

Challenging patient groups

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Abstract

Patients at all stages of their lives present for surgery. Some patients have systemic comorbidities, and these are discussed in other articles. This article focuses on those patients that do not necessarily fit a systems-based approach of classification. Many of these patients present challenges to the clinicians involved with perioperative care and so it is important to have a good understanding of how they should be managed. This article will focus on elderly patients, pregnant patients presenting for non-obstetric surgery, obese patients and immunocompromised patients. We have chosen to focus on key aspects of preoperative, intraoperative and postoperative care for each patient group, highlighting the physiological basis of such recommendations.

Keywords Elderly; immunocompromised; non-obstetric; obese; perioperative medicine; pregnant

There are a number of patient groups that can present challenges to the clinician in the perioperative setting. Some of these patients are challenging due to the nature of their comorbidities while others have differing needs due to their stage of life. Comorbidities can be classified systemically such as cardiovascular, respiratory, renal, etc. This article will focus on patient groups that do not necessarily fit this classification and therefore we have chosen to call them ‘challenging patient groups’. These are:

- elderly patients
- pregnant patients presenting for non-obstetric surgery
- obese patients
- immunocompromised patients.

The elderly patient

It is well-known that the UK population is ageing. Approximately 8% of the population are currently aged over 75 years and these patients account for 23% of surgical procedures.¹ It is projected that by 2025 approximately 10% of the population will be over 75 years. [Figure 1](#) shows the increase in the population aged over 90 years with time. This represents a growing socioeconomic burden with more of these patients requiring NHS care, particularly surgery. The National Confidential Enquiry into Perioperative Death (NCEPOD) entitled *Elective and Emergency Surgery in the Elderly: An Age Old Problem* suggests that care of these patients has been suboptimal leading to increased rates of morbidity and mortality. It is therefore important for healthcare

professionals to understand some specific needs of this elderly cohort of patients.

Elderly patients often have multiple, pre-existing, complex medical problems when they present for surgery. They may also suffer from cognitive dysfunction. There is a decrease in physiological reserve in all organ systems at a rate of 1% per year after the age of 40.² Particularly of importance in the perioperative period are the cardiovascular and respiratory systems. These patients cannot easily tolerate physiological insults such as surgery or acute illness. [Table 1](#) details some of the systemic concerns in an elderly patient presenting for surgery.

Preoperative care

A thorough preoperative assessment should be carried out, starting at the same time as resuscitation in the emergency setting. This should include a detailed history of comorbidities, medications review, and discussion and assessment of functional capacity and cognitive function. Investigations including blood tests to assess baseline haemoglobin, renal function and liver function should be carried out along with measurement of vital signs and ECG. Functional reserve can be crudely assessed by asking the patient to walk a short distance or more formally assessed in the form of cardiopulmonary exercise testing (CPET) depending on resources and urgency of surgery.

It is important to recognize that surgical procedures may be associated with postoperative cognitive decline, particularly in the presence of preoperative cognitive dysfunction.³ The patient and carers must be made aware of this preoperatively and steps to minimize this risk must be considered.

There must be shared decision making regarding risks versus benefits of having/not having surgery involving the patient and the multidisciplinary team. Risk prediction tools such as POSSUM and American College of Surgeons National Surgical Quality Improvement Program (NSQUIP) can guide these conversations. There are also a number of organ specific risk scores.

Optimization

Depending on urgency, there may be limited time for thorough optimization. The benefits of optimization must be balanced against the risks of delaying surgery. For example, delaying emergency laparotomy is associated with poorer outcomes. There are multiple detailed guidelines on the management of the major comorbidities that can influence morbidity postoperatively (e.g. anaemia, diabetes and respiratory disease). Perioperative medicine (or pre-assessment) teams can often advise regarding these.

Some key goals for optimum perioperative care include prevention of venous thromboembolism, maintenance of normoglycaemia and normal electrolytes, nutrition, minimization of triggers for acute delirium and prevention of ischaemia. Prevention of ischaemia is achieved by focusing on two main strategies:

- reduce oxygen demand
 - adequate analgesia
 - prevention of hypothermia
 - treatment of sepsis with appropriate antibiotics
 - address perioperative nausea and vomiting
- maintain oxygen delivery in the face of increased demand
 - supplemental oxygen

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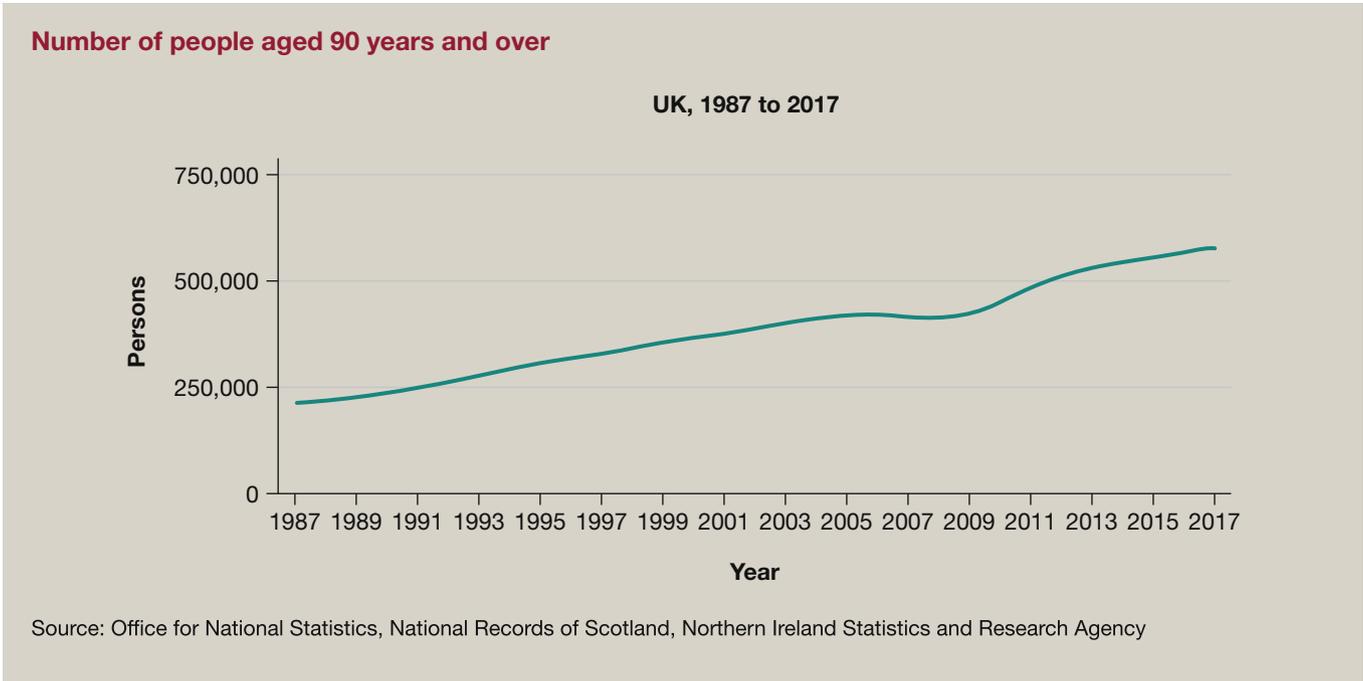


Figure 1

Systemic features often seen in the elderly patient presenting for surgery

Cardiovascular system	<ul style="list-style-type: none"> • Reduced ability to compensate for blood loss and fluid shifts • Myocardial ischaemia related to atherosclerosis • Reduced oxygen delivery and uptake by the tissues leading to cardiac ischaemia and strokes • Often take betablockers and antihypertensives that can worsen above effects perioperatively.
Renal system	<ul style="list-style-type: none"> • Steady decline in renal function with age • Electrolyte abnormalities are common
Haematological system	<ul style="list-style-type: none"> • More likely to be anaemic or become anaemic postoperatively • Reduced immune function therefore more prone to postoperative infection • May be taking anticoagulant drugs that can cause increased bleeding.
Central nervous system	<ul style="list-style-type: none"> • Pre-existing cognitive decline can also predispose to postoperative cognitive dysfunction
General function	<ul style="list-style-type: none"> • Frailty • Malnutrition • Fragile skin and bones that must be protected perioperatively • Immobility predisposes to venous thromboembolism • Polypharmacy and its adverse effects

- maintain fluid balance
- treatment of anaemia
- prompt haemostasis and transfusion if required
- avoidance of hypotension.

These principles must be continued in the postoperative period.

Postoperative care

Postoperative care destinations must be considered carefully. It is recommended that patients with a risk of mortality >10% should be managed in level 2 or 3 hospital facilities. This ideal is often not possible in practice due to bed constraints; therefore, discussions must take place between surgeon, anaesthetist and intensivist regarding the postoperative destination for each patient. Recognition and management of acute delirium is important. Table 2 shows some common, specific postoperative issues seen in elderly patients and a brief overview on management.

The pregnant patient

Non-obstetric surgery occurs in up to 2% of pregnant women. Surgery may be required at any stage of pregnancy with the most common indications being acute abdominal infections (acute appendicitis incidence 1:2000 pregnancies and cholecystitis 6:1000 pregnancies), maternal trauma and surgery for maternal malignancy.⁵

Planning perioperative care for the pregnant patient requires consideration of both maternal and foetal welfare and requires a good knowledge of the physiological changes during pregnancy and issues surrounding pharmacology in pregnancy.

Maternal concerns

Physiological changes: there are a number of physiological changes and these tend to change as pregnancy progresses. Here

Table 1

Specific postoperative issues in elderly patients and their management

Postoperative issue	Management
Cognitive dysfunction	<ul style="list-style-type: none"> • Avoid drugs that precipitate delirium if possible e.g. Benzodiazepines, long acting opioids, Atropine • Orientate patient to time, place and person. • Maintain normovolaemia, electrolyte balance, oxygenation and ventilation
Pain	<ul style="list-style-type: none"> • This can often be difficult to assess due to cognitive deficits • See Royal College of Physicians/British Pain Society/British Geriatric Society 'Algorithm for the assessment of pain in older people'⁴
Malnutrition	<ul style="list-style-type: none"> • Maintain good nutrition perioperatively to aid wound healing and recovery • Enteral nutrition is preferred as it leads to better outcomes.
Functional decline	<ul style="list-style-type: none"> • MDT should provide care in the post-operative period • Involve a care of the elderly physician early in postoperative care along with rehabilitation experts such as physiotherapists and occupational therapists.

Table 2

is a brief overview of important cardiorespiratory changes that become more pertinent in the second and third trimesters.

- cardiovascular system:
 - 40% increase in circulatory volume leads to proportional increase in cardiac output
 - dilutional anaemia occurs due to disproportionate rise in plasma volume to red blood cell volume
 - aortocaval compression occurs in the supine position leading to reduced venous return and hypotension.
 - increased risk of deep vein thrombosis (DVT)
- respiratory system
 - increased oxygen consumption by growing fetus
 - higher incidence of difficult airway
 - higher risk of aspiration of stomach contents during intubation and emergence from anaesthesia

Altered drug handling: due to the physiological changes discussed above and altered maternal metabolism, some drugs are handled differently in the pregnant patient. Many drugs are also not licensed for use in pregnant patients and therefore alternatives may need to be sought. The effects of drugs administered on the fetus must also be considered.

Fetal concerns

Timing of procedure: there is a risk of preterm labour perioperatively. This may be due to manipulation of the uterus, the surgery itself or sepsis as part of the underlying condition. Elective surgery

should be postponed till after the birth of the baby however in emergency cases the health of the mother should be considered first, and she should not be denied medically necessary surgery. It is thought that surgery in the first and second trimester are associated with greater risk of fetal loss than later on in pregnancy, so if possible, essential but non urgent surgery should be delayed until the third trimester.

Teratogenicity: anaesthetic drugs are generally designed to be lipid soluble so that they may cross the blood–brain barrier. As such they readily cross the uteroplacental unit into the fetus. Historically there were concerns regarding teratogenicity of anaesthetic drugs, however years of research has resulted in no conclusive evidence.⁶ They can, however, cause a transient 'anaesthetic' effect in the foetus and therefore this should be discussed with the obstetrician, neonatologist and also the patient.

Avoidance of fetal hypoxia: the uteroplacental circulation is not autoregulated and therefore perfusion is highly dependent on the mean arterial pressure (MAP). Any factor that causes reduction in maternal blood pressure (e.g. anaesthetic agents, blood loss and sepsis) will result in fetal ischaemia if prolonged.

Practical recommendations

Pregnant patients presenting for non-obstetric surgery should be discussed with the obstetric team. Discussion will include the need and provision of intraoperative and postoperative fetal monitoring, consideration of the need for intravenous corticosteroids for fetal lung maturation, provision of obstetric staff perioperatively, and postoperative destination. It is highly advisable that surgery takes place in a centre with obstetric and neonatal facilities. It is also advisable to make the neonatal team aware of the patient in case preterm delivery occurs.

The obese patient

Body Mass Index (BMI) is used by the World Health Organization to define obesity. A BMI of 30 kg/m² or more is classed as class I obesity and >40 kg/m² is classed as class III obesity, otherwise known as morbid obesity (Figure 2). The latest national data shows that 27% of men and 30% of women are obese, with morbid obesity rising from fewer than 1% in 1993, to almost 4% in 2017.⁷ It is a growing problem and leads to greater morbidity and mortality particularly in the perioperative setting.

Systemic effects of obesity

There are multisystemic effects leading to further patient comorbidities:

- Respiratory system:
 - greater incidence of difficult airway with increased aspiration risk.
 - reduced Functional Residual Capacity (FRC) and atelectasis leading to intraoperative and postoperative hypoxia
 - sleep disorders including Obstructive Sleep Apnoea (OSA) and Obesity Hypoventilation Syndrome (OHS). OSA is related to postoperative desaturation, respiratory failure and ICU admissions along with increased incidence of cardiac events. See Table 3 for assessment questionnaire commonly used to assess for OSA.

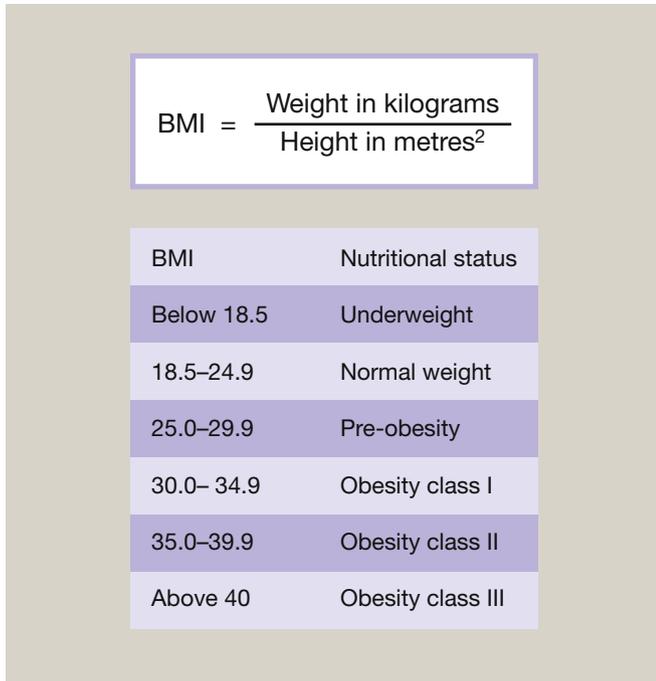


Figure 2

- obstructive airways disease due to airway closure leading to wheeze.
- Cardiovascular system:
 - hypertension.
 - Ischaemic heart disease - increased likelihood of perioperative cardiac event.
 - cardiac failure, leading to difficult fluid management perioperatively.
 - arrhythmias.

STOP-BANG questionnaire

STOP		
Snore	Do you snore loudly? (loud enough to be heard through closed doors?)	Yes/No
Tired	Do you often feel tired, fatigued or sleepy during the daytime?	Yes/No
Observed	Has anyone observed you stop breathing during sleep?	Yes/No
Blood Pressure	Do you have or are you being treated for high blood pressure?	Yes/No
BANG		
Body Mass Index (BMI)	>35kg/m ² ?	Yes/No
Age	>50 years?	Yes/No
Neck circumference	>40cm?	Yes/No
Gender	Male?	Yes/No

Yes to ≥3 questions = high risk of Obstructive Sleep Apnoea (OSA).
 Yes to <3 = low risk of OSA.

Adapted from Chung F et al. Anaesthesiology 2008; 108:812–21

Table 3

Diabetes: This is very common in the obese population due to increased insulin resistance. Good perioperative diabetic control leads to better patient outcomes.

Venous thromboembolism (VTE): This is more common in obese patients who may need prolonged VTE prophylaxis.

Careful history and examination should be carried out pre-operatively along with relevant investigations. Discussion should focus on current systemic comorbidities, presence and severity of OSA and functional reserve. The anaesthetist will carry out a thorough airway assessment.

Practical considerations

There are multiple challenges involved in caring for an obese patient. They can present technical difficulties to both surgical and anaesthetic teams, with longer times in the anaesthetic room and also on the operating table. It is preferable that the patient is managed by an experienced anaesthetist and surgeon with a view to minimize the amount of time the patient is anaesthetized and also because these patients are at higher risk of perioperative complications.

Positioning of the patient for surgery will require multiple staff members trained in moving and handling, along with specialist equipment, which will include appropriate surgical table, bed and instruments. This should be discussed at the preoperative team brief of the WHO surgical checklist.

Another consideration is that standard monitoring devices do not necessarily operate as normal in the obese patient.

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) and Society of Obesity and Bariatric Anaesthesia (SOBA) have guidelines published in 2015 for the optimal care of the obese patient.

Postoperative care

As discussed previously, obese patients are at higher risk of hypoxia leading to complications postoperatively. Supplemental oxygen may be required for a longer period with the addition of night time Continuous Positive Airway Pressure (CPAP). Level 2 or 3 care may be required. Opioids and sedatives should be used cautiously (but not withheld) due to greater risk of respiratory depression. These patients are also at higher risk of surgical complications and poor wound healing, so must be reviewed carefully daily.

The immunocompromised patient

The immune system is complex and multifaceted. Disorders of the immune system can be classified broadly as primary (congenital) or secondary (acquired). Table 4 shows a classification of acquired immunodeficiencies.

Cancer patients

Cancer patients are likely to be immunocompromised due to the cancer itself in cases such as leukaemias, but also due to treatment of the cancer. This may include chemotherapy and radiotherapy. It is likely that these patients will undergo multiple cycles of therapy following which there is a period of worsening immunosuppression. Elective surgery should be timed for recovery of the immune system post therapy.

Acquired immunodeficiency disorders

Category	Example
Endocrine	Diabetes mellitus
Gastrointestinal	Hepatic insufficiency, protein-losing enteropathy, hepatitis
Haematological	Aplastic anaemia, cancer, graft-vs-host disease, sickle cell disease
Iatrogenic	Anticonvulsants, immunosuppressants, chemotherapy and radiotherapy, splenectomy
Infectious	Cytomegalovirus, Epstein–Barr virus, HIV infection, measles, varicella
Nutritional	Alcoholism, malnutrition
Physiological	Immunodeficiency in infants due to immaturity of the immune system, pregnancy
Renal	Nephrotic syndrome, renal insufficiency, uraemia
Rheumatological	Rheumatoid arthritis, Systemic Lupus Erythematosus
Other	Burns, chromosomal abnormalities (e.g., Down syndrome), congenital asplenia, critical and chronic illness, sarcoidosis

Adapted from Littlewood K, 2008⁸

Table 4

The cancer as well as the therapy may affect multiple systems. For example, some chemotherapy drugs can cause cardiotoxicity leading to cardiomyopathies and heart failure, nephrotoxicity or hepatotoxicity. It is important therefore to conduct a systemic enquiry when assessing these patients preoperatively and arrange relevant investigations. Frailty and malnutrition can also occur due to cancer and its treatment. Venothromboembolism is more prevalent therefore this must be considered at preoperative assessment.

Patients taking steroids

Patients may be taking systemic steroids for a number of reasons, including chronic respiratory disease and rheumatic diseases. Steroids have a number of multi-system side effects with chronic use. Most notable other than immunosuppression, may be fragile skin, which must be protected intraoperatively and post-operatively, diabetes and hypertension. If the patient is taking the equivalent of more than 10 mg of prednisolone a day, steroid replacement at induction of anaesthesia and also post operatively may be required.

Organ transplant patients

Transplant recipients will require a lifelong regimen of immunosuppressants. These can have significant side effects affecting multiple organs including liver and kidneys. Preoperative assessment should include assessment of function of the graft

and systemic enquiry focusing on other organs that may be compromised due to immunosuppressant therapy and look for the presence of rejection and infection. It is important to continue these drugs perioperatively to avoid transplant rejection which can have disastrous consequences.

Human immunodeficiency virus (HIV)

Treatment for HIV has improved significantly in the last decades. The newer drugs delay disease progression and improve survival. HIV can have multi-systemic effects although most patients are asymptomatic. It is important to assess each system that HIV can affect preoperatively. The respiratory system could be compromised by opportunistic infections such as *Pneumocystis jirovecii* and *Mycobacterium tuberculosis*, which can lead to pneumonia and lung abscesses. Lymphomas and Kaposi's sarcoma can also affect the lungs. The cardiovascular system may be affected by infections causing endocarditis or myocarditis. The patient may be malnourished or may have diarrhoea and vomiting leading to fluid and electrolyte imbalance. HIV may also lead to central nervous system infections which may make the patient encephalopathic. Anaemia, leukopenia and thrombocytopenia are also common.

It is important to prevent cross infection between patients and between healthcare workers and patients. Standard universal precautions must be employed and the use of disposable equipment where possible should be encouraged.

Overall, immunocompromised patients must be treated as high risk for postoperative surgical site infection and sepsis. Antibiotic prophylaxis for some procedures, good hand hygiene and strict asepsis during invasive techniques should be practiced. ◆

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