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Developing a predictive tool for post-operative delirium in orthopaedic settings in Hong Kong

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Summary ***Aims:*** A prospective study was conducted to develop a Common Risk-factor Assessment Predictive Tool (CAP) for identifying factors associated with post-operative delirium (POD) in orthopaedic surgery. A high, moderate and low risk score system was developed. The incidence rate of POD was also determined.

Background: POD has been reported as contributing to complications and poor outcomes, consequently affecting recovery and health-care provision.

Methods: Thirteen risk factors were evaluated. Regression coefficient and odds ratios were used to determine the association of the risk factors with POD. These were then used to develop a tool. Validation of these associated risk factors was carried out to check their effectiveness in predicting the development of POD.

Findings: Fifty nine of 277 patients developed POD. Four major risk factors were identified: visual impairment ($p = 0.011$; scored as 2), cognitive impairment ($p < 0.001$; scored as 4), urinary tract or respiratory tract infection ($p = 0.028$; scored as 3) and use of urinary catheterisation ($p = 0.046$; scored as 3). Using a 12-point score system the cut-off values were 4.5 (61.0% sensitivity and 85.8% specificity) and 7 (11.9% sensitivity and 95% specificity) respectively.

Conclusion: The tool can predict different levels of risk for POD. Nurses can use the tool to communicate patients' risk of POD and identify potential preventive strategies.

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Editor's comments
It is, perhaps, dangerous to assume on the strength of one study, that dehydration is not a factor to be associated with delirium and further work needs to be done to explore the relationship between post-operative cognitive problems and dehydration before we can be convinced that it should not be included in an assessment tool. However, this detailed study contributes significantly to informing orthopaedic practitioners about those things they might realistically include in a pre-operative assessment aimed at identifying those at risk of a very distressing condition that significantly mars postoperative recovery for many. JS-T

Introduction

Delirium is a term that is used to describe a disorder characterised by a cluster of cognitive impairments with an acute onset and specific precipitating factors (Laraia and Sundeen, 2001). Delirium can most simply be defined as an acute confusional state with a decline in attention and cognition (Inouye, 2006). It results in disturbances in consciousness that reduce awareness of the environment, disturbances of attention that impair the ability to process stimuli, disturbances in cognition that impair memory, disorientation in time and person, language disturbance and disturbances in perception that result in misinterpretations and hallucinations.

Post-operative delirium (POD) has been reported following surgical procedures (Holmes and House, 2000). In a Japanese study, 8% of patients presented with delirium after spinal surgery (Kawaguchi et al., 2006). Between 10% and 61% of elderly hip fracture patients were vulnerable to developing delirium postoperatively (Schuurmans et al., 2003). The serious problems caused by delirium following surgery and hospitalisation include prolonging hospitalisation (Saravay et al., 2004), falls (Foreman et al., 1999) and a high mortality rate (Marcantonio et al., 2003).

The prevalence of delirium reported in different studies varies from 5% to 86%, reflecting differences in how delirium is identified (Fick et al., 2002). One report showed the development of delirium in surgical patients ranged from 5% to 70% (Dyer et al., 1995). Conversely, the incidence of POD in elective orthopaedic patients was estimated at between 10% and 40% (Dupplis and Wikblad, 2000; Galanakis et al., 2001). Patients with fractures of the hip developed POD at a rate of between 9% and 65 % (Sorensen and Wilblad, 2000). Development of POD is associated with poor outcomes and lengthening hospitalisation (Inouye et al., 1998) and consequent increased cost.

A number of studies (Inouye and Charpentier, 1996; Elie et al., 1998; Fann, 2000; McCusker et al., 2001; Morrison et al., 2003) have demonstrated that precipitating and predisposing factors to POD include poly-pharmacy, malnutrition, physical restraint, bladder catheterisation, psychotropic drugs, under-treated pain, visual impairment, cognitive impairment, functional decline and advanced age. These risk factors have also been explored in specific types of surgery and the results reflect differences between clinical settings. In orthopaedic settings POD has not only been found in postoperative hip or spine surgery, but also in other types of procedure such as total joint arthroplasty and open reduction and internal fixation. It is likely that identifying common risk factors is very important in predicting POD.

Aims

The aims of this study were to develop a Common Risk-factor Assessment Predictive Tool (CAP) for clinical use in predicting the development of POD following orthopaedic surgery at the United Christian Hospital in Hong Kong and to determine the incidence of POD. We also aimed to assess the rate of the associated risk factors for POD in different categories of patients with high, moderate and low risk.

Methodology and design

Sample and recruitment

A prospective study was conducted in two phases (January to March, 2008 and July to September, 2008) in 4 acute orthopaedic wards (138 beds) in a district hospital in Hong Kong. Male or female patients who were aged 18 or above admitted for orthopaedic surgery and who could understand and communicate in Cantonese or English were recruited. The surgery must have taken place under either general anaesthesia or spinal anaesthesia. Patients with dementia were recruited if they were able to communicate effectively. If patients underwent multiple orthopaedic surgeries or were transferred to other non-orthopaedic wards upon operation, they were excluded. Multiple regression