A survey of sedation assessment and management in Australian and New Zealand paediatric intensive care patients requiring prolonged mechanical ventilation

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Abstract:

Introduction: A retrospective analysis of sedation management for children receiving prolonged ventilation in one Australian paediatric intensive care unit (PICU) revealed no identifiable pattern in sedation management and an inadequacy in the sedation scoring system. Therefore, the investigators sought to explore the current practice of sedation in critically ill children in PICUs across Australia and New Zealand.

Method: This study used a mail-out survey to audit sedation management within the eight dedicated Australian and New Zealand PICUs. Results: 100% of the units surveyed replied (n=8). There were a total of 6,133 admissions to 8 Australian and New Zealand PICUs, where 3036 (49.5%) required ventilation. Of these children, 888 (29.2%) required ventilation ≥72 hours. Only 4 units had written guidelines for sedation management. A combined sedation regime of benzodiazepines and opioids was employed in six units. Administration and titration of sedation agents was managed by nursing staff alone in six units. All units indicated that they aimed to achieve a 'moderate level' of sedation. Two units used designated assessment tools for sedation and withdrawal assessment. One unit utilised Bispectral Index (BIS) monitoring.

Conclusion: There were similarities observed in the methods and types of sedation agents used within Australian and New Zealand PICUs. However, only half of the units had guidelines for sedation management, and most units did not use validated paediatric scales to assist staff in assessing patient sedation and pain levels. Therefore it is recommended that a standardised approach to sedation assessment and management of critically ill children requiring prolonged ventilation be developed and tested.

Keywords: sedation, survey, mechanical ventilation, paediatric intensive care

Introduction

The role of the healthcare team providing care to the critically ill child requiring sedation for mechanical ventilation is multi-faceted and centres on providing the safest level of care to the patient. The major therapeutic goal of analgesia and sedation in the paediatric intensive care unit (PICU) is to minimise the perception and response to anxiety and pain. Standards for managing analgesia and sedation should be incorporated into the plan of care already established based on the admitting diagnosis. It was perceived amongst the researchers' PICU colleagues that analgesia and sedation administration was managed adequately in children who were mechanically ventilated for short periods (<72 hours). However, there was a perception that children requiring prolonged mechanical ventilation (>72 hours) had additional sedation requirements and these were managed inconsistently. A retrospective audit on 109 children requiring prolonged ventilation was conducted, and no identifiable pattern to the escalation, titration or tapering of sedation agents was found [1]. Additionally, the issue of drug tolerance was poorly managed and documented sedation scores did not accurately reflect patients' sedation status.

The practice of sedation in adult and paediatric intensive care units has been surveyed widely [2-13]. An extensive literature search failed to reveal any published surveys of Australian and/or New Zealand sedation management in the PICU setting. Festa, Bowra and Schell conducted a survey in 2002 of PICU physicians in Australia and New Zealand, but only looked at the current pattern of use with a single agent – propofol [4]. In this study none of the respondents reported using propofol as a first line sedative agent, however 82% used the drug at some time during the child's admission with further duration and dose restrictions.

Studies in the United States of America on the use of sedatives identified a benzodiazepine (midazolam/lorazepam) and opiate (morphine/fentanyl) combination as the most commonly used for sedating children requiring ventilation. However in over 85% of units there was no written protocol for the administration of these agents [2, 5]. In the United Kingdom the most recent survey of PICU sedation practices found the most commonly used sedative agent was midazolam in combination with morphine [6]. Written protocols for the administration of sedative agents were available in 45% of units. Studies in both countries identified that sedation was formally assessed using a validated tool in less than half of the units they surveyed. The lack of reporting on dose ranges and use of validated sedation scales in these studies led to an inability to benchmark sedation practice against other PICUs. Consequently, the audit on the researcher's unit and a review of the literature led to the desire to benchmark PICU sedation practice and management across the region.

Aim of study and research question

The aim of this study was to survey all eight dedicated PICUs in Australia and New Zealand to ascertain current practice in the management of sedation in children who require prolonged mechanical ventilation (>72hrs). The specific research question asked was "Is there a standardised approach to sedation management for children requiring prolonged mechanical ventilation in Australian and New Zealand PICUs?". Participation in the study was voluntary and consent was assumed by the return of the survey. The research involved only the collection of retrospective data and expedited ethical approval from the investigating institution was granted.

Research design

This study employed a non-experimental design using a mail-out survey, with the primary purpose of auditing current sedation management in the studied units. Characteristics and utilisation activity data was also collected to describe the setting. A written survey method was used for this descriptive study. Surveys are an appropriate tool for collecting detailed descriptions of the characteristics of an institution thereby using the data to assess and justify current practice, thus informing prospective changes in health care service delivery [14].

Sample

The population consisted of the eight dedicated PICUs in Australia and New Zealand identified through records held by the Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR). All eight units were surveyed to avoid any sampling bias or error and to obtain a regional perspective.

Development of questionnaire

The investigating team developed a data collection tool based on variables identified in the literature on sedation management in the adult and paediatric populations (pharmacological agents used, presence of guidelines, patient population and diagnoses, and nursing qualifications). Dillman developed the Tailored Design Method for mail and internet surveys, and elements of the method were used to guide the development, presentation and distribution of the survey in this study [15]. Dillman's method draws on the social exchange theory believing that a cost-reward balance is inherent in people. The investigators aimed to keep the time and effort (or cost) on the participant's part to a minimum by developing clear and concise questions on the topic. A note of appreciation and the promise of feedback of the results were potential rewards for the participant.

The six page national survey developed by the investigating team consisted of 12 open-ended and 18 structured questions. Questions on the survey were similar to those used in previous sedation surveys [2, 5-9]. Questions were arranged with the most pertinent questions about the patient population, ventilation and sedation first. The last item on the survey consisted of an open-ended question, which invited participants to provide further comments about the management of sedation in ventilated children on their unit and a final note of thanks and appreciation for the participant's time and effort.

The initial version of the survey was piloted on clinical nurse leaders in three adult ICUs to test content and face validity. Overall feedback was positive and only minor revisions were required before the final draft of the survey was forwarded.

Data collection

A courtesy call was made to the Nurse Unit Managers (NUM)/ Nurse Practice Coordinators (NPC) in charge of the eight PICUs in Australia and New Zealand. The purpose of the telephone call was to provide preliminary information about the study and enlist their support. A covering letter and one copy of the survey were sent to each unit's NUM/NPC. The covering letter explained the rationale and purpose of the study, as well as reassuring the respondents of the confidentiality and anonymity of their reply. Their consent was assumed by return of the completed survey in the accompanying reply paid envelope.

Results

A 100% response rate was achieved with all eight units NUMs/ NPCs returning the survey. Data was coded and entered into a database file. Due to small numbers, statistical analysis was not undertaken. Unit activity and practice were not compared. Aggregate data only is reported.

Unit characteristics and activity

Over a 12-month period preceding the survey there were 6,133 admissions to the eight Australian and New Zealand PICUs; 3,036 (49.5%) children required ventilation, with 888 (29.2%) requiring ventilation for greater than 72 hours. Annual admission rates for individual units ranged from 473 to 1,388, with admissions for ventilation ranging from 178 to 966. The participants were asked to rank the three main reasons for admission to the unit for mechanical ventilation. Respiratory disorders were the main reason for admission to six of the eight units (Figure 1). A cardiac cause was the leading reason for two units and also cited as the second leading cause for two other units. Trauma causes, though not a primary reason for admission, were the leading second reason for admission for one unit and the third reason for three units. General surgical causes were the leading second reason for admission for two units and the third reason for two units. Other reasons for admission included neurological and general medical conditions. The median number of beds was 10 (range 8-24).

Figure 1: Reasons for admission to PICU requiring mechanical ventilation.