



Acute Care Undergraduate
Teaching
(ACUTE)
Initiative



A joint publication from the Resuscitation Council (UK) and
Intercollegiate Board for Training in Intensive Care Medicine

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Executive Summary

The care of the acutely ill hospitalised patient presents problems for health services worldwide. Each year, an estimated 23,000 preventable in-hospital cardiac arrests occur in the UK. It is well recognised that, in many of these cases, the signs of clinical deterioration remain undetected or ignored by ward staff or the clinical response is poor.

The Acute Care Undergraduate Teaching (ACUTE) project used consensus techniques to develop competencies in the care of acutely ill or arrested patients that medical students should possess at the point of graduation. This process generated 71 core competencies and 16 optional competencies which could usefully be integrated into undergraduate curricula. Whilst aimed primarily at medical undergraduates, we hope that the outcome of this process is relevant to other healthcare undergraduates who acquire responsibility for the care of these patients.

Background

The care of the acutely ill hospitalised patient presents problems for health services worldwide(1). Each year, an estimated 23,000 preventable in-hospital cardiac arrests occur in the UK(2). It is well recognised that, in many of these cases, the signs of clinical deterioration remain undetected or ignored by ward staff(3) or the clinical response is poor. In a UK study of 100 consecutive admissions to intensive care, 54 patients received sub-optimal care before intensive care unit (ICU) admission; this was associated with higher ICU and hospital death rates(4). The National Confidential Enquiry into Patient Outcome and Death report “An Acute Problem” evaluated the care of over 1,500 medical admissions to intensive care and found evidence of sub-optimal management in nearly 50% of cases(5). Sub-optimal care is frequently related to poor management of simple aspects of acute care – those involving the patient’s airway, breathing and circulation, oxygen therapy, fluid balance and monitoring(6;7). Other contributory factors include organisation failures, a lack of knowledge, failure to appreciate the clinical urgency of a situation, a lack of supervision, failure to seek advice and poor communication(8;9).

Effective earlier intervention requires that staff are trained in the care of the acutely ill patient. Ideally, competence (knowledge, skills and attitudes) in caring for these patients should be a clearly defined component of healthcare curricula, starting at undergraduate level. However, previous studies have shown that resuscitation and intensive care training is neglected in the undergraduate curriculum(10-12), with UK medical schools only recently managing to deliver universal training in basic life support(11). The challenge now facing undergraduate training in the UK is to ensure that it empowers Tomorrow’s Doctors (section 16e of the General Medical Council’s recommendations on undergraduate medical education)(13) to recognise and manage acute illness. This requirement implies some agreement between medical schools learning outcomes in acute care.

The ACUTE project

The ACUTE project used consensus techniques to develop core competencies in the care of acutely ill or arrested patients that medical students should possess at the point of graduation. A full description of the methodological process is available in our paper published in *Intensive Care Medicine*(14). During the initial Delphi phase

of the study, 359 participants submitted 2629 competency suggestions to the study website. These were condensed into 95 representative competency statements, which were rated for importance by a nominal group comprised of doctors, nurses, educators and a medical student. Details of the nominal group membership are provided in the appendix. Seventy-one competencies were rated as important or very important by the nominal group and are included as essential competencies. Sixteen competencies were rated with moderate importance are included as optional competencies(16).

These competencies provide a focus for curriculum planning for students and undergraduate tutors. The advantage of a competency-based curriculum is that it defines the desired outcomes of the training program rather than the process of education. This promotes standardisation of the end product. At the same time, it encourages locally appropriate approaches to content delivery and the integration of training throughout the curriculum, rather than confining it to the final undergraduate years. An additional strength of standardising outcomes of undergraduate education is that, for doctors, this facilitates integration with the postgraduate foundation programmes(15). Courses, such as the Resuscitation Council (UK) Immediate Life Support course and Portsmouth Hospitals NHS Trust Acute Life-threatening Events – Recognition and Treatment (ALERT™) course, enable delivery of elements of the curriculum to students in small groups with standardisation of content and delivery. Details of some of these courses are contained in the appendix.

Whilst aimed primarily at medical undergraduates, we hope that the outcome of this process is relevant to other healthcare undergraduates who acquire responsibility for the care of these patients. Our premise is that promoting opportunities for multi disciplinary learning in these core competencies adds benefit to undergraduate curricula as shared learning actively promotes ‘team working’.

Funding

This study was supported by an unrestricted research grant from the Resuscitation Council (UK). The funding organisation hosted the website for phase 1 of the study and provided accommodation and travel costs for the nominal group meeting. The funding organisation did not contribute to the study design, analysis or interpretation of results or decision to submit for publication.

The project was supported by:

- Intensive Care Society (UK)
- Royal College of Physicians Critical Care Committee
- Royal College of Anaesthetists Critical Care Committee
- Faculty of Accident and Emergency Medicine
- Council of Professional Resuscitation Officers

Competency Statements

Items in normal font identify competencies considered essential. Competencies in *italics* are optional.

Airway and Oxygenation

The trainee:

- Describes the signs of airway obstruction
- Demonstrates safe use of simple airway manoeuvres / adjuncts (head-tilt, chin lift, suction, oropharyngeal, nasopharyngeal airway)
- Describes the indications and rationale for safe oxygen therapy in the critically ill patient
- Describes the principles of controlled oxygen therapy in the patient with COPD (emphasising the importance of alleviating life threatening hypoxia)
- Demonstrates basic treatment for simulated choking

- *Demonstrates safe and effective use of laryngeal mask airway*
- *Describes the indications for and method of needle cricothyroidotomy*
- *Describes the indications for and method of surgical cricothyroidotomy*
- *Demonstrates safe and effective tracheal intubation*

Breathing and Ventilation

The trainee:

- Demonstrates a systematic clinical assessment of breathing and oxygenation
- Describes the common causes of breathlessness
- Describes the clinical signs and treatment of a tension pneumothorax
- Demonstrates effective bag-mask ventilation
- Demonstrates effective mouth-mask-ventilation
- Demonstrates effective expired air ventilation without adjuncts.

- *Describes the indications for invasive mechanical ventilation*

Circulation

The trainee:

- Describes the clinical features of shock
- Describes potentially reversible causes of a cardiac arrest
- Demonstrates the immediate management of a simulated witnessed in-hospital cardiac arrest
- Describes how to recognise and treat common peri-arrest arrhythmias
- Demonstrates peripheral venous cannulation including attention to patient comfort and infection control
- Demonstrates effective external chest compressions
- Describes effective fluid resuscitation
- Describes control of external haemorrhage
- Recognises cardiac arrest rhythms (VF, pulseless VT, PEA and asystole)

- Demonstrates safe and effective use of an automated external defibrillator
- Demonstrates safe and effective use of a manual defibrillator
- Describes alternatives to peripheral venous access
- Describes the indications, risks and safe administration of blood products
- *Describes the indications for central venous catheterisation*

Confusion and Coma

The trainee:

- Describes the common causes of altered consciousness
- Demonstrates a systematic approach to the assessment of the acutely ill patient with altered consciousness
- Describes how to recognise and initiate treatment of status epilepticus
- *Demonstrates the recovery position*

Drugs, therapeutics and protocols

The trainee:

- Describes how to recognise and initiate treatment for an acute attack of asthma
- Describes how to recognise and initiate treatment for diabetic emergencies
- Describes how to recognise and initiate treatment for acute heart failure
- Describes how to recognise and initiate treatment for an anaphylactic reaction
- Describes the causes, presentations and treatment of oliguria
- Describes the indications and dosages of drugs used in the management of a cardiac arrest
- Describes how to recognise and initiate resuscitation of a patient with an acute abdomen
- Describes how to recognise and initiate treatment for meningococcal septicaemia
- Describes how to recognise and initiate treatment for a pneumonia
- Describes how to recognise and initiate treatment for common drug overdoses
- Describes how to recognise and initiate treatment for acute coronary syndromes
- Describes how to recognise and initiate treatment for an acute exacerbation of COPD
- Describes the common causes and treatment of life threatening disturbances of sodium and potassium homeostasis
- *Describes the role of vasoactive drugs in treatment of the shocked patient*

Clinical examination, monitoring and investigations

The trainee:

- Describes normal physiological ranges for basic vital signs including pulse, blood pressure, SpO₂, respiratory rate, urine output and body temperature

- Demonstrates a systematic approach to the clinical assessment and timely management of the critically ill patient
- Demonstrates safe handling and disposal of sharps and clinical waste
- Demonstrates a systematic approach to 3 and 12 lead ECG interpretation
- Demonstrates a systematic approach to chest X ray interpretation
- Measures arterial blood pressure correctly using a manual method
- Describes the importance of repeated and timely reassessment of the acutely ill patient
- Demonstrates / describes how to obtain an arterial blood gas
- Describes a systematic approach to arterial blood gas analysis
- Describes the principles and limitations of pulse oximetry
- Describes appropriate laboratory tests for the initial investigation of the acutely ill patient

- *Describes the pathophysiological processes underlying critical illness*
- *Describes the indications and complications of arterial line insertion*
- *Demonstrates / describes how to perform urinary catheterisation*
- *Describes the principles and limitations of central venous pressure monitoring*
- *Describes the principles and limitations of invasive arterial pressure monitoring*

Team-working, organisation and communication

The trainee:

- Describes / demonstrates how to recognize one's own limitations and when to call for help
- Describes / demonstrates the principles of breaking bad news
- Describes appropriate coping strategies for managing personal stress
- Describes / demonstrates the principles of good communication skills
- Demonstrates the ability to work as part of a multi-professional team
- Demonstrates the ability to extract and critically appraise literature

- *Describes the role of early warning scoring systems and / or ICU outreach*
- *Demonstrates good time keeping, punctuality*

Patient and Societal needs

The trainee:

- Describes the importance of and methods for achieving adequate pain control
- Demonstrates respect for patient dignity
- Describes key aspects of in-patient safety
- Describes the ethical and legal implications of attempting / not attempting resuscitation
- Describes the principles of consent in the acutely ill patient

Trauma

- Describes the principles of recognition and initial management of patients with suspected spinal injuries

- Describes or demonstrates a systematic approach to the assessment and immediate treatment of the victim of trauma

Equipment

- Demonstrates how to set up an intravenous infusion correctly
- Demonstrates how to prepare and give an intravenous drug correctly
- Demonstrates how to set up and give high flow and controlled oxygen therapy correctly
- Demonstrates how to set up and use an oxygen / air driven nebuliser and describes indications for use of either device

- *Describes how to set up, insert and manage a chest drain*

Infection and inflammation

The trainee:

- Adheres to the basic principles of infection control measures including handwashing
- Describes the recognition and immediate resuscitation of a patient with sepsis
- Describes a rational approach to antibiotic prescribing in the patient with sepsis
- Describes / demonstrates an appropriate technique for collecting blood cultures

Appendix: Examples of current educational materials

1. Basic Life Support and Automated External Defibrillation (BLS/ AED)

The European Resuscitation Council (ERC) Basic Life Support and Automated External Defibrillation course is a six hour course which teaches the theoretical and practical aspects of BLS, AED and emergency first aid. The University of Birmingham has successfully introduced a system of peer-led resuscitation training based on the ERC BLS/AED programme(16). In this scheme second year healthcare students are trained to be instructors and then deliver the programme to their first year colleagues. When the quality and outcome of peer-led training was evaluated compared to training from clinical teachers in a randomised controlled study, results from the peer-led group were superior to that from clinical teachers(17).

Further details:

European Resuscitation Council www.erc.edu

2. Immediate Life Support Course (ILS)

The Immediate Life Support Course is a one-day multi-professional resuscitation course(18). It provides tuition on the essential knowledge and skills required to manage a patient in cardiac arrest for the short time before the arrival of a cardiac arrest team or other experienced medical assistance. The ILS course also introduces healthcare professionals to the role of a cardiac arrest team member. Recognition and intervention in the acutely unwell patient prior to cardiac arrest, basic airway skills, rhythm recognition, rapid safe defibrillation using either manual or automated external defibrillators (AEDs) and basic cardiac arrest drug pharmacology are the prime objectives of the course. The course includes lectures, skill stations and cardiac arrest scenarios and is supported by an 80 page course manual. The chapter headings for the ILS course manual are given below. ILS is based on the current European Resuscitation Council Advanced Life Support (ALS) cardiac arrest treatment algorithms and has standardised much of the life support training that already takes place in hospitals in the UK. The ALS course by contrast has been seen as the gold-standard for resuscitation training, and in its new format is aimed at resuscitation team leaders and not towards PRHOs or medical students.

The ILS course is much more appropriate for the needs of undergraduate and PRHO training.

ILS Manual Chapter Headings

- Introduction
- Causes and prevention of cardiorespiratory arrest
- Basic life support
- Cardiac arrest rhythms
- Treatment algorithms
- Defibrillation
- Airway management and ventilation
- Drug delivery
- Drugs

Further details:

Resuscitation Council (UK), Tavistock House North, Tavistock Square, London.

www.resus.org.uk

3. ALERT™ Course

The ALERT™ course is a one-day, interprofessional course originally designed to give medical students, pre-registration house officers and nurses greater confidence and ability in the recognition and management of patients who have impending or established critical illness(19). ALERT™ was developed using principles common to many advanced life support courses and incorporates aspects of clinical governance, multiprofessional education and interprofessional working. It has been designed to enable front-line, healthcare staff (particularly trainee medical and ward nurses) to train together using a common system of assessment that will be familiar to those who have attended other advanced life support courses. It incorporates pre-course reading, informal and interactive seminars, practical demonstrations and role-play during clinically based scenarios. A particularly novel aspect of ALERT™ is that participants undertake role interchange during scenarios, thereby facilitating mutual understanding. At all times during the course, participants are encouraged to reflect on their actions and to pay particular attention to detail. The course focuses on those problems that lead ward nurses to call PRHOs for assistance, e.g., “the blue patient”, “the hypotensive patient”. Communication skills are covered frequently in the course, during seminars and scenarios, but also as a specific session that covers three aspects – breaking bad news, writing patient notes and interpersonal/ interprofessional communication. The chapter headings from the course manual are:

ALERT™ Course Manual Chapters

- Introduction
- Preliminary safety and hygiene measures
- Assessing the critically ill patient
- The blue and breathless patient
- The hypotensive patient
- The patient with a disordered conscious level
- The oliguric patient
- Pain relief in critical illness
- Organisational and communication skills
- A brief introduction to the ethics of acute care

Further details:

ALERT course office 02392 286000 ext 5831

Competencies covered by the European Resuscitation Council Basic Life Support and Automated External Defibrillation (BLS/AED) course, Resuscitation Council (UK) Immediate Life Support (ILS) course and University of Portsmouth Acute Life Threatening Emergencies Recognition and Treatment (ALERT)

(Competencies considered optional are shown in *italics*)

	BLS AED	I L S	A L E R T
Airway and Oxygenation			
Describes the signs of airway obstruction	X	X	X
Demonstrates safe use of simple airway manoeuvres / adjuncts (head-tilt, chin lift, suction, oro- and naso-pharangeal airway)		X	X
Describes the indications and rationale for safe oxygen therapy in the critically ill patient		X	X
Describes the principles of controlled oxygen therapy in the patient with COPD(emphasising the importance of alleviating life threatening hypoxia)			X
Demonstrates basic treatment for simulated choking			
<i>Demonstrates safe and effective use of laryngeal mask airway</i>		X	
<i>Describes the indications for and method of needle or surgical cricothyroidotomy</i>		X	
<i>Demonstrates safe and effective tracheal intubation</i>			
Breathing and Ventilation			
Demonstrates a systematic clinical assessment of breathing and oxygenation		X	X
Describes the common causes of breathlessness			X
Describes the clinical signs and treatment of a tension pneumothorax		X	X
Demonstrates effective bag- mask ventilation		X	X
Demonstrates effective mouth-mask-ventilation		X	
Demonstrates effective expired air ventilation without adjuncts.		X	
<i>Describes the indications for invasive mechanical ventilation</i>			X
<i>Describes how to manage hypercapnoeic respiratory failure</i>			X

Circulation			
Describes the clinical features of shock			X
Describes potentially reversible causes of a cardiac arrest		X	X
Demonstrates the immediate management of a simulated witnessed in-hospital cardiac arrest		X	
Describes how to recognise and treat common peri-arrest arrhythmias		X	
Demonstrates peripheral venous cannulation including attention to patient comfort and infection control			
Demonstrates effective external chest compressions	X	X	
Describes effective fluid resuscitation			X
Describes control of external haemorrhage	X	X	X
Recognises cardiac arrest rhythms (VF, pulseless VT, PEA and asystole)		X	
Demonstrates safe and effective use of an automated external defibrillator	X	X	
Demonstrates safe and effective use of a manual defibrillator		X	
Describes alternatives to peripheral venous access		X	
Describes the indications, risks and safe administration of blood products			
<i>Describes the indications for central venous catheterisation</i>			
Confusion and Coma			
Describes the common causes of altered consciousness			X
Demonstrates a systematic approach to the assessment of the acutely ill patient with altered consciousness		X	X
Describes how to recognise and initiate treatment of status epilepticus			
<i>Demonstrates the recovery position</i>	X		
Drugs, therapeutics and protocols			
Describes how to recognise and initiate treatment for an acute attack of asthma			
Describes how to recognise and initiate treatment for diabetic emergencies			
Describes how to recognise and initiate treatment for acute heart failure			
Describes how to recognise and initiate treatment for an anaphylactic reaction			
Describes the causes, presentations and treatment of oliguria			X

Describes the indications and dosages of drugs used in the management of a cardiac arrest		X	
Describes how to recognise and initiate resuscitation of a patient with an acute abdomen			
Describes how to recognise and initiate treatment for meningococcal septicaemia			
Describes how to recognise and initiate treatment for a pneumonia			
Describes how to recognise and initiate treatment for common drug overdoses			
Describes how to recognise and initiate treatment for acute coronary syndromes			
Describes how to recognise and initiate treatment for an acute exacerbation of COPD			
Describes the common causes and treatment of life threatening hypo / hyper natraemia and kalaemia			
<i>Describes the role of vasoactive drugs in treatment of the shocked patient</i>			
Clinical examination, monitoring and investigations			
Describes normal physiological ranges for basic vital signs including pulse, blood pressure, SpO2, respiratory rate, urine output and body temperature			X
Demonstrates a systematic approach to the clinical assessment and timely management of the critically ill patient		X	X
Demonstrates safe handling and disposal of sharps and clinical waste			
Demonstrates a systematic approach to 3 and 12 lead ECG interpretation, recognising common and important abnormalities		X	
Demonstrates a systematic approach to chest X ray interpretation recognising common and life threatening abnormalities			
Measures arterial blood pressure correctly using a manual method			
Describes the importance of repeated and timely reassessment of the acutely ill patient		X	X
Demonstrates / describes how to obtain an arterial blood gas			
Describes a systematic approach to arterial blood gas analysis			
Describes the principles and limitations of pulse oximetry			X
Demonstrates the rationale use of common laboratory tests and investigations in the critically ill patient			

<i>Describes the pathophysiological processes underlying critical illness</i>			
<i>Describes the indications and complications of arterial line insertion</i>			
<i>Demonstrates / describes how to perform urinary catheterisation</i>			
<i>Describes the principles and limitations of central venous pressure monitoring</i>			
<i>Describes the principles and limitations of invasive arterial pressure monitoring</i>			
Teamworking, organisation and communication			
Describes / demonstrates how to recognize one's own limitations and when to call for help		X	X
Describes / demonstrates the principles of breaking bad news			X
Describes how to deal with the personal emotional issues surrounding critical incidents, breaking bad news, post incident stress etc			
Describes / demonstrates the principles of good communication skills		X	X
Demonstrates the ability to work as part of a multi-professional team		X	X
Demonstrates the ability to extract and critically appraise literature			
<i>Describes the role of early warning scoring systems and / or ICU outreach</i>			
<i>Demonstrates good time keeping, punctuality</i>			
Patient and Societal needs			
Describes the importance of and methods for achieving adequate pain control			X
Demonstrates respect for patient dignity			
Describes key aspects of in-patient safety			
Describes the ethical and legal implications of attempting / not attempting resuscitation		X	X
Describes the principles of consent in the acutely ill patient			X
Trauma			
Describes the principles of recognition and initial management of patients with suspected spinal injuries			
Describes or demonstrates a systematic approach to the assessment and immediate treatment of the victim of trauma			

Equipment			
Demonstrates how to correctly set up an intravenous infusion			
Demonstrates how to correctly prepare and give an intravenous drug			
Demonstrates how to correctly set up and administer high flow and controlled oxygen therapy			X
Demonstrates how to set up and use an oxygen / air driven nebuliser and describes indications for use of either device			
<i>Describes how to set up, insert and manage a chest drain</i>			
Infection and inflammation			
Adheres to the basic principles of infection control measures including handwashing			
Describes the recognition and immediate resuscitation of a patient with sepsis			
Describes a rational approach to antibiotic prescribing in the patient with sepsis			

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