

**Nursing  
Times**

# The Deteriorating Patient



**SPECIAL SUPPLEMENT**

# INTRODUCTION

## Careful observation and appropriate action can save lives

Deterioration in acutely unwell patients can happen quickly and have catastrophic effects, so observations must be recognised as a fundamental rather than basic task

When patients come into hospital they put their trust in the professionals caring for them. They assume they are being monitored and that any deterioration in their condition will be detected and acted on quickly. Unfortunately, this is not always the case – hospital mortality statistics reveal that disturbing numbers of patients die simply because staff failed to spot or act on changes in their condition.

Patients might assume that hospital procedures ensure all patients have the right observations taken at the right by the right professionals. However, a survey undertaken by *Nursing Times* in late 2009 found that these assumptions are often wrong. Its findings make sobering reading for nurses and other healthcare professionals, and chilling reading for patients.

Over 830 nurses responded to the survey, and one in three could recall at least one situation in the previous month where staff had not noticed that a patient's condition was deteriorating - one respondent said he had seen at least 20. Only 27% of respondents said that agreed procedures were always followed in their place of work when signs indicated that a patient was deteriorating – one in five said such procedures were rarely or never followed.

Our survey also revealed that respondents believed observations were being left to people without the skills to interpret and act upon the findings- almost half were either not confident or only fairly confident that staff undertaking observations had these skills. In addition, almost

40% said that staff using observation technology were not always trained to do so.

There are many reasons for the situation revealed by the survey. For example, increasing nurse workload means they must delegate tasks to unqualified staff and increased reliance on technology means manual skills are lost. As the article on px illustrates, newly qualified staff often lack confidence in fundamental acute care skills, while the research report on page X suggests that students may be socialised into seeing observations as basic tasks reserved for HCAs rather than fundamental nursing skills.

Whatever the causes, nursing needs to take control of the situation and ensure patients are adequately monitored and any deterioration in their condition is quickly acted upon. This supplement looks at seven signs of deterioration, their significance, and the nurse's role in detecting and managing them. We hope it will provide a useful reference resource and teaching aid that will help nurses to ensure patient observations detect deterioration in its early stages and that significant changes are acted upon appropriately.

**Jenni Middleton**  
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## Using supported learning to ensure nurse recruits are skilled to care for acutely ill patients

Nurses often lack the necessary skills to care for patients with acute illness. A trust set up a programme to enable applicants to train before taking up posts

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### INTRODUCTION

A shortage of competent nurses could jeopardise the government's plans to modernise the NHS. Nurses are central to delivering healthcare and a crucial resource (Maben and Griffiths, 2008). The changing profile of acute care requires nurses who are competent to respond effectively to the needs of acutely ill patients.

Like many acute trusts, the Royal United Hospital Bath Trust faces a challenge in recruiting enough registered nurses who are up to date and confident in meeting these acute needs. The trust's recruitment strategy group recognised that many nurses were put off applying for jobs in acute care, or were unsuccessful at interview because they did not have the skills necessary to work with very sick patients.

To recruit suitable staff, the trust's nurse recruitment group commissioned a working group with representatives from education, human resources and nursing practice to develop an acute care training programme.

This training offers supportive learning to enable registered nurses to change their area of practice, and develop knowledge and skills to meet the needs of acutely ill patients cared

for in busy wards. Although the transition from acute care to primary care has been supported elsewhere (Clegg et al, 2006), there is no documented evidence of a specifically designed programme for nurses to gain skills in caring for acutely ill patients in an acute trust.

### THE ACUTE CARE PROGRAMME

The programme provides an opportunity for registered nurses to undertake up to six months of supported learning to enable them to meet the needs of patients with acute illnesses.

A partnership approach is used to develop and implement the programme, which includes clinical and education staff who design the content and implement training and HR staff who organise the contractual arrangements. These include a fixed term contract for the length of the programme and a substantive band 5 post on successful completion.

During the programme each student is allocated a learning partner, who is an experienced nurse working with acutely ill patients, and an educational coach from the education department; they jointly supervise and support students.

The learning partners' role is to provide guidance and enhance clinical skills development. They identify learning needs by considering students' experience and the needs of the workplace with the aid of a learning contract (Knowles et al, 2005), which helps individualise each student's learning. Learning partners give their students feedback on progress as well as constructive comments on aspects of practice that need further development. Students are encouraged to express difficulties and skill gaps that are identified in the workplace.

Educational coaches help students and learning partners understand the requirements to pass the programme successfully. They organise a schedule that includes taught sessions, led by experts in the

### PRACTICE POINTS

- The acute care training programme has helped nurses to develop confidence and competence when caring for patients in acute settings.
- Close working between clinical and educational staff and students has helped overcome the many challenges of developing a new programme.
- An assessment day involving an interview, clinical skills test and team management exercise is vital to nurses successfully completing the programme.
- Flexibility is essential to enable each student to learn according to their personal learning needs and the demands of their workplace.
- An emphasis on students as self directed learners is vital for their ongoing development.

trust, and facilitate work based learning sessions. These sessions promote the sharing of incidents from practice, encourage reflection and provide opportunities for learners with similar concerns and difficulties to come together and support each other.

The programme places significant emphasis on students being self directed learners. For the first two weeks, they have supernumerary status and are given protected learning time to attend study days and undertake independent study and work experiences. This is essential to enable them to complete the required clinical competences and collate evidence for the development portfolio, which is assessed.

Students are expected to be proactive in seeking learning opportunities such as e-learning, in-house training or working in alternative teams for short periods.

They are also responsible for demonstrating they have achieved their agreed competences and skills by completing a learning contract and portfolio of evidence. Those who do not complete the required competences are not offered a substantive post at the end of the programme.

## CHALLENGES AND SOLUTIONS

The working group had to resolve several difficulties before and during implementation of the initial programme. Choosing candidates who are suitable for work in the hospital and motivated to develop skills is a major challenge. Sisters and matrons prefer to choose candidates who are suitable to work in their areas, based on matching their past experience and preferences to the requirements of the post.

There is an assessment day for each cohort, which aims to enable candidates to demonstrate their knowledge and potential to develop. It also enables clinical staff to assess candidates' suitability for their practice areas, which involves one to one interviews with ward sisters. An assistant director of nursing gives a presentation on the trust's expectations and a member of the education team outlines the programme's structure.

Candidates participate in activities such as a clinical skills test and team management exercise. These give them an opportunity to demonstrate their problem solving and teamworking qualities. To encourage as many potential applicants as possible to attend, these days are held on Saturdays.

As applicants have a wide variety of experiences and skills, learning has to be flexible to meet their individual needs and the needs of the areas where they will work.

In developing the programme, education staff considered the difficulties in assessing work performance and clinical skills. Clinical staff do not want to have to complete long and complex documentation as evidence of students' skills.

National Occupational Standards competences, developed by Skills for Health (2010), are already used in the hospital to assess practitioners, so many clinical staff are familiar with them.

The working group identified four compulsory competences from within the NOS that they felt all staff should achieve when working in acute care. Additional optional competences are discussed between

### BOX 1. COMPETENCES TO COMPLETE DURING ACUTE CARE PROGRAMME

- Trust induction programme, including basic life support;
- Four compulsory competences:
  - Physiological measurements;
  - Discharge arrangements;
  - Medication administration;
  - Infection control.
- Two further options relevant to students' area of work and own development gap. For example: supporting patients through the process of dying; carrying out extended feeding techniques to ensure nutritional and fluid intake; intravenous and subcutaneous therapy workbook; blood transfusion.

students and their learning partners. This allows competences to be met according to patients' needs. The required competences to complete as part of the programme are summarised in Box 1.

The use of the NOS competences has proved successful in helping students improve performance and as an assessment tool.

A nurse working with the student witnesses the achievement of each competence and learning partners and educational coaches check that portfolios reflect students' achievements. Although the portfolio is not assessed at higher education institution level, there are opportunities to gain credits towards an academic qualification within the trust.

### Other obstacles

Some ward sisters and charge nurses are apprehensive about accepting acute care students onto wards with staff shortages.

It is difficult for staff to provide additional support as busy wards do not have time to facilitate learning and skills development for newly recruited staff.

To overcome this, two students undertook their acute care training on a ward that had sufficient staff to support them, then moved to another ward of similar specialty towards the end of their training period before they began their substantive posts.

To allow students to settle in to the ward, get to know team members and observe new skills and practices, two weeks of supernumerary practice is included. For some, this has proved insufficient, especially for those who work fewer than three days a week. The programme is therefore not suitable for students who cannot commit to working at least three days a week in clinical practice while undertaking training.

## OUTCOMES AND BENEFITS

The acute care programme has been running for a year and two cohorts of five students each have participated, with more planned for autumn and spring.

Through the evaluation process, learning partners and students have outlined the benefits of the programme on professional development. Students have appreciated being given the support and time to adjust to changes in practice and the pace of acute care nursing, in particular in developing their clinical practice and ensuring they are working to current policies.

Before undertaking the training, most students expressed apprehension and a lack of confidence in being able to nurse in an acute setting. They have been surprised at how their confidence has grown and how quickly they have been able to achieve their competences.

Flexibility in the programme enables students to complete it in 3-6 months, depending on their ability and work patterns. After successfully completing it, all have been given permanent work contracts. So far, most students have completed the programme within 3-4 months, and only two have taken nearer to six months. Two left during the early stages of training because of unexpected changes in their personal circumstances.

## CONCLUSION

The success of the acute care programme relies heavily on learning partners and managers, education and HR staff and the determination of students themselves.

The trust is fortunate to have dedicated staff who provide excellent support for this programme.

As it is proving to be a positive factor in supporting recruitment to our nurse workforce, the programme continues to be offered twice a year with cohorts of up to 10 students at a time. ●

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## BACKGROUND

- Many acute trusts struggle to fill vacant nurse positions in acute care because of a shortage of candidates, in terms of both number and calibre.
- The introduction of the acute care programme is part of a local strategic approach to recruit sufficient nurses.
- Nurses need colleagues' support to enable them to develop necessary skills.

## How student nurses' supernumerary status affects the way they think about nursing

Identifying the mismatched views of student and qualified nurses on what nursing is and what students need to learn from their time on the ward

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**ABSTRACT** Allan HT, Smith PA (2009) How student nurses' supernumerary status affects the way they think about nursing. *Nursing Times*; 105: 43, 10-13.

**Background** Giving students supernumerary status fundamentally shifted the way the profession thought about student nurses' clinical learning, but it has not been without its critics.

**Aim** To examine how supernumerary status affects the way students think about nursing.

**Method** A qualitative study over two years included a literature review, consultation and focus groups with stakeholders, formal and informal interviews with student nurses and clinical stakeholders, and observation in clinical areas.

**Results and discussion** We suggest there is an increased division of labour between registered and non-registered staff, so student nurses observe healthcare assistants performing bedside care and RNs undertaking more technical tasks. This leads students to reject bedside care as part of nursing. Our data suggests that being associated with such work in their supervised practice may lead to students feeling stigmatised. This can then leave them feeling unprepared for their future role as qualified nurses who do not have time to perform such tasks.

**Conclusion** There is clearly a mismatch between qualified and student nurses' views of what nursing is and what student nurses need to learn.

### INTRODUCTION

In this article, we use findings from a qualitative study of nurse education and training to assess how supernumerary status affects the way students think about nursing.

It was prompted by Gordon Brown and David Cameron's speeches to this year's Royal College of Nursing Congress (Brown, 2009; Cameron, 2009). These speeches, and the report of the Commission on the Future

of Nursing and Midwifery, due to be published early next year, show that nurse education remains a topical, political issue (Commission on the Future of Nursing and Midwifery, 2009).

Gordon Brown said nursing was a "profession where you work with your head, heart and hands at the same time". He argued that it should be able to develop and still remain a caring profession.

David Cameron said: "There's no better way to learn about these things [nursing] than by putting down the textbook and getting practical training with living, breathing human beings. But too many of today's placements don't give student nurses the practical experience they need. They're stuck in the role of observer, feeling more like a spare part than a helping hand. We've got to find a way to make training more practical..." In this statement, he implicitly criticised how student nurses learn in clinical areas today, that is, they no longer work as apprentices but undertake a supernumerary role.

We suggest that the consequences of introducing supernumerary status may have changed student nurses' understanding of nursing. Gordon Brown's aspiration that nurses think, feel and undertake practical work may no longer be a reality for students.

### BACKGROUND

Cameron focused on the experience of being a student now that student nurses are no longer key to the NHS workforce. They are university students who work in placements supernumerary to workforce numbers.

As a result of this, bedside or essential care has increasingly been devolved to healthcare assistants who have, since the early 1990s, replaced the student apprenticeship workforce.

This change occurred as a result of the Project 2000 curriculum introduced in the late 1990s (NMC, 2004) and the fitness for practice curriculum (UKCC, 1999), and at the same time as nurse education moved into higher education.

### LITERATURE REVIEW

Supernumerary status means that student nurses are additional to the clinical workforce and undertake a placement in clinical practice to learn, not as members of staff (NMC, 2004).

This does not mean that students do not work while on placement; they are expected to learn through supervised participation in clinical work (Arkell and Bayliss-Pratt, 2007). The level of supervision depends on the stage of training and experience; the role of the supervisor or mentor is crucial to learning (Donaldson and Carter, 2005; Spouse, 2001).

Supernumerary status in nursing education should have fundamentally changed student nurses' role in clinical areas after it was introduced in the early 1990s. However, studies show that it is not always a reality and the apprenticeship model still exists (Elcock et al, 2007). This may be because supernumerary status becomes difficult to sustain when mentors' focus is on working rather than student learning, leading to arguments for improved clarity of their role (McGowan, 2006).

Attitudes to supernumerary status can be positive and negative (O'Callaghan and Slevin, 2003). For example, it is viewed negatively by mentors in clinical areas because of the associated increased workload, and positively because using students as co-workers enables the clinical team to get through the work (Hyde and Brady, 2002).

Negative attitudes to supernumerary status can affect patient care, as Pearcey and Elliott (2004) found. A negative attitude to patients generally affected the ward learning culture and resulted in poor patient care and student learning.

Spouse (1998) gave a more positive view of supernumerary status in her discussion of "legitimate peripheral participation" – this is the process by which student nurses are "allowed" to observe clinical care performed by others, either registered nurses or HCAs. Increasingly, because bedside care is delivered by HCAs, students observe HCAs

delivering this care and registered nurses delivering drugs or other care where it is necessary to be qualified (Mackintosh, 2006).

We argue elsewhere, in an unpublished report, that staff have clear expectations that students should learn through working, and that legitimate peripheral participation was not considered appropriate for student nurses in general, acute clinical areas.

We note that McGowan (2006) and McCormack and Slater (2006) suggested that views about supernumerary status vary according to nursing specialism. For example, attitudes are positive among students and staff in intensive care.

## AIM

Our study investigated how changes in nursing leadership roles have influenced how student nurses learn in practice settings in the NHS, given the move to higher education and other changes such as the introduction of supernumerary status and substitution of student nurses' labour with that of HCAs.

## METHOD

The study was in two stages over two years and included:

- Consultation with stakeholders and a literature review to evaluate clinical learning and leadership in the NHS to produce an evidence-based conceptual framework to generate questions for focus groups and interviews;
- Formal and informal individual interviews with a sample of student nurses from first, second and third year groups in each case study site. In total, 24 students were interviewed;
- Focus group and formal and informal individual interviews with a sample of key clinical stakeholders, including practice development facilitators, placement coordinators, ward managers, mentors, senior nurses and link lecturers in each case study site; in total, 55 participants were interviewed;
- An online ward learning environment questionnaire survey was distributed to a randomised sample of the total population of each student nurse cohort in each case study site; 4,793 surveys were distributed, generating a response rate of 20% (n=937), which is within the normal range for an online survey;
- Observation of participants in clinical areas over three weeks totalling 60 hours was undertaken where informal interviews with clinical staff and students took place.

## PRACTICE POINTS

- Students need to feel part of a ward nursing team and a wider profession.
- They need to be included in the nursing work which qualified nurses perform.
- Students need to observe and participate in bedside care as well as more technical work, to learn how to supervise "care".
- Bedside care, as well as the technical aspects of nursing, can contribute to learning.

## RESULTS

There have been profound changes for both student nurses and staff who teach, mentor and work with them in practice and in the higher education setting. Changes include those in nurses' education, such as the move into higher education, and workforce changes in nursing, such as the changes to students' and HCAs' roles, brought about partly by supernumerary status.

Student learning in clinical practice has become uncoupled from theoretical learning. For students, one of the signs of this has been that their supernumerary status has become a hurdle. The more successful are able to negotiate this to learn effectively in practice. Students who do not negotiate this may find learning difficult and that their status as students becomes a barrier to learning in a ward team.

### What is nursing?

The work students were asked to perform was a source of dispute between students and qualified staff and this led to discontent among both groups. Staff felt that students should be learning to deliver what they had themselves learnt to deliver as students, that is, bedside care. However, nurses were often unable to deliver bedside care because of the busy nature of the clinical areas so students did not see them perform this type of care.

Some staff were aware of the difference between what they encouraged students to learn and what they themselves practised. As O'Connor (2007) found, the HCAs' role was key to understanding what students saw as the nature of nursing. If they observed HCAs delivering hands-on care and qualified nurses involved only in more technical aspects of care and the organisation of the ward, they understandably aspired to the more technical and organisational roles.

This difference between what qualified nurses actually do (drugs and coordinating ward work) (Mooney, 2007), and what they expected students to do (deliver

bedside care) was recognised by participants across the sites. This is illustrated in the following exchange from a focus group between practice development nurses and practice facilitators:

**Participant 1:** "We've changed from being the doers of care to the prescribers of care so, in that sense, I think we need to be more advanced in what we think and what we do. I just sometimes feel in despair that by the time students become qualified they still haven't gained some of the practicalities and common sense, and stuff that we would have learnt as a student – things like time management, basic assessment skills – that we would have automatically been doing on our first ward. OK, we may have only done the washing, but we had to get them all done at a certain time; therefore we had time to manage."

**Participant 2:** "Because some students don't perceive doing nursing care as nursing, but the healthcare assistants do so much work that we as students used to do, they don't see themselves as learning any more."

**Participant 1:** "I think that's a big difference. If they'd just done basic nursing care, it's not basic, but washing, whatever, they [say they] haven't learnt anything all morning. And I think 'Well, actually you have. You've worked very hard all morning and you've given what you're supposed to be giving – nursing care.'"

**Participant 3:** "I think you're quite right there because I have staff coming to work, permanent staff coming to work, they're so keen to get to know how to do all the advanced practice care, that the basic stuff that you have to have a good grounding in before you can advance on to the more difficult tasks, the more acute tasks, they just don't want to do."

**Participant 2:** "They don't perceive it as nursing."

Student nurses were well aware that trained nurses did not deliver bedside care and resisted attempts from staff to direct their work which interfered, as they saw it, with their learning. We recorded the following in our field notes from a morning accident and emergency shift:

# practice research report

"I had come on at 7.30 and watched handover and then walked out with the 'minors' team, including two students. The night staff nurse handed over a lady from a care home who'd fallen over, was mildly concussed and needed rehydrating. She said: 'That elderly lady needs this tea,' and pushed the beaker towards the two students; neither of them moved. I then went and gave the tea. Later that morning, the student and I went up to watch a scan and I was explaining the physiology behind this to her; she observed that this was helpful and she'd learnt something. She then said had I observed her not giving the elderly lady that beaker of tea? Of course I said 'Yes' and she then went on to say: 'I keep being asked to do things which won't help me learn – clear up poo, mop up blood, give patients tea and toast. I realised that I needed to be more focused to learn and I don't do those sorts of things now. I hadn't learnt anything today – I've observed triage, which had lasted five minutes, transferred someone to discharge (10 minutes) – I've refused to do an ECG as I spend all my time doing that.'"

This student nurse was working within the parameters of supernumerary status – she did not see helping a patient with a cup of tea as a learning opportunity. However, none of the nurses pointed out what could have been learnt from that task; neither did they challenge her. But these student nurse choices have consequences. If they do not do bedside work, they risk alienating qualified staff, and they may be perceived as lacking common sense and practical experience.

## Learning opportunities

Nurse lecturers and tutors believe bedside nursing is a learning opportunity for students, and part of nursing practice, as this extract from our interviews confirms:

**Researcher:** "Do they ever come to you and say: 'This ward hasn't been good for my learning?'"

**Nurse tutor:** "Oh yes, a lot of them feel very frustrated, saying they can't learn what is needing to be learnt on that ward because the ward is just not a good learning environment. I think some of that stems from the modular framework that we have in their programme where set learning outcomes have been identified and they don't feel that

the practice opportunities match. It does take quite a bit of convincing to show a student that actually if they look at the learning outcomes more broadly they can be achieved in almost any practice learning environment."

**Senior tutor:** "I think things need to be clear about what it is they get out of a placement. We have students doing a portfolio, and it's trying to tease out and help the student to identify how they can meet this learning outcome."

**Senior lecturer:** "That does really stand out when someone goes to a care home and all they can see, in inverted commas, is 'basic nursing care'. They're stuck, they don't know what nursing is, and some of them really resent having to do that type of work. But I think there's always been a sense of that. I couldn't tell you whether that's worse or better, but students don't expect to deliver practical nursing care for very long at all."

One tutor and two lecturers felt that students did not consider bedside care to be part of nursing because there was a lack of leadership and supervision.

**Nurse lecturer:** "I have seen very little supervision of students, I have seen students walking around aimlessly, I've seen students doing bad practice, I have seen students doing illegal or dangerous acts. But those are the issues, things not being filled in, things not being done, very basic things like people not washing hands or using handgel are not picked up. But that's leadership – people owning the clinical experience in their environment or not."

**Senior tutor:** "I think the junior sisters do not have sufficient experience to pass onto the students. They're not comfortable enough in their role to be able to support students efficiently."

**Researcher:** "And is that what you've observed?"

**Senior tutor:** "Yes, that's what I've observed. And they don't necessarily know how to tackle student problems or things that students do that are not right."

**Researcher:** "And have you got an observation of that in mind?"

**Senior tutor:** "The patient had a urine drainage bag and the student put it on the top rail of the cot's side and the staff nurse saw this happen, she didn't say anything to the student, she didn't observe it. It wasn't until I said to her that you ought to tell the student to put it a bit lower for drainage purposes, but she didn't even recognise that there was a problem. And it is their experience, I think, that is a poor role model for the students."

**Senior lecturer:** "The other thing is that the staff nurses in that [unit] like the idea of giving out medication... rather than trying to think about a very difficult area... about how you get somebody out of bed when they're really angry. It's unusual to have someone focus on that at any level other than care assistants. At the end of the day, if it's the healthcare assistants caring... [students] may think that's not what we [nurses] do."

## DISCUSSION

There were many incidents in the data which led us to ask why students rejected what qualified nurse participants was the crux of nursing: bedside care. Perhaps this is not surprising, given the skills that students observe nurses performing.

The data suggests that qualified nurses focus on tasks that only they can do, while students continue to deliver unqualified care, now supervised by HCAs. This concentration and division of labour between qualified and unqualified workers has led to a division by students of nursing work into high and low status work (as described above), a position similar to that identified by Ousey (2006).

Scott (2008) argued forcibly that the workforce orientation of the NHS in both nursing practice and education has produced a concentration on skills and competencies rather than on caring, which focuses on the patient and is built on a good relationship (relational caring). She said that this new form of instrumental caring puts obstacles in the way of achieving patient-focused care and egalitarian nurse-client relationships.

## What is nursing?

These findings have led us to ask a fundamental question: what is nursing? This is a question that has bedevilled nursing as an occupation since its inception (Baly, 1995), and on which there is little agreement.

For example, Goddard (1953) argued that nursing could be defined as technical,

affective and basic work. Subsequent studies (for example, Alexander, 1983) found that nurses and student nurses valued these components differently; each was assigned low or high status. This is borne out by more recent work by Allan (2007) and Smith et al (2006) into the delivery of caring work by overseas-trained nurses.

Our data suggests that students value technical work more highly than caring work because they see qualified nurses undertaking technical work. While these nurses may value caring work, their values are not being transmitted to students who feel devalued because of the work they do on the wards. This is partly because students do not feel they are treated as members of ward teams. As one of our interviewees said:

**“Doctors see their students as junior colleagues whereas nurses see students as labour.”**

If bedside care continues to have a low status, then doing it may lead to students feeling stigmatised and could leave them feeling unprepared for their future role as qualified nurses who do not have time to perform such tasks.

The relationship between the low status of bedside care, the role of qualified nurses and stigma is complex and may be interpreted in a variety of ways. Students may be made to feel outsiders to the ward nursing team and in particular the professional nurses they aspire to be. They may feel that because the team does not have the time to supervise

them, they are given low status “care” which is believed not to need supervision. The effect on students is to make them feel devalued, marginalised and “stupid”.

## CONCLUSION

Both Gordon Brown and David Cameron argue that professional nursing skills and bedside care are not mutually exclusive. We hope that the Commission on the Future of Nursing and Midwifery considers some of the issues raised here that concern how student nurses learn in their supernumerary role, which in turn affects how they think about nursing.

There is clearly a mismatch between qualified and student nurses’ views of what nursing is and what students need to learn. ●

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# How to ensure patient observations lead to effective management of patients with pyrexia

There is considerable debate about the management of this common clinical condition. It is vital to know about treatment options to ensure optimal care

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Pyrexia is defined by the National Institute for Health and Clinical Excellence as an elevation of body temperature above the normal daily variation. A sudden rise in temperature usually indicates infection, although there are many other non-infectious causes. This article outlines the causes of pyrexia and discusses management options.

## BACKGROUND

The human body maintains a normal temperature of about 37°C, despite variations in metabolic activity and environmental temperature (Pocock and Richards, 2006). Recordings of body temperature provide an index of biological function and are a valuable indicator of patients' health (Dougherty and Lister, 2008).

Abnormal body temperature, particularly pyrexia, is common in illness. However, a temperature >40°C is considered life threatening (Hussein, 2004) (see Box 1).

## GRADES OF PYREXIA

There are three grades of pyrexia:

- **Low grade (normal to 38°C):** indicates an inflammatory response due to mild infection, allergy or disturbance of body tissue such as surgery, injury or thrombosis;
- **Moderate to high grade (38-40°C):** can be caused by an infected wound or soft tissue injury;
- **Hyperpyrexia (40°C and above):** causes include bacteraemia, injury to the hypothalamus or high ambient temperature (Dougherty and Lister, 2008).

## RELATED ANATOMY AND PHYSIOLOGY

Humans are described as homeothermic or having a core temperature that remains constant within a specific range, in spite of environmental changes (Dougherty and Lister, 2008). Normal body temperature ranges from about 36-37.5°C. Different regions of the body have different temperatures: for example, core temperature (temperature of the brain and organs within the thorax and abdomen) is the highest, while surface temperature (the skin) is the lowest (Pocock and Richards, 2006). Core temperature is the balance between heat

## PRACTICE POINTS

- Patients who develop pyrexia must be closely monitored following the airway, breathing, circulation, disability, exposure (ABCDE) approach (Resuscitation Council UK, 2006).
- The cause needs to be identified and treatment of this, if indicated, started.
- Strategies to promote heat loss may be required.

produced in the body and heat lost to the environment.

The most active organs, such as muscles, liver and digestive organs, produce the most heat. Skeletal muscle produces heat particularly following strenuous exercise and also during shivering. The liver is particularly active following a meal.

The majority of heat loss is through the skin and this depends on: the difference between the body and

ambient temperature; the amount of body surface exposed to the environment; and the type of clothes worn. This heat loss can be controlled. Small amounts of heat are also lost during expiration, and in urine and faeces and this cannot be controlled (Waugh and Grant, 2006).

Fluctuations in body temperature can occur naturally as a result of circadian cycles, age, exertion/exercise, menstrual cycle, ingestion of food and ambient temperature (Marcovitch, 2005).

The maintenance of body temperature is essential for health and is achieved through

## USEFUL DEFINITIONS

- **Pyrexia:** is an elevation of body temperature above the normal daily variation (NICE, 2007). Core temperature >37.5°C is considered a pyrexia (Leach, 2009).
- **Hyperpyrexia:** temperature >40°C (Dougherty and Lister, 2008).
- **Fever:** an abnormal rise in body temperature, usually accompanied by shivering, headache and, if severe, delirium.
- **Hyperthermia:** is a body temperature which is significantly above that of normal range.
- **Malignant hyperthermia:** is a rapid rise of temperature to a dangerous level (usually 41-45°C) (Leach, 2009; Marcovitch, 2005).



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negative feedback, so that any variation produces a physiological response to bring it back to a set point (around 37°C). The centre for regulating body temperature is in the hypothalamus of the brain (Fig 1).

This set point can be reset by substances called pyrogens (fever-producing proteins) released by monocytes and macrophages (phagocytic cells responsible for the body's defence system). These act on the thermoregulation centre in the hypothalamus, causing the release of prostaglandins which reset the hypothalamic thermostat to a higher level. This triggers mechanisms to conserve and generate heat such as vasoconstriction and shivering, until the new set point temperature is reached (Waugh and Grant, 2006). This results in the development of pyrexia (Royal College of Nursing, 2008).

## CAUSES OF PYREXIA

There are many causes of pyrexia including:

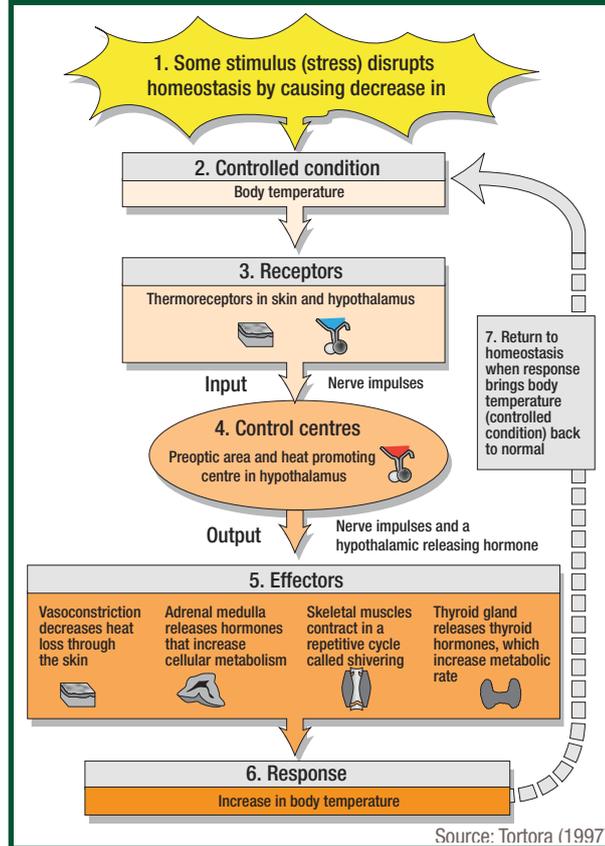
- **Infection:** 50% of pyrexia cases are due to infection (Leach, 2009);
- **High ambient temperature:** heat and humidity in the environment can reduce the amount of heat lost through the skin;
- **Drugs:** amphetamine derivatives, for example, methylenedioxymethamphetamine (ecstasy) and anaesthetics, can induce malignant hyperpyrexia (Leach, 2009);
- **Stroke:** leading to injury to the hypothalamus;
- **Increased muscular activity:** following strenuous exercise (particularly in a hot environment) and fitting;
- **Endocrine:** for example, thyroid storm;
- **Myocardial infarction;**
- **Pyrexia of unknown origin:** is a consistently elevated body temperature >37.5°C persisting for over two weeks with no diagnosis despite investigations (Boon et al, 2006). In 15% of cases either no diagnosis is made or the pyrexia resolves spontaneously (Boon et al, 2006).

## ADVERSE EFFECTS ASSOCIATED WITH PYREXIA

Temperatures above 37.4°C or a trend of increase towards this level should prompt appropriate reporting, in line with early warning scoring systems.

Adverse effects linked to pyrexia include:

**FIG 1. NEGATIVE FEEDBACK MECHANISMS THAT INCREASE HEAT PRODUCTION**



- Increased metabolic rate, increased oxygen consumption (10% rise with each 1°C increase in temperature) and increased production of carbon dioxide;
- Hypovolaemia due to sweating, dehydration and vasodilation;
- Metabolic acidosis;
- Epileptic fit;
- Neurological impairment;
- Renal failure;
- Rhabdomyolysis (rapid breakdown of muscle tissue);
- Death (Leach, 2009; Hussein, 2004).

Adverse effects are usually only associated with hyperpyrexia (>40°C).

## NURSING CARE AND MANAGEMENT

Pyrexia is abnormal and should be considered an adverse sign. It is an important component of early warning scoring systems and can be associated with serious life threatening illness. Nursing care and treatment will be dictated by the severity of the pyrexia and its probable cause, patients' condition, prognosis, local protocols and whether they are symptomatic

(feeling hot, sweating profusely).

General principles of care include the following:

- Assess patients following the airway, breathing, circulation, disability, exposure (ABCDE) approach advocated by the Resuscitation Council UK (2006). If necessary, summon expert help, administer high concentration oxygen and treat life threatening problems;
- Ensure early warning score (EWS) charts (or similar) are completed following local protocols; local EWS escalation policies should be followed;
- Monitor vital signs;
- Monitor fluid balance, ensuring patients remain adequately hydrated. Observe for signs of dehydration, particularly a prolonged capillary refill time of three seconds or longer, cool extremities and reduced urine output (RCN, 2008);
- Try to make patients as comfortable as possible. If they feel hot or are sweating profusely, consider gentle physical cooling methods to make them feel more comfortable, for example, careful use of a fan (see below). If patients are shivering, add a blanket to assist heat conservation (Brooker and Waugh, 2007). Cool, fresh and dry bedlinen and clothing/nightwear usually help to make them more comfortable;

- Consider offering mouthwashes and ice to suck;
- If patients have life threatening hyperpyrexia, administer physical cooling methods (Leach, 2009; Wyatt et al, 2006; Brooker and Nicol, 2003);
- Do not routinely administer antipyretic drugs (see below);
- Try to establish the probable cause of the pyrexia.

## Investigations

One approach to identifying the cause of pyrexia is to check the six Cs:

- **Chest:** does the patient have a chest infection?
- **Cannula:** is the cannula site infected?
- **Calves:** do they have a deep vein thrombosis?
- **Catheter:** do they have a urinary tract infection?
- **Cut:** do they have an infected wound?
- **CVC:** do they have an infected central venous catheter?

It may be necessary to send off sputum

and urine samples for microbiology, culture and sensitivity. Blood tests may be taken for inflammatory markers.

## Cooling methods

Opening a window or using a fan can make pyrexial patients feel more comfortable.

The routine use of physical cooling methods, such as tepid sponging and fanning, are controversial. If the body's natural defence mechanism to combat infection is to raise body temperature, why try to reduce it? Physical cooling methods may actually increase body temperature: they can stimulate a compensatory response by the hypothalamus, initiating heat generating activities such as shivering, which can compromise unstable patients by depleting their metabolic reserve (Brooker and Nicol, 2003).

There is no evidence to support the routine use of tepid sponging in temperate climates such as the UK and it does not produce a sustained drop in temperature. It can cause vasoconstriction, which can result in a further rise in patients' temperature (O'Connor, 2002). If it is performed too quickly, it can cause them to shiver, which will increase metabolic rate and subsequently core body temperature (Glasper and Richardson, 2006). It is also time consuming.

NICE (2007) stipulated that tepid sponging should not be used in children under five years.

However, some authors recommend that physical cooling methods should be used if patients have potentially life threatening hyperpyrexia, heat stroke or malignant hyperthermia (Leach, 2009; Brooker and Nicol, 2003).

It could be argued physical cooling methods can make patients feel weak, particularly during the early stage of pyrexia when temperature is still rising. Others support the

view that these methods can make patients feel more comfortable (Fisher and Roper, 1987). There is no doubt that a cool fan (not directly on patients) or cool flannel on the face can be very welcome when feeling hot.

If necessary, make patients more comfortable by reducing the amount of clothing and bedding.

## ANTIPYRETICS

Antipyretic medication can be administered (*British National Formulary*, 2009). However, it is unlikely to be helpful (Leach, 2009) and can mask the symptoms of illness. The routine use of antipyretics is therefore not recommended (Wyatt et al, 2006).

## PYREXIA AND NEUTROPENIC PATIENTS

Neutropenic patients are particularly prone to bacterial infections (reduced neutrophil count results in reduced ability to fight infection), and will usually be actively treated with broad spectrum antibiotic therapy if they develop a temperature (Boon et al, 2006). Local guidelines and protocols should be followed.

## MALIGNANT HYPERTHERMIA

Malignant hyperthermia is a rare but potentially fatal complication of anaesthesia and is characterised by a rapid rise in temperature, increased muscle rigidity, tachycardia and acidosis. It is treated with dantrolene administered by rapid IV injection (*BNF*, 2009).

## PYREXIA IN INFANTS AND CHILDREN

Pyrexia is a common symptom in infants, children and young people, often indicating a self limiting viral infection, rather than a bacterial or serious illness (RCN, 2008). However, every year 100 infants aged between 1-12 months die from infection, a

number which could be reduced by improving the recognition, evaluation and treatment of febrile illness (NICE, 2007).

The treatment of pyrexia in infants and children is beyond the scope of this article. However, national guidance is available, which includes a recommendation that a "traffic light system" is used to identify serious illness (RCN, 2008; NICE, 2007).

## IMPORTANCE OF ACCURATE TEMPERATURE MEASUREMENTS

Core body temperature measurements are taken to assess for deviation from the normal range, which may indicate disease, deterioration in condition, infection or reaction to treatment.

There has been much debate over the accuracy of different sites for temperature measurement compared with the gold standard pulmonary artery catheter, which is only used in a small group of critically ill patients (Trim, 2005). There are differences between sites and these are not necessarily consistent or predictable. Nurses should be aware of any influences on accuracy of the method used and should ensure both method and site are consistent and documented to help ensure accuracy and reliability. An in depth discussion of these issues can be found on page 10.

## CONCLUSION

The management of pyrexia depends on the severity, cause and patients' degree of ill health. Antipyretic drugs and physical cooling methods should not be used routinely. Hyperpyrexia is life threatening, usually requiring aggressive and prompt management to reduce temperature. Nurses should be familiar with the underlying physiology of temperature control and the causes of pyrexia so they can provide appropriate and informed care. ●

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## How to ensure patient observations lead to prompt identification of tachypnoea

Tachypnoea is one of the first signs of patient deterioration. To prevent further decline it is essential to know how to assess and manage a high respiratory rate

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**ABSTRACT Jevon P (2010) How to ensure patient observations lead to prompt identification of tachypnoea. *Nursing Times*; 106: 2, 12-14.**

**Tachypnoea is one of the first signs of patient deterioration and accurate measurement of respiratory rate is a fundamental part of assessment. This article aims to describe the assessment and management of tachypnoea.**

A normal respiratory rate is 12-20 breaths per minute in adults (Resuscitation Council UK, 2006). Tachypnoea is defined as a fast respiratory rate, that is, greater than 20 breaths per minute (Resuscitation Council UK, 2006). It can be a normal physiological response, for example, during strenuous exercise, but in the healthcare setting it is usually one of the first signs of patient deterioration (Jevon, 2009a).

Accurately measuring respiratory rate is a fundamental part of patient assessment and an important baseline observation. It is a main component of the Resuscitation Council UK's systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of critically ill patients (Resuscitation Council UK, 2006).

Nurses are expected to be competent in the accurate measurement and interpretation of respiratory rate (Department of Health, 2008) but monitoring of this vital sign is poor (National Patient Safety Agency, 2007). Local policies should reinforce the importance of measuring respiratory rate, and early warning scoring (EWS) systems should identify patients who develop tachypnoea to be at risk of deterioration (unless proven otherwise) (NICE, 2007).

### RELATED PHYSIOLOGY

Breathing or respiration is the process whereby air passes into the lungs so the blood can absorb oxygen and excrete carbon

dioxide and water. Fig 1 shows the structure of the respiratory system. Breathing is controlled by the respiratory centre in the medulla oblongata in the brain. Higher centres in the cerebral hemispheres can voluntarily control respiratory rate so that breathing can be temporarily stopped, slowed or increased (Marcovitch, 2005).

The respiratory centre generates the basic rhythm of breathing; the depth and rate can be altered in response to the body's requirements, mainly by nervous and chemical control (Dougherty and Lister, 2008).

### Nervous control of breathing

Nervous control of breathing is via the phrenic and intercostal nerves, which activate the diaphragm and intercostal muscles respectively. Stretch receptors in the thoracic wall generate inhibitory nerve impulses once the lungs have inflated (Hering-Breuer reflex), which are then transmitted to the respiratory centre via the vagus nerve (Waugh and Grant, 2006). Pain, emotion and anxiety can lead to an increase in respiratory rate.

### Chemical control of breathing

Generally, the effects of chemoreceptors are to increase ventilation in response to:

- Hypercapnia (high levels of carbon dioxide);
- Hypoxaemia (low levels of oxygen);
- Acidosis (Shahid and Nunhuck, 2008).

Peripheral chemoreceptors (in the carotid and aortic bodies) mainly respond to hypoxaemia, while central chemoreceptors

### PRACTICE POINTS

- Nursing staff (including healthcare assistants) who measure respiratory rates should be able to identify abnormal values, record the results and assign a trigger score.
- Senior nurses should be able to interpret respiratory rate measurements and respond appropriately following local early warning score (EWS) escalation protocols if needed.
- They should alter the frequency of the EWS observations if required and be able to intervene with basic treatment measures.

Source: Department of Health (2008)

(on the surface of the medulla oblongata) mainly respond to hypercapnia.

Hypercapnia is the main respiratory drive. Hypoxia is the respiratory drive for people with chronic respiratory disease such as emphysema and chronic obstructive pulmonary disease (COPD). This is sometimes referred to as hypoxic drive rather than hypercapnia. Administering high concentrations of supplementary oxygen to this group may lead to respiratory depression and even respiratory arrest.

Those who need to increase respiratory effort will use their accessory muscles of respiration

(sternocleidomastoid muscles), together with the diaphragm and intercostal muscles, to maximise the capacity of the thoracic cavity (Waugh and Grant, 2006). The use of accessory muscles of respiration is an indication that patients may be in respiratory distress.

### CLINICAL SIGNS OF CRITICAL ILLNESS

Regardless of the cause, the clinical signs of critical illness are usually similar because they reflect a compromise of the respiratory, cardiovascular and neurological functions (Nolan et al, 2005). These are usually:

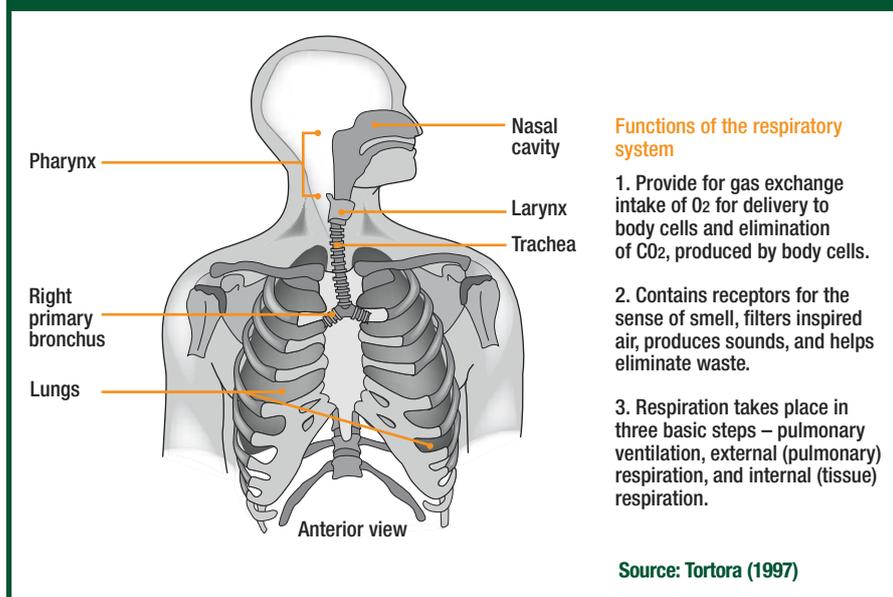
- Tachypnoea;
- Tachycardia;
- Hypotension;
- Altered level of consciousness (indicated by lethargy, confusion, restlessness or falling level of consciousness) (Resuscitation Council UK, 2006).

Tachypnoea is the most common clinical abnormality found in critical illness (Goldhill and McNarry, 2004). It is an important



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**FIG 1. THE STRUCTURE OF THE RESPIRATORY SYSTEM**



indicator of at risk patients (Goldhill et al, 1999). Studies have shown a high respiratory rate (>27 breaths per minute) occurs in 54% of patients in the 72 hours before cardiac arrest (Fieselmann et al, 1993).

## CAUSES OF TACHYPNOEA

There are many causes of tachypnoea, including anxiety, emotional distress, pain, fever and exercise. It is also a common finding in many acute illnesses, including:

- Asthma;
- Pulmonary embolism;
- Pneumonia;
- Acute respiratory distress syndrome;
- Anaphylaxis;
- Heart failure;
- Shock.

Nurses must be familiar with the common causes of this condition (DH, 2008).

Indications for measuring respiratory rate are listed in Box 1.

## MEASURING RESPIRATORY RATE

Measurement of respiratory rate should be undertaken meticulously, following local protocols and EWS guidelines. It is necessary to count the number of respirations in a minute. If patients realise their breathing is being watched, the rate may actually increase. To avoid this, healthcare professionals can pretend to check the radial pulse while, at the same time, counting the respiratory rate (Jevon, 2009b).

Measurement of respiratory rate is central to the comprehensive ABCDE assessment of patients who are critically ill. Tachypnoea can result from a problem with A, B, C, D or E, but a description of all aspects of the assessment is beyond the scope of this article. However, it is helpful to describe the assessment of B (breathing).

When assessing breathing, follow the look, listen and feel approach (see Box 2).

## MANAGING PATIENTS

Assess patients following the ABCDE approach to ascertain whether they are critically ill and ensure appropriate help is called if necessary:

- Establish oxygen saturation monitoring;
- Ensure patients have a clear airway;
- Ideally, sit them upright (to maximise chest movement);
- If patients are critically ill, administer at least 10L of oxygen via a non-rebreathable mask (Resuscitation Council UK, 2006); particular caution is needed in those with chronic respiratory problems as high concentrations of oxygen can lead to respiratory depression. With this group, aim for oxygen saturations of 90-92% (PaO<sub>2</sub> of 8kPa or 60mmHg) (Resuscitation Council UK, 2006). However, if patients with COPD are acutely breathless, administer high concentrations of oxygen as they are more likely to suffer adverse effects from hypoxia than respiratory depression (Smith, 2003). The British

Thoracic Society (2008a) has published guidance on the use of emergency oxygen in adults, which have been endorsed by the National Patient Safety Agency (2009). Arterial blood gas analysis is important in sick patients and particularly those with chronic respiratory disease;

- Attempt to establish the cause of the tachypnoea. If possible, treat the underlying cause, for example, administer nebulised salbutamol to those having a severe asthma attack. Monitor the response to treatment;
- Monitor patients' vital signs and complete an EWS chart following local policies protocols. It is important to adjust the frequency of the EWS observations as appropriate for individuals, following local protocols.

## IN DEPTH ASSESSMENT

It is sometimes appropriate to assess the extent of breathlessness and how it affects activities of daily living. This will help identify existing and/or undiagnosed respiratory problems. Ask patients if they become breathless when at rest, talking, eating, dressing, walking upstairs/uphill.

The following questions explore underlying factors that may indicate respiratory disease (Docherty and McCallum, 2009; Jevon, 2009a):

- Do you smoke? If so, how many cigarettes do you smoke per day?
- Does your position affect your breathing? Orthopnoea and having to sleep in an upright position propped up with pillows suggests a cardiac cause for breathlessness;
- Do you live in a damp home?

## BOX 1. INDICATIONS FOR MEASURING RESPIRATORY RATE

Indications include:

- Critical illness: it is an important component of the airway, breathing, circulation, disability, exposure (ABCDE) approach;
- Ascertaining a baseline respiratory rate for comparison;
- Monitoring changes in oxygenation or in respiratory rate;
- Evaluating response to treatment, for example, following administration of a beta<sub>2</sub> agonist in the treatment of asthma.

Sources: Docherty and McCallum (2009); Dougherty and Lister (2008); Jevon and Ewens (2007)

## BOX 2. MEASUREMENT OF RESPIRATORY RATE

To assess breathing:

- **Note patients' general appearance:** breathless people usually look anxious;
- **Observe their colour:** central cyanosis is a severe adverse sign;
- **Talk to patients:** breathless people may experience difficulty talking (being unable to complete sentences in one breath is considered a severe adverse sign during an asthma attack) (British Thoracic Society, 2008a);
- **Count the respiratory rate;**
- **Look at patients' posture:** for example, those sitting upright supported by pillows may suffer from orthopnoea (shortness of breath when lying flat);
- **Evaluate chest movement:** chest movement should be symmetrical; unilateral chest movements suggest unilateral pathology, for example, pneumothorax, pneumonia, pleural effusion (Smith, 2003). Observe for use of accessory muscles of respiration, as this may indicate respiratory distress;
- **Evaluate depth of breathing:** only marked degrees of hyperventilation and hypoventilation can be detected; hyperventilation is associated with metabolic acidosis or anxiety and hypoventilation may be seen in opiate toxicity (Ford et al, 2005);
- **Evaluate respiratory pattern:** Cheyne-Stokes breathing pattern (periods of apnoea alternating with periods of hyperpnoea) is associated with brain stem ischaemia, cerebral injury or severe left ventricular failure (Ford et al, 2005);
- **Note the oxygen saturation (SaO<sub>2</sub>) reading:** normal is usually considered to be 97-100%. A low SaO<sub>2</sub> could indicate respiratory distress or compromise;
- **Listen to the breathing:** normal breathing is quiet. Rattling airway noises indicate the presence of airway secretions, because patients are unable to cough sufficiently or are unable to take in a deep breath (Smith, 2003). The presence of stridor or wheeze indicates partial, but significant, airway obstruction;
- **Feel for signs of breathing:** in some situations it is necessary to feel for signs of breathing to help confirm whether patients are breathing normally or not.

Some senior nurse practitioners may undertake additional respiratory assessment and:

- **Check the position of the trachea:** deviation of the trachea to one side indicates mediastinal shift (pneumothorax, lung fibrosis or pleural fluid);
- **Palpate the chest wall:** to detect surgical emphysema or crepitus (suggesting a pneumothorax until proven otherwise) (Smith, 2003);
- **Percuss the chest:** abnormal percussion notes can indicate pathology;
- **Auscultate the chest:** to detect air entry and additional sounds such as wheeze (indicating narrowing of the airways associated with, for example, asthma) and crackles (usually indicates excessive fluid in the airways associated with conditions such as pulmonary oedema) (Jevon, 2009a, 2009b; Resuscitation Council UK, 2006).

During the assessment of breathing, it is important to quickly diagnose and treat any life threatening breathing problems such as acute asthma (Resuscitation Council UK, 2006).

- Did you, or do you, work in an occupation that may have caused damage to your lungs?
- Have you recently returned from a foreign holiday or trip? Tuberculosis is common in the Indian subcontinent;
- Are you coughing up sputum? If so, what is it like? Is it blood stained or purulent?

### CONCLUSION

Tachypnoea could indicate critical illness. Always assess patients using the ABCDE approach and administer oxygen if needed. Complete the EWS charts following local policies and protocols, ensuring escalation protocols are followed if required. ●

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# How to ensure patient observations lead to effective management of tachycardia

Tachycardia could indicate serious illness. It is essential that nurses promptly identify and act on this significant sign of patient deterioration

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**ABSTRACT** Jevon P (2010) How to ensure patient observations lead to effective management of tachycardia. *Nursing Times*; 106: 3, 16-17.

**Tachycardia is a normal physiological response to exercise but in the healthcare setting it is considered to be an adverse sign, indicating possible serious illness such as shock. The condition can also be associated with a life threatening cardiac arrhythmia. This article aims to help nurses understand how to manage it.**

Tachycardia is defined as a heart rate >100 beats per minute (Resuscitation Council UK, 2006). It is often one of the first signs that a patient is beginning to deteriorate (Jevon, 2009a).

The clinical signs of critical illness are associated with compromised respiratory, cardiovascular and neurological functions (Nolan et al, 2005). Adverse signs are:

- Tachypnoea;
- Tachycardia;
- Hypotension;
- Altered consciousness level (Resuscitation Council UK, 2006).

## RELATED PHYSIOLOGY

The heart rate is controlled by the cardiovascular centre in the medulla oblongata through the autonomic nervous system (the parasympathetic and sympathetic nervous systems) (Waugh and Grant, 2006; Green, 1991):

- **Vagus nerve (parasympathetic nerve):** acts as a brake on the heart. The greater the vagal activity, the slower the heart rate: if vagal activity diminishes, the heart rate increases (Jevon, 2009b). If the vagal tone is completely blocked, the heart rate increases to around 150 beats per minute (Green, 1991);
- **Sympathetic nerve:** sympathetic nerve activity (“fight or flight”) has a positive

chronotropic action by increasing heart rate. It is particularly active in periods of emotional excitement, exercise and stress.

## SINUS TACHYCARDIA

Sinus tachycardia can be defined as a sinus rhythm >100bpm; the ECG has the same characteristics as sinus rhythm except that the QRS rate is >100bpm (Jevon, 2009b). Sinus rhythm and sinus tachycardia are illustrated in Figs 1 and 2.

Sinus tachycardia can be a normal response to a physiological stimulus such as exercise. However, if it persists, it is usually an indication of pathophysiology (Jevon, 2009b). It is common in critically ill patients.

There are many causes of sinus tachycardia including: anxiety; emotional distress; pain; fever; drugs such as salbutamol, and stimulants such as caffeine and nicotine.

Tachycardia is also a common finding in many acute illnesses including:

- Heart failure;
- Pulmonary embolism;
- Pneumonia;
- Acute respiratory distress syndrome;
- Anaphylaxis;
- Heart failure;
- Shock;
- Thyrotoxicosis (Jevon, 2009b).

## PRACTICE POINTS

### Competencies required

- When measuring heart rate, nursing staff (including healthcare assistants) should be able to identify an abnormal pulse rate, record the result and assign a trigger score.
- Registered nurses should be able to interpret the heart rate measurement and respond appropriately following local early warning score (EWS) escalation protocols. They should alter the frequency of EWS observations if required and be able to intervene with basic treatment measures.
- Nurses should be able to use a cardiac monitor and start ECG monitoring if necessary.

Source: Department of Health (2008)

## INDICATIONS FOR MEASURING HEART RATE

Nurses are expected to be able to measure and interpret heart rate accurately (Department of Health, 2008). Early warning scores (EWS) should identify patients at risk (unless proven otherwise) when they have or develop tachycardia (NICE, 2007).

Measurement of heart rate (pulse) should be undertaken following local protocols and EWS guidelines. It is a fundamental part of

## BOX 1. ASSESSING PULSE

- **Palpate the radial pulse:** measure the pulse over one minute. A rate >100 is tachycardia.
- **Identify whether the pulse is regular or irregular:** an irregular pulse may indicate atrial fibrillation.
- **Assess the volume of the pulse:** a weak, thready pulse suggests a poor cardiac output. A bounding pulse may

indicate septic shock.

- **Check the colour and temperature of hands and fingers:** signs of cardiovascular compromise include cool and pale peripheries.
- **Measure the capillary refill time (CRT):** a prolonged CRT (>2 seconds) could indicate poor peripheral perfusion, although other causes include cool ambient temperature and

old age (Resuscitation Council UK, 2006).

- **Measure blood pressure:** a systolic BP <90mmHg suggests shock.

- **Establish whether the patient has chest pain:** central crushing chest pain is suggestive of an acute coronary syndrome.

Source: Jevon (2009a)



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patient assessment and a main component of the Resuscitation Council (UK)'s (2006) systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of critically ill patients. The assessment of pulse is described in Box 1.

Indications for measuring heart rate include:

- Critical illness;
- Recording a baseline rate for comparison;
- Evaluating response to treatment, for example, following a fluid challenge in suspected circulatory shock;
- Monitoring for adverse reactions to a blood transfusion;
- Monitoring the effect of certain medicines such as beta-antagonistic therapy.

## MANAGING TACHYCARDIA

Assess patients using the ABCDE approach to identify signs of critical illness. Ensure appropriate senior help is called if necessary, following EWS escalation protocols:

- Ensure patients have a clear airway and are breathing adequately;
- For those who are critically ill, administer oxygen as prescribed – see part 2 of this series (Jevon, 2010);
- Monitor vital signs and complete the EWS chart following local protocols. It is important to adjust the frequency of EWS observations following local protocols;
- Try to identify the cause of the tachycardia. For example, observe for signs of pain, anxiety and pyrexia. Check if medication that might cause tachycardia has recently been administered;

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FIG 1. SINUS RHYTHM

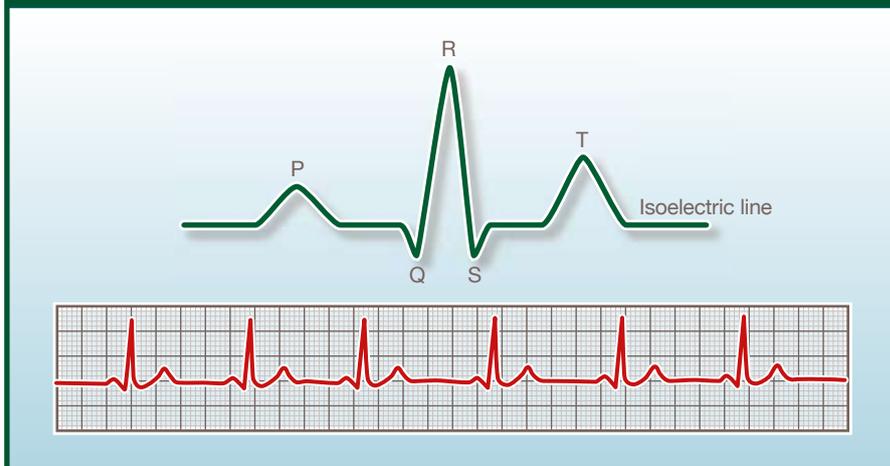
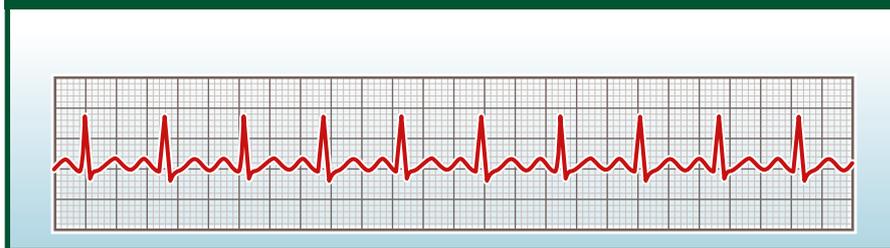


FIG 2. SINUS TACHYCARDIA



- If necessary, take steps to relieve pain and monitor the effects of interventions such as analgesia and repositioning as appropriate;
- Lie patients flat if they are hypotensive or feeling lightheaded. Intravenous fluids may be prescribed to increase circulating volume of fluid;
- Start ECG monitoring if appropriate and record a single lead ECG strip. If indicated, record a 12 lead ECG; this will help to establish the correct interpretation of the ECG rhythm (Nolan et al, 2005).

The Resuscitation Council (UK) (2006) provides guidance for the effective and safe management of patients with a tachyarrhythmia (fast atrial fibrillation, narrow complex tachycardia and broad complex tachycardia). The algorithm is available at [tinyurl.com/tachycardia-RCUK](http://tinyurl.com/tachycardia-RCUK).

## CONCLUSION

Tachycardia could indicate critical illness. Nurses should always assess patients using the ABCDE approach and administer oxygen if needed. They should complete the EWS charts following local systems, ensuring escalation protocols are followed if required. ●

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# How to ensure patient observations lead to effective management of bradycardia

Bradycardia can be an indication of life threatening heart block or impending asystole. It is vital that nurses can detect and respond to this clinical sign

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**ABSTRACT** Jevon P (2010) How to ensure patient observations lead to effective management of bradycardia. *Nursing Times*; 106: 4, 12-14.

Bradycardia can be a normal physiological sign in fit young adults. However, in acute illness it may indicate life threatening heart block or precede asystole. This article outlines the assessment and management of patients with this condition.

Bradycardia is defined in an adult as a heart rate of <60 beats per minute (Resuscitation Council UK, 2006). Although it can be a normal physiological finding – for example, in fit young people (Gwinnutt, 2006) – and therefore require no treatment, in the healthcare setting it should always be considered abnormal until proved otherwise.

In acute illness bradycardia may be a feature of potentially life threatening atrioventricular (AV) (heart) block or a precursor of asystole (when the heart stops beating) (Resuscitation Council UK, 2006).

## PRACTICE POINTS

### COMPETENCIES

- When measuring heart rate, nursing staff (including healthcare assistants) should be able to identify abnormal values, record results and assign trigger scores.
- Registered nurses should be able to interpret heart rate measurements and respond appropriately following local early warning score (EWS) escalation protocols if needed.
- They should be able to alter the frequency of EWS observations and intervene with basic treatment measures.
- If electrocardiogram monitoring is indicated, nurses should be competent at performing it (including knowledge of how the ECG machine works) (Department of Health, 2009).

## CLINICAL SIGNS OF CRITICAL ILLNESS

Tachypnoea, tachycardia, hypotension and altered level of consciousness are the adverse signs usually associated with critical illness, reflecting compromise of the body's

respiratory, cardiovascular and neurological functions (Nolan et al, 2005). Although less commonly associated with critical illness, bradycardia may also be a sign of deterioration and cannot be ignored.

It is, therefore, important to be able to

FIG 1. SINUS RHYTHM

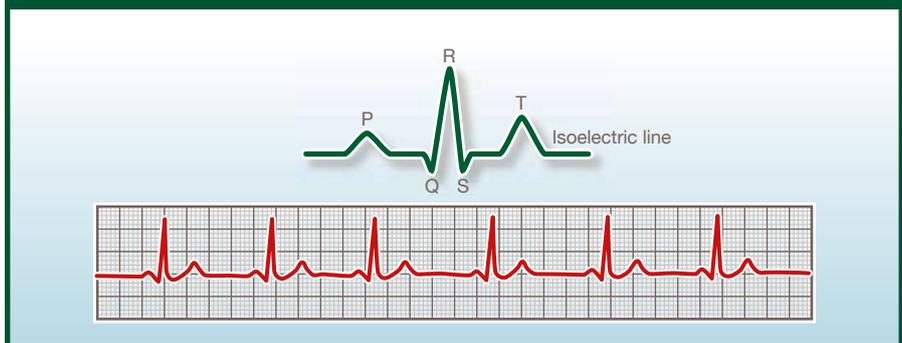


FIG 2. SINUS BRADYCARDIA

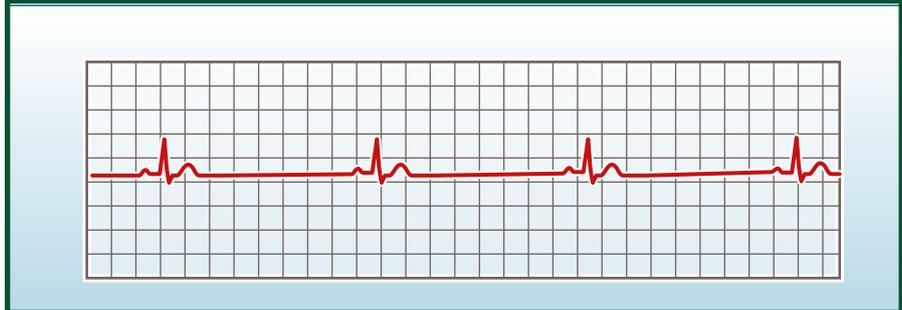


FIG 3. THIRD DEGREE AV BLOCK (COMPLETE AV BLOCK)





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accurately measure and assess patients' pulse/heart rate. This is a main component of the Resuscitation Council UK's (2006) systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to assessing patients who are critically ill.

Sinus bradycardia has the same electrocardiogram characteristics as sinus rhythm (normal ECG rhythm), except that the rate is less than 60 beats/min (Jevon, 2009). Figs 1, 2 and 3 show sinus rhythm, sinus bradycardia and AV block.

## CAUSES OF BRADYCARDIA

The vagus (parasympathetic) nerve has an important role in controlling heart rate. Continuous vagal activity (vagal tone) acts as a brake on the heart: when vagal activity

increases, the heart rate slows, and when vagal activity diminishes, the heart rate increases (Jevon, 2009).

During sleep, vagal activity increases, sometimes resulting in a normal bradycardia. Stimulation of the vagus nerve, for example, during tracheal suction, can also result in bradycardia.

The sympathetic nerve is involved in the "fight or flight" response and has the effect of increasing heart rate. Beta-adrenoceptor antagonists (beta-blockers) such as atenolol and bisoprolol, shield the heart from excessive sympathetic activity, which can result in bradycardia (often a desired effect). When patients present with a slow heart rate, it is prudent to check their medication history to see whether or not

these medicines have been prescribed.

The heart rate is ultimately controlled by the cardiac centre in the medulla oblongata. Damage to this as a result of hypoxia or cerebral insult, such as a stroke, can lead to bradycardia.

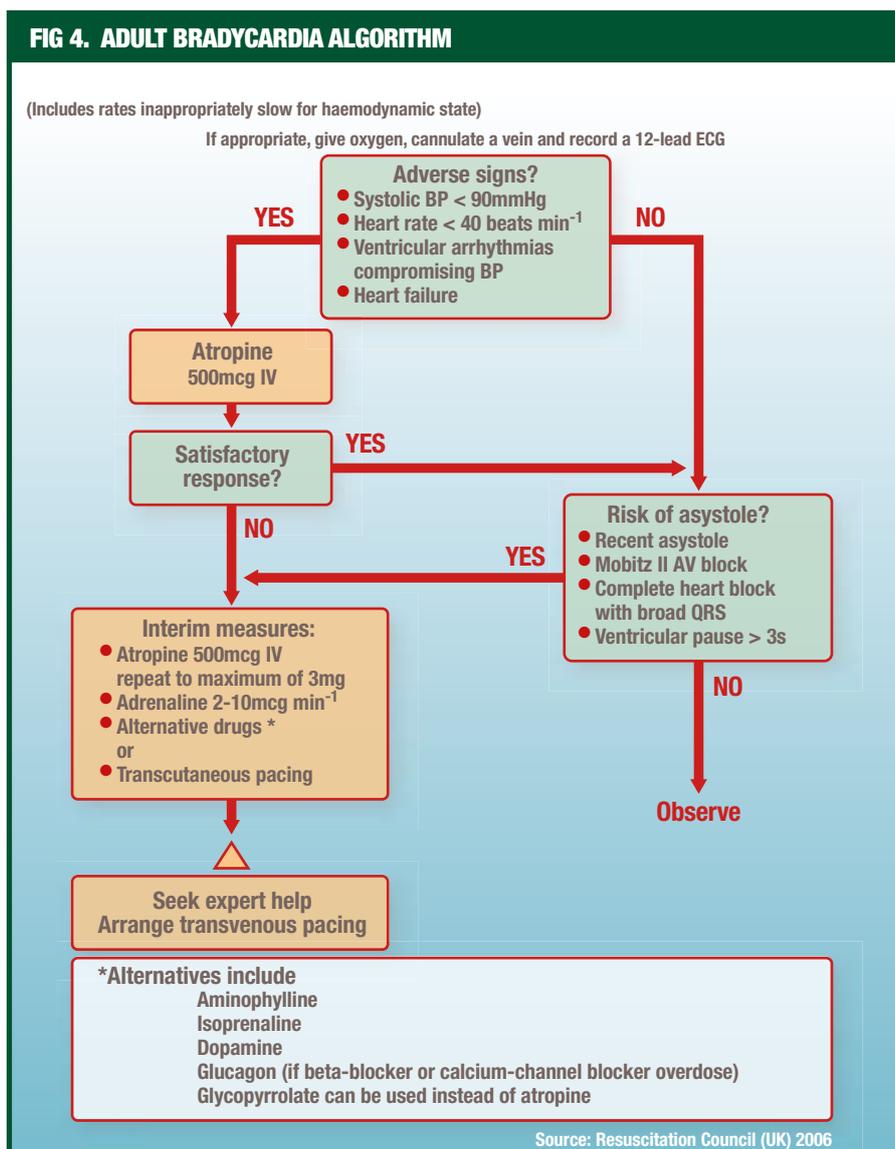
There are many bradycardia related cardiac arrhythmias including sinus bradycardia and AV block. AV block is when the conduction of the cardiac impulse through the AV junction is delayed or blocked. There are varying degrees of AV block: first, second and third (complete).

Other causes of bradycardia include:

- Myocardial infarction;
- Hypothermia;
- Hypoxia;
- Hypothyroidism;
- Hypovolaemia;
- Raised intracranial pressure (Jevon, 2009; Gwinnutt, 2006; Wyatt et al, 2006).

## MANAGING PATIENTS WITH BRADYCARDIA

- Assess patients following the ABCDE approach to ascertain whether they are critically ill. Ensure appropriate senior help is called if necessary, following early warning score (EWS) escalation protocols;
- Ensure patients have a clear airway and are breathing adequately;
- If patients are critically ill, start prescribed emergency oxygen (see part 2 of this series, Jevon, 2010);
- Monitor vital signs and complete the EWS chart following local protocols. It is important to adjust the frequency of EWS observations as appropriate;
- Try to identify the cause of the bradycardia. In particular, check medication history. If patients have been prescribed a beta-adrenoceptor antagonist seek medical advice. It may be necessary to withhold the drug until they are medically reviewed;
- If patients are hypotensive or feel lightheaded, it is important to lie them flat;
- Start ECG monitoring if appropriate and, if possible, record a single lead ECG strip from the monitor; this will help the clinician to accurately interpret the ECG rhythm;
- Prepare for intravenous cannulation to administer drugs such as atropine, if indicated;
- Record a 12 lead ECG; this will help to establish the correct interpretation of the ECG rhythm (Nolan et al, 2005);
- If necessary, assist medical staff with interventions such as administering atropine, pacing to raise the heart rate and monitoring the effect on pulse rate (Jevon, 2009).



## TREATING BRADYCARDIA

A comprehensive account of the treatment can be found elsewhere (Jevon, 2009). The main points are outlined in Box 1.

### Resuscitation Council UK adult bradycardia algorithm

The Resuscitation Council UK's (2006) adult bradycardia algorithm is designed to help non-specialist healthcare professionals provide effective and safe treatment in emergency situations (see Fig 4).

### Atropine

If adverse signs associated with bradycardia are identified following assessment, atropine is the first drug treatment (Wyatt et al, 2006). Atropine blocks the action of the vagus nerve with the aim of increasing the heart rate. The initial dose is 500mcg IV; it can be repeated every 3-5 minutes up to a maximum of 3mg (Jevon, 2009).

### Transvenous pacing

If patients do not respond to atropine and remain unstable and/or there is a risk of asystole, transvenous pacing will usually be required (Nolan et al, 2005). Transvenous pacing is the insertion of a pacing electrode

## BOX 1. TREATING BRADYCARDIA

- The ABCDE approach will identify patients who are critically ill (see Fig 4).
- In most patients, the presence of certain adverse signs and symptoms will determine whether treatment is indicated and its urgency (Resuscitation Council UK, 2006). These include: hypotension; excessive bradycardia (typically a heart rate of <40, although higher rates may not be tolerated by some patients); heart failure (see Fig 4);
- Treatment is indicated if there is a risk of the bradycardia deteriorating into cardiac arrest and asystole, even if no other adverse signs are present.

through a vein into the right ventricle to pace the heart. While waiting for the appropriate expertise and facilities to be arranged, interim measures to help prevent deterioration and improve the patient's condition include:

- Transcutaneous pacing (pacing electrodes applied to the patient's skin to pace the heart);
- Percussion pacing (gentle blows over the pericardium);
- An adrenaline infusion (Resuscitation Council UK, 2006).

## CONCLUSION

Bradycardia could indicate critical illness and/or a risk of asystole. Nurses should always assess patients following the ABCDE approach. They should also complete EWS charts following local protocols, ensuring escalation protocols are followed if required. If necessary they should start ECG monitoring and record a 12 lead ECG. ●

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## How to ensure observations lead to prompt identification and management of hypotension

Hypotension is one of the first signs of patient deterioration. Knowing how to identify and act on this observation quickly may prevent further deterioration

**AUTHOR** Phil Jevon, PGCE, BSc, RN, is resuscitation officer/clinical skills lead, Manor Hospital, Walsall.

**ABSTRACT** Jevon P (2010) How to ensure patient observations lead to prompt identification and management of hypotension. *Nursing Times*; 106: 5, 14-16. Hypotension is blood pressure that is abnormally low and is a medical emergency, requiring rapid treatment and identification of the cause. Failure to manage this clinical sign can lead to a poor prognosis. This article describes the causes and management of hypotension.

The clinical signs of critical illness – tachypnoea, tachycardia, hypotension and altered consciousness – indicate a compromise of the body’s respiratory, cardiovascular and neurological functions (Resuscitation Council UK, 2006; Nolan et al, 2005).

Accurate measurement of blood pressure is a fundamental part of patient assessment and is a main component of the Resuscitation Council UK’s (2006) systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of critically ill patients (Jevon, 2007a; 2007b).

### DEFINITION OF BLOOD PRESSURE

Blood pressure can be defined as the pressure of blood in the circulatory system. Systolic blood pressure is the peak pressure in the artery following ventricular systole (contraction), while diastolic pressure is the level to which the arterial blood pressure falls during ventricular diastole (relaxation) (Talley and O’Connor, 2001).

Blood pressure is determined by cardiac output and vascular resistance (Waugh and Grant, 2006):

- **Cardiac output:** is the amount of blood ejected by the heart per minute;
- **Vascular resistance:** resistance to the flow of blood, determined by the tone of the vascular musculature and the diameter of the blood vessels. The smooth muscle in the arterioles is controlled by the vasomotor centre in the medulla oblongata in the brain. The muscle is in a state of partial contraction caused by continuous sympathetic nerve activity, often referred to as “sympathetic tone”.

A fall in cardiac output, vascular resistance or both can lead to a fall in blood pressure (Smith, 2003)(Fig 1).

### DEFINITION OF HYPOTENSION

It is difficult to define hypotension because it depends on the patient’s clinical condition and pre-morbid state, for example, if there is

### PRACTICE POINTS

#### COMPETENCIES RELATING TO ASSESSMENT OF BLOOD PRESSURE

- Nurses and healthcare assistants measuring blood pressure must be able to record the result, assign a trigger score and identify abnormal values.
- Nurses should be able to interpret blood pressure measurements in the context of patients’ conditions and should respond appropriately following local early warning score (EWS) escalation protocols.
- They should alter the frequency of EWS observations if required.
- Nurses and HCAs should be able to assess cardiac output clinically using the colour of skin, capillary refill, skin temperature, presence of sweating and level of consciousness, and alert senior staff if an assessment indicates inadequate cardiac output (Department of Health, 2008).

a history of chronic hypertension (Adam and Osborne, 2005). In addition, it is important to place blood pressure readings in the context of what is normal for each individual patient; for example, a blood pressure of 90/60mmHg may be well tolerated, and indeed normal, in a fit young adult (Gwinnutt, 2006).

However, in practical terms, if the systolic blood pressure is <90mmHg, the patient is considered to be hypotensive (Wyatt et al, 2006). This is reflected in many EWS systems (for example, Goldhill et al, 1999). The causes of hypotension are listed in Box 1.

### Effects of hypotension

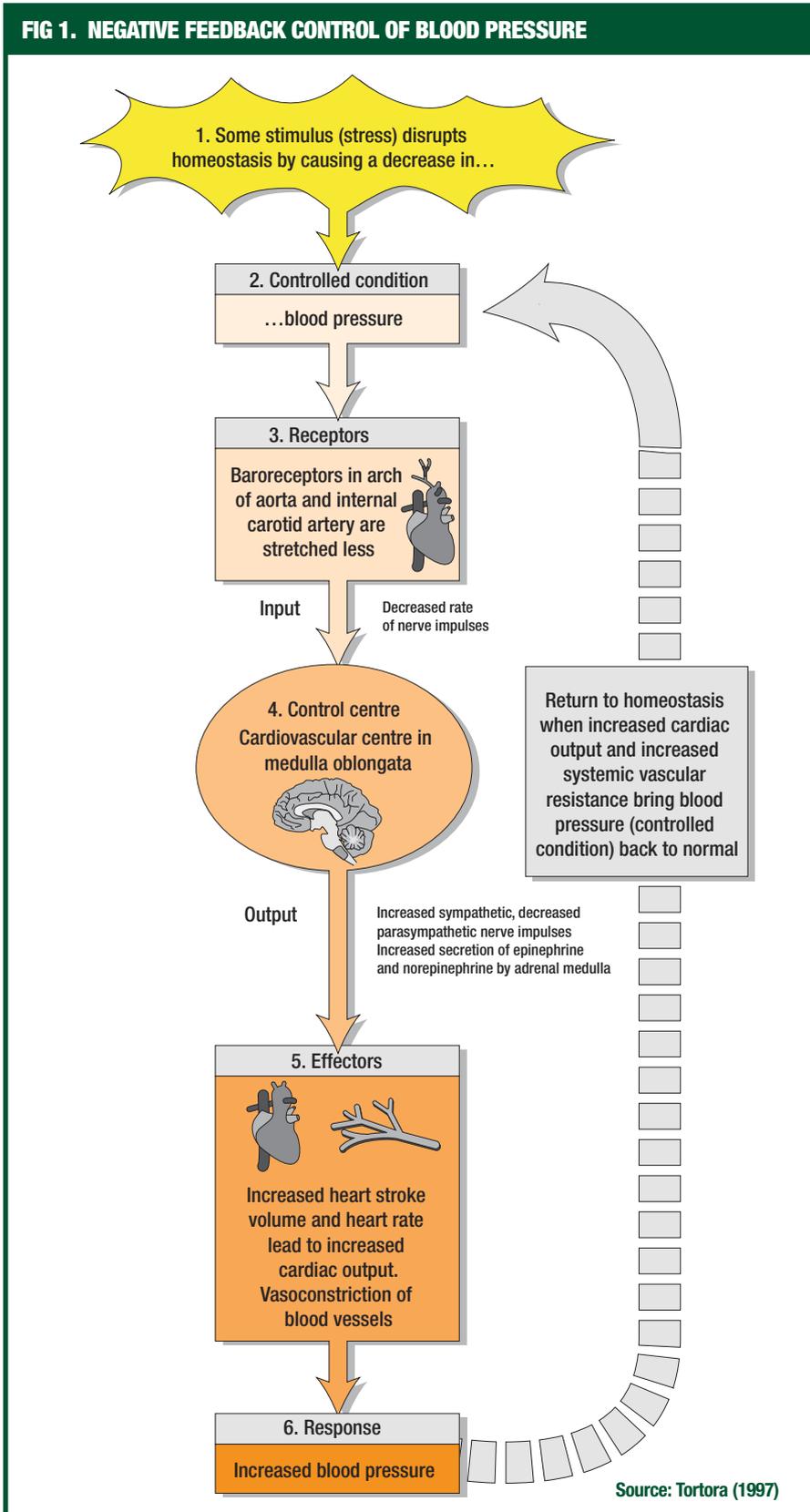
Hypotension has the following effects on organs of the body:

- **Renal system:** decreased renal perfusion leads to a fall in the glomerular filtration rate and oliguria (poor urine output). Acute renal failure may develop;
- **Brain:** reduced cerebral perfusion can



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**FIG 1. NEGATIVE FEEDBACK CONTROL OF BLOOD PRESSURE**



**BOX 1. CAUSES OF HYPOTENSION**

Causes of hypotension include:

- Hypovolaemia: dehydration and/or inadequate intake of fluid, haemorrhage, severe vomiting and/or diarrhoea, extensive burns;
- Cardiogenic: acute coronary syndrome, cardiogenic shock, cardiac arrhythmias;
- Sepsis;
- Anaphylaxis;
- Drugs – such as opiates, beta-blockers;
- Spinal shock;
- Pulmonary embolism.

Source: Jevon (2008)

lead to altered level of consciousness including symptoms of lightheadedness, drowsiness, confusion, agitation, syncope and coma;

● **Heart:** decreased coronary perfusion can lead to myocardial ischaemia and acute coronary syndrome;

● **Gastrointestinal tract:** decreased perfusion can lead to bowel ischaemia;

● **Skin:** poor skin perfusion leads to pallor and cool peripheries. Peripheral ischaemia can develop (Adam and Osborne, 2005; Smith, 2003).

Hypotension is a symptom of shock and is common in critically ill patients. Shock is a complex physiological phenomenon and a life threatening condition. If left untreated, it leads to cell starvation, cell death, organ dysfunction, organ failure and eventually death (Jevon, 2008).

It is usually caused by hypovolaemia, which can respond well to timely and appropriate resuscitation with intravenous fluids (Jevon, 2008).

The presence of shock is best detected by looking for signs of compromised end organ perfusion (ABCDE approach) (Graham and Parke, 2005). For example, poor cerebral perfusion can lead to an altered level of consciousness such as drowsiness, confusion and agitation.

Hypotension is often a late sign of shock (Smith, 2003), occurring when the compensatory mechanisms such as peripheral vasoconstriction and an increase in heart rate activated in response to hypoperfusion, are overwhelmed (Graham and Parke, 2005).

If there is a delay in starting effective treatment, organ failure can occur. In A&E, non-traumatic related hypotension is associated with a higher risk of in-hospital mortality (Jones et al, 2006).

Catherine Hollick

## TREATING HYPOTENSION

Hypotension should be considered a medical emergency (Smith, 2003). The main aim of initial treatment is to buy time to stabilise the patient's condition, make a diagnosis and request expert help (Gwinnutt, 2006). The main objectives of management are to:

- Identify and treat the underlying cause;
- Maintain tissue oxygenation by ensuring adequate cardiac output and adequate arterial oxygen saturation;
- Maintain tissue perfusion pressures by increasing systemic blood pressure (Adam and Osborne, 2005).

A suggested plan for treating hypotension is outlined in Box 2.

## CONCLUSION

Hypotension is associated with critical illness and nurses must ensure that patients' vital signs are monitored and the EWS chart completed following local protocols.

They should ensure that senior help is requested if necessary and that patients are managed appropriately. ●

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## BOX 2. TREATING HYPOTENSION

- Assess patients following the ABCDE approach (Resuscitation Council UK, 2006). Monitor vital signs, complete EWS charts following local protocols and ensure senior help is requested if necessary. It is important to adjust the frequency of EWS observations as appropriate for each patient following local protocols.
- Ensure patients have a clear airway and are able to breathe adequately; administer high concentration oxygen – use a mask with a non-rebreather bag and high flow oxygen (15L per minute). Patients with COPD should be carefully assessed (for details, see Jevon, 2010).
- Monitor the pulse (rate, regularity and volume), blood pressure, capillary refill time, peripheral skin temperature and fluid balance (DH, 2008).
- Consider nursing patients in a supine position; it may be helpful to raise their legs by tilting the bed to increase cerebral perfusion (Resuscitation Council UK, 2006).
- If the hypotension is drug induced, stop the drug (if appropriate) and administer the antidote if indicated. For example, naloxone may be required if hypotension is thought to be opiate induced.
- Attach appropriate monitoring devices such as a cardiac monitor and pulse oximeter – be aware that if peripheral perfusion is poor, it may not detect a pulsatile flow or provide an oxygen saturation reading (Smith, 2003).
- A large bore (14G or 16G) IV cannula should be inserted as they have the highest flow rate and allow rapid infusion of drugs and IV fluids (Resuscitation Council UK, 2006). A second large bore cannula may need to be inserted to provide an additional route for administering drugs and IV fluids.
- Blood should be taken for full blood count, urea and electrolytes, glucose, liver function tests, lactate and coagulation screen (Wyatt et al, 2006). If haemorrhage is suspected, a blood transfusion may be required (Jevon, 2008). Blood cultures will be necessary if sepsis is suspected.
- A rapid fluid challenge (over 5-10 minutes) of 1L of warmed crystalloid solution (Resuscitation Council UK, 2006) such as 0.9% normal saline should be prescribed. Care should be taken with patients who have cardiac failure (Gwinnutt, 2006; Wyatt et al, 2006) and a smaller volume (for example, 250ml) of IV fluid should be administered to them (Gwinnutt, 2006). These patients should be closely monitored using the ABCDE approach. Chest auscultation after each fluid bolus and central venous pressure monitoring may be required to assess for signs of fluid overload (Resuscitation Council UK, 2006). If signs and symptoms of fluid overload occur (for example, dyspnoea, increased heart rate and pulmonary crepitations on auscultation), the fluid infusion rate should be reduced and a doctor informed (Jevon, 2008).
- Monitor vital signs regularly; the target blood pressure is the patient's normal or, if this is unknown, >100mmHg systolic (Resuscitation Council UK, 2006).
- Administer further IV fluids if patients show no signs of improvement. Continue to interpret fluid balance status (DH, 2008).
- If necessary, insert a urinary catheter and monitor urine output.
- If possible, identify and treat the specific cause of hypotension (see above).

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## How to ensure patient observations lead to effective management of altered consciousness

Altered consciousness is a sign of patient deterioration. It is essential that nurses are capable of promptly identifying and acting on this significant observation

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**ABSTRACT** Jevon P (2010) How to ensure patient observations lead to effective management of altered consciousness.

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Altered level of consciousness is common in critically ill patients and is associated with potentially life threatening airway compromise. As problems with airway, breathing or circulation can lead to an altered level of consciousness, the initial priorities are to ensure a clear airway, and that breathing and circulation are adequate. This article aims to outline the management of altered level of consciousness.

Patients who are critically ill usually display the following clinical signs that indicate compromised respiratory, cardiovascular and/or neurological functions (Nolan et al, 2005):

- Tachypnoea;
- Tachycardia;

### PRACTICE POINTS

#### COMPETENCIES

- Nurses and healthcare assistants should be competent to use the AVPU (alert, voice, pain, unconscious) and Glasgow Coma Scale. They should be able to record observations, assign a trigger score and identify abnormal values.
- They should recognise acute confusion as a possible sign of acute illness and carry out investigations such as blood glucose measurement and pulse oximetry to exclude possible causes.
- Nurses should be able to identify the danger of airway obstruction associated with reduced consciousness and take remedial action, such as placing patients in the recovery position.
- Nurses should understand the clinical importance of an abnormal AVPU and GCS score and respond using local escalation protocols.

Source: Department of Health (2008)

- Hypotension;
- Altered consciousness level (Resuscitation Council UK, 2006).

Observing level of consciousness is an essential part of patient assessment, and a main component of the Resuscitation Council UK's (2006) systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of patients who are critically ill.

### DEFINITION OF ALTERED CONSCIOUSNESS

Level of consciousness has been described as the degree of arousal and awareness (Geraghty, 2005).

Altered level of consciousness is considered an adverse sign and may be an indication that the patient is critically ill (Jevon, 2009). It can present in a variety of different ways including confusion, drowsiness, vagueness and aggressive behaviour. The causes are listed in Box 1.

The onset of altered level of consciousness may be sudden – for example, following an acute head injury – or it may be gradual as a consequence of medical problems such as hypoxia or hypoglycaemia (Geraghty, 2005).

### ASSESSING CONSCIOUSNESS LEVEL

Level of consciousness can be assessed by observing patients' behavioural response to different stimuli (Waterhouse, 2005). A variety of scales have been designed to assess these responses.

During the initial rapid assessment of critically ill patients it is helpful to use the AVPU scale (Box 2), together with an examination of the pupils, to determine the level of consciousness (Jevon, 2008).

Any abnormal changes in pupillary reaction, pupil size or shape, together with other neurological signs, are an indication of raised intracranial pressure and compression of the optic nerve (Mooney and Comerford, 2003). Raised intracranial pressure can also lead to a fall in respiratory and heart rates and a rise in blood pressure.

### BOX 1. CAUSES OF ALTERED CONSCIOUSNESS

Causes include:

- Hypoxia;
- Hypercapnia (high levels of CO<sub>2</sub> in the blood);
- Cerebral hypoperfusion;
- Medications such as sedatives or analgesics;
- Hypoglycaemia;
- Drug overdose;
- Stroke;
- Subarachnoid haemorrhage;
- Convulsions;
- Alcohol;
- Head injury.

Sources: Jevon (2008); Resuscitation Council UK (2006)

### Glasgow Coma Scale

The Glasgow Coma Scale (GCS, see Table 1) was originally developed to grade the severity and outcome of traumatic head injury (Teasdale and Jennett, 1974). It assesses the two aspects of consciousness:

- **Arousal or wakefulness:** being aware of the environment;
- **Awareness:** demonstrating an understanding of what the nurse has said through an ability to perform tasks (Jevon, 2008).

The 15 point scale assesses level of consciousness by evaluating three behavioural responses: eye opening, verbal response and motor response (Waterhouse, 2005). It should be used as part of a full patient assessment to more specifically measure level of consciousness (Smith, 2003). It should also be used when assessing patients with head injuries (NICE, 2007).

### MANAGING ALTERED LEVEL OF CONSCIOUSNESS

Nurses should:

- Assess patients following the ABCDE approach to ascertain whether they are critically ill;



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- Ensure they have a clear airway and assess whether breathing is adequate (normal rate, depth and rhythm). The most common cause of airway obstruction in hospital is altered level of consciousness, leading to structures in the mouth (for example, the tongue and epiglottis) blocking the airway (Jevon, 2008);

- For those who are critically ill, administer oxygen as prescribed (see Jevon, 2009);
- Monitor vital signs and complete the early warning scores (EWS) chart following local protocols, calling for senior help if necessary. It is important to adjust the frequency of EWS observations as appropriate for each patient following local protocols;
- Review airway, breathing and circulation (Wyatt et al, 2006). A compromised airway, inadequate breathing or inadequate circulation can lead to altered level of consciousness. Exclude or treat hypoxia, hypercapnia and hypotension (Resuscitation Council UK, 2006);
- Initially assess the patient's level of consciousness using the simple AVPU scale

## BOX 2. AVPU SCALE

- Alert
- Responds to voice
- Responds to pain
- Unconscious

Source: Resuscitation Council UK (2006)

(see Box 2). Record the GCS if they have a head injury (NICE, 2007) and, if necessary, as part of the full patient assessment to provide a more specific measurement of level of consciousness (Smith, 2003);

- If the patient has altered level of consciousness, consider placing them in the lateral (recovery) position. This will

- protect the airway from occlusion by the tongue, regurgitation of gastric contents or debris in the mouth (Jevon, 2008);
- If the patient is unconscious an oropharyngeal airway may be inserted. Tracheal intubation could be required;
  - If the patient is semiconscious and having difficulty maintaining a patent airway, a nasopharyngeal airway may be inserted;
  - Examine the pupils (size, equality and reaction to light). Interpret the pupillary size and response to light; it is important to understand the clinical significance of abnormal pupil size and response to light reflex and react according to local escalation protocols (Department of Health, 2008);
  - Exclude hypoglycaemia; perform bedside

blood glucose measurement. Nurses should have the knowledge to interpret the blood glucose value and should, if necessary, initiate the local protocol for hypoglycaemia (DH, 2008). Administering oral glucose may be sufficient to manage the condition but in some situations, intravenous dextrose will be required (Smith, 2003). It is also important to exclude hyperglycaemia as diabetic ketoacidosis can lead to altered level of consciousness;

- Exclude reversible drug induced causes. Administer the appropriate antagonist if one is available such as naloxone for opioid toxicity (Resuscitation Council UK, 2006).

## CONCLUSION

Altered level of consciousness is a common clinical sign associated with critical illness. Since it can be potentially life threatening, the initial priorities are to ensure a clear airway, that the patient's breathing and circulation are adequate and, where possible, to identify and treat the underlying cause. ●

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TABLE 1. GLASGOW COMA SCALE

Scoring activities of the Glasgow Coma Scale. Scores are added, with the highest score 15 indicating full consciousness	
<b>Eye opening</b>	<b>Scored 1-4</b>
Spontaneously	4 Eyes open without need of stimulus
To speech	3 Eyes open to verbal stimulation (normal, raised or repeated)
To pain	2 Eyes open to central pain (tactile) only
None	1 No eye opening to verbal or painful stimuli
<b>Verbal response</b>	<b>Scored 1-5</b>
Orientated	5 Able to describe accurately details of time, person and place
Sentence	4 Can speak in sentences but does not answer orientation questions correctly
Words	3 Speaking incomprehensible, inappropriate words only
Sounds	2 Incomprehensible sounds following both verbal and painful stimuli
None	1 No verbal response following verbal and painful stimuli
<b>Motor response</b>	<b>Scored 1-5</b>
Obeys command	6 Follows and acts out commands, for example lifts up right arm
Localises	5 Purposeful movement to remove noxious stimulus
Normal flexion	4 Flexes arm at elbow without wrist rotation in response to central painful stimulus
Abnormal flexion	3 Flexes arm at elbow with accompanying rotation of the wrist into spastic posturing in response to central pain
Extension	2 Extends arm at elbow with inward rotation in response to central pain
None	1 No response to central painful stimulus
Source: Dougherty and Lister (2008)	

# How to ensure patient observations lead to effective management of oliguria

Oliguria can be a sign of hypovolaemia and acute renal failure. Fluid balance must be accurately monitored so deficits can be corrected and complications prevented

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**ABSTRACT Jevon P (2010) How to ensure patient observations lead to effective management of oliguria. *Nursing Times*; 106: 7, 18-19.**

**Fluid balance is essential for normal functioning of the body. Oliguria (poor urine output) is usually associated with low circulatory blood volume (hypovolaemia), and can be a sign that a patient is acutely ill and deteriorating. Early warning scoring systems should identify the condition so that appropriate interventions can be undertaken to restore urine output and protect renal function.**

Fluid balance is essential for normal functioning of the body. It helps to maintain body temperature and cell shape, and assists in the transportation of nutrients, gases and waste products (Docherty and Coote, 2006).

Disturbance in fluid balance during episodes of critical illness occurs for a number of reasons, including:

- Disruption to normal physiological mechanisms such as hypernatraemia (elevated sodium levels in the blood);
- Disease processes, for example acute renal failure;
- Side effects of treatment, for example diuretic therapy.

Oliguria (poor urine output) is a common sign of critical illness and is associated with poor fluid intake or excessive fluid loss. This article discusses the assessment and management of oliguria associated with hypovolaemia (low circulatory blood volume).

The condition is defined as the production of abnormally small amounts of urine – 100-400ml of urine in 24 hours (Smith, 2003). Definitions of abnormal urine output are listed in Box 1. It can be a sign that the patient is acutely ill and deteriorating (Jevon, 2008) and is usually associated with hypovolaemia (low circulatory blood volume) caused by restricted fluid intake or excessive fluid loss (Docherty and Coote, 2006). The causes of oliguria are listed in Box 2.

Early warning scoring (EWS) systems should identify oliguria so that timely and appropriate interventions can be carried out to re-establish urine output and protect renal function (Jevon, 2008). This may prevent further deterioration and progression to acute renal failure (Ahern and Philpot, 2002), which is a life threatening

## PRACTICE POINTS

### COMPETENCIES

Nurses and healthcare assistants should be able to record fluid input and output accurately.

Registered nurses responsible for patients should be able to:

- Interpret fluid balance;
- Administer intravenous fluids as prescribed;
- Insert a urinary catheter.

Source: Department of Health (2008)

condition commonly associated with critical illness (Gwinnutt, 2006).

## MONITORING FLUID BALANCE

Fluid balance is defined as the appropriate balance of fluid input and output over 24 hours.

The fluid input over 24 hours in an average person should be approximately 1500-2500ml as liquid, 800ml in ingested food and 200ml as a by-product of food

metabolism. Fluid output should be the same volume – 1500ml urine, 800ml of insensible loss such as sweating, and 200ml in faeces (Marcovitch, 2005).

During critical illness, fluid input and output should be monitored following local EWS protocols and the following should be recorded:

- Oral intake;
- Urine output;
- Wound and nasogastric drainage;
- All drug and fluid infusions (Adam and Osborne, 2005).

A positive fluid balance occurs when input exceeds output. This can occur when a patient's IV fluids administration regimen is increased to rectify fluid volume deficits and dehydration.

A negative fluid balance occurs when output exceeds input, for example following treatment of fluid overload with diuretics (Brooker and Waugh, 2007).

It is important to monitor fluid balance accurately in critically ill patients so that deficits in fluid balance can be corrected and further complications prevented.

## MANAGING OLIGURIA

It is important to identify the cause of oliguria as early as possible so the most appropriate treatment can be instigated before complications occur (Jevon, 2008).



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The most common cause in the critically ill patient is hypovolaemia.

Absolute anuria is rare and is most likely to be caused by a blocked catheter (Ahern and Philpot, 2002).

Occasionally, oliguria can occur because patients have difficulty passing urine in hospital due to embarrassment and this should be considered when other causes have been eliminated.

Patients should be assessed following the Resuscitation Council UK's systematic airway, breathing, circulation, disability, exposure (ABCDE) approach to the assessment of critically ill patients (Resuscitation Council UK, 2006) to ascertain whether they are critically ill. Ensure that appropriate senior help is called if necessary, following local EWS protocols. The following should be carried out:

- In critically ill patients, start prescribed emergency oxygen (Jevon, 2010a) and ensure they have a clear airway and are breathing adequately;
- In hypotensive patients, position them in a supine position if this is tolerated (Jevon, 2010b);
- Insert a urinary catheter to monitor output (Smith, 2003);

## BOX 1. DEFINITIONS OF ABNORMAL URINE OUTPUT

- Oliguria: 100–400ml in 24 hours;
- Anuria: <100ml in 24 hours;
- Absolute anuria: 0ml in 24 hours.

Source: Docherty and Coote (2006); Smith (2003)

Absolute anuria is rare and is usually associated with a blocked urinary catheter (Adam and Osborne, 2005; Ahern and Philpot, 2002).

- In patients with a urinary catheter, ensure the oliguria is not caused by a mechanical problem, for example blocked or kinked catheter tubing;
- Exclude retention of urine as the cause of oliguria (Gwinnutt, 2006);
- Arrange for IV cannulation to administer an intravenous fluid challenge and monitor its effect on urine output. It may be necessary to repeat the challenge (see Box 3);
- Attempt to establish the cause of the oliguria. Perform a urinalysis – dark concentrated urine and a high specific gravity (SG >1.030) are features of volume deficit (Brooker and Waugh, 2007).

## BOX 2. CAUSES OF OLIGURIA

Requirements for normal urine output include the following:

- Adequate renal perfusion (Smith, 2003);
- Normal renal function;
- No obstruction to the flow of urine (Jevon, 2008).

Causes of oliguria

- Pre-renal: for example, hypovolaemia, hypotension;
- Renal: for example, acute tubular necrosis;
- Post renal: for example, ureteric stone, retention of urine (Jevon, 2008).

- Blood tests should be taken to monitor serum sodium, potassium, urea and creatinine levels. It may be necessary to measure the urine volume over 24 hours so that fluid and electrolyte balance can be assessed;
- Regularly monitor fluid balance in combination with vital signs. Complete the EWS chart following local protocols;
- Ask the doctor to review the use of nephrotoxic drugs, for example, non-steroidal anti-inflammatory drugs (NSAIDs), gentamicin and ciclosporin as these may need to be discontinued;
- Seek medical advice for patients on diuretic therapy as this may need to be omitted if they are hypovolaemic.

## BOX 3. FLUID CHALLENGE

Oliguria caused by hypovolaemia can be reversed if a fluid challenge is immediately administered (Smith, 2003).

This is an important treatment intervention aimed at preventing acute renal failure in the general ward setting (Docherty and Coote, 2006).

The aim of a fluid challenge is to produce a significant and rapid increase in plasma volume which will stabilise the patient's condition. This procedure should

be carried out while expert help is being sought (Gwinnutt, 2006).

Procedure points

- An isotonic crystalloid such as 0.9% normal saline is normally infused (Docherty and Coote, 2006).
- Fluids containing dextrose are not used for initial resuscitation because they are rapidly distributed throughout the intracellular and extracellular fluid compartments in the body,

with very little remaining in the circulation (Gwinnutt, 2006).

- A fluid challenge (usually 500ml) is administered over approximately 15 minutes; the patient is closely monitored for signs of improvement, for example, increased urine output, decreased respiratory and pulse rates, a rise in blood pressure and improved level of consciousness (Gwinnutt, 2006).
- The fluid bolus may need to be repeated.

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## Prompt and aggressive management of sepsis gives patients the best chance of survival

Poor knowledge can result in a missed or delayed diagnosis of septic shock or severe sepsis, as well as inappropriate or delayed patient management

**AUTHOR** Kirsty Lovick, BSc, is senior staff nurse at emergency assessment and discharge unit, James Paget University Hospital, Gorleston, Great Yarmouth. **ABSTRACT** Lovick K (2009) Prompt and aggressive management of sepsis gives patients the best chance of survival. *Nursing Times*; 105: 47, 20-22. **This one part unit explains why it is important to recognise the signs and symptoms of sepsis and the action to take if patients become septic.**

### INTRODUCTION

The management of patients has become more complex in general as they are becoming older, sicker and more dependent. This places an increased pressure on healthcare staff (Smith, 2003).

Evidence suggests that nurses' knowledge about the signs of acute illness and their response to these signs are poor (Robson et al, 2007). Gaps in knowledge can result in a missed or delayed diagnosis of septic shock or severe sepsis and lead to inappropriate or delayed management; prompt treatment is crucial to survival.

There is evidence that up to 50% of patients admitted to intensive care units received suboptimal care before referral because of a failure to identify signs of deterioration and lack of skills in responding to acute deterioration (National Patient Safety Agency, 2007).

Doctors also appear to have poor knowledge. Poeze et al (2004) interviewed 1,058 doctors and found that only 17% agreed on a definition of sepsis, but 83% agreed it was frequently missed.

Lack of clarity about the definition of sepsis may contribute to delays in diagnosis and early treatment and increase the risk of patient deterioration and mortality (Ziglam et al, 2006).

It is estimated that patients with sepsis take up 45% of intensive care bed days and 33% of hospital bed days in the UK (Padkin et al, 2003). Forty per cent of intensive care budgets are spent managing sepsis and the average cost of treating a patient admitted to hospital is £10,000 (Dellinger et al, 2004).

Nurses have a key role in identifying patients with sepsis or septic shock and providing appropriate treatment. As such, they need to be knowledgeable about sepsis and nursing guidelines that provide a format for systematic assessment and management.

### LEARNING OUTCOMES

- Understand and differentiate between sepsis, severe sepsis and septic shock.
- Identify the initial treatment required in managing septic patients.

### SURVIVING SEPSIS CAMPAIGN

Worldwide, sepsis kills more people than lung cancer, and more people than bowel and breast cancer combined. Its incidence is rising at a rate of 1.5% per year (Daniels, 2009). Concern about these figures led to the launch of

Surviving Sepsis in 2004 – an international campaign to improve survival. Although now officially concluded, the campaign demonstrated that it was possible to change clinical practice and improve patient outcomes using evidence based guidelines.

The campaign's main aims were to improve the management, diagnosis and treatment of sepsis. These aims were met by:

- Increasing awareness, understanding and knowledge;
- Changing perceptions and behaviour;
- Influencing public policy;
- Defining standards of care (Dellinger et al, 2004).

The campaign concluded that the greatest improvement to patient outcomes had been made through education and changing the process of care for patients with sepsis.

### DEFINING SEPSIS

Sepsis typically starts with systemic inflammatory response syndrome (SIRS). This is the cascade of inflammatory events that are part of the body's response to an insult in an attempt to maintain homeostasis (Lever and Mackenzie, 2007).

SIRS is defined by the presence of two or more of the following symptoms:

- Temperature >38°C or <36°C;
- Heart rate >90 beats per minute;
- Respiratory rate >20 breaths per minute;
- White blood count >12,000 or <4,000 per ml (Levy et al, 2003).

Sepsis is defined as a known or suspected infection accompanied by evidence of two or more of the SIRS criteria (Robson and Daniels, 2008). It is a continuum from a

simple uncomplicated infection to severe sepsis (Fig 1). Changes in patients' condition can be subtle and early indicators of sepsis can be missed. Careful and frequent assessment is the key to spotting deterioration. Respiratory rate is considered to be one of the most sensitive indicators of critical illness, yet it is a vital sign that is often neglected (Stevenson, 2004).

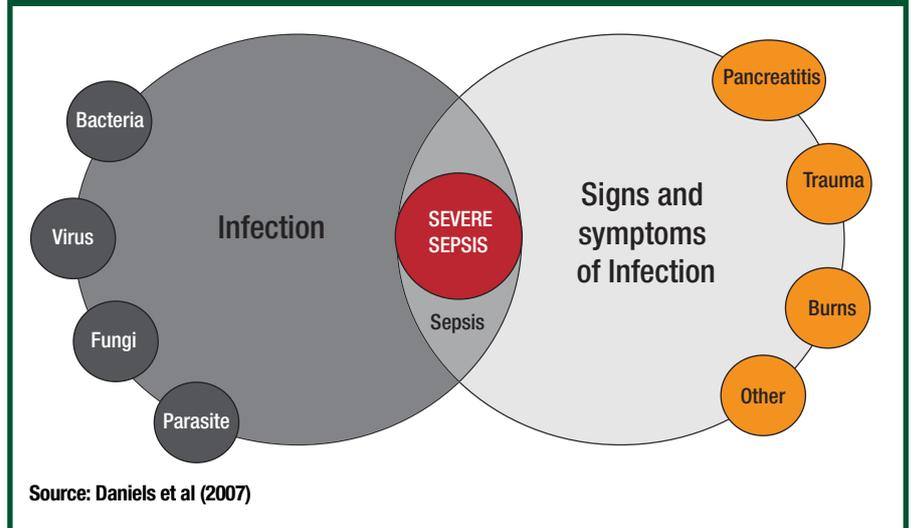
### Severe sepsis

Severe sepsis is the presence of sepsis with organ dysfunction, hypotension or poor perfusion (Peel, 2008). All organs, including the cardiovascular system, lungs, liver, kidneys and brain, can be affected.

Signs include:

- **Hypotension:** a systolic blood pressure of <90mmHg or a mean arterial pressure of <60mmHg. Changes in blood pressure may be a late indicator of deterioration as the body has compensatory mechanisms to maintain it. Fluid resuscitation must be given with the aim of improving blood pressure and cardiac output (Dellinger et al, 2004);
- **Altered mental state:** the AVPU system (A – alert; V – responsive to voice; P – responsive to pain; U – unresponsive) or the Glasgow Coma Scale (GCS) can be used to assess patients' neurological status rapidly. Consciousness levels may be decreased due to hypoxaemia, hypoglycaemia or cerebral hypoperfusion due to shock or medications such as sedatives or analgesics;
- **Hyperglycaemia in the absence of diabetes:** this results from the metabolic and hormonal changes that are part of the stress response (Ruffell, 2004). It occurs in critically ill patients and insulin treatment may be required to maintain normoglycaemia;
- **Hypoxaemia:** oxygen saturations <93% or PaO<sub>2</sub> <9kPa on an arterial blood gas analysis. Pulse oximetry must only be used as a guide as the saturation recording may not be a true reflection of gaseous activity. British Thoracic Society (2008) guidelines recommend that arterial blood gases should be checked in all critically ill patients;
- **Acute oliguria:** urine output of <0.5ml/kg/hr. Poor urine output is an early sign that a patient's condition may be deteriorating. Urine output is a sensitive measure of blood flow to the kidneys and other organs. It is essential that patients have an adequate circulating blood volume; the presence of hypotension, tachycardia and cool peripheries may indicate that extra fluid is required (Smith, 2003);
- **Coagulopathy:** International normalised ratio (INR) >1.5 or platelets <100. The

**FIG 1. THE RELATIONSHIP BETWEEN SYSTEMIC INFLAMMATORY RESPONSE SYNDROME, SEPSIS AND SEVERE SEPSIS**



combination of hypotension, slow blood flow, hypoxaemia and metabolic acidosis will interfere with normal clotting mechanisms. Microthrombi form in small vessels, interfering with blood flow to the tissues and the organs, which, combined with hypotension and hypovolaemia, can cause organ failure (Robson and Newell, 2005);

- **Raised serum lactate:** >2mmol/L. Raised lactate is a sign of severe sepsis and indicates that tissues are not receiving enough oxygen and have to rely on anaerobic metabolism, producing lactic acid.

### SEPTIC SHOCK

Septic shock is defined as severe sepsis with hypotension that does not respond to intravenous fluid resuscitation of 500-2,000ml given rapidly (Dellinger et al, 2004).

Hypotension is not always a reliable indicator of shock, as some patients may maintain a systolic blood pressure above 90mmHg, so further signs and symptoms need to be considered before a diagnosis of septic shock can be made. These include:

- A positive fluid balance;

- An unexplained metabolic acidosis;
- Decreased capillary refill time: >2 seconds (Lever and Mackenzie, 2007). This indicates poor perfusion.

### EARLY IDENTIFICATION OF SIGNS AND SYMPTOMS

Early identification and treatment within the "golden hour" is the key to reducing mortality (Dellinger et al, 2004). The first six hours after diagnosis present a small window of opportunity in which to reverse tissue hypoxia and prevent established organ failure.

The Surviving Sepsis campaign produced a six hour resuscitation bundle (Dellinger et al, 2004); aspects of patient care that can be carried out at ward level are known as the "sepsis six" (Box 1).

### NURSES' ROLE

By increasing their own knowledge and awareness of sepsis, nurses are in an ideal position to ensure patients are reviewed, thereby preventing deterioration into severe sepsis or septic shock. For every hour's delay in beginning treatment, a patient's risk of death increases by 7.6% (Kumar et al, 2006).

The process of increasing awareness of sepsis needs a proactive, multidisciplinary approach. Educational programmes have the potential to increase awareness as well as identify advocates, such as link nurses, to champion sepsis awareness.

The critical care outreach team has a pivotal role in supporting nurses to identify and manage sepsis, and in facilitating escalation of care (Carter, 2007).

#### BOX 1. SEPSIS SIX

- Give high flow oxygen
- Take blood cultures
- Give intravenous antibiotics
- Give intravenous fluid
- Measure lactate and haemoglobin
- Insert urinary catheter and monitor urine output hourly

By developing and using a sepsis screening tool (Fig 2), nurses can use patient observations to identify whether patients have sepsis, severe sepsis or septic shock. Using the "sepsis six" (Box 1) will empower nurses to take action and ensure patients are promptly reviewed and management is initiated.

## CONCLUSION

Introducing the concepts of sepsis pathophysiology and treatment using an evidence based approach increases awareness of sepsis, leading to reductions in mortality, length of stay and cost. It creates a sense of responsibility so that the problem is addressed through early identification and treatment.

Increasing nurses' knowledge and awareness of sepsis will help to improve recognition and prompt aggressive management, ensuring that patients are given the best possible chance of survival. ●

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**FIG 2. NURSING MANAGEMENT OF SEPTIC PATIENTS**

Are any two of the following present and new to the patient? (Systemic inflammatory response syndrome (SIRS) criteria)

Temperature >38°C or <36°C

- Heart rate >90bpm
- Respiratory rate >20bpm
- White blood count >12,000 or <4,000/m

If yes, this is the systemic inflammatory response syndrome, which can be caused by any major insult to the body

Is the history suggestive of a suspected or known infection? If yes, and two of the above SIRS criteria are present, the patient has sepsis

Are any of the following present and new to the patient?

- Blood pressure <90mmHg
- Altered mental state
- Hyperglycaemia in the absence of diabetes
- Saturations <93% or <9kPa on ABG
- Urine output <0.5mg/kg/hr
- INR >1.5 or platelets <100
- Serum lactate >2mmol/L

If yes, the patient has severe sepsis

Does the patient have any of the following?

- Blood pressure <90mmHg despite fluid resuscitation
- A positive fluid balance
- Unexplained metabolic acidosis
- pH <7.35, bicarbonate <20mmol, base deficit >-2.5mmol
- Capillary refill time >2 seconds

If yes, the patient has septic shock

### Treatment of sepsis

- Immediate ABCDE assessment
- Refer to junior doctor for review
- Consider supplemental oxygen
- Give fluid challenge as per PGD
- Give IV antibiotics as prescribed
- Hourly observations
- Reassess for severe sepsis hourly

### Treatment of severe sepsis

- Immediate ABCDE assessment
- Refer to senior doctor for review
- Commence 'sepsis six':
- High flow oxygen as per PGD
- Take blood cultures (two sets)
- Give IV antibiotics as prescribed within one hour
- Give fluid challenge as per PGD
- Catheterise and monitor hourly
- Measure lactate and haemoglobin
- Call critical care outreach team

- Immediate ABCDE assessment
- Ensure urgent senior doctor review
- Start 'sepsis six' if not already
- For critical care review and transfer for further management

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