College of Family Physicians Singapore

# The Singapore Family Physician

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Vol 39(3) July–September 2013

## Emergency Medicine

# Prevent Cervical Cancer. Offer a Pap smear today.

Cervical cancer presents a serious risk to Singaporean women, taking an average of 77 lives each year[1]. Approximately 200 new cases are detected annually, making it the 7th most common cancer among women[1].

Yet something as simple as a Pap smear can help to detect cervical cancer at an early stage.

How can you help to prevent cervical cancer?

1. Offer a Pap smear to women aged 25 or older who have ever had sex
2. Encourage them to go for a Pap smear once every 3 years
3. Follow up on their screening results to ensure continuity of care

Find out more about cervical cancer screening by visiting HPB's website at http://www.hpb.gov.sg/healthscreening or calling a Nurse Advisor on 1800 223 1313.

[1] Singapore Cancer Registry Interim Report 2004 - 2008

Health Promotion Board

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# EMERGENCY MEDICINE – UPDATE 2013

A/Prof Goh Lee Gan

SFP2013; 39(3): 3

The theme of this Family Practice Skills Course is Emergency Medicine. Thanks are due to the domain experts of the subject in writing the units in this issue as well as speaking in the Seminars scheduled for the weekend of 5-6 October 2013. Thanks are also due to the Health Promotion Board and the Ministry of Health, Singapore for supporting this Family Practice Skills Course.

Acute medical and surgical encounters are an important part of the frontline family physicians daily encounters. Succinct history taking, adequate clinical examination form the foundation for correct diagnosis. Added to this is the contextual knowledge and understanding of what needs to be recognised and what pitfalls to avoid.

**Unit 1 – Optimal use of Emergency Services.** The growth of emergency services in Singapore over the years in terms of volume and complexity is relentless. Good documentation of positive and significant negative findings and relevant tests provides a baseline to expedite patient assessment at the ED. An understanding of the available ED resources as well as the access to services, especially when sub-speciality consultation is needed, helps to improve the appropriateness of referrals.

**Unit 2 – Improving primary care management of time sensitive emergencies.** Three time sensitive conditions are discussed: acute coronary syndrome, cerebrovascular accident, and dyspnoea. The best outcomes are achieved with early pattern recognition, early identification and referral, risk stratification and early appropriate treatment.

**Unit 3 – Resuscitation update – 2013.** The practice of resuscitation is guided by the principle of the Chain of Survival, which essentially has four links, viz. Early Access, Early CPR, Early Defibrillation and Early Advanced Life Support. Basic cardiac life support consists of the first two links in the Chain of Survival. Thirty chest compressions to 2 ventilations at the rate of 100 compressions a minute is the norm. Hands only CPR is only used when the rescuer is unable to perform mouth-to-mouth ventilation for some reason. Defibrillation, the third link in the chain of survival, is one of the key strategies in the management of cardiac arrest victims. The fourth link in the Chain of Survival, is very dependent on the optimal conduct of the earlier three links. The diligent practice and readiness will make a difference in improving the survival of cardiac arrest victims.

**Unit 4 – Pitfalls and red flags in common clinical syndromes.** Common medical and surgical emergencies encountered in everyday frontline practice are: acute chest pain, acute coronary syndrome, breathlessness, headaches, abdominal pain, wound injury, and the pregnant patient. Not all present with classical textbook description. The guiding principles for safe and prudent practice are covered in this unit.

**Unit 5 – Initial management of major trauma for physician first responders.** The physician first responder needs to shut out the chaos and distractions at scene and focus on a systematic primary survey to assess for injuries with the potential to cause rapid deterioration, institute crucial life-saving interventions and effect rapid evacuation to hospital. This unit details a simple approach to guide the family physician to assess and prioritise management of the trauma patient, and augment the work of the paramedics in the pre-hospital phase.

**Unit 6 – Emergencies in the very young patients – A primer.** In the family medicine clinic, differentiating the very sick from the not-so-sick in paediatrics similarly requires awareness of the differences and subtleties in paediatric ambulatory medicine, particularly in the very young. Ten commonly encountered from tip to toe are covered in this unit: fever, the crying child, febrile seizures, unexplained tachycardia, respiratory distress, gastroenteritis, head injuries, surgical conditions, urinary tract infection & balanitis, and fractures.

**Original Paper.** In this issue is a study on engagement in general practice from a Medical Officer from the Out-patient Department, Ministry Of Health, Brunei Darussalam. It is a small study but nevertheless a good start in trying to answer the question on what are the characteristics associated with high scores of engagement. We encourage family physicians, Family Medicine Residents and medical undergraduates with FM aspiration to submit original studies as well as write-ups of their experiences in everyday practice. More details are given in the Instructions to Authors page at the end of this issue.

GOH LEE GAN, Senior Consultant Physician & Professorial Fellow, Division of Family Medicine, University Medicine Cluster, National University Health System; Director, Institute of Family Medicine, College of Family Physicians Singapore

Health Promotion Board


## As a doctor, your professional advice and opinion is powerful in triggering and reinforcing your patients' desire to quit smoking. Here's how you can start:

**Strike up a conversation**
Ask your patient if he or she is a smoker. If yes, ask them if they have thought about quitting and strongly encourage them to quit.

**Prescribe your best advice**
Share with them the benefits of a smoke-free lifestyle. Provide tailored, non-judgemental advice on how they can quit and assist them in their quit attempt. This could include setting a quit date and directing them to specialised smoking cessation services. If they have tried to quit in the past and were unsuccessful, find out why and discuss alternative methods of quitting.

If your patient is using smokeless tobacco products like snus or tobacco substitutes like e-cigarettes, discourage him or her from doing so as these contain nicotine, which makes them highly addictive. These products are not smoking cessation aids and have not undergone rigorous clinical trials as required under the Medicines Act.

**Point them to the I Quit Club and/or other smoking cessation services**
The I Quit Club can inspire your patient with stories of ex-smokers while giving him or her the opportunity to meet like-minded individuals who pledge to stay smoke-free. Direct your patient to www.facebook.com/iquitclub. You can also point your patient to other specialised smoking cessation services such as:

- **QuitLine or Email**
  Call 1800 438 2000 or
  email hpb_quitline@hpb.gov.sg
- **I Quit iPhone app**
  Download the smoke-free companion app at
  www.hpb.gov.sg/iquit.aspx
- **QuitLine SMS**
  SMS a Quit consultant (English only) at 9463 3771
  (standard connection charges may apply)
- **QuitLine Windows Live Messenger**
  Chat online with a Quit consultant by adding
  hpb_quitline@hpb.gov.sg as a contact

To request for free resources for smoking patients, please email **hpb_smoking_control@hpb.gov.sg**.
For more information on smoking cessation, visit **www.hpb.gov.sg/smokefree**.


# Distance Learning Course on "Emergency Medicine"

- Overview of "Emergency Medicine" Family Practice Skills Course
- Unit 1 : Optimal Use of Emergency Services
- Unit 2 : Improving Primary Care Management of Time Sensitive Emergencies
- Unit 3 : Update on Cardiopulmonary Resuscitation - 2013
- Unit 4 : Pitfalls and Red Flags in Common Clinical Syndromes
- Unit 5 : Initial Management of Major Trauma for Physician First Responders
- Unit 6 : Emergencies in the Very Young Patients – A Primer

# OVERVIEW OF "EMERGENCY MEDICINE" FAMILY PRACTICE SKILLS COURSE

A/Prof Goh Lee Gan

SFP2013; 39(3): 6-7

## INTRODUCTION

Acute medical and surgical problems are an important part of the frontline medical practitioners' daily encounters. This Emergency Medicine Family Practice Skills Course has several objectives namely, to update ourselves on the conditions that we need to make the correct judgment call to refer early, to be aware of the pitfalls that we can avoid, and finally to be confident on what we can safely treat and observe. There is also a need to educate patients on what they need to be on the look out for as their acute problems unfold and seek appropriate emergency attention as the need arises. Patient at risk of cerebrovascular occlusions and coronary artery occlusions also need to be educated on when they should activate the emergency service system to shorten the arrival to treatment time. Finally, it is helpful to be able to give patients the realistic expectations of what is likely to occur at the Emergency Department and to avoid promising a particular outcome to the patient as this will depend on what is found on further assessment. The axiom of "when in doubt refer" is still golden, except that with attending this course, the areas of uncertainty can be reduced as we have a better understanding of the emergent symptoms and signs versus reassuring symptoms and signs that an emergency referral would not be necessary, at least at the initial encounter. Adequate instructions to patients on what to look out for that may need emergency department attention is a must.

We have assembled a team of domain experts to both write the units for continuing medical education on the subject as well as to speak in the seminars on the weekend of 5-6 October 2013. The Singapore Family Physician editors would like to place on record our thanks for their efforts. Thanks are also due to the Health Promotion Board (HPB) and Ministry of Health (MOH) for supporting this Family Practice Skills Course.

This Emergency Medicine Family Practice Skills Course would be of immense value to you as a CME activity. Do consider attending if you can.

## COURSE OUTLINE AND CME POINTS

This Family Practice Skills Course is made up of the following components. You can choose to participate in one or more parts of it. The CME points that will be awarded are also indicated as follows.

GOH LEE GAN, Senior Consultant Physician & Professorial Fellow, Division of Family Medicine, University Medicine Cluster, National University Health System; Director, Institute of Family Medicine, College of Family Physicians Singapore

### Components and CME Points

- Distance Learning Course – 6 units (6 Core FM CME points upon attaining a minimum pass grade of 60% in Distance Learning Online MCQ Assessment)
- 2 Seminars (2 Core FM CME points per seminar)
- 2 Workshops (1 Core FM CME point per workshop)
- 10 Readings – read 5 out of 10 recommended journals (maximum of 5 CME points for the whole CME year)

### Distance Learning Course

Unit 1 : Optimal Use of Emergency Services
*LTC (Dr) Ng Yih Yng*

Unit 2 : Improving Primary Care Management of Time Sensitive Emergencies
*A/Prof Malcolm Mahadevan, Dr Kanwar Sudhir Lather*

Unit 3 : Update on Cardiopulmonary Resuscitation - 2013
*Prof V Anantharaman*

Unit 4 : Pitfalls and Red Flags in Common Clinical Syndromes
*A/Prof Mark Leong Kwok Fai*

Unit 5 : Initial Management of Major Trauma for Physician First Responders
*Dr Kenneth Heng Wei Jian*

Unit 6 : Emergencies in the Very Young Patients – A Primer
*Dr Jade Kua Phek Hui, A/Prof Ng Kee Chong*

## COURSE TOPIC DETAILS

Unit 1: Optimal Use of Emergency Services

- Introduction: Emergency Medical Services in Singapore
- Emergency Ambulance Services in Singapore
- When Does Emergency Medical Services Make the Biggest Difference?
- Considerations for Using the Ambulance Service
- Interfacing with the 995 Ops Centre and SCDF Paramedics
- Referring to the Emergency Department
- Making Better Emergency Department Referrals
- Saving Patients a Trip to the Emergency Department

Unit 2: Improving Primary Care Management of Time Sensitive Emergencies

- Introduction
- Acute Coronary Syndromes
- Cerebrovascular Accident
- Dyspnea

Unit 3: Update on Cardiopulmonary Resuscitation - 2013
- Introduction
- Basic Cardiac Life Support
- Defibrillation
- Advanced Cardiac Life Support
- Conclusions

Unit 4: Pitfalls and Red Flags in Common Clinical Syndromes
- Introduction
- Acute Chest Pains and Acute Coronary Syndrome (ACS)
- The Breathless Patient
- The Patient with Headaches
- The Patient with Abdominal Pain
- Back Pain
- Wound and Injuries
- The Pregnant Patient
- Conclusions

Unit 5: Initial Management of Major Trauma for Physician First Responders
- Introduction
- Primary Survey
- After Primary Survey
- Special Considerations in Trauma
- Conclusions

Unit 6: Emergencies in the Very Young Patients – A Primer
- Introduction
- Medical and Physiological Differences in the Very Young
- Ten Common Conditions from Top to Toe

## FACE-TO-FACE SESSIONS

**Seminar 1: 5 Oct 2013, 2.00pm – 4.00pm**

Unit 1 : Optimal Use of Emergency Services
*LTC (Dr) Ng Yih Yng*

Unit 2 : Improving Primary Care Management of Time Sensitive Emergencies
*A/Prof Malcolm Mahadevan*

Unit 3 : Update on Cardiopulmonary Resuscitation - 2013
*Prof V Anantharaman*

**Workshop 1: 5 Oct 2013, 4.30pm – 5.30pm**

Quick Refresher on CPR and Use of AED
*Dr Kurugulasigamoney Gunasegaran*
*APN Patsy Chiang, SNM Lee Chin Hian, CI Lim Choon Chai*

**Seminar 2: 6 Oct 2013, 2.00pm – 4.00pm**

Unit 4 : Pitfalls and Red Flags in Common Clinical Syndromes
*A/Prof Mark Leong Kwok Fai*

Unit 5 : Initial Management of Major Trauma for Physician First Responders
*Dr Kenneth Heng Wei Jian*

Unit 6 : Emergencies in the Very Young Patients – A Primer
*A/Prof Ng Kee Chong*

**Workshop 2: 6 Oct 2013, 4.30pm – 5.30pm**

Improving Emergency Care: Case based Discussions
- A panel of experts will discuss cases to illustrate strategies for improving care
- Participants are encouraged to bring their cases up to the panel for discussion

*Dr Quek Lit Sin, A/Prof Mark Leong Kwok Fai, A/Prof Ng Kee Chong, A/Prof Lee Kheng Hock*

UNIT NO. 1

# OPTIONAL USE OF EMERGENCY SERVICES

LTC (Dr) Ng Yih Yng


## ABSTRACT

**The growth of emergency services in Singapore over years in terms of volume and complexity is relentless. In the pre-hospital environment, ambulance call volumes have more than doubled from 62,095 in 1997 to 142,549 cases in 2012. The use of emergency ambulances services should be commensurate with the timeframe of which the medical condition is deteriorating or the potential for sudden catastrophic outcomes. Activation of the EAS ambulance for STEMIs and strokes help to reduce the D2B time and time to thrombolysis. Patients at risk of AMI or stroke often fail to recognise the symptoms and hence fail to activate the EMS system. Physicians do have a role to identify those at risk to educate them to achieve better outcomes. Good documentation of positive and significant negative findings and relevant tests provides a baseline to expedite patient assessment at the ED. An understanding of the available ED resources as well as the access to services, especially when sub-specialty consultation is needed, helps to improve the appropriateness of referrals.**


**Keywords: Emergency Medical Services, Emergency Department Overcrowding, Emergency Healthcare Operations**

**SFP2013; 39(3): 8-13**

## INTRODUCTION: EMERGENCY MEDICAL SERVICES IN SINGAPORE

The growth of emergency services in Singapore over years in terms of volume and complexity is relentless. In the pre-hospital environment, ambulance call volumes have more than doubled from 62,095 in 1997 to 142,549 cases in 2012. Of note, non-emergency calls have drop from 23,900 in 1997 to 2,232 in that period of time. Over the period of 2007 to 2012, P1 caseload has grown by 89.5% while P2 and P3 caseloads have grown by 31.3% and 32.6% respectively.

Similarly, restructured hospitals emergency departments, face a rapidly rising volume from 552,233 attendances in 2003 to 934,485 in 2011. At this rate, 2014 will likely see over a million attendances at the emergency rooms across the country.

In light of such staggering numbers, there is an urgent need to improve the usage of emergency care resources to ensure that the care delivered is effective and coordinated for patients.

NG YIH YNG, Director Medical Department/ Chief Medical Officer, Singapore Civil Defence Force (SCDF)

## EMERGENCY AMBULANCE SERVICES IN SINGAPORE

The Singapore Civil Defence Force manages the national emergency ambulance services (EAS), consisting of a fleet of 36 ambulances during the day and 30 ambulances during the night. It is supplemented by 10 private ambulances performing a long day shift (8am to 10pm) and is committed to respond to the incident site within 11 minutes 80% of the time as the key performance indicator.

The fleet is augmented by 41 fire bike deployment locations whereby fire and rescue specialists trained in CPR/AED can respond to potential cardiac arrest cases around the island during peak traffic hours. In addition, there are currently 8 fast response paramedics that provide a higher capability response for trauma cases and medical emergencies.

### Historical development

Between 1960 to 1976, there were two emergency ambulances services[1]. The Singapore General Hospital managed the Central Ambulance Services, which provided 24/7 first aid and transport services from SGH using a nurse, an attendant and a driver for medical emergencies. They responded to over 10,000 calls annually with a mean response time of 25 minutes. The Singapore Fire Brigade operated the second service solely for responding to accidents and fire casualties. This was integrated into a single service in 1977 called the Emergency Ambulance Services (EAS) under the Singapore Fire Brigade[1].

The Singapore Fire Service eventually merged with the Civil Defence Force along with the EAS in 1989, which exists today. Before 1997, ambulances were crewed by a driver, a nurse and an ambulance attendant. However it was recognised that pre-hospital emergency care competencies and skills are not always matched by nursing skills that are taught. In 1997, SAF and SCDF collaborated to have paramedics locally trained at the SAF School of Military Medicine (SMM), which was accredited by the Justice Institute of British Columbia, a paramedic training institute with 35 years of experience.

### Types of emergency medical service systems and skills levels

There are two common types of pre-hospital care systems, known as the Franco-German Model and the North American model of pre-hospital care. The Franco-German model is physician led and is based on advanced care and stabilisation in the field ("stay and play") while the North American model is based on the use of emergency medical technicians ("scoop and go") with definitive care provided at the hospital.

Due to the differences in infrastructure, resource availability, social and medical culture amongst countries, two types of

**FIGURE 1. ANNUAL SCDF AMBULANCE ATTENDANCES**

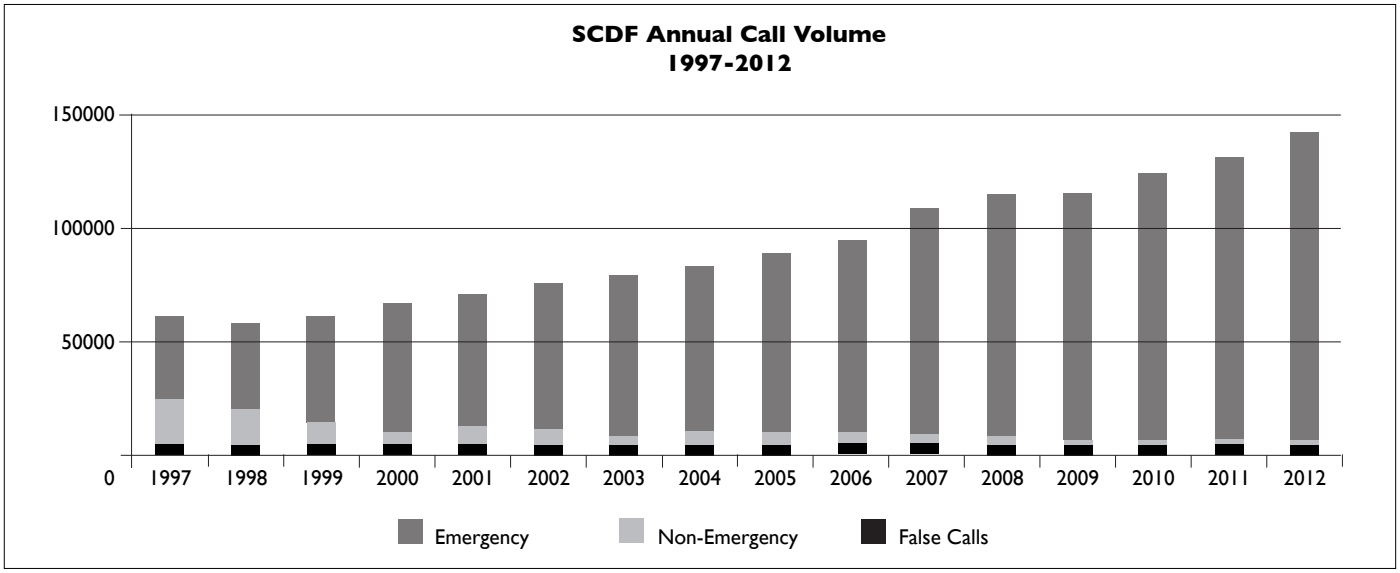
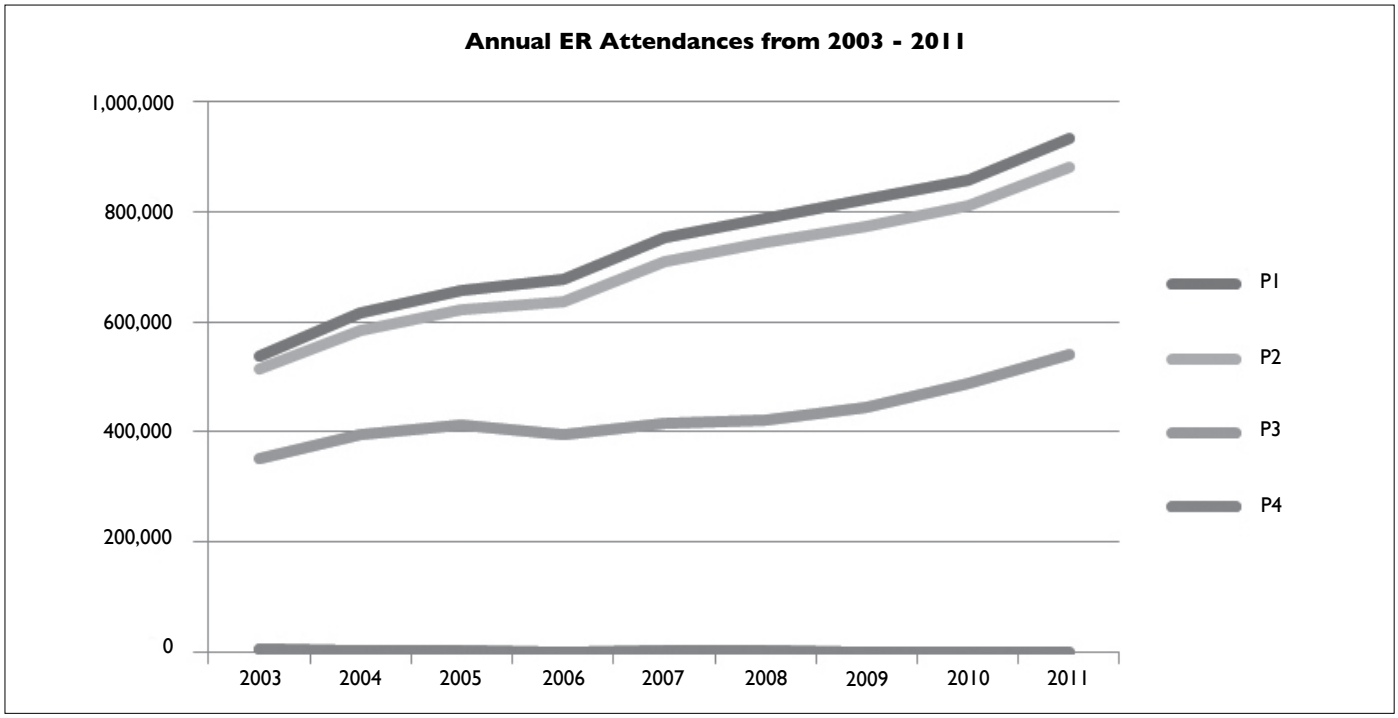



**FIGURE 2. ANNUAL ED ATTENDANCES**




EMS systems have scopes of practice and benchmarks that are very different. Conducting research in emergency systems also pose ethical, resource, time and even space constraints on the ambulances. Hence, no two EMS are exactly comparable.

Broadly speaking, emergency medical technician training and certification are classified broadly into 3-4 levels (not including CPR/AED). The current operational skill level of the SCDF and SAF paramedic is level 3, which is approximately equivalent to the Canadian Primary Care Paramedic or the North American Advanced EMT level.

The scope of practice includes the ability to use supraglottic airways, perform wireless ECGs transmission, semi-automated defibrillation, resuscitators, haemorrhage control, splinting, spinal management, intravenous fluid administration and the administration of drugs, including intravenous adrenaline (for cardiac arrest), intramuscular oxytocin (for delivery), sublingual nitroglycerin, oxygen, Entonox, oral aspirin and nebulised salbutamol and intravenous 10% dextrose.

The range of training hours and types of competencies varies broadly between systems even within the USA alone, as different cities, states and countries adapt standards appropriate to their healthcare standards.

**FIGURE 3. SKILL LEVELS IN VARIOUS PRE-HOSPITAL SYSTEMS[2]**

| Skill Levels examples | Hours | North American | Canadian | Singapore |
|---|---|---|---|---|
| Endotracheal intubation, manual defibrillation, ECG analysis | 1000-2000hrs | EMT – Paramedic | Advanced Care Paramedic | Lvl 4 (Instructors) |
| Supraglottic airways, semi-automated AED use, intravenous lines and limited medication | 300-800hrs | EMT – Advanced | Primary Care Paramedic | Lvl 3 (Operational staff) |
| BVM, splints, spinal immobilisation, airway adjuncts, | 150-400hrs | EMT – Basic | Emergency Medical Responder | EMT (lvl 2) |
| First Aid + BCLS | 16-60hrs | First Responder | First Responder | First Responder |
| CPR/AED | 3-4hrs | | | |

### Medical oversight

When medicine is practiced in the pre-hospital setting, there is a need to provide medical oversight (or supervision) of paramedic practice.

In Singapore, SCDF paramedics follow clearly defined medical protocols spelt out by a Medical Advisory Committee appointed by the Ministry of Home Affairs. This authorises them to carry out a range of emergency medical skills independently. They are required to strictly follow these protocols and not exceed these parameters. This is known as *offline medical control*. Offline medical control is often applied to larger paramedic systems whereby the workload makes it impractical to consult on most cases. These systems are complement by auditing to ensure compliance.

The alternative to this is *online medical control*, whereby drugs or invasive procedures, even intravenous drips, have to be directly authorised by an on-call physician. An example of this is King County EMS in Seattle, Washington. This is often seen in much smaller EMS systems and is resource intensive.

## WHEN DOES EMERGENCY MEDICAL SERVICES MAKE THE BIGGEST DIFFERENCE?

Cardiac arrest, acute myocardial infarction, stroke, acute respiratory failure and trauma are commonly termed as the 'first hour quintet' which are recognised as time sensitive conditions which drive EMS demand and usage[3]. The use of EMS for such situations are fairly well accepted. While the use of EMS for cardiac arrest, acute respiratory distress and trauma are easily recognised, the use of EMS in acute myocardial infarction and stroke is sometimes less successful.

A study of 462 patients treated in SGH for ST elevation myocardial infarction (STEMI) showed that the use of the EMS system shortened the median door-to-balloon (D2B) time from 102 minutes to 86 minutes. 83.6% (n=386) patients did not activate the ambulance service immediately. 19.3% (n=89) of them saw a GP but only 5.4% (n=25) activated the EMS system[7]. 72% of those who saw a GP were not sent to the emergency department by an ambulance. This paper serves to highlight 3 issues:

1. Patients at higher risk of cardiac chest pain are often unaware of the significant cardiac symptoms, and when to activate a 995 ambulance. There is an *opportunity* for GPs to better educate their patients. The AHA/ACC's 2004 guidelines recommend that healthcare providers should address with patients and their families the heart attack risk, symptom recognition, advisability of calling 995 if symptoms are not better or worsen 5 minutes after taking GTN (Class I)[5].
2. GP do need to have a high index of suspicion for chest pain and have a means of risk stratifying the patients through history, examination and performing an ECG.
3. Patients and GPs may not be aware that activating 995 for STEMIs can reduce the D2B time, reducing the ischemic damage. The wireless ECG performed onsite alerts the ED and helps to activate the cath lab concurrently (Class I)[5,7].

Similarly, more than half of the acute ischaemic stroke patients do not receive thrombolysis. The 2007 AHA/ASA (Class I) recommendations include increasing public awareness and educating patients at risk to recognise symptoms. The activation of 995 is also shown to help stroke patients meet the 4.5 hour thrombolysis therapeutic window. In this regard, GPs can play an important role in educating their patients[6].

## CONSIDERATIONS FOR USING THE AMBULANCE SERVICE

Unfortunately, there are still more cases whereby the judgement whether to activate the emergency ambulance may not be as clearly defined. Due to the wide range of potential emergencies, it is impossible to be prescriptive about patients who can be self-conveyed versus using the emergency ambulance services.

Nevertheless, there are some points that can be helpful in making these decisions to activate the ambulance:

1. *Acute, progressive symptoms*: New symptoms, especially those that are rapidly progressing are sinister and warrant further investigation. Cardiac symptoms are one of the most common causes of referrals and a detailed history of its **frequency, intensity, duration**; its response to **exertion, rest, GTN** and finally **similarity to prior ischemic** episodes are often helpful in determining the likelihood for concern. The chronicity of symptoms also help to determine if emergency ambulance transported is warranted.

2. *Sentinel events*: Signs or symptoms that describe a potentially catastrophic outcome. Examples include pregnancy with abdominal pain and syncope (ectopic), history of an abdominal aortic aneurysm with syncope and abdominal pain (leaking AAA), 'worst ever headache' (subarachnoid haemorrhage), fever, neck stiffness and photophobia (meningitis), first presentation of cardiac chest pain after balloon angioplasty (re-stenosis) and ischaemic heart disease and fainting (cardiac syncope). This is by no means exhaustive.
3. *Considering the symptoms in context*: Chest pain in a 20 year old without a medical history has clearly different implications from chest pain in a 50-year old with ischaemic heart disease. Similarly, if a 20-year old who presents with isolated left facial numbness that has not progressed for two days would not benefit from the activation of an ambulance (Bell's Palsy). However, if it doubt or if the patient is potentially at risk for a transient ischaemic attack or stroke, referring for further investigation would be a safe practice.
4. *Treating the patient and not just the results*: Patients recalled for abnormal test results done 1-2 days ago and are asymptomatic should probably not be sent by ambulance unless there is are compelling reasons to believe that the condition has drastically deteriorated in the last 1-2 days.

There have been anecdotal cases from colleagues at SGH A&E whereby a ruptured ectopic pregnancy (with documented ultrasound finding of free fluid!) or documented acute coronary syndrome with STEMI arriving via private transportation. In such cases, the use of EAS ambulance is clearly warranted, as in all cases with potentially *unstable vital signs, changes in mental status*, potentially malignant *arrhythmias* or history of a *sentinel event.*

## INTERFACING WITH THE 995 OPS CENTRE AND SCDF PARAMEDICS

995 call-takers are trained to verify contact numbers, locations, detect cardiac arrest before addressing the chief complaint. It helps to allow the call-taker to ascertain the essential information for the dispatch of the ambulance and any appropriate additional resources such as the fire bikes or fast response paramedic.

Paramedics are trained explicitly to assess every patient, even if a doctor has seen them, and execute the most appropriate protocol(s) relevant to the patient's condition. While you may have already arrived at a conclusion or a clinical diagnosis, the paramedic is still obliged to perform a standard patient assessment with history taking, physical exam and the measurement of vital signs and relevant tests, such as repeating the ECG before instituting treatment and evacuation to hospital.

SCDF has encountered situations whereby GPs, in their haste to see the patient evacuated to hospital, refused to allow the paramedic to assess on site because they did not see the need for paramedics to follow these protocols, or 'waste time' performing another ECG. The wireless ECG is clearly shown internationally as well as locally to improve D2B time for better patient outcomes[5,7].

The rapid assessment by the paramedic is not meant to check on the work of the doctor; its role is to ensure that due diligence is performed for each patient, regardless of the knowledge or skill of the referring person.

## REFERRING TO THE EMERGENCY DEPARTMENT

In 2012, public emergency departments handled 934,485 cases and the growth of P3 cases has outstripped all other types of cases in the last 3 years in terms of percentage as well as absolute numbers. In 2012 the total volume was 985,289 and it is likely that 2013 or 2014 will see over a million cases being attended to at emergency rooms in Singapore!

The modern emergency department today has a forward triage area to sieves out febrile patients for isolation followed by triage according to priority to ambulatory care (P3), critical care (P2) and resuscitation (P1) areas.

Additionally, observation medicine is a recent development in emergency departments to help reduce the number of patients who are admitted for common conditions such as chest pain, gastroenteritis, abdominal discomfort, minor head injury, back pain etc. In the past, these patients are often admitted and discharged within 24 hours.

**FIGURE 4. THE 'GOLDEN HOUR QUINTET'**

| | Time sensitivity | Remarks |
|---|---|---|
| Out of Hospital Cardiac Arrest (OHCA) | Minutes | 7-10% decrease in survival every minute after OHCA without CPR or AED[4]. |
| ST elevation Myocardial Infarction | 90 minutes Door to Balloon Time | The AHA/ACC 2004 practice guideline on STEMIs recommends the use of EMS for patients with STEMI symptoms and education to improve symptom recognition (Class I)[5]. |
| Stroke | 4.5 hour window from onset to thrombolysis | AHA/ASA recommends that the use of EMS is strongly associated with a decreased time to stroke assessment[6]. |
| Acute respiratory distress | Minutes | Due to the broad nature of conditions causing respiratory distress, there are no uniform guidelines. |
| Trauma | "Golden Hour" | A concept that is figuratively correct, but the actual 60 minutes period is not scientifically validated as a determinant of survival. |

Using standardised care protocols, patients are risk stratified, reviewed every as often as 3-8 hourly and managed for up to 23 hours at the ED. This helps to risk stratify patients for admission and discharge low risk patients much faster than it would be possible in ward-based care. Many cases that previously required admission are now managed and discharged faster at much lower cost, freeing up vital hospital beds.

GPs can play a crucial role by helping to taking on a proportion of this ½ million P3 ambulatory cases and referring judiciously to help those more acutely ill patients navigate through the increasingly crowded and busy ED through a better understanding of the services available.

**FIGURE 5. YEAR-TO-YEAR INCREASE IN ED ATTENDANCES BY PRIORITY STATUS**

| | 2009 | 2010 | 2011 |
|---|---|---|---|
| P1 | 47,854 | 48,982 | 52,348 |
| YTY(%) | 10.8% | 2.4% | 6.9% |
| P2 | 328,879 | 320,317 | 341,547 |
| YTY(%) | 1.9% | -2.6% | 6.6% |
| P3 | 443,603 | 488,651 | 539,859 |
| YTY(%) | 5.4% | 10.2% | 10.5% |
| Total | 821,304 | 858,781 | 934,485 |

## MAKING BETTER EMERGENCY DEPARTMENT REFERRALS

Referring a patient to the ED is useful when there is a need to rapidly exclude potentially life-threatening conditions, when admission is likely or a work up is needed within hours or days. Condition that have been stable for days or weeks can probably be referred directly to specialist outpatient clinics. Examples include conditions such as chronic cough, rashes, stable aches and pains or simple finger or toe fractures that can be buddy-splinted or treated conservatively without special equipment. Other than reassurance and a non-urgent specialist referral, there is a limit to what an ED can offer in such situations.

Some of the administrative issues encountered with referral letters seen at the ED include (il)legibility of handwritten memos, insufficient documentation of significant positive AND negative findings. 'Please do the needful' is a term that is subject to many different interpretations.

The documentation of history and physical examination at the point of visit helps to chart the course of disease, as patients do not always repeat the same history, and significant history may be missed. Patients also often do not always go to the ED on the same day as instructed, so having the date of the referral on the memo is helpful to the receiving doctor.

Having baseline data regarding treatment attempted (such as a course of antibiotics), prior investigations, such as old blood results, ECGs to compare against provide a useful point of reference to expedite the working diagnosis at the ED, saving time and resources.

It is also useful to document the current medication or remind the patient to bring it along because this information is not readily available unless the data is captured electronically from polyclinic. The bonus value of patients bringing their medication is also to understand the actual usage versus the prescribed usage. (I am no longer surprised by patients who split tablets to save cost or take daily medication ONLY when they feel unwell.)

Lastly, it is helpful to give the patient realistic expectations of what is likely to occur at ED; promising a particular outcome to a patient may create inappropriate demands. For example, some patients present with a letter from their GP asking the patient to undergo specific investigations, treatments or be admitted. Examples include 'please do CT/MRI', which may not always be available/required, causing confusion and frustration. Instead, the patient could be told to ED and attending doctor will do the necessary assessment and decide whether admission is needed or the condition can be treated without admission.

## SAVING PATIENTS A TRIP TO THE EMERGENCY DEPARTMENT

There are some referral situations that occur in the primary care setting. In the first two, a trip to the ED may be avoided if the condition can be appropriately assessed and documented to be stable. In the third, referring to the right resource would help expedite care for the patient the avoid unnecessary secondary transfers:

1. Non-specific ECG changes – if a patient has had a previous ECG performed at the ED, comparing against the old ECG can help to confirm that no new changes have occurred, saving a time consuming trip down to the ED, especially for an asymptomatic patient.
2. Hypertension – while *hypertensive emergencies* are clearly defined by hypertension associated with end organ damage, there is no consensus on the blood pressure level[8]. These should all be referred to the ED. The less serious condition of a hypertensive urgency is less clearly defined, but a working definition of systolic BP >180mmHg or diastolic BP >120mmHg without symptoms can be used in the primary care setting. It would be reasonable to rest the asymptomatic patient for 15-30 minutes and retake the blood pressure. If the reading falls below these levels, adjusting the medication, appropriate advice to return if symptomatic and an early review can save the patient an ED visit.
3. Referring for subspecialty support – Knowing the availability of specialist support in various hospitals can help expedite patient care.
   a. Pediatric referrals - Referring directly to NUH or KKWCH would be appropriate, especially if there is a likelihood of hospital admission.
   b. Burns – complicated burns, such as over the face, hands, groin, large surface areas and/or deep partial thickness burn would benefit from being assessed by the SGH burns centre.
   c. Obstetrics – obstetric emergencies should be referred to hospitals with an obstetrics department, namely KKWCH, NUH and SGH. Otherwise, secondary transfer for assessment will be required.

**REFERENCES**

1. Lateef F, Anantharaman V. Emergency medical services in Singapore. CJEM. 2000;2(4):272.
2. National Emergency Medical Services Education Standards. Available at: http://www.ems.gov/pdf/811077a.pdf.
3. Fischer M, Kamp J, Garcia-Castrillo Riesgo L, et al. Comparing emergency medical service systems—A project of the European Emergency Data (EED) Project. Resuscitation. 2011;82(3):285–293. doi:10.1016/j.resuscitation.2010.11.001.
4. Cummins RO, Eisenberg MS, Hallstrom AP, Litwin PE. Survival of out-of-hospital cardiac arrest with early initiation of cardiopulmonary resuscitation. Am J Emerg Med. 1985;3(2):114–119.
5. Antman EM, Anbe DT, Armstrong PW, et al. ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction; A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Revise the 1999 Guidelines for the Management of patients with acute myocardial infarction). J Am Coll Cardiol. 2004;44(3):E1–E211. doi:10.1016/j.jacc.2004.07.014.
6. Adams HP, Zoppo G del, Alberts MJ, et al. Guidelines for the Early Management of Adults With Ischemic Stroke A Guideline From the American Heart Association/ American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Stroke. 2007;38(5):1655–1711. doi:10.1161/STROKEAHA.107.181486.
7. Ho AFW, Fook-Chong S, Pek PP, Ng YY, Wong ASL, Ong MEH. Prehospital presentation of patients with ST-segment elevation myocardial infarction in Singapore. Int J Cardiol. doi:10.1016/j.ijcard.2013.04.204.
8. Cherney D, Straus S. Management of Patients With Hypertensive Urgencies and Emergencies. J Gen Intern Med. 2002;17(12):937–945. doi:10.1046/j.1525-1497.2002.20389.x.

**LEARNING POINTS**

- **The use of emergency ambulances services should be commensurate with the timeframe of which the medical condition is deteriorating or the potential for sudden catastrophic outcomes.**
- **Activation of the EAS ambulance for STEMIs and strokes help to reduce the D2B time and time to thrombolysis.**
- **Patients at risk of AMI or stroke often fail to recognise the symptoms and activate the EMS system. Physician do have a role to identify those at risk to educate them to achieve better outcomes**
- **Good documentation of positive and significant negative findings and relevant tests provides a baseline to expedite patient assessment at the ED.**
- **An understanding of the available ED resources as well as the access to services, especially when sub-specialty consultation is needed, helps to improve the appropriateness of referrals.**

UNIT NO. 2

# IMPROVING PRIMARY CARE MANAGEMENT OF TIME SENSITIVE EMERGENCIES

A/Prof Malcolm Mahadevan, Dr Kanwar Sudhir Lather


## ABSTRACT

**Ischemic heart disease, pneumonia, cerebrovascular accidents and chronic obstructive pulmonary disease rank among the top 10 causes of hospitalisation in Singapore[1]. For optimum patient outcomes, acute presentations of each of these spectrum of diseases requires a continuum of care involving crucial steps at primary healthcare, pre-hospital transport, emergency care at the emergency department, hospitalisation and sometimes, rehabilitation at step-down facilities. For patients with suspected ACS, a resting 12-lead electrocardiogram (ECG) should be obtained as soon as possible: do not rule out acute coronary syndrome (ACS) because of a normal resting 12-lead ECG; administer a loading dose of 300mg aspirin, preferably chewed; do not offer other antiplatelet agents in primary care; and if aspirin is given before arrival at hospital, send a written record with the patient. For patients with suspected stroke, attempt to ascertain exact time of onset of stroke - when the patient was last seen at his or her neurologic baseline, rather than the time at which the symptoms were first noticed; immediate assessment using a standardised tool (CPSS, or FAST, or LAPSS) is indicated for patients with new or developing stroke-like symptoms. The therapeutic window for thrombolsis is 3 hours for intravenous tPA and 6 hours for intra-arterial tPA. For patients presenting with acute onset dyspnea, assess emergently for signs and symptoms suggestive of airway obstruction; administer high flow oxygen in sitting position/ position of comfort; without delaying transfer, obtain CXR, ECG, capillary blood glucose.**


**Keywords: acute coronary syndrome, cerebrovascular accident, dyspneal**

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## INTRODUCTION

Ischemic heart disease, pneumonia, cerebrovascular accidents and chronic obstructive pulmonary disease rank among the top 10 causes of hospitalisation in Singapore[1]. For optimum patient outcomes, acute presentations of each of these spectrum of diseases requires a continuum of care involving crucial steps at primary healthcare, pre-hospital transport, emergency care at the emergency department, hospitalisation and sometimes, rehabilitation at step-down facilities.

In the setting of primary care, patients presenting with acute serious illnesses, or acute exacerbations of chronic conditions benefit from the following:

- Early diagnosis
- Instituting immediate primary intervention(s)
- Expedited transfer to hospital by ambulance.

## ACUTE CORONARY SYNDROMES

Acute coronary syndrome (ACS) refers to a spectrum of clinical presentations ranging from those for ST-segment elevation myocardial infarction (STEMI) to presentations found in non-ST-segment elevation myocardial infarction (NSTEMI) or in unstable angina. It is almost always associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct-related artery.

Ischemic heart disease ranks second as the leading cause of death in Singapore[1]. The clinical presentations of CAD include silent ischemia, stable angina pectoris, unstable angina, myocardial infarction (MI), heart failure, and sudden death. Distinguishing patients with acute coronary syndromes (ACS) within the very large proportion with suspected cardiac pain are a diagnostic challenge, especially in individuals without clear symptoms or electrocardiographic features.

As with most of acute care medicine, the best outcomes are achieved with early pattern recognition, early identification and referral, risk stratification and early appropriate treatment. Similarly, the approach to the diagnosis and correct management of the patient presenting with chest pain requires a combination of detailed history, clinical examination, risk stratification and appropriate management.

### Early diagnosis:

An acute coronary syndrome (ACS) is more likely if[2,3]:

- Prolonged episode of anginal chest pain lasting 20 minutes at rest
- New onset angina (class II or III of the Classification of the Canadian Cardiovascular Society), with crescendo symptoms in previously stable angina with at least Class III angina characteristics
- Prolonged pain is observed in 80% of patients while de novo or accelerated angina is observed in the remaining 20%.

Typical clinical presentation of an ACS is retrosternal pressure or

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heaviness (angina) radiating to the left arm, neck or jaw, which may be intermittent (usually lasting for several minutes) or persistent - this would be accompanied by symptoms such as:

- Diaphoresis
- Nausea
- Abdominal pain
- Dyspnea
- Syncope.

Atypical presentations more often observed in patients over 75 years, women, patients with diabetes, chronic renal failure or dementia are:

- Epigastric pain
- Indigestion
- Stabbing chest pain
- Chest pain with some pleuritic features
- Increasing dyspnoea.

Physical findings can range from normal to unstable hemodynamics with signs of congestive cardiac failure and/ or cardiogenic shock.

**Immediate primary intervention(s):**

Management of ACS can start in primary care, and be continued in the ambulance and in secondary care. Management of ACS, whether it be unstable angina (UA) or non-ST-segment elevation myocardial infarction (NSTEMI), or ST-segment elevation myocardial infarction (STEMI), is the same in the primary care setting[4]. Distinguishing between UA, NSTEMI and STEMI cannot be done until an electrocardiogram (ECG) and troponin test have been performed.

Management of (ACS) starts as soon as it is suspected and includes:

- A resting 12-lead electrocardiogram (ECG)[4]. (If possible, transmit ECG to hospital being referred to)
- EMS services in Singapore have the ability to transmit 12-lead ECGs to receiving emergency medicine departments during transit.
- ACS can not be excluded with a normal resting 12-lead ECG
- Administer a loading dose of 300mg aspirin, preferably chewed
- Do not offer other antiplatelet agents in primary care
- If aspirin is given before arrival at hospital, send a written record with
- the patient
- Pain relief may be considered in the form of GTN sublingually or as a patch if the patient has hemodynamic stability
- Intramuscular (IM) injections should be avoided[5]
- Administer high flow oxygen via a non-re-breathe mask during ambulance transfer.

**Expedited transfer to hospital by ambulance:**

Immediately refer any patient who[3]:

- Has current chest pain
- Is currently pain free, but has had chest pain in the last 12 hours, and resting 12-lead electrocardiogram (ECG) is abnormal or not available
- Has developed further chest pain after recent (confirmed or suspected) acute coronary syndrome (ACS)
- Presents with signs of complications such as pulmonary edema.

It has been established that the faster the arrival at the emergency department the better the patient outcomes[6]. In a recently published multivariate analysis of predictors of pre-hospital delay in ACS[7], the following factors were associated with significant delays in hospital presentation from time of onset of symptoms:

- Inability to recognise the presence of fatigue and abdominal symptoms as symptoms of ACS
- Gradual or intermittent onset of symptoms rather than continuous symptoms was associated with longer delays
- Decision by patients to visit primary care facilities rather than call for ambulance upon onset of symptoms was associated with significantly longer delay times
- Decision by patients to self-treat symptoms with non-cardiac related drugs was also associated with significantly longer delays.

## CEREBROVASCULAR ACCIDENT

A cerebrovascular event is a clinical syndrome of rapid onset of global or focal impairment of brain function. It is a medical emergency requiring immediate response. With the widespread availability of emergent thrombolysis capability, the need for immediate transport of suitable patients to the hospital has never been so dire.

Stroke is characterised by the sudden loss of blood circulation to an area of the brain, resulting in a corresponding loss of neurologic function. Classified as either hemorrhagic or ischemic, a significant majority of strokes (approximately 70%) are due to cerebral infarction; about 20% are hemorrhagic and 10% of strokes are of an uncertain type[8].

In an attempt to minimise transfer times and maximise neurological outcomes, the American Stroke Association has described the stroke 'Chain of Survival'.

1. Rapid recognition and reaction to stroke warning signs
2. Rapid EMS dispatch
3. Rapid EMS system transport and pre-arrival notification to the receiving facility
4. Rapid diagnosis and treatment in the hospital.

**Early diagnosis:**

Common signs of stroke include:

- Acute hemiparesis or hemiplegia

- Acute hemisensory loss
- Complete or partial hemianopia, monocular or binocular visual loss, or diplopia
- Dysarthria or aphasia
- Ataxia, vertigo, or nystagmus
- Sudden decrease in consciousness.

Atypical symptoms, especially in women[9,10], include:
- Loss of consciousness or syncope
- Shortness of breath
- Sudden pain in the face, chest, arms, or legs
- Seizure
- Falls or accidents
- Sudden hiccups/ nausea/ fatigue/ palpitations
- Altered mental status.

Conditions that mimic stroke include[11]:
- Seizures/ postictal paralysis (Todd paralysis)
- Syncope
- Intracranial mass effect (hemorrhage, tumor, abscess)
- Metabolic: Hypoglycemia, hyponatremia, hyperosmotic coma
- Hypertensive encephalopathy
- Meningitis/ encephalitis
- Wernicke encephalopathy
- Otorhinolaryngeal: Labyrinthitis, Meniere's disease, Bell's palsy.

To rapidly evaluate a patient with stroke-like signs and symptoms in an outpatient setting the use of a stroke screening tool with a high sensitivity,[12,13] such as the Cincinnati Prehospital Stroke Scale (CPSS), the Face Arms Speech Time (FAST) test, or the Los Angeles Prehospital Stroke Screen (LAPSS) is recommended.

**Immediate primary intervention(s):**

Management of CVA can start in primary care, and be continued in the ambulance and in secondary care.
- Obtain full vital signs including Oxygen Saturation
- Mild and moderately elevated blood pressure should not routinely be lowered in the acute phase of stroke[14]
- Deliver Oxygen by Nasal cannula (if Oxygen Saturation <90%)
- Obtain Intravenous Access
- ECG
- Bedside Serum Glucose
- Focused history (LoST MIND mnemonic):
  1. Last well or Onset
  2. Seizure
  3. Trauma (esp. Closed Head Injury)
  4. Migraine
  5. Illness (recent)
  6. Neck injury
  7. Diabetes Mellitus.

**Expedited transfer to hospital by ambulance:**

Immediate assessment using a standardised tool (CPSS, or FAST, or LAPSS) and then transfer by ambulance is indicated for patients with new or developing stroke-like symptoms.

As the patient might be eligible for thrombolytic treatment, ensure that ambulance control understands the urgency of the situation and that the person needs to be taken immediately to the nearest hospital with facilities for stroke thrombolysis.

Do not delay transfer to hospital.

## DYSPNEA

Dyspnea is a common problem affecting up to half of patients admitted to acute, tertiary care hospitals and one quarter of ambulatory patients[15].

The 2012 consensus statement[16] of the American Thoracic Society defines dyspnea as: a term used to characterise a subjective experience of breathing discomfort that is comprised of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioral responses.

Dyspnea is a complex symptom that potentially warns of a critical threat to homeostasis and thus frequently leads to adaptive responses (such as resting or seeking medical care).

**Early diagnosis:**

The immediate approach to the acutely dyspneic patient hinges on the following 3 questions:
1. Is there airway obstruction? If yes, is it an upper or lower airway problem?
2. How sick is the patient i.e. is there threat to life?
3. What is the likely cause?

### 1) Is there airway obstruction?

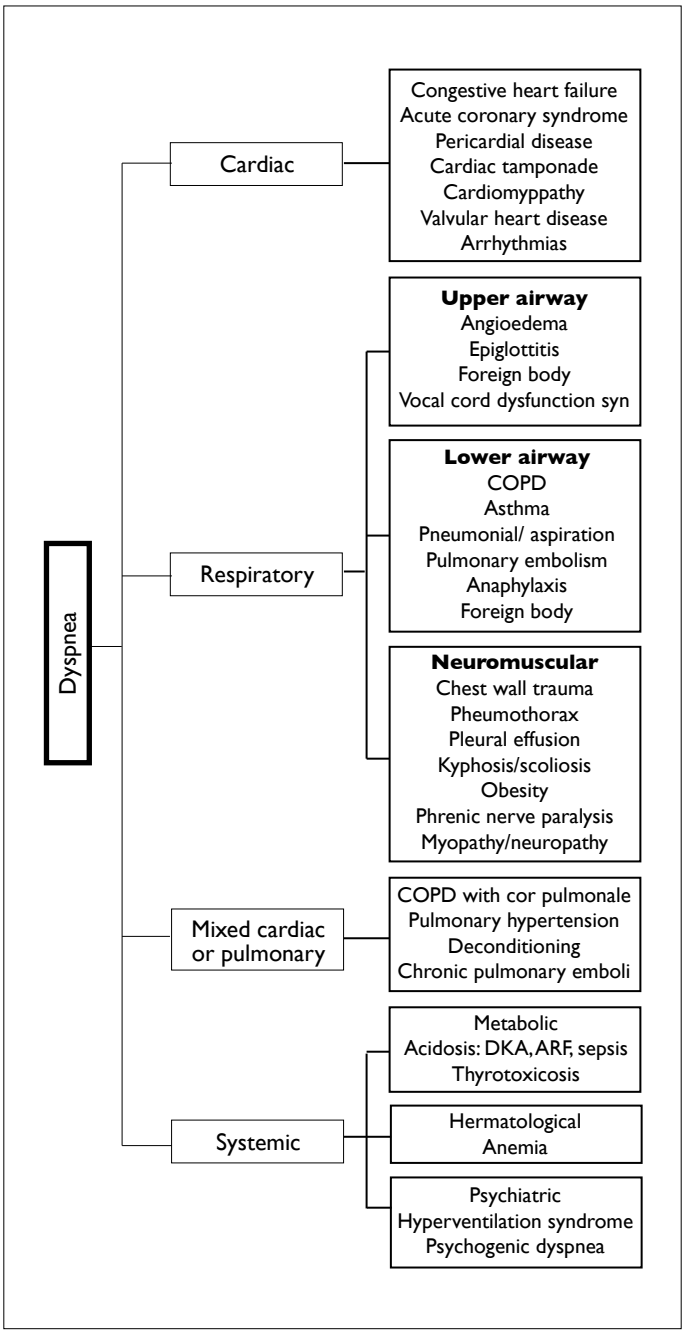
Symptoms of airway obstruction:
- Choking
- Gasping for air.

Signs of airway obstruction:
- Altered level of consciousness: Panic/ agitation/ confusion
- Cyanosis
- Stridor
- Drooling
- Tripod position.

### 2) How sick is the patient?

Does the patient demonstrate:
- Hypoxia
- Cyanosis
- Stridor or other signs of upper airway obstruction
- Unilateral breath sounds or signs suggestive of pneumothorax
- Tachypnea with respiratory rate >40 breaths per minute
- Accessory muscle use with retractions
- Arrhythmia
- Hypotension.

**FIGURE 1. CAUSES OF DYSPNEA**




### 3) What is the likely cause?

Causes of dyspnea in adults are shown in Figure 1. They include:

Cardiac:

- Congestive heart failure (right, left or biventricular)
- Acute coronary syndrome
- Pericardial disease/ cardiac tamponade
- Cardiomyopathy
- Valvular heart disease
- Arrhythmias

Respiratory:

- Upper airway:
  - o Angioedema
  - o Epiglottitis
  - o Foreign body
  - o Vocal cord dysfunction syndrome
- Lower airway:
  - o COPD
  - o Asthma
  - o Pneumonia/ aspiration
  - o Pulmonary embolism
  - o Anaphylaxis
  - o Foreign body
- Neuromuscular:
  - o Chest wall trauma
  - o Pneumothorax
  - o Pleural effusion
  - o Kyphosis/ scoliosis
  - o Obesity
  - o Phrenic nerve paralysis
  - o Myopathy/ neuropathy: Myasthenia gravis, Guillain-Barre syndrome

Mixed cardiac or pulmonary:

- COPD with pulmonary hypertension and cor pulmonale
- Deconditioning
- Chronic pulmonary emboli.

Systemic causes:

- Metabolic:
  - o Acidosis: DKA, acute renal failure, sepsis
  - o Thyrotoxicosis
- Hematological:
  - o Anemia
- Psychiatric
  - o Hyperventilation syndrome
  - o Psychogenic dyspnea (pseudoasthma)

In the acute presentations of dyspnea, it helps to simplify the myriad causes to aid prioritisation of management and correct disposition.

Most-immediately life threatening:

1. Upper airway obstruction
2. Tension pneumothorax
3. Pulmonary embolism
4. Neuromuscular weakness: myasthenia gravis, Guillain-Barre syndrome
5. Fat embolism.

By far the commonest causes of dyspnea in adults are[17]:

1. Asthma
2. Chronic obstructive pulmonary disease (COPD)
3. Interstitial lung disease
4. Myocardial dysfunction
5. Obesity/deconditioning
6. Metabolic causes: DKA, acute renal failure, sepsis.

## Immediate primary intervention(s):

Management of acute dyspnea should start in primary care, and be continued in the ambulance and in secondary care.

- ABC Management
- Administer high flow oxygen in sitting position/ position of comfort
- Obtain full vital signs including oxygen saturation
- Chest x-ray
- ECG
- Capillary blood glucose.

## Expedited transfer to hospital by ambulance:

Arrange for early transfer to hospital for patients presenting with complaints of:

- Severe dyspnea
- New onset dyspnea at rest
- Sudden onset of dyspnea with chest pain.

Immediate ambulance transfer must be arranged for dyspneic patients with[17]:

- Altered level of consciousness
- Hypoxia
- Cyanosis
- Stridor or other signs of upper airway obstruction
- Unilateral breath sounds or signs suggestive of pneumothorax
- Tachypnea with respiratory rate >40 breaths per minute
- Accessory muscle use with retractions
- Arrhythmia
- Hypotension.

Initiate immediate protocol-based disease specific management.

### REFERENCES


1. http://www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore/Top_10_Conditions_of_Hospitalisation.html
2. Hamm CW, Bassand JP, Agewell S et al. European Society of Cardiology (ESC) guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. Eur Heart J 2011 doi: http://dx.doi.org/10.1093/eurheartj/ehr236
3. National Institute for Health and Clinical Excellence (NICE). Assessment and diagnosis of recent onset chest pain or discomfort of suspected cardiac origin. Clinical guideline 95. London: NICE; 2010
4. Institute for Clinical Systems Improvement (ICSI). Diagnosis and treatment of chest pain and acute coronary syndrome (ACS). Bloomington, MN: ICSI; 2012
5. Steg G, James SK, Atar D, et al. Management of acute myocardial infarction in patients presenting with persistent ST segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology. Eur Heart J 2012 doi: 10.1093/eurheartj/ehr236 doi: http://dx.doi.org/10.1093/eurheartj/ehr236
6. Moser DK, Kimble LP, Alberts MJ, et al. Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on cardiovascular nursing and stroke council. Circulation 2006 doi: http://dx.doi.org/10.1161/CIRCULATIONAHA.106.176040
7. McKee G, et al. Multivariate analysis of predictors of pre-hospital delay in acute coronary syndrome, Int J Cardiol 2013 doi: http://dx.doi.org/10.1016/j.ijcard.2013.03.022
8. Royal College of Physicians (RCP). National clinical guidelines for stroke. 3rd edn. London: RCP; 2008
9. Labiche LA, Chan W, et al. Sex and acute stroke presentation. Ann Emerg Med 40(5): 453, 2002 doi: http://dx.doi.org/10.1067/mem.2002.128682
10. Gargano JW, Wehner S, et al. Sex differences in acute stroke care in a statewide stroke registry. Stroke 39(1): 24, 2008 doi: http://dx.doi.org/10.1161/STROKEAHA.107.493262
11. Goldstein LB, Simel DL: Is this patient having a stroke? JAMA293(19):2391, 2005 doi: http://dx.doi.org/10.1001/jama.293.19.2391
12. Crocco TJ. Streamlining stroke care: from symptom onset to emergency department. J Emerg Med. 2007 doi: http://dx.doi.org/10.1016/j.jemermed.2007.02.056
13. Nor AM, Davis J, Sen B, et al. The recognition of stroke in the emergency room scale: development and validation of a stroke recognition scale. Lancet Neurol. 2005 doi: http://dx.doi.org/10.1016/S1474-4422(05)70201-5
14. Adams HP, Jr, del Zoppo G, Alberts MJ, et al. Guidelines for the early management of adults with ischemic stroke: A guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups. Stroke 2007 doi: http://dx.doi.org/10.1161/STROKEAHA.107.181486
15. Kroenke K, Arrington ME, Mangelsdorff AD. The prevalence of symptoms in medical outpatients and the adequacy of therapy. Arch Intern Med 1990 doi: http://dx.doi.org/10.1001/archinte.150.8.1685
16. Parshall MB, Schwartzstein RM, Adams L, et al. An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. Am J Respir Crit Care Med 2012 doi: http://dx.doi.org/10.1164/rccm.201111-2042ST
17. Pratter MR, Curley FJ, Dubois J, Irwin RS. Cause and evaluation of chronic dyspnea in a pulmonary disease clinic. Arch Intern Med 1989 doi: http://dx.doi.org/10.1001/archinte.149.10.2277

**LEARNING POINTS**

- **For patients with suspected ACS, a resting 12-lead electrocardiogram (ECG) should be obtained as soon as possible.**
  - **Do not exclude acute coronary syndrome (ACS) with a normal resting 12-lead ECG.**
  - **Administer a loading dose of 300mg aspirin, preferably chewed.**
  - **Do not offer other antiplatelet agents in primary care.**
  - **If aspirin is given before arrival at hospital, send a written record with the patient.**
- **For patients with suspected stroke, attempt to ascertain exact time of onset of stroke - when the patient was last seen at his or her neurologic baseline, rather than the time at which the symptoms were first noticed. For patients with new or developing stroke-like symptoms, immediate assessment using a standardised tool (CPSS, or FAST, or LAPSS) is indicated.**
  - **Transfer by ambulance is indicated**
  - **The therapeutic window for thrombolysis is 3 hours for intravenous tPA and 6 hours for intra-arterial tPA.**
- **For patients presenting with acute onset dyspnea, assess emergently for signs and symptoms suggestive of airway obstruction.**
  - **Administer high flow oxygen in sitting position/ position of comfort.**
  - **Without delaying transfer, obtain CXR, ECG, capillary blood glucose.**

UNIT NO. 3

# RESUSCITATION UPDATE - 2013

Prof V. Anantharaman


## ABSTRACT

**The practice of resuscitation is guided by the principle of the Chain of Survival, which essentially has four links, viz. Early Access, Early CPR, Early Defibrillation and Early Advanced Life Support. Basic cardiac life support consists of the first two links in the Chain of Survival. Thirty chest compressions to 2 ventilations at the rate of 100 compressions a minute is the norm. Hands only CPR is only used when the rescuer is unable to perform mouth-to-mouth ventilation for some reason. Defibrillation, the third link in the chain of survival, is one of the key strategies in the management of cardiac arrest victims. The commonest initial rhythm 3 at the onset of cardiac arrest is coarse ventricular fibrillation (VF) and the most effective therapy to date for this malignant rhythm is electrical defibrillation of the heart. Advanced Cardiac Life Support (ACLS), the fourth link in the Chain of Survival, is very dependent on the optimal conduct of the earlier three links. Arrhythmia management continues to be the cornerstone of ACLS guidelines. The 2011 guidelines have introduced post-resuscitation interventions into ACLS (i.e. measures carried out after Return of Spontaneous Circulation or ROSC).**


**Keywords: cardio-pulmonary resuscitation, basic cardiac life support, defibrillation, advance cardiac life support.**

**SFP2013; 39(3): 20-31**

## INTRODUCTION

Fifty three years ago, the basis for modern resuscitation practice was laid with the demonstration of modern-day Cardio-Pulmonary Resuscitation[1]. The advent of modern communication technology since then has resulted in the greater sharing of research evidence for determination of community practice of resuscitation. Over the last 15 years, at every five yearly intervals, the International Liaison Committee on Resuscitation (ILCOR), of which Singapore's National Resuscitation Council (NRC) is also a member (through its active role in the Resuscitation Council of Asia), produces a Consensus document on the Science of Resuscitation. The last release of this was in late 2010. Resuscitation Councils of various countries use this document and determine how the science is best applied to their own environment, resulting in the minor differences in the various national resuscitation guidelines. Singapore announced her current guidelines in March 2011 after the NRC reviewed the application of the science locally. These were published in the Singapore Medical Journal August 2011 issue (http://www.nrcsingapore.org/sg/index.php?option=com_content&view=article&id=72&Itemid=94 ).

The practice of resuscitation is guided by the principle of the Chain of Survival, which essentially has four links, viz. Early Access, Early CPR, Early Defibrillation and Early Advanced Life Support. These links will be referred to in the discussion of the many facets of resuscitation that range from basic to advanced life support.

## BASIC CARDIAC LIFE SUPPORT

The key features of basic cardiac life support consist of the first two links in the Chain of Survival and include the following:

1. Need to train many community citizens in cardio-pulmonary resuscitation (CPR): the majority of cardiac arrests occurs out-of-hospital. In Singapore, on average, the time from collapse to arrival of the ambulance crew and starting of CPR is about 25 minutes[2]. Slow reaction time, low rate of bystander CPR (about 20%), the long time taken for ambulance crew to reach location because of road traffic and additional time to patients who live in high rise apartments all add to the delay. Survival drops by 7 to 10% for every minute of delay in initiating CPR.
2. The hand is positioned at the lower half of the sternum and the rescuer positioned vertically above the chest with the elbows extended and locked in position.
3. The rate of chest compressions is at least 100 per minute.
4. The depth of each chest compression should be at least 5.0 cm. Push hard. Allow full chest recoil after the end of each compression.
5. Two ventilations need to be given after every 30 chest compressions. This may be given by mouth-to-mouth breathing, mouth-to-mask or by bag-valve-mask.
6. Training of members of the public should include both chest compressions and mouth-to-mouth ventilation. The pulse check does not need to be taught to lay rescuers. The teaching and use of pulse check for healthcare workers is optional.
7. If a rescuer could not / did not perform mouth-to-mouth ventilation for any reason, then at least he must perform chest compressions well.
8. CPR done out-of-hospital should continue until:
   a. Emergency ambulance crew arrive and take over the resuscitation
   b. An AED is connected to the patient and advises stand clear for rhythm analysis
   c. The casualty regains a circulation and begins to move and breathe on his own

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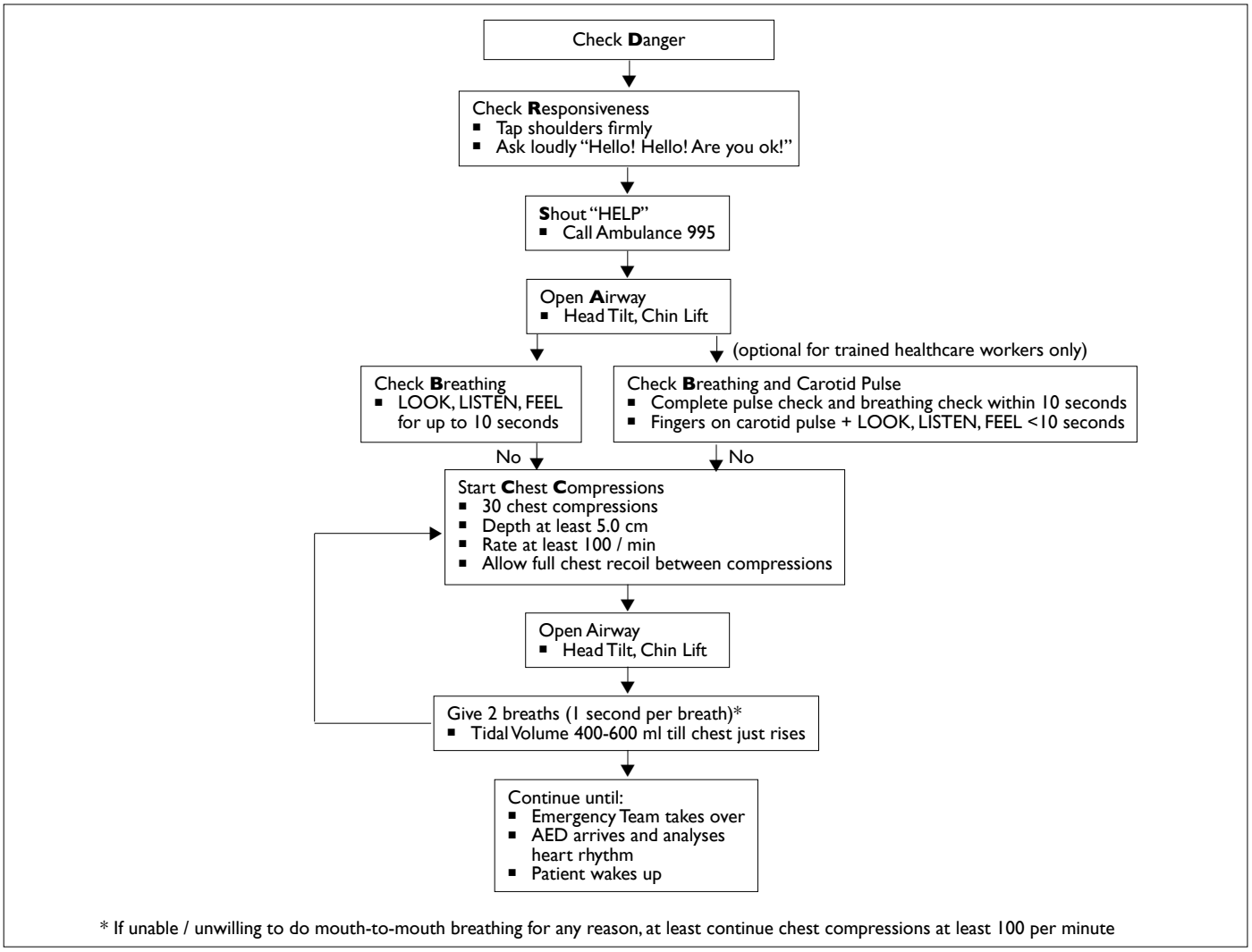
**FIGURE 1. ALGORITHM FOR CARDIO-PULMONARY RESUSCITATION (CPR)**




9. The BCLS algorithm for adults is as given in Figure 1. The steps of CPR can also be pictorially represented as in Figure 2.
10. Hands-only CPR has been used in some states around the world. This refers to provision of only chest compression without any mouth-to-mouth ventilation. The brain needs oxygen to survive. Deprivation of oxygen for more than 4 to 6 minutes results in the onset of brain damage which is usually irreversible after at least 10 minutes of oxygen deprivation. In communities with short emergency ambulance response times, hands-only CPR has appeared to show some benefit. However, where time from collapse to CPR is more than 15 minutes, 30:2 CPR results in better survival than hands-only CPR. Standard 30:2 CPR is, however, very difficult to instruct over the telephone. Hands-only CPR is recommended only in the following situations:
    a. For Dispatcher assisted CPR: This is telephone CPR advice provided by the SCDF Call Centre operator. This allows some form of CPR to be provided by an untrained rescuer before the arrival of the ambulance team.
    b. If the rescuer is unable to or unwilling to provide mouth-to-mouth ventilation.

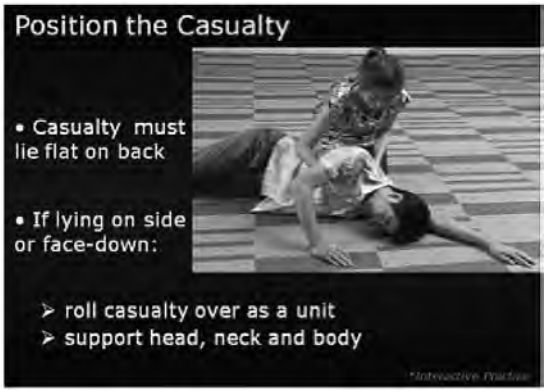
## DEFIBRILLATION

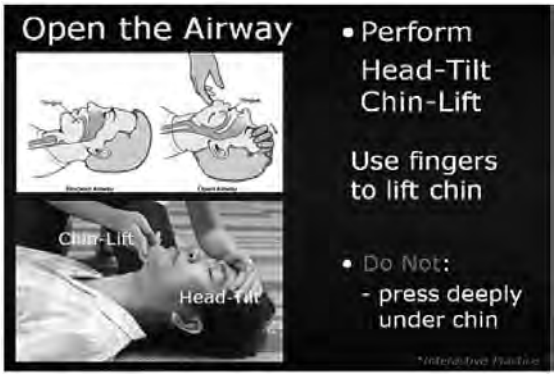
Defibrillation, the third link in the chain of survival, is one of the key strategies in the management of cardiac arrest victims. The commonest initial rhythm[3] at the onset of cardiac arrest is coarse ventricular fibrillation (VF) and the most effective therapy to date for this malignant rhythm is electrical defibrillation of the heart. If VF is not managed promptly, and the patient does not receive CPR or defibrillation within the first few minutes of collapse, coarse VF degenerates into a fine VF of low amplitude and subsequently, within 10 to 12 minutes into a straight line (asystole), which is more difficult to resuscitate back to life. The following statements concerning defibrillation reflect the local consensus on use of defibrillation in Singapore for both in-hospital and out-of-hospital cardiac arrests.

1. The CPR-Defibrillation Sequence
    a. If a life support provider with a defibrillator at hand witnesses a cardiac arrest, defibrillation may be applied immediately. In the immediate absence of a defibrillator, CPR should be initiated first and continued while awaiting the arrival of the defibrillator and while it is being applied. This is relevant in both witnessed and unwitnessed cardiac arrests.

**FIGURE 2. STEP-BY-STEP GUIDE TO CPR**

**(BY COURTESY OF NATIONAL RESUSCITATION COUNCIL, SINGAPORE)**






b. In patients with persistent or recurrent VF despite initial defibrillation, the CPR-defibrillation sequence is adopted. In this sequence, the emphasis is to provide good quality, uninterrupted CPR of 1-2 min duration in-between defibrillations. Good quality CPR promotes systemic and coronary perfusion and also helps improve intravascular medication delivery when resuscitation drugs are used in the context of advanced cardiac life support. At the end of a period of CPR, rhythm analysis should be carried out to determine the need for further cardiac compressions or defibrillation.

c. On delivery of a defibrillatory current to a patient in VF or pulseless VT, CPR should be initiated immediately and continued for at 1-2 minutes before rhythm analysis is performed.

2. Automated external defibrillators (AEDs) are becoming increasingly available in public areas in Singapore. These devices have protocols to guide users through a process of performing safe defibrillation. The actions required are often delivered through voice prompts. The devices even prompt rescuers to "stand clear" during the stages of rhythm analysis and delivery of defibrillatrory shock. Training for healthcare workers and members of the public (bystanders) on the use of these devices integrated with good quality CPR is available at more than fifty NRC-accredited training centres in the country.

3. Defibrillation waveforms and energies
   a. All new defibrillators in Singapore use biphasic waveform to deliver shocks. There is good evidence to indicate that the lower energies used in biphasic defibrillators achieve higher first shock defibrillation success than previous traditional monophasic defibrillators[4,5,6,7,8]. Use of lower energies also allows the creation of smaller sized and lighter defibrillators which easier to maintain and with extended battery life.
   b. The energy range that may be used to deliver biphasic defibrillatory shocks to patients in VF or pulseless VT is 150 to 360 joules. When using monophasic defibrillators, only 360 joule shocks are recommended. Most centres begin biphasic defibrillation at the lower energy range (either 150 or 200 joules). The occurrence of persistent or recurrent VF usually results in the use of escalating doses of defibrillatory energy, usually to 300 joules and further to 360 joules, if required, unless low-energy devices are being used, in which case defibrillation continues at the lower energy levels without escalation.
   c. Though there has been some evidence that some patients require higher energy shocks for successful defibrillation of VF, there are no parameters currently available that allow prediction of optimal energy levels for successful defibrillation. There is also no evidence of increased myocardial damage / dysfunction in humans following use of escalating higher-energy shocks of up to 360 joules.

4. Training rescuers in defibrillation
   a. The NRC recommends that all healthcare workers know how to use an AED or defibrillate in a (semi-)automated mode with a standard manual defibrillator and that all emergency and non-emergency ambulances be equipped with an AED when transporting patients. In addition, the NRC recommends that increased focus be given to imparting AED skills to the following:
   i. School teachers and student groups, for secondary school levels and above
   ii. Grassroots organisations and community groups
   iii. Sports personnel, including coaches
   iv. Armed forces personnel
   v. Community citizens
   b. The NRC is also working with major organisations in Singapore to facilitate the training of the various groups in the combined skills and CPR+AED.

5. Defibrillation paddles / pads and their application and position:
   a. When delivering shocks both self-adhesive pads and paddles are acceptable. The larger the paddle/pad interface, the higher the shock success[9]. Commercially made paddles/pads usually come in sizes ranging from 8 cm to 12 cm.
   b. The paddle/pad must be applied in direct contact with the human skin
   c. Adequate exposure of the application area is essential during pad application.
      i. In a hairy-chested individual, the area of application should be shaved prior to applying the paddle/pad.
      ii. In a female patient in the out-of-hospital scenario, chest exposure should be limited just to be able to apply the defibrillation pads, after which the chest wall may be covered by the patient's own clothing.
   d. The anterior - lateral position for paddle/pad placement is preferred. The anterior paddle/pad is applied on the right anterior chest just below the right clavicle. The lateral paddle/pad is applied immediately below and lateral to the left breast. Alternative acceptable paddle/pad positions include anterior-posterior and apex-posterior positions.
   e. In a patient with a permanent pacemaker or an implantable cardioverter-defibrillator (ICD), defibrillation paddle/pads should be applied at least 4 finger breaths away from the device.

6. Use of monitoring leads during cardiac resuscitation
   a. To ensure no interference with CPR and defibrillation during a resuscitation, the recommended standard electrode positions of 4-lead cardiac monitoring systems are:

| Lead | Positioning |
|---|---|
| Right arm lead | Anterior aspect of right shoulder |
| Left arm lead | Anterior aspect of left shoulder |
| Right leg lead | Right anterior superior iliac spine of pelvis |
| Left leg lead | Left anterior superior iliac spine of pelvis |
| Ground lead (in 5-lead systems) | Lower end of sternum |

7. Use of Oxygen during Defibrillation
   a. Though oxygen is an essential drug used during a resuscitation, its use poses a small risk of fires. To prevent sparking during a defibrillation, the following are recommended:
      i. Turning off oxygen devices that are not in use
      ii. Remove any open sources of oxygen (nasal cannula, face mask) and ensuring that these are directed away from the chest wall
      iii. Form a tight seal with the bag-mouth-mask device when manually ventilating patient or connecting the tracheal tube to a ventilator

8. The use of an AED during a resuscitation may be summarised pictorially as in Figure 3.

9. Ensure that while using an AED or a manual defibrillator, one needs to minimise interruptions to chest compressions and ventilation.

## ADVANCED CARDIAC LIFE SUPPORT

Advanced Cardiac Life Support (ACLS), the fourth link in the Chain of Survival, is very dependent on the optimal conduct of the earlier three links. Arrhythmia management continues to be the cornerstone of ACLS guidelines. The 2011 guidelines have introduced post-resuscitation interventions into ACLS (i.e. measures carried out after Return of Spontaneous Circulation or ROSC). Currently there exists a large gap in the numbers who achieve ROSC and those who leave hospital alive. Post-ROSC measures are playing a larger role in the management of cardiac arrest victims. The 2011 ACLS guidelines address the following aspects of the vital fourth link of the chain of survival:

- Immediate actions following cardiac arrest.
- Airway.
- Breathing (ventilation).
- Supporting the Circulation during cardiac arrest.
- Peri-arrest arrhythmias.
- Identifying reversible causes.
- Post-resuscitation care.
- Organ donation.

### 1. Immediate Actions Following Cardiac Arrest – the Universal Algorithm for Cardiac Arrest (Figure 5)

The principles outlined above for Basic Cardiac Life Support and Defibrillation apply in the immediate phase after cardiac arrest. Good basic life support is the cornerstone of advanced cardiac life support. There is also a need for a system of calling for help within ward areas, ambulatory clinics and public areas of the hospital

### 2. Airway Control and Management

An open airway is crucial for the delivery of oxygen to the lungs and then to the tissues. Access to the airway needs to be ensured within a few minutes of the start of the resuscitation. Basic airway opening techniques include the head-tilt, chin lift and the classical or modified jaw thrust. Once opened the airway needs to be cleared of secretions, usually with a blunt-tipped stiff suction catheter. The routine use of cricoid pressure is not recommended. While it may offer some protection from aspiration and gastric insufflation, it may also impede ventilation and interfere with intubation. If used, pressure should be adjusted, relaxed, or released if it impedes ventilation or placement of an advanced airway.

Oropharyngeal and nasopharyngeal airways can prevent the tongue from occluding the upper airway and may be used in unresponsive patients (those with no cough or gag reflex), or during bag-mask ventilation.

The use of endotracheal intubation or a supraglottic airway, such as the laryngeal-mask airway (LMA) or a combi-tube would help to allow reliable ventilation. SpO2 and ECG monitoring are crucial during placement of an advanced airway. Once in position and secured, the expected standard for confirming correct placement would be:

- Bilateral chest expansion
- Demisting of ETT during inspiration
- 5-point auscultation
- Continuous ETCO2 measurement
- Chest X ray

Endotracheal tube placement allows a definitive patent airway, suction of secretions, reliable oxygen delivery and protection from aspiration of gastric contents.

### 3. Breathing (Ventilation)

The basic objective of ventilation in advanced life support is to ensure oxygenation of tissues. In cardiac arrest management the recommended rate of ventilation is 10 breaths per minute and tidal volume 400 – 600 ml. If bag-mask ventilation (BMV) is being used, the user should compress the bag by about one-third which would be just about sufficient to produce a chest rise over 1 second. Following insertion of an advanced airway device, it is recommended that continuous chest compressions be given with interposed ventilations once every 6 – 8 seconds (or about 8 – 10 breaths per minute).

### 4. Supporting the Circulation during cardiac arrest

This includes the following:

a. <u>Continuing cardio-pulmonary resuscitation with minimal interruption</u>

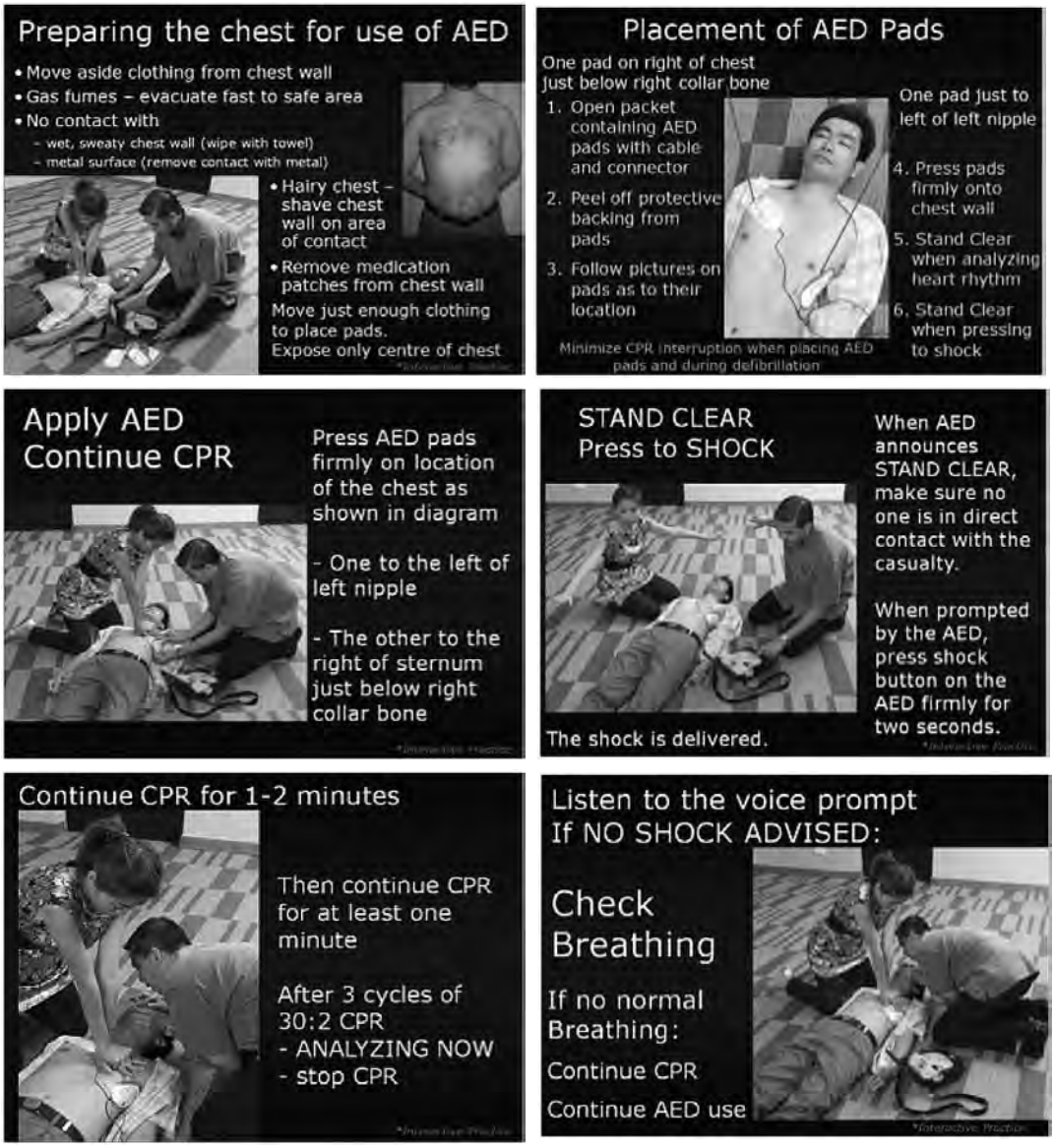
This has already been clearly described earlier under Basic Cardiac Life Support.

b. <u>Establishing vascular access</u>

This is achieved through either intravenous or intra-osseous access. Use one of the larger veins, commonly

**FIGURE 3. STEP-BY-STEP GUIDE TO USE OF AN AED**

**(BY COURTESY OF NATIONAL RESUSCITATION COUNCIL, SINGAPORE)**




at either the right or left ante-cubital fossa, or the external jugular vein. Central lines may be used for administration of intravenous drugs. However, because of their length, every bolus dose of drugs given via a central line requires flushing with at least 20 ml of normal saline. Central lines are also not recommended for rapid fluid resuscitation owing to their length. They would, however, be useful for central venous pressure monitoring as a guide to fluid resuscitation and circulatory management. Using a large peripheral vein allows a faster rate of fluid administration, if needed. If intravenous access cannot be obtained, intra-osseus access at either the proximal tibia or distal femur.

c. Providing infusion fluids

Normal saline is the optimal infusion fluid used in cardiac resuscitation. Rapid fluid resuscitation via central lines may not be a viable option.

d. Continuous ECG monitoring for cardiac rhythm

The further management of the patient would be based on the cardiac rhythm diagnosis, and the resuscitation team would administer the appropriate cardiovascular drugs. The algorithms for the management of the various rhythm disorders are as presented in Figures 4 to 8.

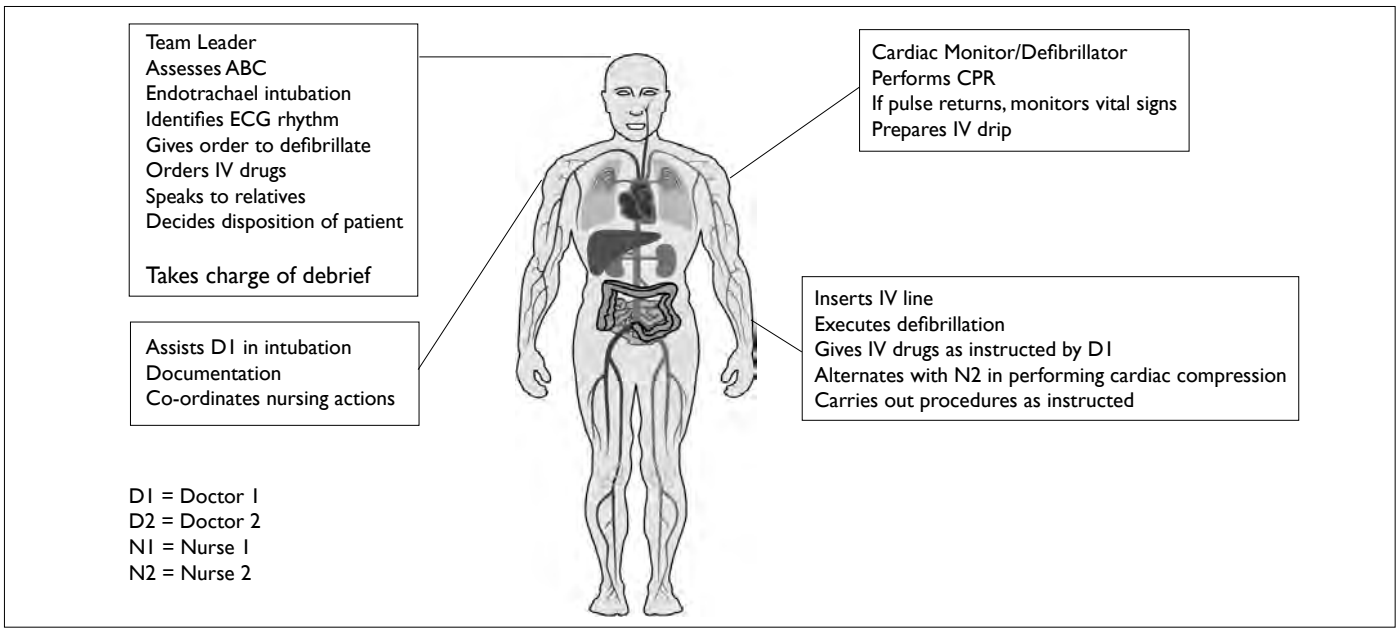
e. Use of intravascular drugs to manage the circulation

Administration of drugs via an endotracheal tube is no more recommended owing to unreliable absorption via airways that may be filled with pulmonary edema fluid. Drugs may be given via the intra-osseus or central line route in the same dosages as via the intravenous route.

## 5. Peri—arrest arrhythmias

In a patient with cardiac arrest and during the immediate period following return of spontaneous circulation, the patient may have one or more of many cardiac arrhythmias.

## FIGURE 4. ACLS TEAM ORGANISATION DURING A RESUSCITATION




## FIGURE 5. UNIVERSAL ALGORITHM FOR CARDIAC ARREST

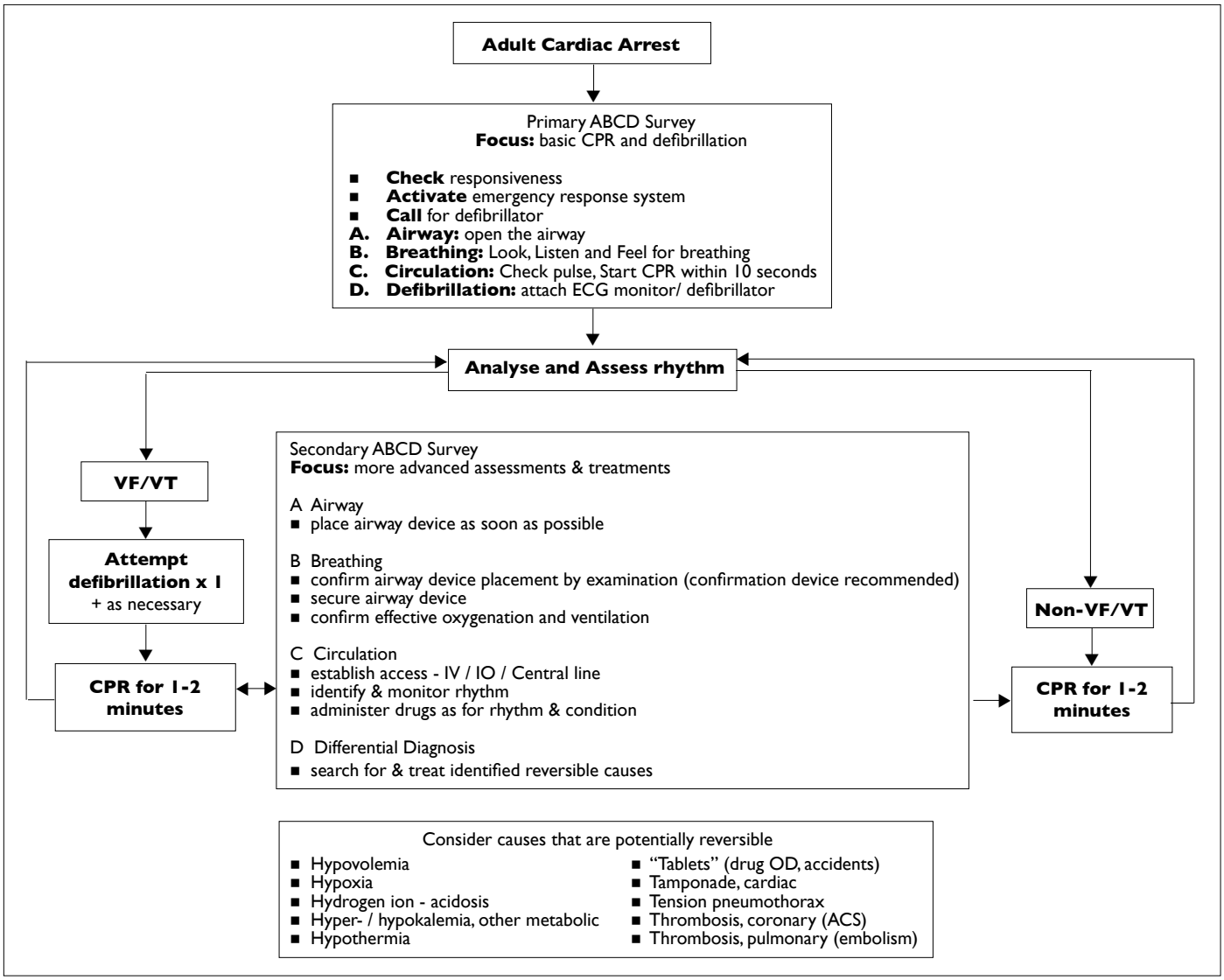


**FIGURE 6. ASYSTOLE / PEA MANAGEMENT ALGORITHM**

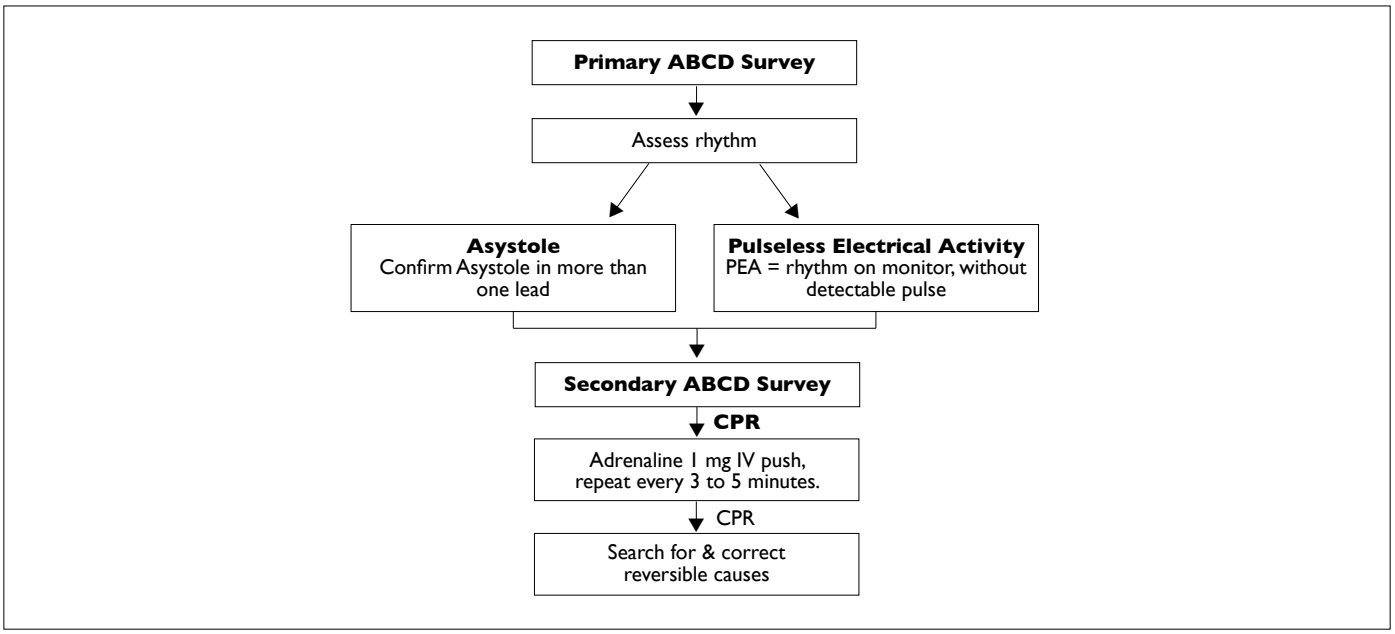



**FIGURE 7. BRADYCARDIA MANAGEMENT ALGORITHM**

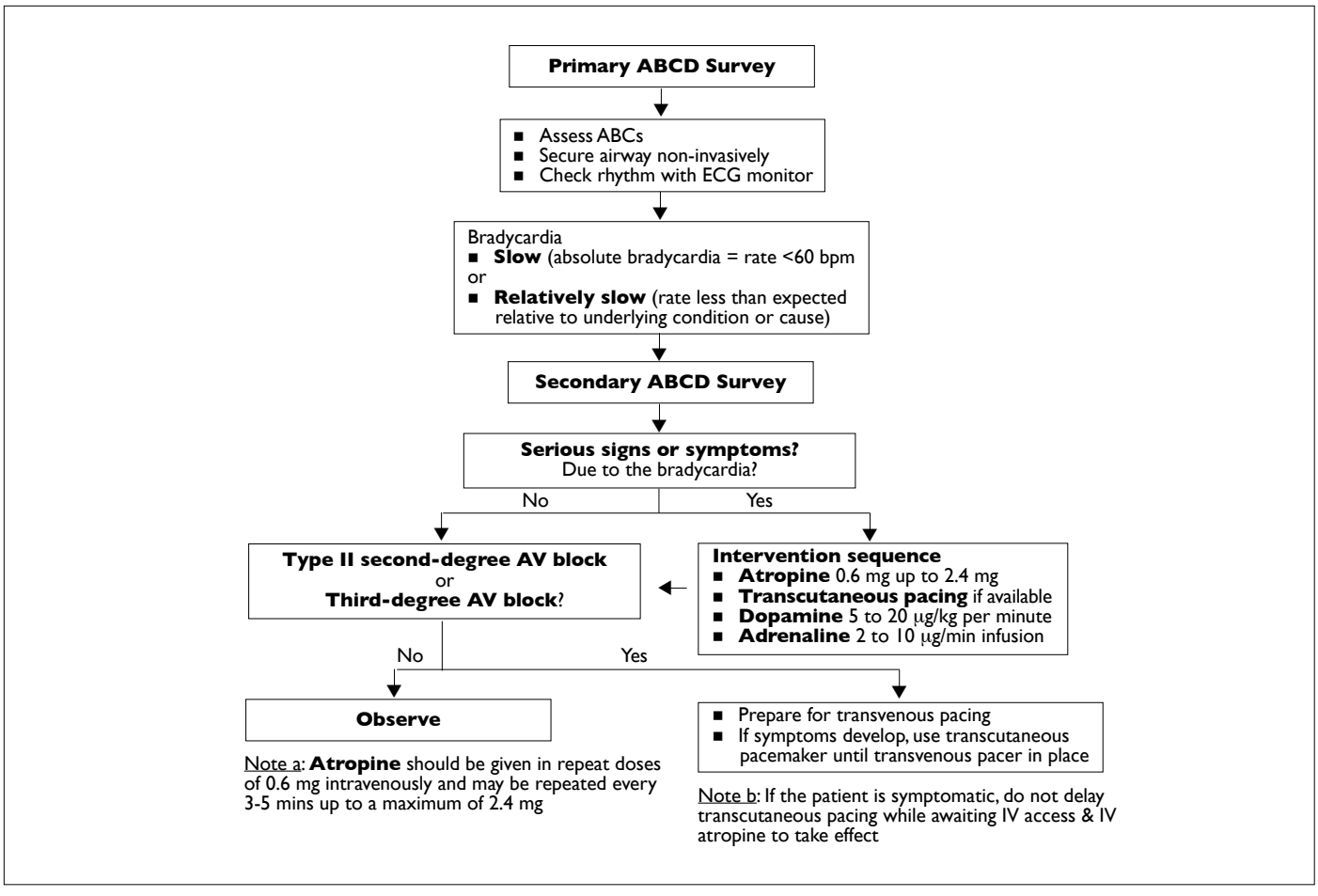
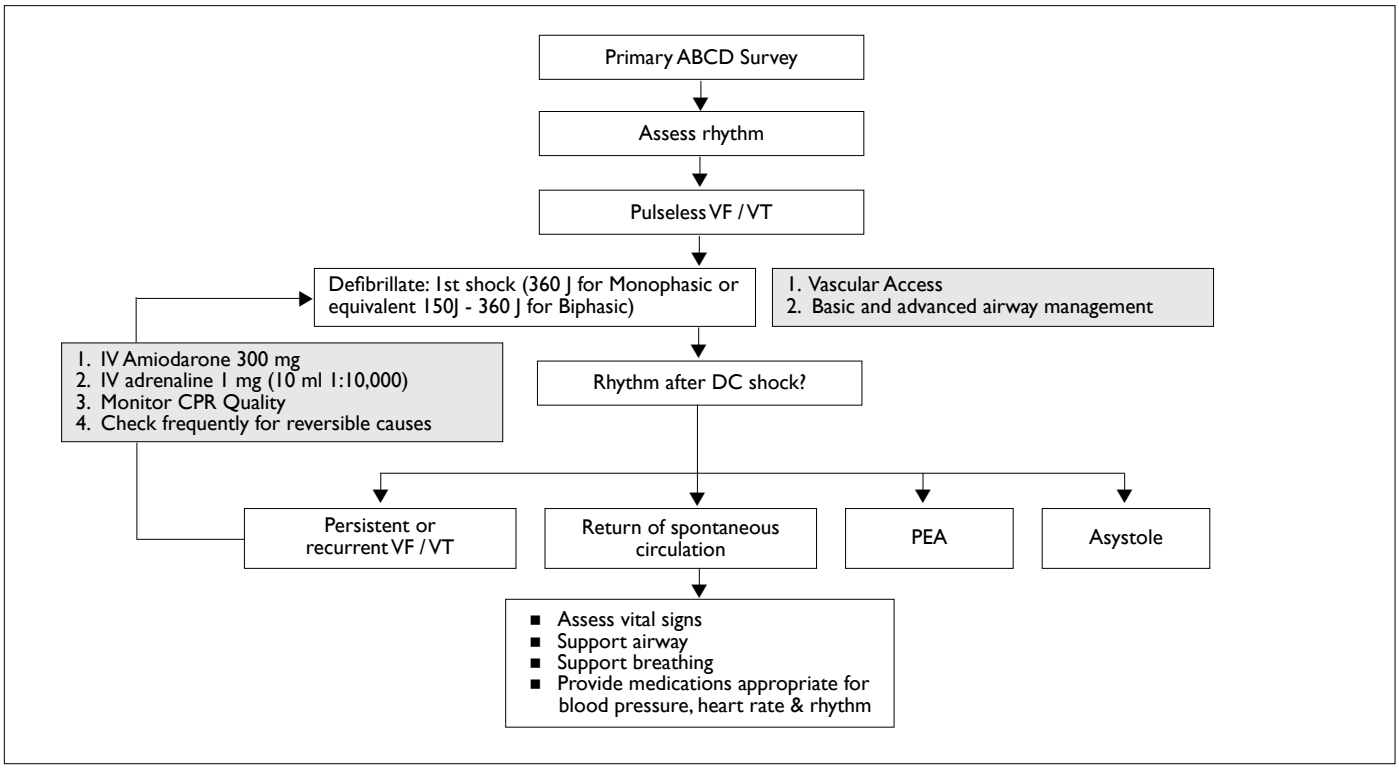


**FIGURE 8. MANAGEMENT OF WITNESSED VF / PULSELESS VT**




Each of these arrhythmias require organised treatment modalities, pari-passu with the above interventions. The range of rhythms that one should be prepared to deal with are listed below. Their management is summarised in the attached Figures 5 to 10 as follows:

Figure 6: Asystole and Pulseless Electrical Activity
Figure 7: Bradycardias
Figure 8: Witnessed VF / Pulseless VT
Figure 9: Narrow Complex Tachycardias
Figure 10: Wide Complex Tachycardias

## 6. Identifying reversible causes

For every cardiac resuscitation, if the patient does not readily respond to the initial resuscitation measures, one needs to determine likely factors contributing to the non-response. Reversible causes are usually grouped under the 5 H's and 5 T's and these are as follows:

- Hypovolaemia
- Hypoxia
- Hydrogen ion acidosis
- Hypo / hyperkalaemia
- Hypothermia
- Toxins
- Trauma
- Tension Pneumothorax
- Tamponade – cardiac
- Thrombosis – cardiac / pulmonary

Careful evaluation to look for any of these reversible causes usually pays dividends and increases chances of a good outcome. The approach to evaluation of these reversible causes is as follows:

a. Hypovolemia is difficult to diagnose in the cardiac arrested individual. Usually, history of fluid loss, if available, will initiate the need for rapid fluid replacement. Empirical fluid therapy is usually employed in cardiac resuscitations at a rate of 500 to 1000 ml over 1 hour. The optimal resuscitation fluid is Normal Saline.

b. Hypoxia occurs with lack of oxygen and alveolar ventilation. One needs to ensure that a definitive airway is placed correctly, and to check breath sounds at frequent intervals to ensure that the endotracheal tube has not slipped out of the trachea or into the right main bronchus. Oxygen supply must be ensured whether from an oxygen cylinder (ensure it is not depleted) or piped. Therefore all connections of the oxygen delivery system will need to be checked to ensure that hypoxia is not the cause of a poor outcome.

c. Hydrogen ion – acidosis: The acidosis of cardiac arrest is a combination of respiratory and metabolic acidosis. Respiratory acidosis is caused by lack of alveolar ventilation with oxygen. The metabolic acidosis is caused by lack of blood circulation to the tissues and lack of oxygen in the tissues. Respiratory acidosis is addressed by early endotracheal intubation and delivery of 100%

**FIGURE 9. NARROW COMPLEX TACHYCARDIA ALGORITHM**

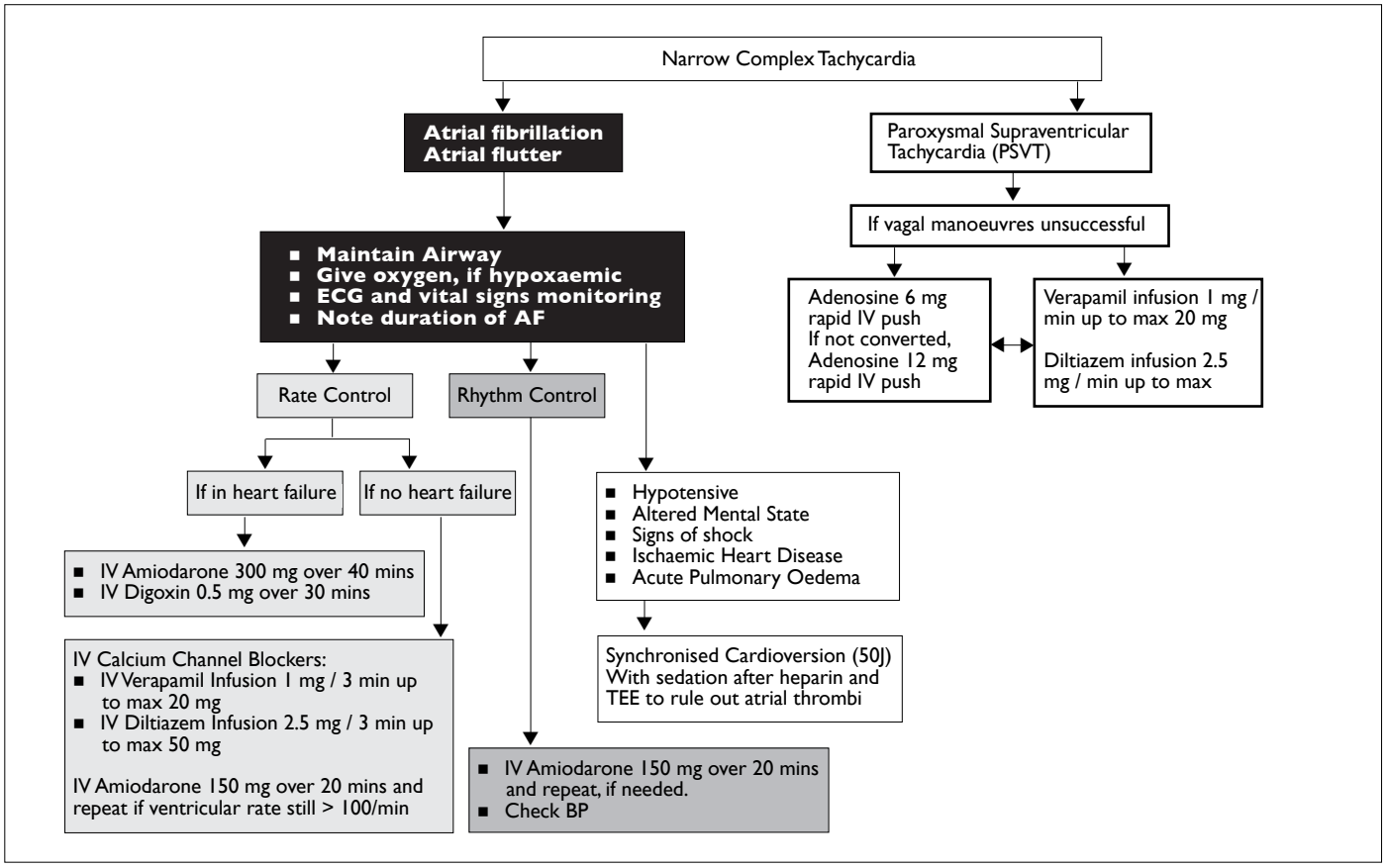
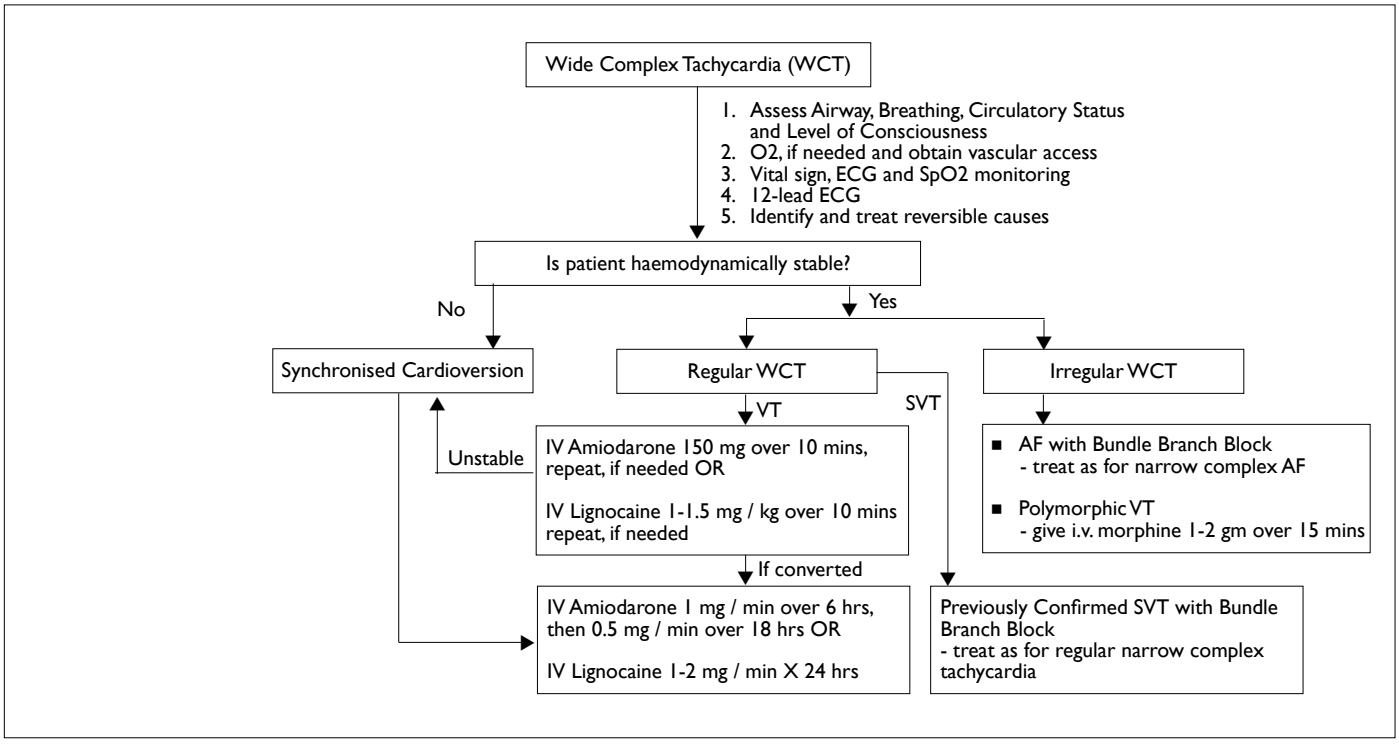



**FIGURE 10. WIDE COMPLEX TACHYARRHYTHMIA ALGORITHM**



oxygen at the rate of 10-12 ventilations per minute. The excessive production of hydrogen ions as a result of tissue hypoxia can be addressed by delivering the O2 via good circulation through quality CPR and good oxygenation through alveolar ventilation with 100% oxygen at the rate suggested earlier. The circulation resulting from CPR and alveolar ventilation also ensures that carbon dioxide generated by the hydrogen ions interacting with the body's own bicarbonate buffering mechanism is brought to the lungs where it can be blown away. Therefore, good CPR and good alveolar ventilation with 100% oxygen should form the cornerstone of the prevention and treatment of the metabolic and respiratory acidosis of cardiac arrest. Administration of Sodium Bicarbonate solution intravenously, while it may attempt to reverse the changes in pH, can have other adverse consequences, viz. severe alkalosis, poor cardiac contractility and inactivation of resuscitation drugs in alkaline medium. Therefore, sodium bicarbonate is only administered in the presence of significant acidosis that can occur with prolonged resuscitations or poor initial resuscitation, and even then only in judicious amounts at the initial rate of 1 – 1.5 ml 8.4% NaHCO3 per kg body weight, and if re-administered only after at least 10-15 minutes at half the initial dose.

d. Hyperkalemia may be suspected especially in patients on hemodialysis or peritoneal dialysis (look for presence of a-v fistula or Tenckhoff catheter). Other metabolic disorders are extremely difficult to confidently identify in a collapsed patient. If hyperkalemia is suspected administering 10 ml of Calcium chloride followed by 20 ml 50% dextrose and insulin injection 8 units offers hope for some reduction in serum potassium levels within a few minutes.
e. Hypothermia is a rare occurrence in the tropics. However, in the event it does occur, gradual re-warming with blankets and warm intravenous fluids may help the gradual process of re-establishing a near normal temperature environment for the patient.
f. "Tablets" (drug OD, accidents) may not be picked up during a resuscitation. In cases of antidepressant overdose some administration of intravenous sodium bicarbonate may help in rapid elimination of the drug from the circulation and a slight lowering of drug levels just sufficient to allow return of a pulse.
g. Cardiac tamponade is best identified, during a resuscitation, by rapid transthoracic ultrasound. This would require brief interruption of chest compressions. Once identified, it is best treated by introduction of an intrapericardial catheter through the sub-xiphisternal approach and under continuous ECG guidance.
h. Tension pneumothorax is suspected during a cardiac resuscitation if breath sounds are significantly unequal on chest auscultation. Treatment has to based on the clinical diagnosis and should involve introduction of a large-bore intravenous cannula into the 2nd intercostal space over the anterior mid-clavicular line on the side affected. Once this is carried out, the tension in the pneumothorax will be relieved and the mediastinum gradually swings back to its usual near-central position. Then measures may be taken to place a chest tube electively into the chest on the affected side. One should not wait for Chest X-ray confirmation of a tension pneumothorax before performing needle thoracocentesis.
i. Thromboses of the coronary arteries (ACS) or the pulmonary vessels (pulmonary embolism) are well known causes of cardiopulmonary arrest. Recognising the cause suggests that if one could obtain initial return of spontaneous circulation after a short burst of active resuscitation, procedures to re-vascularise the thrombosed vessels become relevant soon after the pulse returns. It would be important to obtain a history of the patient before collapse to surmise that an acute thrombotic event was the cause of the collapse, in which case revascularisation procedures may be contemplated.

## 7. Post-Resuscitation Care

In the event of return of spontaneous circulation (ROSC), one needs to consider institution of measures 10 that will minimise likelihood of rearrest and increase chances of survival and good neurological outcome. The components of post-resuscitation care that are gradually being incorporated into in-hospital care protocols are as follows:

a. Therapeutic hypothermia at 33 degrees Celsius for at least 24 hours with gradual rewarming subsequently
b. Maintaining euglycaemic with blood sugar levels maintained between 6 to 10 mmol/L
c. Prevention of hyperoxemia and optimal ventilation. The recommended ventilator parameters are as follows:
    1. PaCO2 between 35 and 45 mm Hg (5 – 6 kPa)
    2. SaO2 between 94% and 98%
    3. Tidal volumes between 6 – 8 ml / kg body weight
    4. PETCO2 between 35 – 40 mm Hg.
    5. Normocapnic ventilations between 10 to 12 ventilations per minute.
d. Early PCI after ROSC so as to maximise myocardial viability.
e. Intravenous fluids and drugs titrated to optimise blood pressure, cardiac output and urine output. The target for blood pressure would be a mean arterial pressure (MAP) of 65 - 100 mm Hg and for blood oxygenation an SCVO2 ≥ 70%.
f. Neurological enhancement measures to minimise the impact of reperfusion injury on the brain.

## CONCLUSIONS

The way forward to maximise survivals from cardiac arrest is to make use of all of the principles described above when managing the collapsed patient. Confident performance of resuscitation requires training and retraining. Certification courses in basic and advanced resuscitation are available in various healthcare institutions and accredited training course. The challenge for the physician is to stay current in these basic resuscitation skills.

### REFERENCES


1. Kouwenhoven WB, Jude JR, Knickerbocker GG. Closed chest cardiac massage. JAMA 1960;173: References
2. Ong ME, Ng FS, Anushia P, Tham LP, Leong BS, Ong VY, Tiah L, Lim SH, Anantharaman V. Comparison of chest compression only and standard cardiopulmonary resuscitation for out-of-hospital cardiac arrest in Singapore. Resuscitation. 2008;78:119-26.
3. Valenzuela TD, Roe DJ, Cretin S, Spaite DW, Larsen MP. Estimating effectiveness of cardiac arrest interventions: a logistic regression survival model. Circulation. 1997;96:3308-13.
4. Morrison LJ, Dorian P, Long J, et al. Out-of-hospital cardiac arrest rectilinear biphasic to monophasic damped sine defibrillation waveforms with advanced life support intervention trial (ORBIT). Resuscitation 2005; 66:146-9.
5. Killingsworth CR, Melnick SB, Chapman FW, et al. Defibrillation threshold and cardiac responses using an external biphasic defibrillator with pediatric and adult adhesive patches in pediatric-sized piglets. Resuscitation 2002; 55:177-85.
6. Kudenchuk PJ, Cobb LA, Copass MK, et al. Transthoracic incremental monophasic versus biphasic defibrillation by emergency responders (TIMBER): a randomised comparison of monophasic with biphasic waveform ascending energy defibrillation for the resuscitation of out-of-hospital cardiac arrest due to ventricular defibrillation. Circulation 2006; 114:2010-8.
7. Higgins SL, Herre JM, Epstein AE, et al. A comparison of biphasic and monophasic shocks for external defibrillation. Physio-Control Biphasic Investigators. Prehosp Emerg Care 2000; 4:305-13.
8. Stiell IG, Walker RG, Nesbitt LP, et al. BIPHASIC Trial: a randomized comparison of fixed lower versus escalating higher energy levels for defibrillation in out-of-hospital cardiac arrest. Circulation 2007; 115:1511-7.
9. Dalzell GW, Cunningham SR, Anderson J.et al. Electrode pad size, transthoracic impedance and success of external ventricular defibrillation. Am J Cardiol 64:741–744 Oct 1989.1064-7
10. Anantharaman V. The Post-Resuscitation Bundle. Singapore Medical Journal. 2011; 52(8): 607-10.


### LEARNING POINTS

- **The practice of resuscitation is guided by the principle of the Chain of Survival, which essentially has four links, viz. Early Access, Early CPR, Early Defibrillation and Early Advanced Life Support.**
- **Basic cardiac life support consists of the first two links in the Chain of Survival. Thirty chest compressions to 2 ventilations at the rate of 100 compressions a minute is the norm. Hands only CPR is only used when the rescuer is unable to perform mouth-to-mouth ventilation for some reason.**
- **Defibrillation, the third link in the chain of survival, is one of the key strategies in the management of cardiac arrest victims. The commonest initial rhythm[3] at the onset of cardiac arrest is coarse ventricular fibrillation (VF) and the most effective therapy to date for this malignant rhythm is electrical defibrillation of the heart.**
- **Advanced Cardiac Life Support (ACLS), the fourth link in the Chain of Survival, is very dependent on the optimal conduct of the earlier three links. Arrhythmia management continues to be the cornerstone of ACLS guidelines. The 2011 guidelines have introduced post-resuscitation interventions into ACLS (i.e. measures carried out after Return of Spontaneous Circulation or ROSC).**

UNIT NO. 4

# PITFALLS AND RED FLAGS IN COMMON CLINICAL SYNDROMES

A/Prof Mark Leong Kwok Fai


## ABSTRACT

**Awareness of pitfalls in common clinical symptoms is important. Not all patients with ACS presents with chest pains (beware of patients presenting with syncope, diaphoresis, dyspnoea, pain upper back, etc.). In a breathless patient, anxiety and other psychiatric conditions should only be considered as the diagnosis after careful exclusion of other life threatening causes: metabolic acidosis, partially occluded upper airway, bronchospasm, and pulmonary embolism. In a patient with headaches, intracranial haemorrhage, meningitis/encephalitis, and brain mass lesion need to be considered in the differential diagnosis. The elderly patient presenting with acute abdominal pain will require FPs to maintain a high index of suspicion for potential life threatening causes. Possible causes of serious backache are ACS, AD, AAA, and spinal cord compression. In the wounded patient, there is a need to determine the medical condition that may have resulted in the patient's injury, and patient's risk profile is as important as the wound profile for correct management. In the pregnant patient, dyspnea can be due to pulmonary embolism, or heart failure; placenta abruption from abdominal injury may not have the classical triad of pain, tenderness or vaginal bleeding.**


**Keywords: acute chest pain, acute coronary syndrome, breathlessness, headaches, abdominal pain, wound, injury, pregnant patient**

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## INTRODUCTION

Family Physicians (FP), practising primary care in Singapore, are likely to see patients presenting with varying acuity and clinical problems. Within this varied group of patients, the majority of which is likely to require basic evaluation at the clinic/office setting with minimal investigations. When an acute patient (e.g. acute on going chest pain in a patient with multiple coronary artery risk factors) presents, FPs are well prepared in recognising the possibility of acute coronary syndrome (from history and physical examination and ECG, when available), initiate acute intervention (e.g. providing sublingual nitrates) and arrange for urgent referral to the Emergency Department (ED).

However, our patients with acute medical and surgical emergencies do not always present with classical textbook description, at times making clinical diagnosis a challenge

Common "benign" symptoms can represent initial presentation of acute life threatening emergencies. Overlooking and under recognition can result in grave consequences for both patient and physician.

The objective of this article is to describe some common pitfalls that FPs, practising in Singapore, may encounter in their clinical setting and provide guiding principles for safe and prudent clinical practice. Learning points and pitfalls will be highlighted as case studies during the series workshops.

## ACUTE CHEST PAINS AND ACUTE CORONARY SYNDROME (ACS)

One of the most important life threatening causes of acute chest pains is acute myocardial infarction (AMI). Its diagnosis requires the presence 2 out of 3 factors namely chest pains, acute electrocardiogram (ECG) changes or raised cardiac biomarkers. Without the availability of ECG, blood tests, and short of referring all chest pains to ED, FPs have to rely on history and physical examination to exclude possibility of ACS. Diagnosis of ACS is often made based on typical history of exertion chest pain with its central location and radiation to neck, jaw, left upper limb associated with diaphoresis and dyspnoea. However, ACS (including AMI), can occur without chest pains ("Silent MI"). Patients with history of heart failure/strokes, elderly, diabetes, and females can present with AMI without any overt chest pains[1]. Patients have been known to present acutely with "unexplained" diaphoresis (after having excluded possibility of hypoglycaemia in diabetics) or sensation of dyspnoea (more typically exceptional dyspnoea) and astutely diagnosed as probable ACS and referred appropriately through EMS to EDs for evaluation.

A resting ECG is an important first investigation which all patients with acute chest pains should have at point of care. ST changes and arrhythmias can be picked up and provide certainty to the diagnosis. However, the absence of typical ST changes in a resting ECG does not exclude the possibility of ACS. Table 1 list some of the pitfalls in diagnosis of ACS.

### TABLE 1. COMMON PITFALLS IN PATIENTS WITH ACUTE CHEST PAINS AND ACS

1. Not all patients with ACS presents with chest pains (beware of patients presenting with syncope, diaphoresis, dyspnoea, pain upper back, etc.)
2. Thinking that a normal resting ECG excludes AMI
3. Tenderness on palpation of the chest wall and concluding that it is a musculoskeletal cause
4. Resolution of pain with antacids and gastric medications does not always point to non ACS cause
5. Reliance on one initial cardiac enzyme to rule out ACS
6. Not thinking about other life threatening causes of chest pain
   a. Pneumothorax
   b. Acute aortic dissection
   c. Acute pulmonary embolism
   d. Pericarditis/Myocarditis
   e. Boerhaave's syndrome (Rupture esophagus)
7. Not examining the chest and back for rashes (e.g. Herpes Zoster)

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## THE BREATHLESS PATIENT

FPs should not have a problem identifying the acutely ill patient who is breathless and tachypneic. Such patients often have background history of pulmonary (e.g. bronchial asthma, COPD or cardiac (e.g. congestive heart failure) related conditions with detectable clinical signs. For those who do not have chronic diseases and previously fit and well, acute breathlessness without any antecedent respiratory symptoms (such as cough, running nose) may lull FPs into thinking of Hyperventilation (e.g. secondary to Panic attack) as the cause. Patients with history of psychiatry and behavioural conditions (e.g. anxiety and depression) may be erroneously "labelled" as having hyperventilation attacks. One must not forget that Pulmonary Embolism (PE), and patients with metabolic acidosis presents with dyspnoea and air hunger. Patients with Diabetic Ketoacidosis have been wrongly evaluated for respiratory conditions.

FPs often encounters patients with abnormal respiratory sounds audible at bedside or on auscultation. This may trigger an immediate reflex action of ordering a beta2 agonist nebulisation to relieve bronchospasm. Partial and non responders are often referred to EDs. Infrequently, EDs have picked out such patients who does not have bronchospasm but stridor from upper airway obstruction. Stridor is an abnormal inspiratory sound produced by partially occluded upper airway (ranging from ingested foreign body to infective causes e.g. acute epiglottitis). It is imperative for FPs to recognise during which phase of respiration the abnormal audible respiratory noise is heard. Bronchospasm produce rhonchi and audible wheeze which is heard during the expiratory phase of breathing. Mistaking stridor for a wheeze can delay diagnosis of acute life threatening upper airway obstruction and emergent treatment required.

Handheld pulse oximeters are now widely available and are becoming indispensable in the initial evaluation of the breathless patient. It tells us how well our patient's blood is saturated with oxygen. Low oxygen saturation generally requires immediate administration of supplemental oxygen. However, the number on the pulse oximeter merely informs us of the oxygen saturation but not the carbon dioxide level. Breathless patients on supplemental oxygen with normal oxygen saturation can still hypercapneic and this is a sign of potential need for non-invasive or mechanical ventilation. Table 2 summarises some pitfalls in the acutely breathless patient.

### TABLE 2. PITFALLS IN PATIENTS PRESENTING WITH ACUTE SHORTNESS OF BREATH

1. Anxiety and other psychiatric conditions should only be considered as the diagnosis after careful exclusion of other life threatening causes
2. Not considering non pulmonary/cardiac causes such as metabolic acidosis
3. Mistaking stridor for wheezing
4. Not including PE as a possible diagnosis
5. Thinking that normal pulse oximeter reading excludes respiratory failure.

## THE PATIENT WITH HEADACHES

Headache is one of the commonest presentations that FPs need to deal with. It is well recognised that patients with unremitting severe headaches with other accompanying history such as vomiting, altered mental status, abnormal neurological symptoms and signs mandate further evaluation including advanced imaging in many such cases. After exclusion of intracranial haemorrhage, meningitis/encephalitis and brain mass lesion, the majority of remaining cases generally have more "benign" causes and course.

Subarachnoid Haemorrhage (SAH) is often described as acute sudden onset of worse ever headache of their life, thunder clasp in nature. The key to diagnosis is to get a good history of the onset of the headache. SAH can also present in many other ways as altered mental status such as confusion, syncope. Any change in mental status from their premorbid status must include SAH as part of FP's differential diagnosis.

Meningitis and Encephalitis presenting with headache are life threatening emergencies not to be missed in our practice. The classic triad of fever, neck stiffness and altered mental status may not be present in all patients. Diagnosis often required a high index of suspicion and confirmed only by examination of spinal fluid obtained through a lumbar puncture.

Another oft encountered clinical situation by FP is headache in the patient with elevated blood pressure. It is common belief that headache is related to elevated blood pressure. Whether it is the headache that causes the elevated pressure or vice versa is debatable. Data from ED patients in USA did not find any correlation between elevated BP and headaches[2]. In fact, thinking that a patient's headache is due to elevated BP may result in one missing on serious causes (e.g. SAH, spontaneous subdural haemorrhage). Any change in the usual headache pattern, presence of new associated symptoms, or new onset in elderly should make FP consider referring the patient for advance imaging of the brain. Table 3 list some pitfalls in patients presenting with headaches.

### TABLE 3. PITFALLS IN PATIENTS WITH HEADACHES

1. Not considering need for advanced imaging for patients with possible diagnosis of intracranial haemorrhage, meningitis/encephalitis and brain mass lesion
2. Dependent on the classical triad of fever, neck stiffness and altered mental status to diagnose meningitis/encephalitis
3. Considering headache as a consequence of elevated blood pressure
4. Not considering a more sinister cause in the following patients:
   a. New onset headache in elderly
   b. Change in headache pattern
   c. New associated symptoms e.g. visual change
5. Failure to consider other "non cranial" causes of headaches:
   a. Acute angle closure glaucoma
   b. Temporal arteritis
   c. Pregnancy related complications e.g. pre-eclampsia

## THE PATIENT WITH ABDOMINAL PAIN

As medical students and physicians, we have been taught that in 90% of our patients a good clinical history and physical examination will be sufficient to clinch the diagnosis. Even in the era of readily available advanced laboratory and imaging technology, the mind and skills of the learned FP is vital in deciding appropriate disposition and management. However, there are several potential pitfalls which FP must be cognizant of to ensure optimal outcome for their patients.

The elderly patient presenting with acute abdominal pain can present a challenge to any physician for a variety of reasons. At the ED, elderly patients with abdominal pain should have a ECG to exclude possibility of ACS which may present as abdominal pain instead of typical chest pain. Those with acute sudden onset are often given higher priority for evaluation as there are many life threatening causes that require exclusion such as perforated ulcers, mesenteric ischemia, rupture hepatoma, leaking abdominal aortic aneurysm, strangulated hernia, etc. The physical examination (apart from abdominal examination) should include looking for jaundice/pallor, cardiac examination for pulses, arrhythmia (such as atrial fibrillation), murmurs and heart failure (low flow state), trunk and back for rashes (e.g. lesions of herpes zoster), hernia orifices and a per rectal examination.

In general, the elderly patient presenting with acute abdominal pain will require FPs to maintain a high index of suspicion for potential life threatening causes. The varied and atypical presentation makes this a challenging clinical encounter. Very often, serial reviews with physical examination with use of laboratory testing and imaging may help in elucidating the cause. Table 4 list some pitfalls in the evaluation of patients with acute abdominal pain

**TABLE 4. PITFALLS IN PATIENTS WITH ACUTE ABDOMINAL PAIN**

| | |
|---|---|
| 1. | Not recognising that elderly patients generally presents atypically compared to younger patients with the same cause for their pain. |
| 2. | Lack of clinical signs on abdominal examination does not exclude potential life threats e.g. mesenteric ischemia. |
| 3. | Failure to recognise that low flow states (such as heart failure), and arrhythmias (such as atrial fibrillation) can produce mesenteric ischemia |
| 4. | Not excluding pregnancy and its related complication as a possible cause in females of reproductive age group. |
| 5. | Not considering possibility of ACS in elderly patients. |

## BACK PAIN

Patients with acute and chronic non traumatic back pain often presents to primary care and EDs for evaluation and relief of symptoms. Although most of such patients only require rest, analgesia and other conservative measures, there are some who have life threatening causes masquerading as the musculoskeletal back pain.

Upper back pain can be the first symptoms of ACS (e.g. posterior infarction) and Aortic Dissection (AD). Typically AD presents with tearing chest pain which radiates to the back. Leaking abdominal aortic aneurysm (AAA) may also present with low back pain. Therefore, particularly in the elderly, presentation with back pain require more than physical examination of the back and neurological status of the spine and lower limbs. AD can present with a myriad of other clinical symptoms and signs depending on extent of the dissection.

Back pain with sciatica and radiculopathy (sensory symptoms and pain) is a bothersome condition for most but can often be managed conservatively with physical therapy and pain control. However, the presence of myelopathy and signs of cord compression mandate more urgent evaluation as treatment can be time sensitive (e.g. cord compression from tumours). The evaluation of the spinal cord for compression is required for all cases with back pain (such as sensory level, weakness, saddle anaesthesia, loss of anal tone, bladder emptying, etc.) Table 5 list some potential pitfalls in evaluation of back pain

**TABLE 5. POTENTIAL PITFALLS IN EVALUATION OF BACK PAIN**

| | |
|---|---|
| 1. | Not considering ACS, AD and AAA as possible causes |
| 2. | Failure to perform a full neurological examination to look for spinal cord compression |
| 3. | Overuse of plain x-rays for evaluation of non-traumatic back pain (providing false reassurance). |

## WOUND AND INJURIES

Every FP will in their professional practice encounter patients with injuries and wounds. Those who sustained severe multiple injuries are generally evacuated to EDs of RHs for management. Compared to many other primary care medical conditions, the injured patient generally takes a little more time to be evaluated and treated as this may involve wound care and other clinic based interventions.

Following injury, it is imperative for FP to find out what caused the injury. For example, did the patient experience a syncopal episode? Was it related to alcohol intoxication? Did any bystander notice any seizure activity? Often the injury dominates the attention of the FP and the cause may not be appreciated. The mechanism and the consequence of injury were being sought after. Patients on antiplatelet, antithrombotic and, in particular anticoagulants, e.g. warfarin are at increased risk of bleeding. Internal bleeding (e.g. head, chest and abdomen) must be suspected if these compartments are injured.

One area of recurring contention is the management of wounds with foreign bodies e.g. glass fragments. This can arise from workplace, domestic and violence. It is known that detection of foreign body (FB) e.g. glass is unreliable by physical examination. If there is history of involvement of glass fragment and there is presence of sensation of FB in the wound, it is imperative that wound exploration be done. If no FB is found, x rays can be used to look for any retained FB. X-rays are generally useful for detecting radiopaque FBs (note that not

all glass fragments are radiopaque). It is prudent to inform the patient of possibility of retained foreign body and seek medical attention as appropriate.

Certain wounds are at risk for increased morbidity compared to others (see Table 6). Regardless of risk, all wounds are to be treated with thorough cleansing, exploration (if possible) and wound dressing or closure (as appropriate). Bites from mammals (e.g. dogs and cats) are likely to increase with popularity of domestic pets. Human bites (e.g. fight bite – deep laceration with involvement of MCP joint/s of the hand from patient throwing a punch to the opponent's mouth/teeth) are prone to most prone to infection followed by cat and dog bites in decreasing frequency[3]. It is prudent to assess mammalian bite wounds based on wound and patient characteristics to determine the risk and need for prophylactic antibiotics. High risk wound characteristics include – puncture wounds, deep involving underlying structures, crushing with devitalising wounds. Patients who are immune compromised (e.g. diabetes); surgical implants and prosthesis are at increased risk. Table 6 list some common pitfalls when evaluating and managing wounds in ambulatory setting.

**TABLE 6. COMMON PITFALLS WHEN EVALUATING AND MANAGING INJURIES AND WOUNDS IN AMBULATORY SETTING**

1. Failure to determine the medical condition that may have resulted in the patient's injury
2. Distraction by concern for overt external injury and failure to recognise undetected internal injury
3. Failure to recognise the increased morbidity and mortality for patients on anticoagulants following blunt head and torso injuries.
4. Retained FB (e.g. glass) in wounds are a common cause of patient dissatisfaction
5. Wound closure may be technically appealing but wound toilet and exploration is key to wound care and prevention of infection.
6. Patient characteristics and risk profile is as important as wound profile for proper management.

## THE PREGNANT PATIENT

The presence of a foetus is an additional burden that FPs have to deal with in a pregnant female patient. There is usually a heightened sense of concern and index of suspicion whenever a pregnant patient presents to the clinic or the ED with any clinical complaints. It is well known that there are anatomical changes which make the pregnant patient presenting with abdominal pain more difficult to assess. The enlarging gravid uterus rising from pelvis splints and limits diaphragm movement making breathing in some patients a more conscious activity compared to totally subconscious activity for normal persons.

Dyspnoea is a relatively common symptom in pregnant patients particularly in the third trimester. In general, dyspnoea should be a gradual onset and may worsen as pregnancy progresses. However, acute onset of dyspnoea must be taken seriously and possible differential diagnosis considered. Peri-partum Cardiomyopathy (PPCM) and pulmonary embolism (PE) are possible causes. PPCM presents with clinical symptoms and signs of congestive heart failure usually in the third trimester or in the early post-partum period. Unfortunately, features such as dyspnoea, fatigue, orthopnoea and pedal edema suggestive of cardiac failure are also commonly found in normal third trimester patients. Pregnancy results in a hypercoaguable state and increases the risk of venous thromboembolism such as PE. Diagnosis of PE in a non-pregnant patient is clinically challenging. Patients with low pre-test probability can have PE ruled out if their d-dimer test is negative. However, pregnant patients are considered to have a moderate pre-test probability and there is no role of d-dimer in the diagnostic workup. If PE is suspected, then it is prudent to refer them to ED for CT pulmonary angiogram or other investigations.

Pregnant patients who present following blunt thoracic and abdominal injury require the assessment with principles advocated by BTLS and ATLS. A stable patient however does not mean that the foetus is not in any distress. Placenta abruption is the commonest cause of foetus loss following blunt abdominal injury in pregnancy. Classical triad of abdominal pain, tenderness and vaginal bleeding has been used to identify patients who may have abruption. However, in a small proportion of patients, the classic triad may not be present. The only way to detect this is to monitor the foetus for distress which requires cardiotocographic monitoring (CTG). Table 7 lists potential pitfalls in managing a pregnant patient

**TABLE 7. POTENTIAL PITFALLS IN MANAGING A PREGNANT PATIENT**

1. Not realising that anatomical and physiological changes in pregnancy can result in atypical presentation of common clinical entities.
2. Assuming that dyspnoea (particularly of acute onset) is due to growing size of the gravid uterus
3. Attributing the signs of heart failure to that of normal third trimester of pregnancy
4. Not including diagnosis of PE in the differential diagnosis of acute medical complaints
5. Fetal monitoring is important to exclude complications following blunt maternal thoraco-abdominal injury.

## CONCLUSIONS

Majority of the patients in your family medicine practice will present with common clinical problems which can be evaluated, investigated and treated in the clinic/office setting. Many of whom may be patients who have chronic medical problems (such as hypertension, diabetes etc.) which you have been providing long term care and follow up. However, when they do seek attention with other acute emergent issues, the FP has to decide who and which problem requires further evaluation and treatment. Some of whom may require referral to EDs or SOCs. The learning points presented can help FPs identify areas where potential pitfalls in patient management could occur.

**REFERENCES**

1. Canto JG, Shlipak MG, Rogers WJ, et al. Prevalence, clinical characteristics, and mortality among patients with myocardial infarction presenting without chest pain. J Am Med Assoc 2000; 283:3223-9.
2. Karras DJ, Ufberg JW, Harrigan RA, Wald DA, Botros MS, McNamara RM. Lack of relationship between hypertension associated symptoms and blood pressure in hypertensive ED patients. Am J Emerg Med 2005; 23:106-10.
3. Medeiros I, Saconato H. Antibiotic prophylaxis for mammalian bites. Cochrane Database of Systematic Reviews 2005; 4.

**LEARNING POINTS**

- **Not all patients with ACS presents with chest pains (beware of patients presenting with syncope, diaphoresis, dyspnoea, pain upper back, etc.)**
- **In a breathless patient, anxiety and other psychiatric conditions should only be considered as the diagnosis after careful exclusion of other life threatening causes: metabolic acidosis, partially occluded upper airway, bronchospasm, and pulmonary embolism.**
- **In a patient with headaches, intracranial haemorrhage, meningitis/encephalitis, and brain mass lesion need to be considered in the differential diagnosis.**
- **The elderly patient presenting with acute abdominal pain will require FPs to maintain a high index of suspicion for potential life threatening causes.**
- **Possible causes of serious backache are ACS, AD, AAA, and spinal cord compression.**
- **In the wounded patient, there is a need to determine the medical condition that may have resulted in the patient's injury, and patient's risk profile is as important as the wound profile for correct management.**
- **In the pregnant patient, dyspnea can be due to pulmonary embolism, or heart failure; placenta abruption from abdominal injury may not have the classical triad of pain, tenderness or vaginal bleeding.**

UNIT NO. 5

# INITIAL MANAGEMENT OF MAJOR TRAUMA FOR PHYSICIAN FIRST RESPONDERS

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## ABSTRACT

**Family physicians may be called upon to respond to trauma patients in their clinics or at scene of injury. Managing trauma can be daunting to any physician who encounters it infrequently. The physician first responder needs to shut out the chaos and distractions at scene and focus on a systematic primary survey to assess for injuries with the potential to cause rapid deterioration, institute crucial life-saving interventions and effect rapid evacuation to hospital. This article details a simple approach to guide the family physician to assess and prioritise management of the trauma patient, and augment the work of the paramedics in the pre-hospital phase.**


**Keywords: Major trauma, Pre-hospital**

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## INTRODUCTION

Family physicians may be called upon to respond to trauma patients in their clinics or at scene of injury. As a first responder, the priorities are to perform a primary survey to assess for severe injuries and injuries with potential to cause rapid deterioration, institute crucial life-saving interventions and effect rapid evacuation to hospital. Due to the wide spectrum of possible organ system involvement, severity and varying mechanisms of injury, major trauma can be daunting to any physician who encounters it infrequently. This article details a simple approach to guide the family physician to systematically assess and prioritise the management of the trauma patient and augment the work of the paramedics in the crucial pre-hospital phase.

When first approaching the trauma patient, the physician needs to ensure the following:

1) Activation of Emergency Medical Services (EMS) in the form of Singapore Civil Defense Force (SCDF) ambulance. Information to be provided to the despatcher includes number of patients to be conveyed, what happened, apparent injuries and location of incident. Relevant information regarding access route to the incident site will aid the rapid deployment of SCDF ambulance to the scene. It has been reported that 31.2% of calls to SCDF are trauma-related and mean ambulance response time (time of call to arrival at scene) is 8 minutes (SD 4.8 min)[1].
2) Personal protection. At the very least, double gloves and eye shields should be worn to protect against blood and fluid borne diseases. Full protection should include mask and gown.
3) Crowd control and safety of rescuers. In a multiple casualty situation, the responding physicians need to be able to ensure that the rescuers are not in danger, delegate crowd control and life saving measures, like holding the airway open or applying pressure to stop haemorrhage, to members of the public.

## PRIMARY SURVEY

**Overview** — The primary survey promulgated by Advanced Trauma Life Support™ (ATLS™)[2] is an easy to remember, organised approach to management of a severely injured patient. In the settings of a primary health clinic or incident scene, limited resources necessitates a targeted systematic survey performed in a set order, which searches for injuries that pose the most immediate threats to life. Any problems identified in the primary survey are managed immediately, in the order they are detected, before moving on to the next step of the survey.

The primary survey consists of the following steps:

- **A**irway assessment (and cervical spine stabilisation when appropriate)
- **B**reathing assessment
- **C**irculation assessment (assess perfusion, control hemorrhage)
- **D**isability assessment (perform basic neurologic evaluation)
- **E**xposure and environmental control

A. i) **Airway assessment** — in major trauma, airway obstruction is an imminently preventable cause of death[3,4]. Rapid airway assessment[5] in a conscious patient includes getting the patient to talk (eg. by asking for the name). If the patient is able to answer and speak normally, the airway is patent. Look for signs of respiratory distress like tachypnea and use of accessory muscles of respiration. Look for evidence of airway obstruction like stridor, altered voice, or injuries with potential to cause airway obstruction like facial trauma or burns, oral bleeding or anterior neck crepitus.

ii) Airway intervention – If airway obstruction is imminent, perform jaw thrust with in-line cervical immobilisation, provide suctioning if available, and apply supplemental oxygen until evacuation to emergency department (ED). Poor lighting, unfamiliar equipment and inexperienced operators are all non-

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ideal circumstances to attempt to secure the airway, and hence oral intubation is discouraged as multiple unsuccessful attempts will worsen the airway obstruction. One retrospective review of patients who received airway support from paramedics working in a major urban EMS system found that patients assisted with bag mask ventilation (BMV) were more likely to survive than those treated with intubation due to delays in transfer and morbidity from failed attempts[6].

In the unconscious patient, use the jaw thrust manoeuvre to open the airway while applying in-line cervical immobilisation. Remove any obstruction (eg, foreign body, vomitus). Use airway adjuncts like the oropharyngeal airway, if available. If breathing is laboured or absent, assisted ventilations should be performed with BMV or, if unavailable, via mouth-to-mouth with an oral barrier. SCDF paramedics are trained to insert laryngeal masks (LMA) which allows "hands-free" bagging. LMA does not prevent aspiration and should be converted to a cuffed endotracheal tube upon arrival at the ED.

If the patient is in extremis and the rescuer is unable to bag the patient because of upper airway obstruction, needle cricothyrotomy may be attempted using a large bore (14 gauge or larger) intravenous cannula inserted through the cricothyroid membrane and connected to high flow oxygen. The rescuer should regulate inspiration and expiration according to the ratio 1:3 seconds. Needle cricothyrotomy allows oxygenation but hypercapnoea builds up after 20 minutes. It is a temporising measure until surgical cricothyrotomy can be performed in the ED.

B. i) **Breathing assessment** — Chest trauma accounts for up to 25 percent of trauma-related deaths, due to its harmful effects on oxygenation and ventilation[7]. Chest injuries which affect breathing and ventilation requiring immediate intervention include tension pneumothorax, open sucking chest wound and circumferential full-thickness chest burns. Inspect the chest wall looking for signs of injury. In a noisy environment, auscultation may be technically difficult, instead visually inspect for asymmetric or paradoxical movement (eg, flail chest). Distended neck veins, unilateral decreased chest movement or air entry, hypotension and shifting of the trachea to the contralateral side indicate tension pneumothorax.
ii) Breathing interventions. Presumptively treat patients exhibiting signs of tension pneumothorax with needle decompression using a large bore (14 gauge or larger) intravenous cannula, in the second intercostal space in the mid-clavicular line. Needle decompression is followed immediately by emergent transfer to ED for chest tube insertion.

Open sucking chest wound should be covered with dressing, taped on three sides forming a one-way "exhalation valve" to prevent a tension pneumothorax from forming.

Circumferential full thickness chest burns which prevent chest expansion should be released by escharotomy longitudinally along both anterior axillary lines, transverse across the costal margin and second intercostal space. Using a scalpel, incise down to adipose tissue. As full thickness burns are insensate, anaesthesia is not required. The ability to ventilate the patient is immediately apparent after successful escharotomy.

C. i) **Circulation assessment** — the patient's circulatory status may be clinically assessed by palpating the central pulses (carotid or femoral) and assessing for signs of shock such as prolonged capillary refill more than two seconds, cool extremities, tachycardia and altered mental state not due to head injury. If pulses are present and capillary refill is normal, blood pressure measurement may be deferred till the arrival of SCDF paramedics. It should be noted that in young trauma patients, hypotension generally does not manifest until at least 30 percent of the patient's blood volume has been lost2. In such cases, delayed capillary refill (which is prolonged by compensatory peripheral vasoconstriction) may be the most sensitive sign of shock. Attention should be turned to location of sources of exsanguinating haemorrhage.
ii) Circulation interventions – External exsanguinating hemorrhage must be controlled by a combination of direct manual pressure, proximal compression with a tourniquet and elevation, if the source of bleeding is a limb. Commercial haemostatic agents may be used if available. Occult haemorrhage may occur in the thoracic, peritoneal or retroperitoneal cavities. Only retroperitoneal bleeding from unstable pelvic fractures is amenable to stabilisation in the pre-hospital setting. Patients with pain, ecchymosis or crepitus at the pelvis should be stabilised by tying a sheet firmly around the pelvis at the level of the anterior superior iliac spine. Particularly in open-book fractures, this manoeuvre will tamponade pelvic bleeding by "reducing" the pelvic volume. Significant haemorrhage may also occur in muscle or soft tissue from long bone fractures (eg. femur) and such bleeding can be controlled by traction and splinting.

Once SCDF paramedics arrive with intravenous equipment and fluids, patients with signs of shock, should receive two large-bore (16 gauge or larger) intravenous cannulas in the antecubital fossa of each arm and 1 litre intravenous normal saline started[2].

Non-hemorrhagic causes of shock include tension pneumothorax and cardiac tamponade. For cardiac tamponade, urgently transfer to ED for pericardiocentesis.

D. i) **Disability and neurologic evaluation** — Once the airway, breathing and circulation are stabilised, assess the patient's level of consciousness using either "AVPU": Alert, responds to Voice, responds to Pain, or Unresponsive; or the Glasgow Coma Scale (GCS). Assess the pupil size and reactivity and gross motor function and sensation. It is important to document the initial level of consciousness so that subsequent comparison can be made and deterioration identified.
ii) Neurological intervention – Patients with blunt trauma are assumed to have cervical spine injury until proven otherwise and cervical spine immobilisation should be performed.

Maintain in-line cervical immobilisation until proper spinal immobilisation equipment arrives (includes a hard cervical collar, foam pads to prohibit lateral head movement, and a long backboard). Patients with an isolated penetrating trauma and no secondary blunt injury, who have no neurologic deficits typically do not have an unstable spinal column injury[5] and do not require spinal immobilisation.

Patients trapped in a vehicle pose a challenge and the first responders and fire fighters need to work as a team to extricate the victim whilst providing spinal immobilisation and simultaneously performing primary survey.

E. **Exposure and environmental control** — after exposure to identify injuries, the patient should be kept warm and covered with a blanket.

## AFTER PRIMARY SURVEY

1) The primary survey should be **repeated** every few minutes until transfer is initiated deterioration can be identified early and the necessary remedial actions taken.

2) **Wounds** – While waiting for paramedic arrival, if time permits, wounds should be covered with dressing and fractures splinted. A "dough-nut" dressing should be placed around impaled objects to stabilise it and prevent it from moving. No attempts should be made to remove an impaled object as it may cause tamponaded bleeding to re-bleed.

3) **Analgesia** – If available, parenteral analgesia may be given to patients in obvious pain, however it should not delay transport to ED.

4) **History** – The AMPLE mnemonic is used to obtain a rapid, focused history from the patient and eye witnesses.
   **A** – Allergies
   **M** – Medications. In particular the use of anticoagulation (which may need subsequent reversal), antiplatelets (associated with increased morbidity[8]) and beta blockers (which may alter haemodynamic response to shock)
   **P** – Past medical history
   **L** – Last meal and drink
   **E** – Events. Knowing the mechanism of injury can aid ED personnel in identifying injury patterns. As a first responder, the physician should ask bystanders regarding the mechanism of the injury. Important mechanistic information to gather include: Seat belt use; Steering wheel deformation; Airbag deployment; Direction of impact and damage to the automobile; Distance ejected from the vehicle; Height of fall; State of destruction of helmet

5) **Transfer to ED** – Rapid transport to ED is critically important and paramedics should minimise the amount of time spent at scene initiating intravenous lines, dressing non-haemorrhaging wounds or splinting minor fractures[9]. If intravenous access is achieved without delaying transport, blood pressure targets enroute depends on the injury mechanism. A mean arterial pressure (MAP) around 65 mmHg or a systolic blood pressure (SBP) around 90 mmHg is a reasonable goal in penetrating trauma[10]. This strategy of controlled hypotension prevents prematurely expanding the intravascular volume which can lyse life-saving clots and cause re-bleeding before surgical haemostasis is achieved. In blunt trauma patients, particularly those with possible traumatic brain injury, a mean arterial pressure above 105 mmHg or a systolic blood pressure above 120 mmHg is reasonable to maintain cerebral perfusion.

## SPECIAL CONSIDERATIONS IN TRAUMA

1) **Elderly trauma patients** – All elderly trauma patients are assumed to have sustained a significant injury and should be sent to ED, even if they appear well[11]. The severity of injury may be masked in elderly trauma patients because of medications (eg. Beta blockers). Blood pressure may appear to be in the "normal range" when they are actually hypotensive relative to their baseline hypertension. Apart from managing the actual injury sustained, the precipitating cause for the trauma (eg. syncope, myocardial infarction, sepsis, stroke) needs to be elucidated.

2) **Non-accidental injury** needs to be suspected in trauma patients at both extremes of age. Intimate partner violence needs to be suspected in the vulnerable population. These patients may have repeated attendances for trauma and appear difficult to deal with, or present with multiple vague complaints. When suspected, referral to the medical social worker and police is mandatory.

3) **Electrical injuries** – Rescuers need to be cautious that the source of electricity is removed or switched off. Electrocution injuries are caused by conversion of electrical energy to heat, which causes burns. Often the burns are more extensive that what appears on the surface. Apart from local burns and tissue destruction, other complications include rhabdomyolysis with hyperkalaemia and acute kidney injury, compartment syndrome, autonomic dysfunction and cardiac arrhythmias, hence it is recommended to transfer to the ED for evaluation. For collapsed patients, prolonged cardiopulmonary resuscitation (CPR) should be performed following electrical injury regardless of the initial rhythm, as most victims are young and good outcomes have been noted even among patients with asystole[12].

4) **Burns** – Patients are at risk of inhalation injury due to prolonged exposure to heat, such as when rescued from the fire in an unconscious state. In such cases supporting signs of inhalation injury include facial burns, carbonaceous sputum, and hoarse voice. Immediate transfer to ED is imperative as there may be impending upper airway obstruction. Altered mental state in rescued burns patients may be due to hypoxia, carbon monoxide or cyanide poisoning or intracranial injuries suffered from a blast. For other types of burns, first aid includes stopping the burning process by removing smoldering clothes, jewelry and rinsing with copious amounts of tap water to cool the burn. Chemical burns are dealt with in the same way by brushing off chemical residue and irrigating copiously with water to dilute the chemical.

5) **Wound Pitfalls**
   i. "Fight bite" – should be suspected as the cause for wounds around the knuckles of the hands. Patients, fearing prosecution, are not always forthcoming with how they got injured. These wounds are highly contaminated, may have breached the capsule of the metacarpophalangeal joint and require surgical debridement, prophylactic antibiotics and delayed closure.
   ii. Pressure jet injuries (water or paint) – these wounds typically look innocuous on the skin surface but actually penetrate deep along the tissue planes. There is a high risk of infection and surgical debridement is required.
   iii. Shin wounds in the elderly – these skin flaps tend to necrose and should not be sutured. Instead the flap should be unrolled, cleansed and wound edges approximated with steristrips. Follow up is imperative and referral for skin grafting if there is subsequent skin necrosis.

## CONCLUSIONS

Major trauma patients have a high risk of death and morbidity. When approaching a trauma patient as a physician first responder, following the described framework will help focus critical assessment and management, and optimise patient outcomes.

### REFERENCES


1. Ong ME, Ng FS, Overton J, Yap S, et al. Geographic-time distribution of ambulance calls in Singapore: utility of geographic information system in ambulance deployment (CARE 3). Ann Acad Med Singapore 2009 Mar;38:184-91.
2. American College of Surgeons Committee on Trauma. Advanced Trauma Life Support for Doctors, Student Course Manual, 9th ed, American College of Surgeons, Chicago 2012.
3. Hussain LM, Redmond AD. Are pre-hospital deaths from accidental injury preventable? BMJ 1994; 308:1077.
4. Esposito TJ, Sanddal ND, Hansen JD, et al. Analysis of preventable trauma deaths and inappropriate trauma care in a rural state. J Trauma 1995; 39:955.
5. Walls, RM, Murphy, MM. Manual of Emergency Airway Management, 3rd, Lippincott Williams & Wilkins, Philadelphia 2008.
6. Eckstein M, Chan L, Schneir A, et al. Effect of prehospital advanced life support on outcomes of major trauma patients. J Trauma 2000; 48:643.
7. Demetriades D, Murray J, Charalambides K, et al. Trauma fatalities: time and location of hospital deaths. J Am Coll Surg 2004; 198:20.
8. Ferraris VA, Bernard AC, Hyde B. The impact of antiplatelet drugs on trauma outcomes. J Trauma Acute Care Surg 2012; 73:492.
9. McCoy CE, Menchine M, Sampson S, et al. Emergency medical services out-of-hospital scene and transport times and their association with mortality in trauma patients presenting to an urban Level I trauma center. Ann Emerg Med 2013; 61:167.
10. Bickell WH, Wall MJ Jr, Pepe PE, et al. Immediate versus delayed fluid resuscitation for hypotensive patients with penetrating torso injuries. N Engl J Med 1994; 331:1105.
11. Sterling DA, O'Connor JA, Bonadies J. Geriatric falls: injury severity is high and disproportionate to mechanism. J Trauma 2001; 50:116.
12. Spies C, Trohman RG. Narrative review: Electrocution and life-threatening electrical injuries. Ann Intern Med 2006; 145:531.


### LEARNING POINTS

- **While performing the primary survey, delegate tasks like traffic control, applying pressure to stem haemorrhage, in-line cervical stabilisation to bystanders.**
- **Jaw thrust with bag-valve-mask ventilation is preferable to struggling with endotracheal intubation in non-ideal circumstances, causing delay in transport to hospital.**
- **Assume cervical spine injury in all cases of blunt trauma and immobilise the neck appropriately.**
- **All physicians should familiarise themselves with how to do needle chest decompression and needle cricothyrotomy as these procedures may be life-saving.**

UNIT NO. 6

# EMERGENCIES IN THE VERY YOUNG PATIENTS – A PRIMER

Dr Jade Kua Phek Hui, A/Prof Ng Kee Chong


## ABSTRACT

**The family physician has the monumental task of deciding if a pediatric patient can be treated as an outpatient or needs to be referred to the hospital for further acute care. Some common conditions that may be discharged without referral include the stable child with a minor head injury and balanitis. Others may be complicated by decompensated gastroenteritis or serious bacterial infections such as unstable pneumonia and urinary tract infection in the very young. The younger the child, the more subtle the signs and symptoms are. There is also a higher incidence of congenital conditions like pyloric stenosis in the very young that are unique in this population group.**

**This article summarises such conditions with helpful hints on recognition of abnormal vital signs, and seeks to act as a guide to assist the family physician who may face these patients in his daily practice.**


**Keywords: Age-dependent vital signs, Congenital abnormalities, very young, unexplained tachycardia, shock, non-accidental injuries**

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## INTRODUCTION

It is always a challenge at the front line when faced with a young patient, to decide if he can be treated at the family physician's clinic with outpatient medication or if he needs immediate referral to the hospital.

The range and scope of cases that present at emergency medicine departments varies from truly serious and life threatening paediatric emergencies to more mundane ambulatory cases.

In the family medicine clinic, differentiating the very sick from the not-so-sick in paediatrics similarly requires awareness of the differences and subtleties in paediatric ambulatory medicine, particularly in the very young.

There is no strict criteria or age cut-off to differentiate the "very young" from the "young" per se.

## MEDICAL AND PHYSIOLOGICAL DIFFERENCES IN THE VERY YOUNG

Some of the important reasons for clinical differentiation are listed as follows:

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### A) Medical Conditions In The Very Young

1) There is a higher incidence of congenital as opposed to "acquired" conditions in the very young. This includes hypertrophic pyloric stenosis, congenital diaphragmatic hernia, congenital heart diseases (cyanotic as well as acyanotic) and various genetic syndromes.
2) There are also various medical conditions that only occur in the young – eg febrile seizures, neonatal and prolonged neonatal jaundice, bronchiolitis, croup, pulled elbows and non-accidental injuries.
3) In general, younger children tend to have more emergent and urgent medical conditions that are usually respiratory, infective and gastro-intestinal in nature.

### B) Physiological Considerations In The Very Young

The normal vital signs in the very young are different from older children and adults. There are essentially three "age-dependent vital signs":

- Heart / pulse rate
- Respiratory rate
- Blood pressure

Generally, the younger the child is, the heart rate and respiratory rates have a higher normal threshold. Conversely, the younger the child, the blood pressure is generally lower as a norm.

**TABLE 1. USEFUL NORMS**

| Age (in yrs) | Breaths / min | Heart rate / min |
|---|---|---|
| < 1 | 30-40 | 110-160 |
| 2-5 | 20-30 | 95-140 |
| 5-12 | 15-20 | 80-120 |
| >12 | 12-15 | 60-100 |
| Expected systolic blood pressure : {70 + (age in years x 2)} mmHh | | |
| Estimated weight : 2 {age in years + 4} kg | | |

The younger child has proportionately lower absolute blood volumes compared to an older child or an adult. The estimation blood volume of a child is roughly about 80 mls/kg. A proportionally small degree of blood loss or fluid loss (through a seemingly innocuous event like poor feeding or vomiting) can result in significant haemodynamic compromise.

The haemodynamic response to loss of preload in a child is different from the adult (Figure 1)

Hence, in the very young, there is a tipping point beyond which the "compensated' state of haemodynamic compromise suddenly results in a precipitous drop in the blood pressure.

Therefore, it is very important to appreciate that the first sign of shock in a young child is unexplained tachycardia.

**TABLE 2. PRACTICAL DIFFERENCES IN THE PAEDIATRIC AIRWAY**

- The relatively large head/occiput flexes the neck and results in airway obstruction in the unconscious child.
- The lower airways are smaller and the supporting cartilage are less well developed in the infant and young child.
- This results in easy obstruction of these passages by mucus, pus, edema, blood and bronchoconstriction from raised airway resistance because resistance is inversely proportional to the 4th power of the radius.
- The ribs are pliable and compliant.The tidal volume in a young child is more dependent on the diaphragmatic function and movement than on intercostal muscles.
- Respiration is easily affected when diaphragmatic movements are impeded (by hyperinflation and pulmonary edema within the lungs or from abdominal distention leading to diaphragmatic splinting).
- During passive expiration, alveolar collapse can aggravate the ventilation/perfusion mismatch.
- Children have higher metabolic rates, with an oxygen consumption of 6-8 ml/kg/min compared to 3-4 ml/kg/min in the adult.This results in hypoxaemia occurring more quickly in a child.
- Hypoxaemia occurs more easily in a child than in an adult.
- Ventilatory compromise can also result from CNS depression from : Hypothermia, Metabolic derangements (from eg hypoglycaemia), Drugs & Head injury.

**TABLE 3. TIPS IN ASSESSMENT OF THE VERY YOUNG**

- Examine when you can.
- Ensure the ABCs (airway, breathing & circulation) are intact.
- Rule out/Think of congenital conditions, eg pyloric stenosis, volvulus in a vomiting infant.
- Don't be "shy" – strip completely and examine thoroughly, including doing a gentle per rectal examination.
- When there is incongruity between the history & examination, think of "unconventional event(s)": viz
  - Foreign Bodies
  - Poisoning
  - Non-accidental Injuries

## TEN COMMON CONDITIONS FROM TOP TO TOE

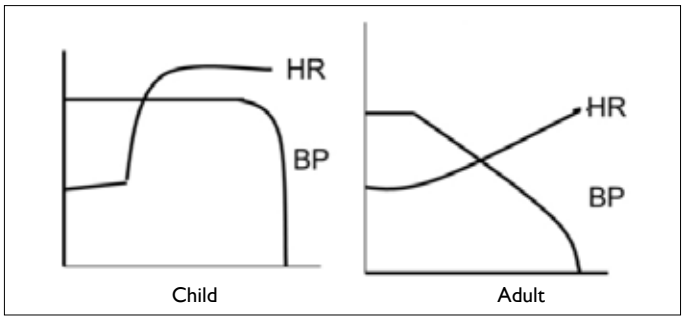
### 1. FEVERS IN CHILDREN

Fevers are by far the most common reason children seek attention in the paediatric emergency department. Studies have shown that as much as 30% of the daily attendance comprises of children with fever.

Fever is a sign, not a diagnosis. It can be broadly divided into "Infective" and "Non-Infective" causes aetiologically.

There are many ways to further approach an infective febrile children. For practical purposes, an infective febrile children can be divided broadly into a febrile child "with or without toxicity" and a febrile child "with or without an infective source".

**FIGURE 1. HAEMODYNAMIC RESPONSE IN CHILD VERSUS ADULT**




The age of the febrile child plays an important part in the initial risk stratification of the child, mainly because in the younger child, the signs and symptoms of a serious illness are more subtle and indistinct[1-16].

Children less than 3 months old with a documented fever have neonatal pyrexia (NNP) or infantile pyrexia. They should be referred to the hospital for further care and management.

a) Fever Without Source (FWS)

This is an acutely febrile illness in which the etiology of fever is not clinically apparent after a careful history and examination[9-14]. The febrile child otherwise remains stable and is NOT toxic. Looking for the source includes taking a history (including contact history) and doing an examination plus carrying out various investigations to determine the source of the fever, such as a full blood count, urinalysis or Xrays.

b) Kawasaki Disease:

A great mimic of many conditions is the syndrome of generalised acute inflammatory conditions known as Kawasaki Disease (KD). This is common in young children under 5 years old and is more difficult to diagnose in infants, in whom there is a higher incidence of cardiac sequelae[17-23]. The classical diagnosis is based on the presence of fever for more than 4 days with 4 out of 5 clinical features: bilateral nonsuppurative conjunctivitis; enlarged cervical lymph node more than 1.5cm unusually unilateral; mucositis eg red/cracked lips, strawberry tongue, injected pharynx; polymorphous rash; swollen hands and feet in the acute phase which start peeling in the convalescent phase.

**TABLE 4. AETIOLOGICAL APPROACH TO FEVERS IN CHILDREN**

| Infective fever | Non-infective fever |
|---|---|
| • Type of Infective Organism – ie viral, bacterial, parasitic and others | • Inflammatory conditions like Kawasaki's Syndrome |
| • Organ-specific – eg pneumonias, lymphomas, brain tumours etc | • Malignancies like leukemia, urinary tract infections, meningitis etc |
| • Specific infective conditions – dengue, hand-foot-mouth disease, exanthem subitum, cat-scratch disease etc | • Auto-immune conditions like Systemic Lupus Erythematosus, Juvenile Rheumatoid Arthritis etc |
| *(NB :The above three infective aetiological factors are not mutually exclusive)* | • Vaccines and other medications like antibiotics |
| | • Others – including medications |

The treatment is admission for intravenous immunoglobulins to reduce the morbidity of cardiac complications: Inflammation of medium sized vessels including coronary artery can result in aneurysms.

**TABLE 5. PITFALLS IN THE DIAGNOSIS OF KAWASAKI DISEASE (KD)**

- Atypical Age Groups – in the less than 1 year old and adolescents.
- Rash is mistaken for allergy or viral exanthema or rash is mistaken for bacterial infection and clinician is waiting for blood cultures to be ready
- KD is mistaken for lymphadenitis.
- Pyuria is mistaken for UTI (sterile pyuria in KD).
- Not all signs and symptoms in KD will be present in all cases nor will they all appear at the same time or in the same intensity.

**TABLE 6. ADMISSION GUIDELINES FOR CHILDREN WITH FEVER**

1) Less than 3 months old who present with fever/symptoms of toxicity.
2) Toxic in appearance: (sepsis syndrome)
   a) lethargic (level of consciousness characterised by poor or absent eye contact or failure of child to recognise parents)
   b) signs of poor perfusion
   c) hypo- or hyperventilation
3) > Day 7 of fever without source
4) Temperature > 41 degrees Centigrade
5) Immunocompromised (eg chronic or cyclical neutropenia; malignancy on chemotherapy; on high- or chronic steroids; post-splenectomy; post-transplantation etc)
6) Dengue Fever with platelet less than 80,000 or unwell
7) Features suggestive of classical or atypical Kawasaki disease

## 2. THE CRYING CHILD

A child who cries is a child who is uncomfortable, sickly or in pain. The physician must therefore take a comprehensive history and perform a thorough examination to determine the ultimate root cause for the crying. This will involve determining the vital signs of the child and doing a complete holistic physical examination of the child, including looking out for an evolving acute surgical abdomen, incarcerated inguinal hernias as well as for the hair tourniquet syndrome.

If the child has fever, one should also screen the urine to rule out a urinary tract infection especially if the child is preverbal and cannot vocalise dysuria. Infant colic per se is a diagnosis of exclusion.

## 3. FEBRILE SEIZURES

Children aged between 6 months to 6 years old are at risk of developing simple febrile seizures. The incidence locally is about 3 to 5% in this age group.

The child should be assessed both for the type of febrile seizure as well as to ascertain the actual nature of the fever[1-3, 24-27].

Children who are more than 18 months old, with simple febrile seizures and who are not septic and do not have a serious infective source of fever (eg serious bacterial infection) can be considered for outpatient monitoring and care. Children less than 18 months old with simple febrile seizures should still be admitted for monitoring to rule out evolving meningitis.

**TABLE 7. SIMPLE FEBRILE SEIZURES**

- In the typical age group (6 months to 6 years old).
- Presence of fever.
- Generalised tonic-clonic seizure.
- Duration of seizure less than 15 to 20 mins.
- Not more than 1 seizure a day.
- Post-ictally, child is drowsy but has no residual neurological deficits.

## 4. UNEXPLAINED CAUSES OF TACHYCARDIA

Serious unexplained causes of tachycardia, adjusted for the age of the child, include the different forms of shock, ie septic shock, hypovolaemic shock, cardiogenic shock etc and supraventricular tachycardia (SVT) as well as obvious serious medical conditions like pneumonia or severe asthma in significant respiratory distress.

Table 8 summarises the clinical signs and symptoms of myocarditis. SVT is the most common significant arrhythmia in childhood[1-3, 28-31]. Table 9 summarises the main clinical differences between SVT and sinus tachycardia[1-3, 32-35].

Less serious causes of unexplained tachycardia include physiological causes like from a high temperature, stranger anxiety or due to pain or distress.

**TABLE 8. CLINICAL SIGNS & SYMPTOMS OF MYOCARDITIS**

**Presentation of Myocarditis:**

- Cardiac failure.
- Arrhythmias.
- Cardiopulmonary collapse.
- Non-specific symptoms.
  - Palpitation, syncope, near-syncope.
  - Chest pain, especially cardiac in nature (ischaemic pain, pericarditis-type pain) and associated with other signs and symptoms; or in a young child.
  - Vomiting.
  - Feeling unwell, malaise, lethargic, "less active" than usual.
  - Poor feeding in infants/young children.
  - Cough.
  - Wheezing, persistent rhonchi despite nebs in "bronchiolitis"/"asthma"
  - Respiratory distress – dyspnoea, grunting, cyanosis.
  - Infant/ child whose overall appearance is inconsistent with the presumptive diagnosis of bronchospasm or URTI.

**Physical examination:**

1. Signs of cardiac failure
   – Tachycardia (at rest), S3, gallop rhythm.
   – Soft heart sounds.
   – Tachypnoea.
   – Hepatomegaly.
   – Raised JVP.
   – Poor perfusion (pallor, cool extremities), sweatiness.
   – Lung crepitations.
   – Cardiogenic shock.
2. Signs of rhythm abnormality
   – Tachycardia, bradycardia, irregular HR.

**TABLE 9. DIFFERENCES BETWEEN SVT & SINUS TACHYCARDIA**

| | Sinus Tachycardia | Supraventricular Tachycardia |
|---|---|---|
| Rate | <180 bpm<br>Consistent with volume loss, fever, infection | >220 bpm<br>Non-specific – irritability, poor feeding, tachypnea, sweating, pallor |
| Physical examination | Consistent with dehydration, fever, sepsis, blood loss | Poor perfusion<br>Possibly signs of cardiac failure with fine crepitations and hepatomegaly |
| ECG<br>fixed<br>. | Rarely helpful, usually normal | Monotonous rhythm – fairly rate despite changes in actrivity.<br>Sudden termination/initiation. |

## 5. COMMON RESPIRATORY CONDITIONS

**Bronchiolitis:** This is a lower respiratory tract infected caused commonly by the respiratory syncytial virus[1-3, 36-43]. It usually affects children aged 18 months to 2 years old and below. They present with cough with fever and get worse from Day 3 to 4 of illness. Management is symptomatic, aimed at managing the respiratory distress and ensuring adequate oral intake. Use of nebulised adrenaline has been shown to reduce admissions for cases of bronchiolitis with moderate respiratory distress.

**Acute Laryngo-Tracheo Bronchitis/ALTB (Croup):** This is an infection of the upper respiratory tract caused commonly by the parainfluenza virus[1-3, 44-52]. The child present with a barking cough, hoarse voice and inspiratory stridor. Management is again aimed at improving the degree of respiratory distress (which can be gauged by the Wesley Croup Score) with dexamethasone, nebulised adrenaline and moisturised oxygen.

The main differentials for ALTB with respiratory symptoms of stridor and fever include epiglottitis and less common causes like retropharyngeal abscess etc. Epiglottitis is caused by Haemophilus Type B and patients are usually more septic with higher temperatures.

Radiologically, the "thumb" sign is pathognomonic of acute epiglottitis on a lateral neck Xray. In ALTB, an AP neck Xray reveals the "steeple sign"[48].

**Pneumonia:** The cardinal triad is that of fever, tachypnea and cough but fever may be absent in young infants under 3 months old. Infants under 1 year old may present with non-specific complaints like anorexia, malaise, altered mental status or isolated fever[1-3, 53-63]. Other symptoms may include myalgia, abdominal pain and vomiting especially after coughing. The child should be referred onwards if they are toxic looking or lethargic, are in respiratory distress, have a history of poor feeding or evidence of dehydration, or underlying systemic illness such as congenital heart, leukemia, chronic lung disease, immunodeficiency, neurological disorder eg cerebral palsy or spinal muscular dystrophy.

For young infants with pneumonia, especially if they have not completed their full course of immunisation, one should also rule out possible pertussis as the primary aetiological agent. In those older than 6 months old and for young child less than 5 years, the most common etiology is Streptococcal pneumonia. Outpatient management in uncomplicated pneumonia is high dose amoxicillin 80mg/kg/day in 3 divided doses for 7-10 days. In the older child aged 5 and above, the likely aetiology agents still includes pneumococcus but one should also think of mycoplasma, especially if the blood counts are normal or show a low total white count with interstitial lung markings.

Bachur et al 59 did a retrospective review of records of children 5 years and below with fever without source (see above) with a triage temperature of >/= 39 degrees Celsius and who had a total white count of >/= 20,000 and then who were subsequently diagnosed to have occult pneumonia. Of the 278 patients studied, the prevalence of occult pneumonia was 26% (19% to 34%).

## 6. GASTROENTERITIS

Gastroenteritis (GE) remains a common problem in children. Most children with mild-moderate dehydration can be treated with oral rehydration using low osmolality oral rehydration solutions since drugs are usually unnecessary and may do harm[1-3, 64-67].

The first is to rule out other more ominous causes of vomiting. This can range from various serious surgical disorders to other more serious medical causes of vomiting, including undiagnosed diabetic ketoacidosis.

Next is to determine the severity of the child's state of dehydration (Table 11).

Small frequent aliquots of clear feeds such as hydralyte are administered to prevent vomiting yet keep the child

**TABLE 10. THE WESLEY GROUP SCORE**

| Signs and symptoms | Grading | |
|---|---|---|
| Inspiratory stridor | None | = 0 |
| | At rest with stethoscope | = 0 |
| | At rest without stethoscope | = 0 |
| Retractions | None | = 0 |
| | Mild | = 1 |
| | Moderate | = 2 |
| | Severe | = 3 |
| Air entry | Normal | = 0 |
| | Decreased | = 1 |
| | When agitated | = 1 |
| | At rest | = 2 |
| Cyanosis | None | = 0 |
| | When agitated | = 1 |
| | At rest | = 2 |
| Conscious state | Normal | = 0 |
| | Altered | = 1 |

**Mild to moderate ALTB = Wesley score <3**

**TABLE 11. DEGREE OF DEHYDRATION IN GE**

| SIGNS & SYMPTOMS | DEHYDRATION | | |
|---|---|---|---|
| | Mild (3-5%) | Moderate (7%) | Severe (10% >>) |
| FEVER | +/- | + | + |
| Skin Elasticity | N | Decreased | Markedly decreased |
| Fontanelle | N | N / depressed | Markedly depressed |
| Eyes | N | N | Sunken |
| Skin | N | N | Cold, clammy, mottled |
| Oliguria | +/- | + | ++ |
| Fits | - | - | +/- |
| Acidotic Breathing | - | +/- | + |
| Coma | - | - | +/- |

**TABLE 12. THE GLASGOW COMA SCORE & TRAUMA BRAIN INJURY (TBI)**

| Parameters | Standard Glasgow Coma Scale (GCS) | Paediatric Glasgow Coma Scale (GCS) – Preverbal (< 2years old) | GCS |
|---|---|---|---|
| Eye opening | Spontaneous | Spontaneous | 4 |
| | To verbal stimuli/speech | To verbal stimuli/speech | 3 |
| | To pain | To pain | 2 |
| | None | None | 1 |
| Best verbal response | Oriented | Coos, babbles | 5 |
| | Confused | Irritable, cries | 4 |
| | Inappropriate words | Cries to pain | 3 |
| | Incomprehensible sounds | Moans to pain | 2 |
| | None | None | 1 |
| Best motor response | Follows commands | Normal spontaneous movement | 6 |
| | Localises pain | Withdraws to touch | 5 |
| | Withdraws to pain | Withdraws to pain | 4 |
| | Flexion to pain | Abnormal flexion | 3 |
| | Extension to pain | Abnormal extension | 2 |
| | None | None | 1 |
| | Severity of TBI | GCS (min 3, max 15) | |
| | Mild/Minor TBI | 13/14 to 15 | |
| | Moderate TBI | 9 to 12 | |
| | TBI | < 9 | |

adequately hydrated. A child who is not suitable for outpatient treatment is one who has at least moderate dehydration. A proportionally small degree of fluid loss (through a seemingly innocuous event like poor feeding or vomiting) can result in significant haemodynamic compromise.

In addition, it is not only just that volume is needed but the child's glycaemic status must also be determined. Young children have high metabolic rates and relatively low glycogen reserves. They tend to tip into hypoglycaemia very easily.

For diarrhea, additional fluids should be factored in if there is a large volume of fluid loss per episode. In breastfed infants, we encourage the parent to breastfeed more often. In formula-fed infants, we encourage the parent to continue the usual formula milk unless the diarrhea persists for more than 10 days, then lactose-free formula such as soy milk can be considered to offset possible secondary lactose intolerance. While soy-based preparations are in no way harmful calorie-wise, it is usually the less than palatable taste that might dissuade the already sick GE child from taking easily to it.

## 7. HEAD INJURIES

The most common minor trauma incident that is seen in the CE is a fall at home. In the very young child, this is often due to a fall from an adult bed and in the ambulant child, this may be due to slipping on a wet surface. The usual injury sustained is that of a cephalohematoma.

If the clinical history reveals loss of consciousness of at least 1 minute, progressive headache and lethargy, confusion, seizures, vomiting at least 4 times or bleeding from the ears & nose in the absence of local injury, it potentially more than just a minor head injury[1-3, 68-75]. The child should be adequately assessed by the Glasgow Coma Score (Table 12).

One would need also to be more careful if the child is extremely young and the mechanism of the fall is worrisome. In addition, a non-accidental nature for the head injury must be ruled out.

Otherwise in the absence of serious clinical indicators of traumatic brain injury and if the child is able to play and feed well, the child can possibly be observed at home with advice to monitor for the next 72 hours and to refrain from

participating in any strenuous activities.

Linear skull fractures by themselves in the absence of impaired GCS heal spontaneously. Only depressed skull fractures need to be admitted.

## 8. COMMON SURGICAL CONDITIONS

Intussusception: This is usually a spontaneous event with the telescoping of the small intestine into the caecum at the ileo-caecal junction[1-3, 76-82]. The classical triad is bilious vomiting with severe abdominal pain with updrawing of the legs and currant-jelly stools.

**Hypertropic Pyloric Stenosis:** This also occurs more frequently in males and the presentation is projectile non-bilious vomiting when the baby is about 3 weeks' old or more just after or near the end of a feed[1-3, 83-84]. Progressively they developed hypochloraemic metabolic alkalosis though most cases by far present very much earlier these days.

A pyloric tumour (olive) can sometimes be felt near lateral margin of the right rectus muscle below the liver edge and has been reported to be palpable in 85% of cases. This is best felt right after the bout of vomiting.

## 9. URINARY TRACT INFECTION (UTI) & BALANITIS

The preverbal child with urinary tract infection often presents with only fever. Children under 6 months with suspected UTI should be admitted because there is an urgent need to effectively curtain potentially aggressive pyelonephritis as well as concomitant sepsis[1-3, 85-93].

While urinalysis is used as an initial screen for possible UTI, a midstream or catherised urine specimen must be obtained for a proper urine culture.

It is important that the final diagnosis is confirmed as UTI by cultures as this will have downstream implications when the child is followed up subsequently to rule out congenital urinary problems such as vesico-ureteric reflux or pelvi-ureteric junction obstruction and the like.

**Balanitis:** Young boys are commonly referred for painful red penile tips or balanitis. Balanitis is inflammation of the glans penis only while balanitis involving the foreskin and prepuce is termed balanoposthitis. Though uncommon, a complication of balanitis is constricting phimosis, or inability to retract the foreskin from the glans penis. They do not need a urine dipstick if there are no other clinical signs or symptoms suggestive of UTI. If grossly inflamed and locally infected, treatment is with oral cephelexin plus topical analgesia such as lignocaine gel and an antiseptic wash as well as hygiene advice.

## 10. FRACTURES

While accidental injuries usually cause more fractures in the young, one must also rule out non-accidental fractures[94-96]. Young children, especially if they have just started ambulating like for toddlers do fall accidentally and sustain injuries including fractures. Toddler fractures typically occur between 9 months and 3 years of age, and are believed to be the result of new stresses placed on the bone due to recent and increasing ambulation. Toddlers often present as limping children and Xrays of the tibia/fibula may reveal an undisplaced spiral fracture. Should these fractures occur in a non-ambulatory child, or if there is any delay in presentation, inconsistent history from the caregiver, multiple bruises or fractures of different ages, the diagnosis of a non-accidental injury (NAI) should be considered[1-3, 97-106].

The typical skeletal fracture in cases of NAI is the Classical Metaphyseal lesion.

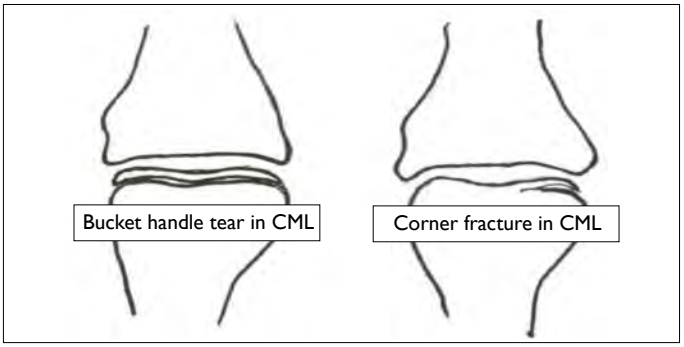
**Table 13. Suspicious Aspects in History and examination in NAI**

| |
|---|
| **Suspicious aspects in the history :** |
| * Delay in seeking consult |
| * Account of accident is vague & inconsistent |
| * Discrepancy between history & degree of injury |
| * Parental behaviour is abnormal, lack of concern for child |
| * Interaction between child & parents is abnormal |
| **Suspicious aspects in the physical examination:** |
| Injuries not consistent with history |
| Multiple injuries in different stages of healing |
| Unusual and specific injuries |

**Table 14. SPECIFICITY OF NAI TO TYPE OF SKELETAL INJURY[99]**

| Specificity | Fracture |
|---|---|
| High | Classic metaphyseal lesions |
| | Rib fractures (esp posteromedial) |
| | Scapular fractures |
| | Spinous process fractures |
| | Sternal fractures |
| Moderate | Multiple fractures (esp bilateral) |
| | Fractures of different ages |
| | Epiphyseal separations |
| | Vertebral body fractures and subluxations |
| | Digital fractures |
| | Complex skull fractures |
| Low | Subperiosteal new bone formation |
| | Clavicular fractures |
| | Long Bone shaft fractures |
| | Linear skull fractures |

**FIGURE 2. CLASSICAL METAPHYSEAL SKELETAL LESION OF NAI**



## TABLE 15. COMMON EMERGENCIES IN THE VERY YOUNG

| Condition | Pointers & Plan of Action | |
|---|---|---|
| Neonatal Pyrexia / Infantile Pyrexia | • Check for perinatal red flags – Maternal Group B Srep infection?<br>• Mode of delivery<br>• APGAR Score | • Admit for observation if less than 2 to 3 months – with partial or full septic workout to rule out evolving sepsis |
| Fevers | • Look actively for an infective source<br>• Consider less common but important non-infective causes of fever | • Consider role of various ambulatory point-of-care tests like FBC, urinalysis and xrays in cases of "Fever Without Source". |
| Crying baby | • This is a child in distress<br>• Examine thoroughly including taking a complete set of vital signs | • Infant colic is a diagnosis of exclusion not a default diagnosis linked to "crying baby" |
| Suprventricular Tachycardia (SVT) | • Think of SVT if sudden onset and heart rate is very high (>220 bpm) | • Assess for haemodynamic stability |
| Prolonged NNJ | • Important to rule out biliary atresia<br>• Also linked to evolving UTI – check urine to rule out UTI pneumonia, asthma and upper respiratory tract infections | • Determine if the hyperbilirubinaemia is conjugated<br>• Breastmilk jaundice is a diagnosis of exclusion |
| Common Respiratory problems | • Includes bronchiolitis, croup & other causes of inspiratory stridor, pneumonia, asthma and upper respiratory tract infections | • Ensure patient is not in respiratory distress<br>• Ensure feeding is adequate |
| Vomiting & Diarrhoea<br><br>Child with Bloody Diarrhoea | • Assess clinical condition of the<br>• Determine hydration | • Rule out other less common medical/surgical causes of vomiting<br>• Rule out dysentery (blood and mucus with loose stools)<br>• Rule out local causes from bloody excoriation |
| Urinary Tract Infections (UTI) | • How urine is collected is important<br>• Urinalysis is a screen for UTI<br>• Urine culture is the gold standard | • Admit suspected UTIs less than 6 months old<br>• Specialist followup for UTIs less than 2 years of age with prophylaxis |
| Poisonings | • Check on the potential toxicity of the agent – it can be medicines or simple, common household products and even household plants | • Attend to the ABCs first<br>• Monitor the child<br>• Consider the role of decontamination before dispatch to the hospital |
| Common Surgical emergencies in the very young | • Hypertrophic Pyloric Stenosis<br>• Intussusception<br>• Appendicitis<br>• Volvulus<br>• Congenital diaphragmatic hernia<br>• Meckel's<br>• Torsion of the testes<br>• Foreign Bodies<br>• Head Injuries<br>Pulled elbows<br>• Fractures and cuts<br>• Non-Accidental Injuries | |

## TABLE 16. TEN COMMANDMENTS OF A PAEDIATRIC CONSULTATION

**TEN COMMANDMENTS OF A PAEDIATRIC CONSULTATION**

1. The **YOUNGER** the child, the more non-specific the signs and symptoms.

2. **MEDICATIONS:** Always check the weight/ possible allergies of the child before prescribing any treatment.
   Medications To Avoid/Minimise Administering In The Very Young:
   - Promethazine (less than 24 months old)
   - Stemetil/chlorpromazine – can cause oculogyric crisis
   - Paracetamol less than 3 months old/Ibuprofen less than 6 months to 1 year old
   - Hyoscine and metoclopromide in the young as they can lead to functional ileus

3. **EXAMINE WHEN YOU CAN:** In a fretful child, always exam the child when opportunity knocks, preferably in the arms of the caregiver.

4. **EXPOSE FULLY:** Expose the abdomen fully and examine the perineum/genitilia (+/- cremasteric reflex) and do a per rectum exam particularly in child with vomiting and other suspected acute abdominal complaints

5. **A&B:** Airway and Breathing are usually the most important essentials to maintain and stabilise - remember to rule out hypercarbia in hypoventilation

6. **TACHYCARDIA:** The first sign of impeding shock may just be tachycardia rather than overt depressed BP

7. **BLOOD SUGAR:** Always check the blood sugar of a sick child to rule out hypoglycaemia

8. **RULE OUT NAI:** One must also consider Non-Accidental Injuries (NAI) when faced with an unusual set of complaints or serious of injuries

9. **RULE OUT INGESTIONS/POISONINGS & FBs:** Especially in the young and inquisitive, rule out accidental ingestions including foreign body (FB) ingestion/insertions

10. Always give **CLEAR, CONCISE ADVICE** to parents.

**REFERENCES**


1. KK Women's and Children's Hospital, Department of Emergency Medicine. Children's Emergency Clinical Guidelines. May 2013.
2. Puthucheary J, Tan TH, Phua KB, Tan CL (Editors). KK Women's and Children's Hospital. The Baby Bear Book—A Practical Guide on Paediatrics. 2008.
3. Gary R. Fleisher (Editor), Stephen Ludwig MD (Editor). Textbook of Pediatric Emergency Medicine. Publisher: Lippincott Williams & Wilkins; 6th edition. 2010; ISBN-10: 1605471593, ISBN-13: 978-1605471594.
4. American College of Emergency Physicians. Clinical policy for the initial approach to children under the age of 2 years presenting with fever. Ann Emerg Med. 1993;22:628-637.
5. American College of Emergency Physicians. Clinical policy for children younger than 3 years presenting to the Emergency Dept with fever. Ann Emerg Med. 2003;42:530-45.
6. Baraff LJ. Editorial: Clinical policy for children younger than three years presenting to the emergency department with fever. Ann Emerg Med. 2003; 42:546–549.
7. Browne GJ, Currow K, Rainbow J. Practical approach to the febrile child in the emergency department. Emerg Med (Fremantle). 2001;13(4):426-35.
8. Klein JO. Management of the febrile child without a focus of infection in the era of universal pneumococcal immunization. Pediatr Infect Dis J. 2002; 21(6):584-8; discussion 613-4.
9. Baraff LJ. Management of fever without source in infants and children. Ann Emerg Med. 2000; 36:602-14.
10. Baraff LJ, Lee SI. Fever without source: management of children 3 to 36 months of age. Pediatr Infect Dis J. 1992; 11(2):146-51.
11. Baraff LJ. Management of infants and children 3 to 36 months of age with fever without source. Pediatr Ann. 1993; 22(8):497-8, 501-4.
12. Baraff LJ, Lee SI. Fever without source : management of children 3 to 36 months of age. Pediatr Inf Dis J. 1992; 11:146-51.
13. Baraff LJ, Bass JW, Fleisher GR et al. Practice Guidelines for the management of infants and children 0 to 36 months of age with fever without source. Pediatr. 1993; 92:1-12.
14. McCarthy PL, Klig JE, Kennedy WP et al. Fever without apparent source on clinical examination, Lower respiratory infections, and enterovirus infections. Curr Opinion Peds. 2000; 12:77-95.
15. Baraff LJ, Oslund SA, Schriger DL et al. Probability of bacterial infections in febrile infants less than 3 months of age : a meta-analysis. Pediatr Inf Dis J. 1992; 11:257-64.
16. Bandyopadhyay S, Bergholte J, Blackwell CD et al. Risk of serious bacterial infection in children with fever without source in the post-Haemophilus influenza era when antibiotics are reserved for culture-proven bacteremia. Arch Pediatr Adolesc Med. 2002; 156:512-7.
17. Newburger JW, Takahashi M, Gerber MA, Gewitz MH, Tani LY, Burns JC, et al. Diagnosis, treatment, and long-term management of Kawasaki disease: a statement for health professionals from the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, Council on Cardiovascular Disease in the Young, American Heart Association. Circulation. 2004 ;110(17):2747-71.
18. Dajani AS, Taubert KA, Gerber MA, Shulman ST, Ferrieri P, Freed M, et al. Diagnosis and therapy of Kawasaki disease in children. Circulation. 1993;87:1776–80.
19. Shulman ST. Kawasaki disease. In: Textbook of Pediatric Infectious Diseases, 5th ed., Feigin, RD, Cherry, JD, Demmler GJ, Kaplan SL (Eds), W.B. Saunders, Co., Philadelphia, Pennsylvania, 2004, pp. 1055-74.
20. Barone SR, Pontrelli LR, Krilov LR. The Differentiation of Classic Kawasaki Disease, Atypical Kawasaki Disease and Acute Adenoviral Infection Use of Clinical Features and a Rapid Direct Fluorescent Antigen Test. Arch Pediatr Adolesc Med. 2000;154:453-6.
21. Dummer KB, Newburger JW. Acute management of Kawasaki disease. Progress Pediatr Cardiol. 2004;19:129–35.
22. Joffe A, Kabani A, Jadavji T. Atypical and complicated Kawasaki disease in infants. Do we need criteria? West J Med 1995; 162:322-7.
23. Chang FY, Hwang B, Chen SJ, et al. Characteristics of Kawasaki disease in infants younger than six months of age (Abstract). Pediatr Infect Dis J 2006; 25:241.
24. Practice parameter: the neurodiagnostic evaluation of the child with a first simple febrile seizure. American Academy of Pediatrics. Provisional Committee on Quality Improvement, Subcommittee on Febrile Seizures. Pediatrics. 1996;97(5):769-72; discussion 773-5.
25. Riemenschneider TA, Baumann RJ, Duffner PK, et al. Practice parameter: the neurodiagnostic evaluation of the child with a first simple febrile seizure. American Academy of Pediatrics. Provisional Committee on Quality Improvement, Subcommittee on Febrile Seizures. Pediatrics. 1996;97(5):769-72; discussion 773-5.
26. Baumann RJ. Technical report: treatment of the child with simple febrile seizures. Pediatrics. 1999;103(6):e86.
27. Steering Committee on Quality Improvement and Management, Subcommittee on Febrile Seizures. Febrile seizures: clinical practice guideline for the long-term management of the child with simple febrile seizures. Pediatrics. 2008;121(6):1281-6.
28. Bohn D, Benson L. Diagnosis and management of pediatric myocarditis. Paediatr Drugs. 2002;4(3):171-81.
29. Schwartz SM, Wessel DL. Medical cardiovascular support in acute viral myocarditis in children. Guidelines for the Treatment of Myocarditis in Infants and Children and Proceedings of the 2005 Pediatric Cardiac Intensive Care Symposium. Pediatr Crit Care Med. 2006. 7(6) :Supplement: S12-S16,
30. Kindermann I, Kindermann M, Kandolf R, Klingel K, Bültmann B, Müller T, et al. Predictors of outcome in patients with suspected myocarditis. Circulation. 2008;118(6):639-48.
31. Freedman SB, Haladyn JK, Floh A, Kirsh JA, Taylor G, Thull-Freedman J. Pediatric myocarditis: emergency department clinical findings and diagnostic evaluation. Pediatrics. 2007;120(6):1278-85.
32. Paul T, Bertram H, Bökenkamp R, Hausdorf G. Supraventricular tachycardia in infants, children and adolescents: diagnosis, and pharmacological and interventional therapy. Paediatr Drugs 2000; 2:171-81.
33. Kugler JD, Danford DA. Management of infants, children, and adolescents with paroxysmal supraventricular tachycardia. J Pediatr 1996; 129:324-38.
34. Garson A Jr, Gillette PC, McNamara DG. Supraventricular tachycardia in children: clinical features, response to treatment, and long-term follow-up in 217 patients. J Pediatr 1981; 98:875-82.
35. Josephson ME, Wellens HJ. Differential diagnosis of supraventricular tachycardia. Cardiol Clin 1990; 8:411-42.
36. American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. Pediatrics. 2006;118(4):1774-93.
37. Shaw KN, Bell LM, Sherman NH. Outpatient assessment of infants with bronchiolitis. Am J Dis Child. 1991;145:151-5
38. Wang EE, Law BJ, Stephens D. Pediatric Investigators Collaborative Network on Infections in Canada (PICNIC) prospective study of risk factors and outcomes in patients hospitalized with respiratory syncytial virus lower respiratory tract infections. J Pediatrics. 1995;126:212-19.
39. Papoff P, Moretti C, Cangiano G, et al. Incidence and predisposing factors for severe disease in previously healthy term infants experiencing their first episode of bronchiolitis. Acta Paediatr. 2011;100(7):e17-23.
40. Wainwright C, Altamirano L, Cheney M et al. A multicenter, randomized, double-blind, controlled trial of nebulized epinephrine in infants with acute bronchiolitis. N Engl J Med. 2003;349(1):27-35.
41. Plint AC, Johnson DW, Patel H, Wiebe N, Correll R, Brant R, et al. Epinephrine and dexamethasone in children with bronchiolitis. N Engl J Med. 2009;360(20):2079-89.
42. Hartling L, Fernandes RM, Bialy L et al. Steroids and bronchodilators for acute bronchiolitis in the first two years of life: systematic review and meta-analysis. BMJ. 2011;342:d1714.
43. Wohl ME, Chernick V. Treatment of acute bronchiolitis. N Engl J Med. 2003;349(1):82-3.

44. Worrall G. Croup. Can Fam Physician. 2008;54(4):573-4.
45. Zoorob R, Sidani M, Murray J. Croup: an overview. Am Fam Physician. 2011;83(9):1067-73.
46. Bjornson C, Russell KF, Vandermeer B, et al. Nebulized epinephrine for croup in children. Cochrane Database Syst Rev. 2011;CD006619.
47. Sobol SE, Zapata S. Epiglottitis and croup. Otolaryngol Clin North Am. Jun 2008;41(3):551-66, ix.
48. Huang CC, Shih SL. Images in clinical medicine. Steeple sign of croup. N Engl J Med. 2012;367(1):66.
49. Scolnik D, Coates AL, Stephens D, Da Silva Z, Lavine E, Schuh S. Controlled delivery of high vs low humidity vs mist therapy for croup in emergency departments: a randomized controlled trial. JAMA. 2006;295(11):1274-80.
50. Fifoot AA, Ting JY. Comparison between single-dose oral prednisolone and oral dexamethasone in the treatment of croup: a randomized, double-blinded clinical trial. Emerg Med Australas. 2007;19(1):51-8.
51. Russell K, Wiebe N, Saenz A, et al. Glucocorticoids for croup. Cochrane Database Syst Rev. 2004;CD001955.
52. Dobrovoljac M, Geelhoed GC. 27 years of croup: an update highlighting the effectiveness of 0.15 mg/kg of dexamethasone. Emerg Med Australas. 2009;21(4):309-14.
53. Michelow IC, Olsen K, Lozano J et al. Epidemiology and clinical characteristics of community-acquired pneumonia in hospitalized children. Pediatrics. 2004;113(4):701-7.
54. Juvén T, Mertsola J, Waris M, Leinonen M, Meurman O, Roivainen M, et al. Etiology of community-acquired pneumonia in 254 hospitalized children. Pediatr Infect Dis J. 2000;19(4):293-8.
55. Chong CY, Lim WH, Tang JPL et al. Lower respiratory tract infections in hospitalized children. Respirology. 2003;8 (1):83-9.
56. Wingerter SL, Bachur RG, Monuteaux MC et al. Application of the World Health Organization Criteria to Predict Radiographic Pneumonia in a US-based Pediatric Emergency Department. Pediatr Infect Dis J. 2012;31(6):561-4.
57. Lynch T, Platt R, Gouin S et al. Can we predict which children with clinically suspected pneumonia will have the presence of focal infiltrates on chest radiographs? Pediatrics. 2004;113(3 Pt 1):e186-9
58. Mahabee-Gittens EM, Grupp-Phelan J, Brody AS et al. Identifying children with pneumonia in the emergency department. Clin Pediatr (Phila). 2005;44(5):427-35.
59. Bachur R, Perry H, Harper MB. Occult pneumonias: empiric chest radiographs in febrile children with leukocytosis. Ann Emerg Med. 1999;33(2):166-73.
60. Murphy CG, van de Pol AC, Harper MB et al. Clinical predictors of occult pneumonia in the febrile child. Acad Emerg Med. 2007;14(3):243-9.
61. Rutman MS, Bachur R, Harper MB. Radiographic pneumonia in young, highly febrile children with leukocytosis before and after universal conjugate pneumococcal vaccination. Pediatr Emerg Care. 2009;25(1):1-7.
62. Wubbel L, Muniz L, Ahmed A et al. Etiology and treatment of community-acquired pneumonia in ambulatory children. Pediatr Infect Dis J. 1999;18(2):98-104.
63. Bradley JS, Byington CL, Shah SS, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the pediatric infectious diseases society and the infectious diseases society of america. Clin Infect Dis. 2011;53(7):e25-76
64. Elliott EJ. Acute gastroenteritis in children. BMJ. 2007;334:35-40.
65. Shek KC, Ng P, Hung CY. A review on the management of acute gastroenteritis in children. Hong Kong J. Emerg. Med. 2004; 11(3) ; 152-160.
66. National Collaborating Centre for Women's and Children's Health Commissioned by the National Institute for Health and Clinical Excellence. Diarrhoea and vomiting caused by gastroenteritis diagnosis, assessment and management in children younger than 5 years. 2009. ISBN 978-1-906985-14-1.
67. King CK, Glass R, Bresee JS. Managing Acute Gastroenteritis Among Children - Oral Rehydration, Maintenance, and Nutritional Therapy. Morbidity and Mortality Weekly Report. 2003; 52(No. RR-16).
68. Schunk JE, Schutzman A. Pediatric Head Injury. Pediatrics in Review. 2012; 33:398-411.
69. Kochanek PM, Carney N, Adelson PD, et al. Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents--second edition. Pediatr Crit Care Med. 2012;13 Suppl 1:S1-82.
70. Dunning J, Daly JP, Lomas JP et al. Children's head injury algorithm for the prediction of important clinical events study group. Derivation of the children's head injury algorithm for the prediction of important clinical events decision rule for head injury in children. Arch Dis Child 2006;91(11):885-91.
71. Holmes JF, Palchak MJ, MacFarlane T et al. Performance of the Pediatric Glasgow Coma Scale in children with blunt head trauma. Acad Emerg Med 2005;12(9):814-9.
72. Gordon KE. Pediatric minor traumatic brain injury. Semin Ped Neurol 2006;13(4):243 55.
73. Osmond MH, Klassen TP, Wells GA, et al; for the Pediatric Emergency Research Canada (PERC) Head Injury Study Group. CATCH: A clinical decision rule for the use of computed tomography in children with minor head injury. CMAJ 2010;182(4):341-8.
74. Da Dalt L, Marchi AG, Laudizi L, et al. Predictors of intracranial injuries in children after blunt head trauma. Eur J Pediatr 2006;165(3):142-8.
75. Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet. 2009;374(9696):1160-70.
76. Stringer MD, Pablot SM, Brereton RJ. Paediatric intussusception. Br J Surg. 1992; 79:867-876.
77. Weihmiller SN, Buonomo C, Bachur R. Risk stratification of children being evaluated for intussusception. Pediatrics. 2011;127(2):e296-303
78. Niramis R, Watanatittan S, Kruatrachue A, et al. Management of recurrent intussusception: nonoperative or operative reduction?. J Pediatr Surg. 2010;45(11):2175-80.
79. Beasley SW, Auldist AW, Stokes KB. The diagnostically difficult intussusception: its characteristics and consequences. Pediatr Surg Int. 1988; 3:135-138.
80. Lee JM, Kim H, Byum JY, et al. Intussusception: characteristic radiolucencies on the abdominal radiograph. Pediatr Radiol. 1994; 24:293-295.
81. Bisset GS, III, Kirks DR. Intussusception in infants and children: diagnosis and therapy. Radiology. 1988; 168:141-143.
82. Daneman A, Alton DJ. Intussusception: issues and controversies related to diagnosis and reduction. Radiol Clin North Am. 1996; 34:743-756.
83. Garcia VF, Randolph JG. Pyloric stenosis: diagnosis and management. Pediatr Rev. 1990;11(10):292-6.
84. Pandya S, Heiss K. Pyloric stenosis in pediatric surgery: an evidence-based review. Surg Clin North Am. 2012;92(3):527-39.
85. Subcommittee on Urinary Tract Infection; Steering Committee on Quality Improvement and Management. Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months. Pediatrics. 2011;128(3):595-610.
86. Downs SM. Technical report: urinary tract infections in febrile infants and young children. The Urinary Tract Subcommittee of the American Academy of Pediatrics Committee on Quality Improvement. Pediatrics. 1999;103(4):e54.
87. Committee on Quality Improvement, Subcommittee on Urinary Tract Infection, American Academy of Pediatrics. Practice Parameter: The Diagnosis, Treatment, and Evaluation of the Initial Urinary Tract Infection in Febrile Infants and Young Children. Pediatrics. 1999;103(4 Pt 1):843-52.
88. Finnell SM, Carroll AE, Downs SM. Technical report—Diagnosis and management of an initial UTI in febrile infants and young children. Pediatrics. 2011;128(3):e749-70.

89. Shaikh N, Morone NE, Bost JE et al. Prevalence of urinary tract infection in childhood: a meta-analysis. Pediatr Infect Dis J. 2008;27(4):302-8.
90. Hoberman A, Chao HP, Keller DM et al. Prevalence of urinary tract infection in febrile infants. J Pediatr. 1993;123(1):17-23.
91. Zorc JJ, Levine DA, Platt SL, Dayan PS, Macias CG, Krief W, et al. Clinical and demographic factors associated with urinary tract infection in young febrile infants. Pediatrics. 2005;116(3):644-8.
92. Shaikh N, Morone NE, Lopez J, Chianese J, Sangvai S, D'Amico F, et al. Does this child have a urinary tract infection? JAMA. 2007;298(24):2895-904.
93. Lisboa C, Ferreira A, Resende C et al. Infectious balanoposthitis: management, clinical and laboratory features. Int J Dermatol. 2009;48(2):121-4
94. Thein MM, Lee BW, Bun PY. Childhood injuries in Singapore: A community nationwide study. Singapore Med J. 2005; 46(3):116-121.
95. Ong MEH, Ooi SBS, Manning PG. A review of 2517 Childhood Injuries seen in a Singapore Emergency Department in 1999-Mechanisms and Injury Prevention Suggestions. Singapore Med J 2003, 44(1): 12-9.
96. Snodgrass AM, Ang A. Unintentional injuries in infants in Singapore. Singapore Med J. 2006; 47(5):376-82.
97. Halsey MF, Finzel KC, Carrion WV et al. Toddler's fracture: presumptive diagnosis and treatment. J Pediatr Orthop. 2001;21(2):152-6.
98. Donnelly LF. Toddler's fracture of the fibula. AJR Am J Roentgenol. 2000;175 (3): 922.
99. Offiah A, van Rijn RR, Perez-Rossello JM et al. Skeletal imaging of child abuse (non-accidental injury). Pediatr Radiol. 2009; 39:461–470.
100. Kleinman PK. Problems in the diagnosis of metaphyseal fractures. Pediatr Radiol. 2008; 38(Suppl 3):S388–S394
101. Kleinman PK, Marks SC Jr. Relationship of the subperiosteal bone collar to metaphyseal lesions in abused infants. J Bone Joint Surg Am. 1995; 77A:1471–1476
102. Caffey J. Some traumatic lesions in growing bones other than fractures and dislocations: clinical and radiological features: The Mackenzie Davidson Memorial Lecture. Br J Radiol. 1957; 30:225–238.
103. Kleinman PK, Marks SC Jr, Spevak MR et al. Extension of growth-plate cartilage into the metaphysis: a sign of healing fracture in abused infants. AJR. 1991; 156:775–779.
104. Grayev AM, Boal DK, Wallach DM et al. Metaphyseal fractures mimicking abuse during treatment for clubfoot. Pediatr Radiol. 2001; 31:559–563.
105. Sugar NF, Taylor JA, Feldman KW. Bruises in infants and toddlers: those who don't cruise rarely bruise. Puget Sound Pediatric Research Network. Arch Pediatr Adolesc Med. 1999; 153:399–403.
106. Carty H, Pierce A. Non-accidental injury: a retrospective analysis of a large cohort. Eur Radiol. 2002; 12:2919–2925.

**LEARNING POINTS**

- **The family physician has the monumental task of deciding if a pediatric patient can be treated as an outpatient or needs to be referred to the hospital for further acute care.**
- **Common conditions that may be discharged without referral include the stable child with a minor head injury and balanitis.**
- **Decompensated gastroenteritis, serious bacterial infections such as unstable pneumonia and urinary tract infection in the very young need admission.**
- **The younger the child, the more subtle the signs and symptoms are, so the threshold of referral needs to be low.**
- **Congenital conditions like pyloric stenosis in the very young are unique in this population group and need referral.**

## ASSESSMENT OF 30 MCQs

# FPSC NO : 55
# MCQs on EMERGENCY MEDICINE
# Submission DEADLINE : 19 NOVEMBER 2013 12 NOON

**INSTRUCTIONS**

- **To submit answers to the following multiple choice questions, you are required to log on to the College On-line Portal (www.cfps2online.org).**
- **Attempt ALL the following multiple choice questions.**
- **There is only ONE correct answer for each question.**
- **The answers should be submitted to the College of Family Physicians Singapore via the College On-line Portal before the submission deadline stated above.**

**1. The total volume of attendances at the restructured hospitals' emergency departments has been increasing since 2003. What is the projected number in 2014?**

(A) Over a third of a million attendances.
(B) Over half a million attendances.
(C) Over three quarters of a million attendances.
(D) Over a million attendances.
(E) Over a million and a quarter attendances.

**2. In Singapore, for a newly diagnosed ST elevation myocardial infarction, what is the upper limit of the "door to balloon time" that has been set?**

(A) 1 00 minutes.
(B) 90 minutes.
(C) 80 minutes.
(D) 70 minutes.
(E) 60 minutes.

**3. The appropriate use of the Emergency Medical Service ambulance is necessary. Which of the following patient has the LEAST need to be sent to the Emergency Department this way?**

(A) 24-year-old patient with pregnancy, abdominal pain and syncope.
(B) 20-year-old patient with isolated left facial numbness for 2 days.
(C) 18-year-old patient with "worst ever headache".
(D) 48-year-old patient with chest pain and history of balloon angioplasty a year ago.
(E) 62-year-old patient with ischemic heart disease and fainting.

**4. A paramedic arrives with Emergency Medical Service ambulance to pick up a patient with acute chest pain. She proceeds to perform a standard patient assessment with history taking, physical examination, the measurement of vital signs, and repeats the ECG before instituting treatment and evacuation. Which of the following is the LEAST LIKLELY reason for doing this?**

(A) To perform a wireless ECG.
(B) To follow the protocol that has been set for the paramedic
(C) To ensure due diligence is performed for each patient.
(D) To counter check on the need for referral.
(E) To have a baseline of the clinical status of the patient

**5. For a patient with early stroke, what is the therapeutic window between onset to thrombolysis for intravenous tPA to be used?**

(A) 3.0-hour window.
(B) 3.5-hour window.
(C) 4.0-hour window.
(D) 4.5-hour window.
(E) 5.0-hour window.

**6. A 35-year-old patient is suspected to have acute coronary syndrome. Which of the following statements is INCORRECT?**

(A) Epigastric pain can be a presentation.
(B) Nausea can be present.
(C) Syncope can be present.
(D) Diaphoresis is a clinical feature.
(E) A normal 12-lead ECG rules out the diagnosis.

**7. A 41-year-old patient with acute chest pain is diagnosed to have acute coronary syndrome. Which of the following about initial treatment is INCORRECT?**

(A) GTN may be given sublingually for relief of pain.
(B) GTN patch can be used for relief of pain.
(C) Aspirin 300 mg is given before arrival at the hospital.
(D) Clopidogrel 75 mg can be given while waiting for the ambulance.
(E) If aspirin is given, a written record should accompany the patient.

**8. About the factors that may cause a delay of presentation of a patient with myocardial ischaemia to the emergency department, which of the following is the LEAST likely?**

(A) A feeling of fatigue rather than chest pain.
(B) Decision by the patient to self treat symptoms.
(C) Diaphoresis as a presenting symptom.
(D) Decision by the patient to see primary care facilities rather than call for emergency medical service ambulance.
(E) Epigastric discomfort instead of chest pain.

**9. To minimize transfer times and maximize neurological outcomes, the American Stroke Association has described the stroke "Chain of Survival". Which of the following is NOT in this "Chain of Survival"?**

(A) Rapid recognition and reaction to stroke warning signs.
(B) Rapid emergency medical service ambulance dispatch.
(C) Pre-arrival notification to the receiving facility.
(D) Rapid diagnosis and treatment in hospital.
(E) Aspirin is given before arrival at the hospital.

**10. The mother of a 5-year-old boy complains that since this morning her son is noted to be drooling, preferring to sit up, and also has noisy breathing. Which of the following is the MOST likely diagnosis?**

(A) Bronchial asthma.
(B) Acute bronchiolitis.
(C) Acute epiglottitis.
(D) Interstitial lung disease.
(E) Diabetic keto-acidosis.

**11. The chain of survival for cardiac arrest consists of 4 links: early access, early cardio-pulmonary resuscitation (CPR), early defibrillation, and early advanced life support. In this context, which of the following CORRECTLY describes what is included in basic cardiac life support?**

(A) Early access, early CPR.
(B) Early access.
(C) Early CPR.
(D) Early defibrillation.
(E) Early access, early CPR, and early defibrillation.

**12. In cardio pulmonary resuscitation (CPR), what is the desired rate of cardiac compressions per minute?**

(A) 100.
(B) 90.
(C) 80.
(D) 70.
(E) 60.

**13. With regards to training of cardiopulmonary resuscitation (CPR), which of the following is CORRECT?**

(A) Teaching hands only CPR to lay rescuers is adequate.
(B) Both chest compressions and mouth-to-mouth ventilation should be taught to lay rescuers.
(C) Mouth-to-mouth ventilation is more important than chest compression.
(D) Pulse check is routinely included in teaching lay rescuers.
(E) Pulse check is mandatory to be taught to healthcare workers.

**14. With regards to cardiac arrest, which of the following is the most common rhythm at onset of arrest?**

(A) Ventricular tachycardia.
(B) Rapid atrial fibrillation.
(C) Ventricular asystole.
(D) Complete heart block.
(E) Coarse ventricular fibrillation.

**15. In cardiopulmonary resuscitation, after defibrillation is done, what is the next step?**

(A) Check ECG for cardiac rhythm before more chest compression.
(B) Continue uninterrupted CPR of 1 minute.
(C) Continue uninterrupted CPR of 1-2 minutes.
(D) Continue uninterrupted CPR of 2-3 minutes.
(E) Continue uninterrupted CPR of 3-4 minutes.

**16. A 35-year-old man complains of acute breathlessness since 3 hours ago. Which of the following statements is INCORRECT?**

(A) A patient with metabolic acidosis can present with breathlessness.
(B) Pulmonary embolism can present with chest pain and breathlessness.
(C) A normal pulse oximeter reading rules out respiratory failure.
(D) Anxiety should only be considered as the diagnosis after careful exclusion of other life threatening causes.
(E) Pneumothorax can present with chest pain and breathlessness.

**17. A 36-year-old woman complains of headache lasting 3 hours. Which of the following statements is INCORRECT?**

(A) Meningitis can be present even though the classical triad of fever, neck stiffness and altered mental state is not complete.
(B) A change in headache pattern can be a clue to a life threatening cause.
(C) Pre-eclampsia can present as acute headache.
(D) Acute angle closure glaucoma can present as acute headache.
(E) There is a correlation between high blood pressure and headache.

**18. A 75-year-old man presents with acute abdominal pain lasting for 4 hours. He has a history of atrial fibrillation for 10 years. Which of the following statements is INCORRECT?**

(A) Normal abdominal examination findings rules out mesenteric ischaemia as a cause for the pain.
(B) The possibility of acute coronary syndrome needs to be considered.
(C) A leaking abdominal aortic aneurysm can be a cause for the pain.
(D) Acute appendicitis needs to be considered.
(E) A perforated gastric ulcer can present this way.

**19. A 65-year-old man complains of backache lasting for four weeks. He now has urinary urgency for a week. A straight X-ray of the back is reported as normal apart from osteoarthritic changes. Which of the following statements is INCORRECT?**

(A) Upper back pain can be the first symptom of acute coronary syndrome from posterior myocardial ischaemia.
(B) The normal X-ray of the back rules out myelopathy from cord compression.
(C) Leaking abdominal aortic aneurysm can present with low back pain.
(D) Abdominal aortic aneurysm can present with chest pain radiating to the back.
(E) Spinal stenosis causes back pain that is relieved by bending forward.

**20. About wounds and injuries encountered in the ambulatory care setting, which of the following statement is CORRECT?**

(A) Surgical implants have normal risk of infection in people with diabetes.
(C) Glass fragments as retained foreign bodies will be picked up by plain X-rays as they are uniformly radio-opaque.
(D) A dog bite is more prone to infection than a cat bite.
(E) Human bite sustained from a fight is more prone to infection than a cat bite.

**21. A targeted systematic survey performed in a set order which searches for injuries that pose the most immediate threats to life is set out in the Advanced Trauma Life Support (ATLS) course can be remembered as A,B,C,D, and E. Which of the following is INCORRECT?**

(A) A = Airway assessment.
(B) B = Breathing assessment.
(C) C = Circulation assessment.
(D) D = Danger assessment.
(E) E = Exposure and environmental control.

**22. A 29-year-old driver is involved in head-on collision. Which of the following indicates that airway obstruction is present?**

(A) Presence of stridor.
(B) Ability to answer and speak normally.
(C) Loss of consciousness.
(D) Facial trauma.
(E) Oral bleeding.

**23. About airway management in the patient with major trauma, which of the following statement is CORRECT?**

(A) Laryngeal masks (LMAs) prevent "hands-free" bagging.
(B) Oropharygeal airway is ineffective in securing a patent airway.
(C) If breathing is absent, bag mask ventilation (BMV) is the action to take.
(D) Laryngeal masks (LMAs) prevent aspiration.
(E) Intubation is superior in outcome compared to bag mask ventilation (BMV).

**24. A 45-year-old man construction work sustained a blunt injury to the chest when he slipped on a slippery floor and fell onto a concrete slab. He is suspected to have a tension pneumothorax. Which of the following clinical feature is NOT consistent with such a diagnosis?**

(A) Distended neck veins.
(B) Unilateral decreased chest movement.
(C) Shifting of trachea contralateral to the side with decreased chest movement.
(D) Hypotension.
(E) Paradoxical chest movement.

**25. A 23-year-old construction worker falls from a height and lands on his feet. Which of the following is the most sensitive sign that he is suffering from an exsanguinating haemorrhage from a ruptured viscus?**

(A) Tachycardia.
(B) Cool extremities.
(C) Confusion.
(D) Delayed capillary refill more than 2 seconds.
(E) Pallor.

**26. About the practical anatomical and physiological characteristics of the paediatric airway, which of the following statements is CORRECT?**

(A) In the infant and young child, the lower airways are larger but the supporting cartilage are less well developed.

(B) The relatively large head flexes the neck and results in airway obstruction in the unconscious child.
(C) The tidal volume in the young child is more dependent on the intercostal muscle function than the diaphragmatic function.
(D) Children have higher metabolic rates, with an oxygen consumption of 10-12 mil/kg/min compared to 3-4 ml/kg/min in the adult.
(E) The ribs are less pliable and complaint in the child compared to the adult.

**27. The correct dosage of paediatric medications is often weight dependent. The weight of the child can be estimated by a formula if a weighing machine is not available. Using this formula, which of the following is the correct estimated weight in a 5-year-old child?**
(A) 12 kg.
(B) 18 kg.
(C) 17 kg.
(D) 19 kg.
(E) 21 kg.

**28. Fever is a common presentation of the sick child. As a rule, which of following groups of children needs referral to the hospital routinely for further care and management?**
(A) Less than 3 months old.
(B) Less than 6 months old.
(C) Less than 9 months old.
(D) Less than 12 months old.
(E) Less than 15 months old.

**29. Kawasaki disease is great mimic of many febrile conditions. What is the reason for admitting such a child with this condition to hospital?**
(A) Treatment of dehydration.
(B) Treatment of renal complications.
(C) Intravenous immunoglobulin therapy.
(D) Monitoring of cardiac complications.
(E) Treatment of fever.

**30. A 5-year-old girl presents with fever without source. The triage temperature is 39 degree Celsius. The total white count is 20,000. Based on the findings of a retrospective study, what is the likelihood she has an occult pneumonia?**
(A) 12%.
(B) 16%.
(C) 22%.
(D) 26%.
(E) 32%.

# READINGS

- A Selection of Ten Current Readings on Topics Related to Emergency Medicine

# A SELECTION OF TEN CURRENT READINGS ON TOPICS RELATED TO EMERGENCY MEDICINE – some available as free full-text and some requiring payment

**Selection of readings made by A/Prof Goh Lee Gan**

## READING 1 – CLINICAL PREDICTION MODEL FOR MANAGING FEBRILE CHILDREN

**Nijman RG, Vergouwe Y, Thompson M, van Veen M, van Meurs AH, van der Lei J, Steyerberg EW, Moll HA, Oostenbrink R. Clinical prediction model to aid emergency doctors managing febrile children at risk of serious bacterial infections: diagnostic study. BMJ. 2013 Apr 2;346:f1706. doi: 10.1136/bmj.f1706. PubMed PMID: 23550046; PubMed Central PMCID: PMC3614186.**

URL: http://www.bmj.com/cgi/pmidlookup?view=long&pmid=23550046 – Free full text

Department of General Paediatrics, Erasmus MC-Sophia Children's Hospital, 3015 GJ Rotterdam, Netherlands.

ABSTRACT

OBJECTIVE: To derive, cross validate, and externally validate a clinical prediction model that assesses the risks of different serious bacterial infections in children with fever at the emergency department.

DESIGN: Prospective observational diagnostic study.

SETTING: Three paediatric emergency care units: two in the Netherlands and one in the United Kingdom.

PARTICIPANTS: Children with fever, aged 1 month to 15 years, at three paediatric emergency care units: Rotterdam (n=1750) and the Hague (n=967), the Netherlands, and Coventry (n=487), United Kingdom. A prediction model was constructed using multivariable polytomous logistic regression analysis and included the predefined predictor variables age, duration of fever, tachycardia, temperature, tachypnoea, ill appearance, chest wall retractions, prolonged capillary refill time (>3 seconds), oxygen saturation <94%, and C reactive protein.

MAIN OUTCOME MEASURES: Pneumonia, other serious bacterial infections (SBIs, including septicaemia/meningitis, urinary tract infections, and others), and no SBIs. RESULTS: Oxygen saturation <94% and presence of tachypnoea were important predictors of pneumonia. A raised C reactive protein level predicted the presence of both pneumonia and other SBIs, whereas chest wall retractions and oxygen saturation <94% were useful to rule out the presence of other SBIs. Discriminative ability (C statistic) to predict pneumonia was 0.81 (95% confidence interval 0.73 to 0.88); for other SBIs this was even better: 0.86 (0.79 to 0.92). Risk thresholds of 10% or more were useful to identify children with serious bacterial infections; risk thresholds less than 2.5% were useful to rule out the presence of serious bacterial infections. External validation showed good discrimination for the prediction of pneumonia (0.81, 0.69 to 0.93); discriminative ability for the prediction of other SBIs was lower (0.69, 0.53 to 0.86).

CONCLUSION: A validated prediction model, including clinical signs, symptoms, and C reactive protein level, was useful for estimating the likelihood of pneumonia and other SBIs in children with fever, such as septicaemia/meningitis and urinary tract infections.

PMCID: PMC3614186 PMID: 23550046 [PubMed - indexed for MEDLINE]

## READING 2 – SURVEY STUDY OF INDEX FOOD RELATED ALLERGIC REACTIONS & ANAPHYLAXIS

**Jacobs TS, Greenhawt MJ, Hauswirth D, Mitchell L, Green TD. A survey study of index food-related allergic reactions and anaphylaxis management. Pediatr Allergy Immunol. 2012 Sep;23(6):582-9. PubMed PMID: 22625658.**

URL: http://dx.doi.org/10.1111/j.1399-3038.2012.01315.x - Payment required

Department of Pediatrics, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA 15224, USA.

ABSTRACT

BACKGROUND: Initial food-allergic reactions are often poorly recognized and under-treated.

METHODS: Parents of food-allergic children were invited to complete an online questionnaire, designed with Kids with Food Allergies Foundation, about their children's first food-allergic reactions resulting in urgent medical evaluation.
RESULTS: Among 1361 reactions, 76% (95% CI 74-79%) were highly likely to represent anaphylaxis based on NIAID/FAAN criteria. Only 34% (95% CI 31-37%) of these were administered epinephrine. In 56% of these, epinephrine was administered by emergency departments; 20% by parents; 9% by paramedics; 8% by primary care physicians; and 6% by urgent care centers. In 26% of these, epinephrine was given within 15 min of the onset of symptoms; 54% within 30 min; 82% within 1 h; and 93% within 2 h. Factors associated with a decreased likelihood of receiving epinephrine for anaphylaxis included age <12 months, milk and egg triggers, and symptoms of abdominal pain and/or diarrhea. Epinephrine was more likely to be given to asthmatic children and children with peanut or tree nut ingestion prior to event. Post-treatment, 42% of reactions likely to represent anaphylaxis were referred to allergists, 34% prescribed and/or given epinephrine auto-injectors, 17% trained to use epinephrine auto-injectors, and 19% given emergency action plans. Of patients treated with epinephrine, only half (47%) were prescribed epinephrine auto-injectors.
CONCLUSIONS: Only one-third of initial food-allergic reactions with symptoms of anaphylaxis were recognized and treated with epinephrine. Fewer than half of patients were referred to allergists. There is still a need to increase education and awareness about food-induced anaphylaxis. 
PMID: 22625658 [PubMed - indexed for MEDLINE

## READING 3 – EVALUATION OF FIRST NON-FRBRILE SEIZURES

**Wilden JA, Cohen-Gadol AA. Evaluation of first nonfebrile seizures. Am Fam Physician. 2012 Aug 15;86(4):334-40. Review. PubMed PMID: 22963022.**

URL: http://www.aafp.org/afp/2012/0815/p334.html - Free full text

Indiana University School of Medicine, Indianapolis, IN 46202, USA.

ABSTRACT
Nonfebrile seizures may indicate underlying disease or epilepsy. The patient history can often distinguish epileptic seizures from nonepileptic disorders by identifying the events directly preceding the convulsion, associated conditions, and details of the seizure, including triggers, length, and type of movements. Laboratory testing, lumbar puncture, and neuroimaging may be indicated depending on the presentation, suspected etiology, and patient's age. Electroencephalography should be performed 24 to 48 hours after a first seizure because of its substantial yield and ability to predict recurrence. Neuroimaging is recommended for adults, infants, and children who have cognitive or motor developmental delay or a focal seizure. Neuroimaging may be scheduled on an outpatient basis for patients with stable vital signs who are awake and have returned to neurologic baseline. Emergent neuroimaging should be performed in patients with persistent decreased mental status or a new focal neurologic abnormality. Although magnetic resonance imaging is generally preferred to head computed tomography because of its greater sensitivity for intracranial pathology, computed tomography should be performed if intracranial bleeding is suspected because of recent head trauma, coagulopathy, or severe headache. Treatment with an antiepileptic drug after a first seizure does not prevent epilepsy in the long term, but it decreases the short-term likelihood of a second seizure. Adults with an unremarkable neurologic examination, no comorbidities, and no known structural brain disease who have returned to neurologic baseline do not need to be started on antiepileptic therapy. Treatment decisions should weigh the benefit of decreased short-term risk of recurrence against the potential adverse effects of antiepileptic drugs.

PMID: 22963022 [PubMed - indexed for MEDLINE]

## READING 4 – CT IN DIAGNOSIS OF ACUTE APPENDICITIS

**Nelson DW, Causey MW, Porta CR, McVay DP, Carnes AM, Johnson EK, Steele SR. Examining the relevance of the physician's clinical assessment and the reliance on computed tomography in diagnosing acute appendicitis. Am J Surg. 2013 Apr;205(4):452-6. PubMed PMID: 23388421**

URL: http://linkinghub.elsevier.com./retrieve/pii/S0002-9610(13)00037-8 – Payment required

Department of Surgery, Madigan Army Medical Center, 9040 Fitzsimmons Drive, Fort Lewis, WA 98431, USA.

ABSTRACT
BACKGROUND: The aim of this study was to examine the relevance of clinical assessment in diagnosing appendicitis in the current medical environment, in which routine use of computed tomography (CT) has become the norm.
METHODS: A retrospective review was conducted, analyzing patient demographics, Alvarado clinical assessment scoring, and radiologic and pathologic results.
RESULTS: A total of 664 patients were identified. Higher Alvarado scores were significantly associated with pathologically confirmed appendicitis (low, 87%; moderate, 92%; high, 96%; P = .05). As clinical assessment scores increased, use of CT decreased significantly (low, 97%; moderate, 85%; high, 79%; P = .01). The negative appendectomy rate for patients with clinical assessments consistent with appendicitis was 4%, compared with 3% associated with CT. Regardless of assessment scores, 82% of the cohort underwent CT. From a random sample of 100 charts, 87% of initial emergency department plans stratified disposition on the basis of the results of CT.
CONCLUSIONS: Although physical examination remains crucial, CT has become the primary modality dictating care of patients with presumed appendicitis. Published by Elsevier Inc.
PMID: 23388421 [PubMed - indexed for MEDLINE]

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## READING 5 – SURVIVAL RADIOLOGY FOR GPs

**Skinner S. Survival radiology for GPs. Aust Fam Physician. 2012 Jun;41(6):376-84. PubMed PMID: 22675676.**

URL: http://www.racgp.org.au/afp/201206/47071 - Free full text

Bendigo Health, Bendigo, Victoria, Australia. sskinner@bendigohealth.org.au

ABSTRACT
BACKGROUND: General practitioners in regional and rural areas may be required to interpret emergency imaging of their patients without the immediate assistance of a radiologist.
OBJECTIVE: To provide a structured approach to interpretation of X-rays performed as part of routine care of common emergency presentations.
DISCUSSION: X-rays are an important diagnostic tool and should follow a complete history and examination. A structured approach and awareness of potential pitfalls will enable the primary care doctor to confidently interpret plain X-rays in emergency situations.
PMID: 22675676 [PubMed - indexed for MEDLINE]

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## READING 6 – GOUT-RELATED HEALTH CARE UTILISATION IN US EMERGENCY DEPARTMENTS

**Garg R, Sayles HR, Yu F, Michaud K, Singh J, Saag KG, Mikuls TR. Gout-related health care utilization in US emergency departments, 2006 through 2008. Arthritis Care Res (Hoboken). 2013 Apr;65(4):571-7. PubMed PMID: 22949176.**

URL http://dx.doi.org/10.1002/acr.21837 - Payment required

Creighton University, Omaha, Nebraska.

ABSTRACT
OBJECTIVE: To characterize gout-related emergency department (ED) utilization using a nationally representative sample and to examine factors associated with the frequency and charges of gout-related ED visits.
METHODS: Using the National Emergency Department Sample data from 2006-2008, the weighted national frequency of gout visits was calculated along with the median ED charge and total national ED-related charges. Associations of several patient- and facility-level factors were examined with the occurrence of gout visits using multivariable logistic regression and with ED-related charges using multivariable linear regression.
RESULTS: Gout was the primary indication for 168,410 ED visits in 2006, 171,743 visits in 2007, and 174,823 visits in 2008, accounting for ~0.2% of all visits annually and generating ED charges of more than $128 million in 2006, $144 million in 2007, and $166 million in 2008. Age, male sex, household income <$39,000, private insurance, and hospital locations in nonmetropolitan areas and the southern US were associated with an increased propensity for ED utilization in gout. Higher ED-related charges for gout were associated with female sex, age, a higher number of coded diagnoses, and a metropolitan residence.
CONCLUSION: Gout accounts for a substantial proportion of ED visits, leading to significant health care charges. Effective strategies to reduce gout burden in EDs could potentially benefit by targeting groups characterized by factors demonstrated to be related to a higher ED utilization in gout as identified by our study. 
PMID: 22949176 [PubMed - indexed for MEDLINE]

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## READING 7 – UPDATE ON ACUTE ANKLE SPRAINS

**Tiemstra JD. Update on acute ankle sprains. Am Fam Physician. 2012 Jun 15;85(12):1170-6. Review. PubMed PMID: 22962897.**

URL: http://www.aafp.org/afp/2012/0615/p1170.html - Free full text

Department of Family Medicine, University of Illinois College of Medicine, Chicago, IL 60607, USA. jtiemstr@uic.edu Summary for patients in Am Fam Physician. 2012 Jun 15;85(12):1.

ABSTRACT
Ankle sprains are a common problem seen by primary care physicians, especially among teenagers and young adults. Most ankle sprains are inversion injuries to the lateral ankle ligaments, although high sprains representing damage to the tibiofibular syndesmosis are becoming increasingly recognized. Physicians should apply the Ottawa ankle rules to determine whether radiography is needed. According to the Ottawa criteria, radiography is indicated if there is pain in the malleolar or midfoot zone, and either bone tenderness over an area of potential fracture (i.e., lateral malleolus, medial malleolus, base of fifth metatarsal, or navicular bone) or an inability to bear weight for four steps immediately after the injury and in the emergency department or physician's office. Patients with ankle sprain should use cryotherapy for the first three to seven days to reduce pain and improve recovery time. Patients should wear a lace-up ankle support or an air stirrup brace combined with an elastic compression wrap to reduce swelling and pain, speed recovery, and protect the injured ligaments as they become more mobile. Early mobilization speeds healing and reduces pain more effectively than prolonged rest. Pain control options for patients with ankle sprain include nonsteroidal anti-inflammatory drugs, acetaminophen, and mild opioids. Because a previous ankle sprain is the greatest risk factor for an acute ankle sprain, recovering patients should be counseled on prevention strategies. Ankle braces and supports, ankle taping, a focused neuromuscular training program, and regular sport-specific warm-up exercises can protect against ankle injuries, and should be considered for patients returning to sports or other high-risk activities.
PMID: 22962897 [PubMed - indexed for MEDLINE]

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## READING 8 – HEART FAILURE MANAGEMENT PROGRAMME IN SWEDISH PRIMARY HEALTHCARE

**Agvall B, Alehagen U, Dahlström U. The benefits of using a heart failure management programme in Swedish primary healthcare. Eur J Heart Fail. 2013 Feb;15(2):228-36. PubMed PMID: 23109650.**

URL: http://eurjhf.oxfordjournals.org/cgi/pmidlookup?view=long&pmid=23109650 – Payment required

County Council of Östergötland, Local Health Care Services in Central Östergötland, Primary Health Care Centres, Linköping University, Department of Medical and Health Sciences, Faculty of Health Sciences, Linköping, Sweden. Bjorn.Agvall@lio.se

ABSTRACT

AIM: Heart failure (HF) is a common condition with which high mortality, morbidity, and poor quality of life are associated. It has previously been shown that use of HF management programmes (HFMPs) in HF clinics can be beneficial. The purpose of this study was to evaluate if the use of HFMPs also has beneficial effects on HF patients in primary healthcare (PHC).

METHODS AND RESULTS: This is a randomized, prospective, open-label study including 160 patients from five PHC centres with systolic HF and a mean age of 75 years (standard deviation 7.8). In the intervention group, an intensive follow-up was performed by HF nurses and physicians providing information and education about HF and the optimization of HF treatment according to recognized guidelines. There was a significant improvement of composite endpoints in the intervention group. Significantly more patients with reduced N-terminal pro brain natriuretic peptide (P = 0.012), improved cardiac function (P = 0.03), fewer healthcare contacts (P = 0.04), and fewer emergency room visits and admittances (P = 0.0002 and P = 0.03, respectively) could be seen in the intervention group when compared with the control group.

CONCLUSIONS: The use of a HFMP in a PHC setting was found to have beneficial effects in terms of reducing the number of healthcare contacts and hospital admissions, and improving cardiac function in patients with systolic HF, even if the result should be interpreted with caution. It can therefore be recommended that HFMPs should be used in PHC.

PMID: 23109650 [PubMed - indexed for MEDLINE]

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## READING 9 – STRATEGIES TO REDUCE NONURGENT EMERGENCY DEPARTMENT USE

**DeVries A, Li CH, Oza M. Strategies to reduce nonurgent emergency department use: experience of a Northern Virginia Employer Group. Med Care. 2013 Mar;51(3):224-30. PubMed PMID: 23222497.**

URL:http://meta.wkhealth.com/pt/pt-core/template-journal/lwwgateway/media/landingpage.htm?issn=0025-7079&volume=51&issue=3&spage=224 – Payment required

HealthCore Inc, Wilmington, DE 19801, USA.

ABSTRACT

BACKGROUND: This administrative claims analysis evaluated the impact of a health plan-sponsored Emergency Room Utilization Management Initiative (ERUMI), which combined increased patient copays for ED visits with educational outreach to reduce inappropriate ED use and encourage use of retail health clinics (RHCs) and other alternative treatment sites among a commercially insured population.

METHODS: Emergency department (ED) utilization rates for select acute but nonurgent conditions that could be treated appropriately in an RHC were compared for members of an employer group with (intervention group) and without (comparators) ERUMI. Utilization was compared for baseline period (January-June 2009) and ERUMI implementation period (January-June 2010).
RESULTS: A total of 56,896 members (14,224 intervention, 42,672 matched comparators) were included. ED utilization for conditions that could be treated appropriately by RHCs decreased by 10.39 visits/1000 members in the intervention group versus 6.29 visits in comparators. RHC visits rose for both the groups, with a greater increase in the intervention group (22.61 visits/1000 members, P<0.001) versus comparison (1.64/1000, P=0.064). After ERUMI implementation, intervention group members were nearly 5 times more likely than comparators to choose RHCs over ED for nonurgent care.
CONCLUSIONS: The health plan-sponsored ERUMI program, consisting of both financial and educational components, decreased nonurgent ED utilization while increasing the use of alternative treatment sites.
PMID: 23222497 [PubMed - indexed for MEDLINE]

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## READING 10 – WHAT ASPECTS OF PRIMARY CARE PREDICT EMERGENCY ADMISSION RATES

**Gunther S, Taub N, Rogers S, Baker R. What aspects of primary care predict emergency admission rates? A cross sectional study. BMC Health Serv Res. 2013 Jan 7;13:11. PubMed PMID: 23294563; PubMed Central PMCID: PMC3547739.**

URL: http://www-ncbi-nlm-nih-gov/pmc/articles/PMC3547739/ - Free full text

Public Health Department, NHS Northamptonshire, Northampton, UK. stephen.gunther@nhs.net

ABSTRACT
BACKGROUND: From 2004 to 2009 there was almost a 12% rise in emergency admissions in England. This can be explained partly by an aging population and other socio-demographic characteristics, but much cannot be explained by these factors. We explored aspects of care, in addition to known demographic characteristics in general practice, that are associated with emergency admissions.
METHODS: A cross-sectional design employing hospital admission data from 76 general practices in Northamptonshire, England for 2006-08, including demographic data, quality and outcomes framework points and GP patient survey outcomes.
RESULTS: There were statistically significant associations between emergency admissions and age, gender, distance from hospital and proportion classified as white. There was also a statistically significant relationship between emergency admissions and being able to book an appointment with a preferred doctor; this relationship was stronger in less deprived communities.
CONCLUSIONS: Enabling patients to book with a preferred doctor, particularly those in less deprived communities could have an impact on reducing emergency admissions. It is possible that being able to consult a preferred GP gives patient's confidence to avoid an emergency admission or it facilitates consistent clinical management that helps prevent the need for admission. However the findings only explained some of the variation.
PMCID: PMC3547739 PMID: 23294563 [PubMed - indexed for MEDLINE]

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# Original Papers

- **Engagement in General Practice**

# ENGAGEMENT IN GENERAL PRACTICE

Dr Fung En Po


## ABSTRACT

**Work engagement has been associated with better performance, low levels of burnout, and good mental and physical health. Therefore, employee characteristics associated with high degree of engagement are important for organisations that are trying to improve work productivity. Such data on general practitioners has been lacking. This study aimed to evaluate work engagement amongst general practitioners in outpatient clinics in Brunei Darussalam, expressed in the 3 dimensions of engagement, and to determine any association between age, sex, duration of prior employment and nationality, and engagement. The study instrument was the UWES-17 questionnaire with a page attached for respondents to state the demographic details of interest. The response rate was 65%. The proportion of respondents who scored high or very high in at least one dimension was only 35%. Only 20% of respondents scored high or very high in all 3 dimensions. Characteristics associated with high or very high scores were the age group 51-60 years, male sex, nationals of other countries, and longer duration of prior service. The reasons for the low rate, and the observed associations should be explored further, so that steps can be taken to promote engagement to improve work productivity and performance.**



**Keywords:**
**Engagement, general practitioners, UWES**

**SFP2013; 39(3): 64-68**


## Introduction

Engagement was first thought to be the direct opposite of burnout, and characterised by energy, involvement and efficacy, the opposites of exhaustion, cynicism and inefficacy[1]. Later it was found that employees who were burned out were not necessarily also not engaged in their work, and vice-versa[2]. Thus, burnout and work engagement are two distinct concepts[2]. (An instrument for assessing burnout therefore cannot be used to assess engagement, and vice-versa.) Work engagement has been defined as "a positive, fulfilling, work-related state of mind that is characterised by vigor, dedication, and absorption"[2].

Work engagement has been associated with better performance, low levels of burnout, and good mental and physical health[3]. It is therefore important for organisations to promote work engagement amongst their workers. As engagement is a relatively new concept in occupational psychology, there is lack of data on engagement amongst general practitioners specifically. The prevalence of work engagement amongst general practitioners in Brunei Darussalam is not known. This information could form the basis of further research into the factors contributing to engagement. It could also beckon policymakers to assess organisational structure and resources.

FUNG EN PO, Medical Officer, Out-patient Department, Ministry Of Health, Brunei Darussalam

## Objectives

This study aimed:

1. To evaluate work engagement amongst general practitioners in government outpatient clinics in Brunei-Muara District (an urban district of Brunei Darussalam), expressed in the 3 dimensions of work engagement
2. To determine any association between age, sex, duration of prior employment and nationality, and engagement.

## Study Population

Inclusion criteria were: general practitioners in employment in any of the government outpatient clinics in Brunei-Muara District, a minimum of 6 months of employment prior to this study, and having a work schedule of a total of 7.5 hours a day for 5 days a week, and a 7 hour duty once a month on a public holiday.

## Study Design

The instrument used to evaluate work engagement in this study was the Utrecht Work Engagement Scale (UWES), which was in the form of a self-report questionnaire. It evaluated work engagement in terms of three dimensions: vigor, dedication, and absorption. Vigor was characterised by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties[2]. Dedication was characterised by being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge[2]. Absorption was characterised by being fully concentrated and happily engrossed in one's work, whereby time passes quickly and one has difficulties with detaching oneself from work[2].

In this study, the English version of the UWES-17 questionnaire[2] was used without alteration. The questionnaire was available online and free for use for scientific research. Permission from the authors had been obtained[4]. The

questionnaire consisted of 17 items, each attributing to a dimension of work engagement: 6 items for vigor, 5 items for dedication, and 6 items for absorption. The questionnaire used a 7-point Likert-type scoring system to describe the frequency of symptoms. The three-dimension structure had been validated by several studies, and the constituent dimensions had been shown to be highly correlated[2]. Scores on the UWES had also been shown to be relatively stable across time[2].

On the questionnaire, items 1, 4, 8, 12, 15, and 17 represented vigor; items 2, 5, 7, 10, and 13 represented dedication; and items 3, 6, 9, 11, 14, and 16 represented absorption.

Data analysis was as described in the UWES manual. For every respondent, the mean score for each dimension was determined. The mean score for that dimension was then matched to one of the 5 qualifications (low, very low, average, high, very high) depending on the reference range of scores specific for that dimension. There were no universal reference range of scores for each of the qualifications for each of the 3 dimensions. These ranges were population-specific; they had to be determined in terms of percentiles of mean scores from that population: "very low" being less than the 5th percentile, "low" being from the 5th percentile to less than the 25th percentile, "average" being from the 25th percentile to less than the 75th percentile, "high" being from the 75th percentile to less than the 95th percentile, and "very high" being from the 95th percentile.

There was another page attached to the questionnaire where respondents provided personal details of interest: age, sex, duration of prior service in outpatient clinics in Brunei Darussalam, and nationality. Age was expressed in ranges of 10 years (21-30, 31-40, 41-50, 51-60, 61 or older), and nationality as either Bruneian or national of another country (unspecified).

## Data Collection

All eligible practitioners were given a print-out copy of the study materials by hand or fax, and free of charge. Completion of the questionnaire was not mandatory. Completed questionnaires were returned anonymously by hand or post, within a period of 2 weeks.

## Data Analysis

All data were manually entered into tables for analysis. Calculations were made manually, or using Microsoft Office functions.

## Result

There were a total of 9 outpatient clinics in the district, with 47 general practitioners. Of these, 36 were eligible for the survey. Of these 36 general practitioners, 5 were excluded: 4 were on leave, 1 was the researcher himself. Only 20 (65%) responded to the survey. Table I shows the respondent characteristics. More than half (55%) of the respondents were in the 31-40 years age group, 85% were female, 60% were overseas practitioners, and the mean duration of prior service in outpatient clinics was 7.8 +/- 5.0 years (range 1-18 years).

The reference range of scores for each qualification, and the number of respondents in each qualification in each dimension are shown in Table II. It shows that most respondents scored average in any one of the dimensions (50% scored average in vigor, 55% in dedication, and 50% in absorption). The table also shows that the 3 dimensions correlated well with each other: there were about the same number of respondents in each of the 3 dimensions for the same qualification.

**TABLE I. Characteristics of the 20 Respondents**

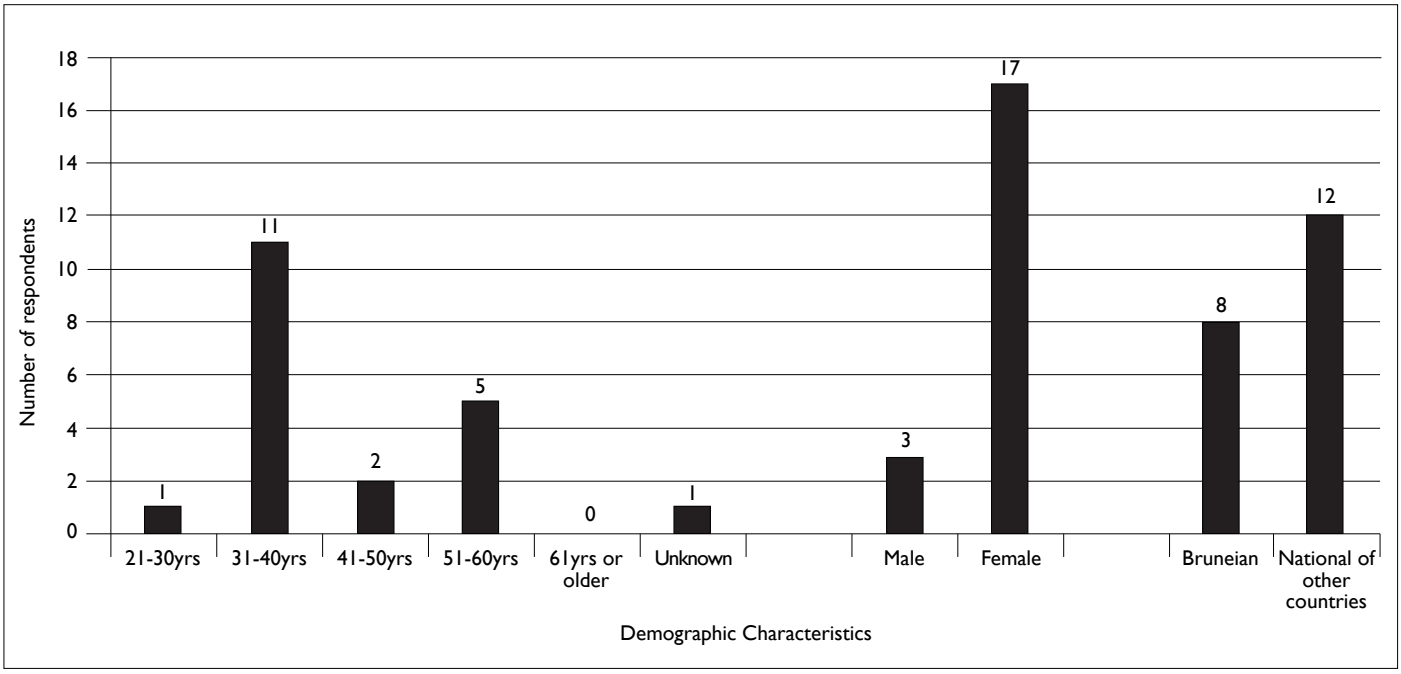

**TABLE II. Number of Respondents in Each Qualification for Each Dimension**

| Qualification | Dimensions Of Work Engagement | | | | | |
|---|---|---|---|---|---|---|
| | Vigor | | Dedication | | Absorption | |
| | Number Of Respondents | Reference range of scores (corrected to 2 decimal places) | Number Of Respondents | Reference range of scores (corrected to 2 decimal places) | Number Of Respondents | Reference range of scores (corrected to 2 decimal places) |
| Very low (< 5th percentile) | 1 (5%) | 0.00 - 1.07 | 1 (5%) | 0.00 - 1.49 | 1 (5%) | 0.00 - 1.32 |
| Low (≥ 5th percentile but < 25th percentile) | 4 (20%) | 1.08 - 2.41 | 3 (15%) | 1.50 - 2.99 | 4 (20%) | 1.33 - 3.07 |
| Average (≥ 25th percentile but < 75th percentile) | 10 (50%) | 2.42 - 4.07 | 11 (55%) | 3.00 - 4.59 | 10 (50%) | 3.08 - 4.16 |
| High (≥ 75th percentile but < 95th percentile) | 4 (20%) | 4.08 - 5.82 | 3 (15%) | 4.60 - 5.99 | 4 (20%) | 4.17 - 5.91 |
| Very high (≥ 95th percentile) | 1 (5%) | 5.83 - 6.00 | 2 (10%) | 6.00 | 1 (5%) | 5.92 - 6.00 |
| | Total 20 (100%) | | Total 20 (100%) | | Total 20 (100%) | |

**TABLE III. Frequency Distribution of Respondents by the Number of Dimensions with either High or Very High Qualification Scores**

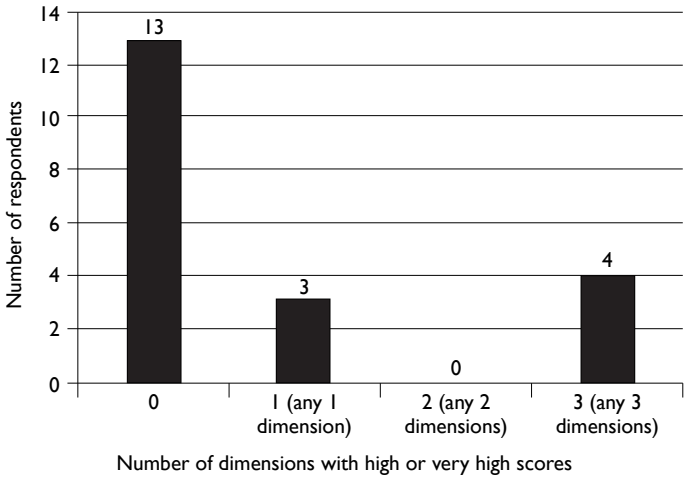


Table III shows that only 4 (20%) respondents scored high or very high in all 3 dimensions together. A total of 13 (65%) respondents did not score either high or very high in any of the 3 dimensions of work engagement.

Table IV shows that the age group 51-60 years had the highest number of respondents scoring high or very high in the dimensions vigor and dedication. For the dimension absorption, both age groups 31-40 years and 51-60 years had the same number of respondents scoring high or very high. Male sex was more likely to score high or very high in absorption. Nationals of other countries were more likely to score high or very high in any one of the 3 dimensions, compared to their Bruneian counterparts. The mean duration of prior service for scoring high or very high in vigor, dedication, and absorption were 11.4 years, 8.8 years, and 8.4 years respectively.

## DISCUSSION

The questionnaire had been validated from psychometric analyses, involving various professions including physicians and other healthcare teams[2]. It was therefore assumed that its validity was extended to general practitioners. However, its validity to the Brunei population was unknown. As work engagement had been a relatively new concept, no validated regional questionnaire was found. Concerns over possible language barrier were minimised by the usage of the questionnaire in only the English language version. All the general practitioners had their medical training in English language, and it was the medium of language in written notes during consultation.

Although the reference range of scores for each qualification of each of the 3 dimensions were population-specific, cross-study comparisons could still be made. Each qualification was determined in terms of percentiles of mean scores from the population. Comparisons between different populations would thus be in terms of respective percentiles, much like the case when comparing obesity in children between one region and another.

The study did not include general practitioners from the other 3 districts of the country because they had different work schedule and work capacity. This study was not comparing work engagement between general practitioners from different districts (and different work environments), but merely exploring work engagement amongst those in similar working environments. Brunei-Muara District was chosen for convenience, and its being the most densely populated district with the most number of outpatient clinics and general practitioners meant that it would potentially yield more data.

The 6-month period was arbitrary - this was to minimise possible influence from previous employment. Such was necessary to exclude general practitioners who had newly been recruited.

**TABLE IV. Association between Respondent Characteristics and High or Very High Scores in Each Dimension of Work Engagement**

| Respondent Characteristics | Number Of Respondents (% of 20 respondents) | | |
|---|---|---|---|
| | High or Very High Degree of Vigor | High or Very High Degree of Dedication | High or Very High Degree of Absorption |
| **Age** | | | |
| 21-30yr | 0 | 0 | 0 |
| 31-40yr | 1 (5%) | 1 (5%) | 2 (10%) |
| 41-50yr | 0 | 1 (5%) | 0 |
| 51-60yr | 3 (15%) | 2 (10%) | 2 (10%) |
| 61yr or older | 0 | 0 | 0 |
| Unknown | 1 (5%) | 1 (5%) | 1 (5%) |
| **Sex** | | | |
| Male | 0 | 0 | 1 (5%) |
| Female | 5 (25%) | 5 (25%) | 4 (20%) |
| **Nationality** | | | |
| Bruneian | 1 (5%) | 1 (5%) | 1 (5%) |
| Nationals of other countries | 4 (20%) | 4 (20%) | 4 (20%) |
| **Duration of prior service in outpatient clinics in Brunei Darussalam, expressed in years** | | | |
| High or very high scores | Mean 11.4 +/- 4.4 | Mean 8.8 +/- 3.3 | Mean 8.4 +/- 3.9 |
| Very low, low or average scores | Mean 9.5 +/- 5.0 | Mean 7.1 +/- 2.1 | Mean 9.8 +/- 5.0 |

The 4 general practitioners who were on leave during the study period were excluded because their leave period lasted beyond the data collection period of 2 weeks. The period of 2 weeks was arbitrary; it was mainly for practical reasons. As response was not spontaneous, respondents could potentially have manipulated their responses. This was minimised by the anonymous use of the questionnaire, and informing participants that the questionnaire was for assessment of their "well-being", or using other vague terms rather than "engagement".

In this study, 35% of respondents scored high or very high in at least one dimension of work engagement, and 20% of respondents scored high or very high in all 3 dimensions. More than half (65%) of respondents did not score a high or very high in any of the 3 dimensions. Further studies could be conducted to determine the causes, eg. possible concurrent high prevalence of burnout, absence of organisation-related factors that could promote work engagement, or merely, an expected outcome due to the nature of the job.

Characteristics that were associated with high or very high scores in this study were: age range of 51 to 60 years, male sex, and nationals of other countries. It was surprising to find that the 51 to 60 years age group was associated with high or very high degree of work engagement - these respondents were near retirement, and so, one could think that whether they had been highly or otherwise engaged with their work could only affect mildly their job prospect. However, one can argue that by that age, most employees would have achieved their targets in life (eg. work, security, family) and acquired vast knowledge and experience related to their work, and therefore could engage easily on their work. Age was a possible confounder in this study; the observed association between longer duration of prior service and high or very high scores of work engagement could merely reflect the advanced age of the employees rather than the longer duration itself.

In this study, male sex was associated with high or very high scores in absorption. No male respondents scored high or very high in the dimensions vigor and dedication; there were only female respondents.

This study also found that nationals of other countries were more engaged than their local counterparts in any of the 3 dimensions of work engagement. This could be due to difference in culture and attitude. Another possible explanation could be that these overseas general practitioners had decided to continue working in the country because of certain reasons (eg. better wages), and subsequently found themselves easily becoming engaged, for as long as those reasons were present. Those who were not engaged probably had quitted soon, and therefore did not make it to the survey. This could also be the explanation for the observed association between higher scores and longer duration of prior service: those who enjoyed working in the country, and became engaged, would tend to stay longer. Whether it was the longer duration of prior service that had resulted in high degree of work engagement or the reverse is open to question.

Multivariate analysis was not performed in this survey due to limited resources, and small study population. It would have been considered if the study was conducted at national level.

Policymakers should consider researching the reasons for high

or very high degree of work engagement in the aforementioned subgroups of respondents (older age groups, male sex, overseas general practitioners). Such information could be important for performance improvement and work productivity. Focus-group qualitative studies might be useful.

## CONCLUSION

In this study with a 65% response rate, 35% of general practitioners scored high or very high in at least one of the dimensions of work engagement. The older age group of 51 to 60 years, and nationals of other countries were associated with high or very high scores in any one of the dimensions. Male sex was associated with high or very high scores in the dimension absorption, while longer duration of prior service was associated with high or very high scores in the dimensions vigor and dedication. This study presented data relating specifically to general practitioners and an Asian country, which had been lacking or inexistent. The characteristics that were associated with high or very high scores in the dimensions of work engagement merit further studies. Policymakers should base the rates of engagement as reasons to evaluate organisational structure and provision.

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Conflict of interest: None declared.

### REFERENCES

1. Maslach C & Leiter MP. The Truth About Burnout. New York: Jossey-Bass, 1997.
2. Schaufeli W & Bakker A. Utrecht Work Engagement Scale: Preliminary Manual (Version 1, November 2003). Utrecht: Occupational Health Psychology Unit, Utrecht University; 2003. Obtained online: http://www.beanmanaged.eu/pdf/articles/arnoldbakker/article_arnold_bakker_85.pdf
3. (no author). Work Engagement. Retrieved on 18/04/2011 from http://en.wikipedia.org/wiki/Work_engagement
4. Schaufeli W. Notice For Potential Users Of The UWES And The DUWAS. http://wilmarschaufeli.nl/wp/downloads/

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1. MOH Clinical Practice Guidelines on Cancer Screening 1/2010
2. National Registry of Diseases Office. Information paper on colorectal cancer, 2010

# Guidelines and Information for Authors

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The submission should comprise of the following:

1. Title Page
2. Summary/ Abstract
3. Key Words
4. Text/ Manuscript (anonymised version)
5. Tables
6. Illustrations
7. Authors Agreement/ Copyright Assignment Form
8. Patient's Consent Form, if necessary (including consent for photograph or illustration taken of human subject)

and each one of these sections should start on a fresh page.

Authors are advised to ensure the anonymity of study subjects and patients by removing any and all information that could compromise their privacy from the submission.

The text should be typed in Arial font, 12 point size with a 1.5 line space.

#### The Title Page

- The title should be concise and highlight the key elements of the article.
- Include on the title page first name, qualifications, present appointments, type and place of practice of each contributor.
- Include name, address, handphone number and email address of the first author to whom correspondence should be sent.
- Insert at the bottom: name and address of institution or practice from which the work originated.

#### The Summary/ Abstract

- The summary should describe why the article was written and present the main argument or findings.
- Limit words as follows: 250 words for major articles; 200 words for case reports.

#### Key Words

- Add, at the end of summary in alphabetical listing, keywords of up to 5 in number which will be used for article indexing and retrieval under Medical Subject Headings or MeSH. MeSH is the NLM controlled vocabulary thesaurus used for indexing articles for WPRIM and PubMed. Please refer to www.nlm.nih.gov/mesh/ for details.

#### The Text/ Manuscript (full complete)

The text should have the following sequence:

- **Introduction:** State clearly the purpose of the article.

- **Methods:** Describe the selection of the subjects clearly. Give References to established methods, including statistical methods; provide references and brief descriptions of methods that have been published but are not well known. Describe new or substantially modified methods, giving reasons for using them and evaluate their limitations. Include numbers of observations and the statistical significance of the findings where appropriate.

  Drugs must be referred to generically; all the usual trade names may be included in parentheses.

  Dosages should be quoted in metric units.

  Laboratory values should be in SI units with traditional unit in parentheses.

  Do not use patients' names, initials or hospital numbers to ensure anonymity.

- **Results:** Present results in logical sequence in the text, table and illustrations.

- **Statistics:** Describe statistical methods which can be easily understood and verified by the reader. Use technical terms in its proper place, and where possible quantify readings and indicate errors of uncertainty and confidence intervals.

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Where there are more than three authors, the first three should be named and then followed by et al.

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Tables should be submitted on a separate page. Label them in roman-numeric sequence [I,II,III etc] and ensure they are clear and with explanatory legends as required.

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- Illustrations must be submitted in a separate page, and should be provided whenever appropriate. Illustrations should be cited in the text. When required, it is the author's responsibility to obtain permission to reproduce illustrations. Authors need to ensure that photographs, illustrations and figures do not contain any information that will reveal the identities of the patients and authors. From 1 January 2012, all photographs and illustrations taken from any human subject must be accompanied by the respective endorsed consent form. Clear captions to the figures should be provided.

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As the original article will be subjected to a double-blinded peer review process, all identification of names and institutions have to be removed from this version to facilitate the peer review process.

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Authors planning to submit their case studies to the PRISM section should structure their article according to these headings:

**Title**
- The title should be framed into a question to define the key focus of the case study.

**Patient's revelation: What happened?**
- The author(s) will provide a concise description of the setting on which the subject raised his/her medical or psychosocial issue pertaining to their health or disease management. It should cover the background, encounter and interaction of patient with the healthcare professional (doctor, nurse or allied healthcare professional). Author(s) should conceal the identity of the subject and/or related or accompanying personnel: abbreviation should be used instead, if necessary.

**Gaining insight: What are the issues?**
- The issue(s) raised by the patient should be framed into question(s). The question(s) will constitute a problem list and will serve as a focus for the management of this subject.

**Study the management: How do we apply in our clinical practice?**
- This section covers the approach to the management of the subject by the author(s). The author(s) should provide a literature review of current evidence, if any, of the basis of the subject's management, or to highlight the gaps of knowledge if such evidence is lacking. The author(s) will suggest ways to apply the new knowledge in clinical practice or to highlight the limitations of its applications, if any.

**Conclusion**
- The author(s) will provide a concise summary of the lessons learnt from this case study.

The article submitted to the PRISM section should be written by not more than three authors. Each article should not exceed 2000 words. Photographs or charts may be included but should conform to the specific instructions for any other articles submitted to The Singapore Family Physician.

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Manuscripts may be returned to their respective authors for revision. This will be accompanied by an Editor's email for which comments and recommendations may be made. The authors are advised to read and to take note of these comments carefully and to revise their articles accordingly. The authors need to reply to the editor's email to outline their response before the resubmission of the revised manuscript. They should exclude the identity of the authors and their institutions, as the email may be redirected to the reviewers during the resubmission process. The resubmitted manuscripts should include the revised complete version, as well as the anonymised version as before.

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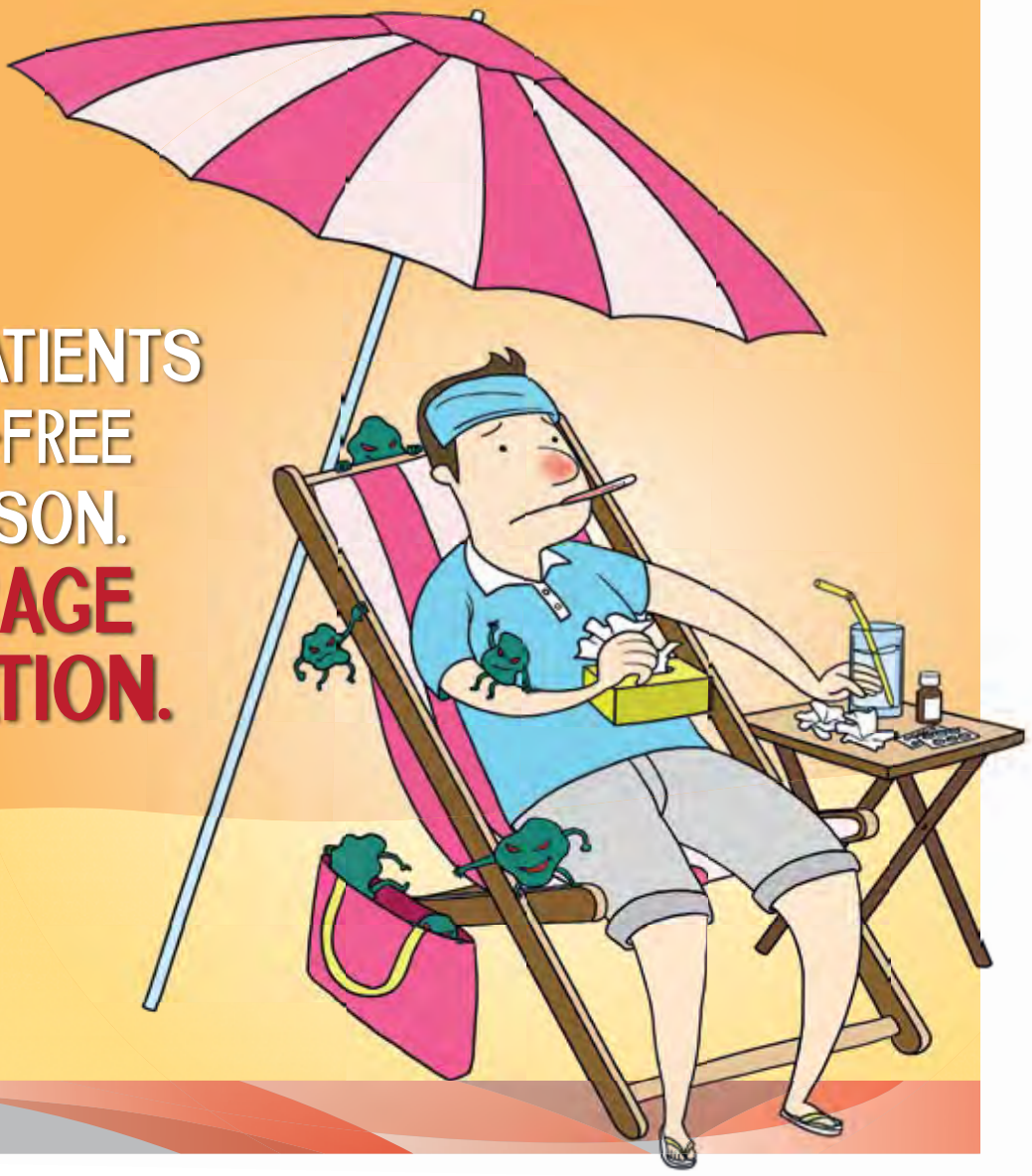

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1. National Health Survey, 2010
2. MOH Statistics 2006

| DISEASE | SCREENING TEST | AGE TO SCREEN FROM (YEARS) | FREQUENCY OF SCREENING |
|---|---|---|---|
| For men and women | | | |
| Obesity | Body mass index<br>Waist circumference measurement | 18 and older | Once every year |
| High blood pressure | Body pressure measurement | 18 and older | Once every 2 years |
| Diabetes | Fasting venous blood glucose | 40 and older | Once every 3 years |
| High blood cholesterol | Fasting venous blood glucose | 40 and older | Once every 3 years |
| Colorectal cancer | Faecal Immunochemical Test (FIT)<br>or<br>Screening Colonoscopy | 50 and older | Once every year<br><br>Once every 10 years |
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