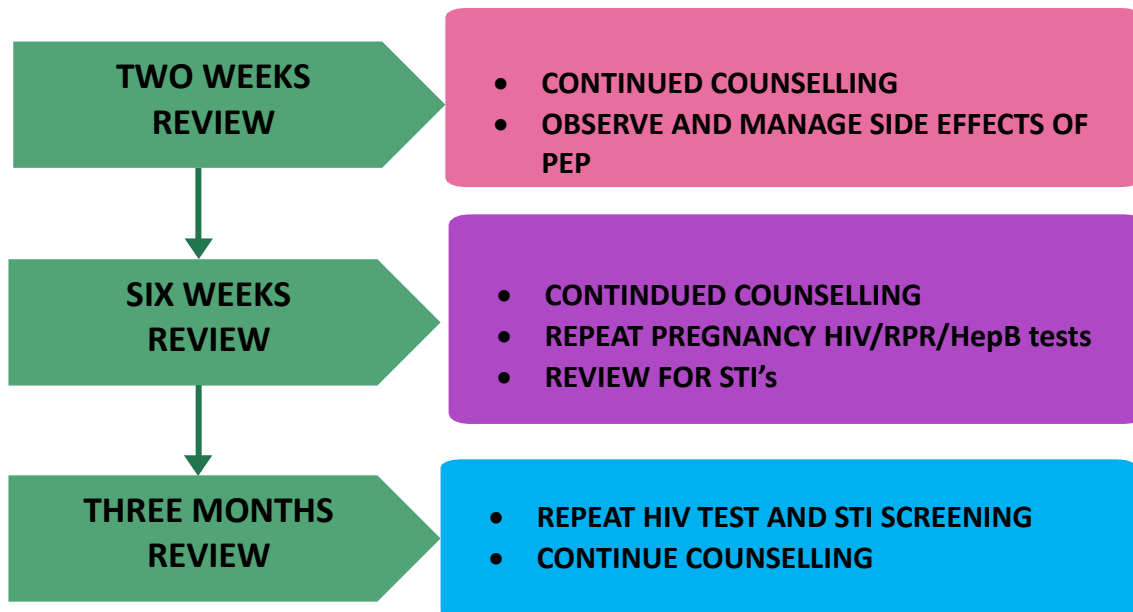


Fig 52. Child sexual assault medical management

Emergency Contraception

- Levonorgestrel 1.5 mg PO STAT

FOLLOW UP SCHEDULE





Ministry of Health



Zambia Paediatric Association



World Health Organization



United Nations Children's Fund



Program for Appropriate Technology in Health



Centre for Infectious Disease Research in Zambia



University of Zambia – School of Medicine



Clinton Health Access Initiative



Catholic Relief Services



University Teaching Hospital HIV/AIDS Program

Ministry of Health
Ndeke House
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Lusaka, Zambia.