Long-term outcomes from critical care

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Abstract

With the improved survival of critical care patients, a cohort of chronically critically ill patients has emerged. These patients have a higher 5-year morbidity and mortality and greater utilization of healthcare resources. This well-documented deterioration in physical, cognitive and/or psychological health in critical care survivors is known as post intensive care syndrome (PICS), which has personal and socioeconomic implications not only for the patient but for their families, care givers and society. Greater awareness of the impact of critical illness on quality of life has led to the emergence of research focused on overall patient outcomes rather than crude survival. Contemporary national guidelines state personal rehabilitation programmes involving a multidisciplinary team should be commenced within 24 hours of admission and continued after discharge to the ward. Once discharged home, specialist ICU follow-up clinics are key in identifying any long-term complications of critical care admission and should focus on all aspects of the PICS.

Keywords Cognitive morbidity; critical illness; mortality; physical morbidity; psychological morbidity; quality of life; rehabilitation

Introduction

Over 150,000 patients are admitted to critical care each year in the UK, and in the 5 years after admission this group have a higher morbidity and mortality compared with age-matched controls.[1] The purpose of critical care is to support individuals through their acute illness to allow them to return to their pre admission lifestyle and functional status. With advances in critical care, a group of chronically critically ill patients have emerged who would historically not have survived the acute episode. This group tend to have longer critical care and hospital length of stay (LOS), with serious lasting physical, cognitive and psychological problems and a greater dependence and healthcare utilization following discharge from hospital.[1,2] This well-documented deterioration in physical, cognitive and or psychological health in critical care survivors is known as post intensive care syndrome (PICS).[3] PICS has personal and socioeconomic implications not only for the patient, but also for their families, care givers and society. The exact prevalence is unknown although it is estimated over half of all patients will experience at least one of the three components of PICS.

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Physical

Physical complications following an episode of critical illness are often under recognized by healthcare professionals and under reported by patients.

After what may be considered a short ICU admission (greater than 4 days), national guidelines for the provision of critical care recommend patient follow-up at 2, 6 and 12 months post discharge in specialist clinics run by the intensive care team.[4] Critical care follow-up clinics form part of a series of national recommendations to monitor and support patients return to their pre admission health. However, within the financial constraints placed upon the modern day NHS this is not always feasible and the availability of allied health professionals such as clinical psychologists and occupational therapists can be lacking in areas.

Airway

Laryngeal pathology is common after prolonged intubation. Inflammation from the endotracheal tube (ETT) can cause vocal cord damage and the formation of granulation and scar tissue. This can lead to vocal changes, stridor and susceptibility to upper airway obstruction.

Tracheal stenosis may occur in up to 30% patients who undergo tracheostomy insertion. This often occurs at the stoma site, but can be related to pressure damage from the tracheostomy tube cuff distal to the stoma. Laser treatment and tracheal stenting at a later date may be required in severe cases. Symptoms may include stridor, persistent cough and exertional dyspnoea.[5]

Tracheomalacia occurs following ischaemic injury to the tracheal wall causing damage to the cartilage that provide the structural integrity of the trachea. Potential risk factors include recurrent infection, prolonged invasive ventilatory support or tracheostomy with their associated mucosal friction and inflammation. Symptoms are often absent but may develop due to tracheal collapse on expiration and can include stridor, persistent cough, sputum retention and exertional dyspnoea. This may be seen when downsizing a tracheostomy as part of the weaning process or around the time of extubation or decannulation. Patients may present with profound respiratory failure, the source of which may be unclear. A low threshold for suspicion may be necessary to identify this as a cause prompting further investigation.

Respiratory

Long-term respiratory dysfunction has been reported in a significant proportion of patients requiring invasive ventilation during their critical care stay. Prolonged exertional dyspnoea and failure to return to pre-admission baseline is seen in a number of patient groups. This often reflects severity of illness, number of organ failure and the degree of pre-morbid comorbidities.

In high-risk patients with severe acute respiratory distress syndrome (ARDS), respiratory function can be impaired for 2–5 years following hospital discharge, with some evidence of prolonged impairment in functional status extending beyond 5

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years.[6] Thoracic computed tomographic imaging of survivors of ARDS commonly show minor fibrotic changes in non-dependant areas of the lung.[7] This structural change is reflected in pulmonary function tests with abnormal lung volumes and reduced 6 minute walk tests, 70% of which remain abnormal at 1 year.[6]

In addition to parenchymal damage respiratory impairment can be related to diaphragmatic and respiratory muscle weakness associated with ICU-acquired weakness.

Cardiovascular

Arterial line placement for monitoring and blood sampling is both common and often prolonged during an ICU admission. The most common site of arterial catheter placement is the radial artery. Complications in the short term can include limb ischaemia occurring due to embolic phenomenon from line placement in end arteries, e.g. commonly the brachial artery, requiring embolectomy. Rarer sequelae include pseudoaneurysms and cosmetic scarring at insertion sites along with numbness, neuropathic pain and local tenderness. These are of particular relevance when occurring in the dominant upper limb of the patient.

Central venous catheters can be associated with serious complications such as catheter-related blood stream infection, sepsis and ensuing organ dysfunction, in addition to infections local to the catheter site such as endocarditis.

Repeated central venous catheters placement may predispose to venous stenosis and/or thrombosis. The resultant impaired venous drainage can cause limb oedema and further vessel stenosis leading to potential difficulty with future line placement. These are particularly important if vascular access is required or the formation of an arteriovenous fistula anticipated for long-term dialysis.

Gastrointestinal

Weight loss and muscle wasting are common during a period of critical illness despite the provision of early nutritional support. Problems during admission with abnormal functional swallowing, ileus and malabsorption can persist after discharge from ICU and enteral feed or calorie supplementation may be required for a prolonged period of time after hospital discharge.

Patients can also be troubled with anorexia, nausea and altered taste that can make eating unappealing and onerous, affecting the individual's ability to sustain adequate nutritional intake. The symptoms generally resolve with time but can be quite distressing and have a negative impact on quality of life.

Genitourinary

Sexual dysfunction is a frequent problem after a critical illness and is under reported due to the sensitive nature of the issue. This clearly impacts on patients and the intimacy of their relationships to differing degrees but can contribute to ongoing psychological difficulties associated with recovery and rehabilitation. The cause of this can be multifactorial and is often related to medications started during admission, surgery or procedures during treatment and the psychological impact of the acute events. National guidelines stipulate patients should be questioned about return of sexual health during follow-up clinics, and referral to specialist healthcare services as required.[4,14]

Patients with acute kidney injury (AKI) requiring renal replacement therapy (RRT) are known to have higher in-hospital mortality and morbidity. Schiffl et al. reported an overall in-hospital mortality in this group of 47%, with mortality rates at 10 years as high as 80%.[8] AKI in ICU is also a risk factor for the development of chronic renal impairment at a later date. Critical care survivors who develop chronically worsened renal function are commonly followed-up by primary care physicians and or nephrologists to monitor residual renal function, plan for RRT and manage its associated complications.

Musculoskeletal

Loss of muscle mass in critical illness: in critically ill patients over 15–20% of total muscle mass can be lost by the end of the first week of the ICU admission, with a greater proportion of muscle lost by those with escalating organ failure. Patients with greater pre-existing muscle reserve will have a better outcome but will never return to age matched base line or premorbid state. This is because muscle repaired following critical illness may not be of comparable quality, with higher fat and water content. Even with multimodal therapy to restore or increase muscle bulk, aerobic capacity may still fail to recover to the individual's baseline status.

Despite early proactive physiotherapy, flexion contractures can occur and are common in patients who have a prolonged stay or those with neuromuscular diseases. This impacts on future rehabilitation potential and ability to return to work.

Intensive care unit acquired weakness: (ICU-AW) is the most common form of physical impairment seen in ICU survivors.[9] It is a group of disorders which encompasses patients with ill-defined weakness and poor mobility along with those with critical illness myopathy (CIM), polyneuropathy (CIP), and combined CIM/CIP. Clinically, patients demonstrate global limb weakness, more pronounced in the proximal muscle groups (e.g. shoulders and hips), and it also affects respiratory muscles that can impede weaning from mechanical ventilation.[9] This is often seen in patients who have had a protracted stay, requiring prolonged sedation and liberal use of neuromuscular blockers, all reflecting increased illness severity. It continues to be an important contributor to reduced quality of life in patients with severe ARDS who were followed up for 5 years.[6] Muscle weakness and functional impairment were frequently observed at 1 year, and recovery from physical dysfunction was incomplete even 5 years after discharge.

A formal diagnosis of ICU-AW can be made using nerve conduction studies and electromyography. It is also important to rule out any organic causes that may mimic neuromuscular weakness. Management is good supportive care, good nutrition and ongoing rehabilitation.

Early mobilization of patients whilst in ICU is a term used to describe passive and active mobilization within 72 hours of ICU admission, applied to those with severest respiratory failure. The purpose is to preserve muscle function and limit muscle wastage related to immobility with the intention of reducing the burden related to loss of muscle function. It also encourages the use of minimal sedation which further contributes to a reduction in delirium and ICU acquired weakness.[10] Studies so far have yielded mixed results but overall have failed to show significant improvement in primary outcome measures. Despite the inconclusive preliminary studies it remains a complex area of intense

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