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Using All Patient Refined Diagnosis Related Group to Identify Cost-Management Targets

Brian Benneyworth, Mark Rigby, Mary Heskett, Aaron Carroll and Mara Nitu*

Department of Pediatrics, Indiana University School of Medicine, USA

***Corresponding author:** Mara E Nitu, Associate Professor of Clinical Pediatrics, Clinical Chief, Section of Pediatric Critical Care, Riley Hospital for Children at Indiana University Health, Indiana University School of Medicine, 705 Riley Hospital Drive, RI 4909, Indianapolis, Indiana 46202-5225, USA, Tel: 317- 948-2802; Fax: 317-944-3442; E-mail: mnitu@iu.edu

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Abstract

Background: Evaluate patterns in existing cost data for patients with respiratory illness managed in a large academic Pediatric Intensive Care Unit (PICU), with the goal to identify targets for potential cost-management strategies.

Methods: Retrospective, observational study of patients admitted to a 34-bed multidisciplinary PICU from October 2011 to September 2012.

Study design: Variable direct costs (VDC) for each All Patient Refined Diagnosis Related Group (APR DRG) were obtained from the Decision Support Group and detailed analysis was performed for top respiratory APR DRGs.

Results: During the study period, 1,999 patients were admitted to the PICU equating to 17,053 PICU days. Medical critical care patients accounted for 54% of all admissions and 46% PICU days. The top 5 respiratory-related APR DRGs accounted for almost 45% of all PICU medical admissions. Non-asthma respiratory-related APR DRGs accounted for 23% of medical admission and 18% of medical PICU days. Of the total VDC for this subgroup, 54% and 20% was attributed to nursing and respiratory care respectively, with a significant minority (<10%) on pharmacy and laboratory services. Further analysis of the VDC for respiratory care indicated one-third of all costs are incurred for pulmonary hygiene care, another third for delivery of bronchodilator therapy, and just 16.4% for mechanical ventilation.

Conclusion: Analysis of VDC in context of APR DRG can indicate areas for potential cost management strategies. A high percentage of respiratory care costs accounted for pulmonary clearance interventions. This type of cost analysis may identify potential targets for cost-management interventions in various PICU populations.

Keywords: Intensive care units; Pediatrics; Diagnosis related groups; Accountable care organization; Critical care; Decision support systems; Health care costs

Introduction

The cost of providing critical care has increased substantially over the past decade. Expenditures in the United States related to critical care medicine were $56.6 billion in 2000, but grew to $81.7 billion by 2005 [1]. According to the Society of Critical Care Medicine, the cost of adult and pediatric intensive care in the United States between 2000 and 2005 accounted for 13.4 % of hospital costs and 4.1% of national health expenditures [2].

In 2012, the United States devoted 17% of its Gross Domestic Product to health care related expenditures (most European countries spend between 8-12%) with more resources to critical care services than almost any other country [3,4]. Cost-management approaches have included attempts to reduce upfront expenses by containing fixed costs (e.g. overhead and staffing), with little correlation to clinical outcome (e.g. overall length-of-stay or ventilation days). Furthermore, many "cost-saving" strategies impact the "cost" incurred by the payers (in terms of charges and reimbursements) rather than the "cost" spent by the hospitals (reflected as fixed and variable direct costs) [5].

As opposed to the way physicians usually group patients (e.g. ICD coding), the Diagnosis Related Group (DRG) groups patients by the type of the care provided. This system assists hospitals and insurance providers to obtain financial information on "like groups" to assist in understanding, tracking and anticipating costs, charges and revenue. Patients with very disparate conditions and outlooks may be grouped together, while patients with similar conditions can be grouped into different DRGs based on differences in care provided. This classification developed by Fetter, PhD, and Thompson, MPH, in the mid 1970's intended to identify "products" that a hospital provides with the goal of correlating it to reimbursement [6]. Since patients within each category purportedly have similar needs they are expected to use similar levels of hospital resources. The APR (All Patient Refined) DRG was developed through collaboration with 3M and the National Association of Children's Hospitals and Related Institutions (NACHRI) as a way to improve the stratification of pediatric diagnoses. It expands the basic DRG structure by subdividing each APR DRG into four severities of illness and four risk mortality subclasses [7,8].

As hospitals and medical systems strive to increase accountability and efficiency, the entire medical team, from providers to hospital administration, must be engaged in cost containment efforts. A clearer understanding of the actual cost structure is paramount. The purpose of this study was to analyze the existing hospital financial data to look for potential cost-management targets for a specific set of respiratory-related APR DRGs that are prominent in the pediatric intensive care unit (PICU). We hypothesize that novel cost-management targets can be identified by examining the variable direct costs (VDC) for specific groups of APR DRGs.

Materials and Methods

Study type

Retrospective, observational analysis conducted in a multidisciplinary, 34-bed multidisciplinary medical/surgical/cardiovascular PICU in a major US children's hospital. Pediatric critical care physicians are involved in care of all patients but serve in a co-managing role for primarily surgical/cardiovascular admissions. Respiratory-related APR DRG were selected from the entire PICU population because the critical care physicians provide the primary management to these patients. The APR DRG is determined using a proprietary algorithm from 3M to group patients into similar patterns of care for the purposes of reimbursement and severity adjustment. Patient demographics, primary/secondary diagnoses, and primary/secondary procedures are included in the algorithm. Respiratory diseases are the most common medical diagnoses and we hypothesized that identifying a large, relatively homogenous population would allow us to identify patterns in care that could lead to systematic cost management strategies. All hospitalized patients who received care in the PICU from October 1, 2011 to September 30, 2012 were analyzed to provide context for the respiratory cases. This study was reviewed by the IRB board and the exempt status was approved.

Summary data by APR DRG were provided by the hospital's Decision Support Group. All patients admitted to the pediatric critical care unit for any portion of their hospitalization were included in the contextual analysis. The primary analysis focused on respiratory-related APR DRGs: 1) 130 - Respiratory system Diagnosis with Ventilator support 96+ hours, 2) 133 - Pulmonary Edema and Respiratory Failure, 3) 138 - Bronchiolitis and RSV Pneumonia, 4) 139 - Other Pneumonia, and 5) 141 - Asthma. Available data includes the number of cases in each APR DRG group, hospital length of stay (LOS), ICU LOS, and variable direct costs (VDC) per case for all APR DRGs who met inclusion criteria (not hospital charges). VDC are the expenses incurred by the hospital to provide care throughout the entire hospital course. The VDC were further divided into cost-center categories including: nursing, lab, pharmacy, radiology, respiratory services, and other.

Descriptive comparisons between respiratory-related APR DRGs and other APR DRGs admitted to the PICU were performed. The proportion of VDC in each cost center for respiratory-related APR DRGs was described. Significant recurring costs in each cost-center were identified as potential targets of a cost-management strategy.

Results

A total of 1,999 patients were admitted to the PICU during the one year study period, accounting for 17,053 ICU days. Medical patients accounted for 54% (n=1,079) of total admissions, and 46% (n=7,844) of total patient days. The average LOS for all patients was 8.7 days and 7.3 days for medical patients. The patients admitted to PICU during the study period were captured within 175 APR DRGs; the top 12 account for approximately 50% of all PICU admissions (Figure 1). Figure 2 describes the top APR DRGs in the context of patients days. Of medical patients, asthma was the most common APR DRG (141), with the next four APR DRGs: seizures (53), bronchiolitis and RSV pneumonia (138), other pneumonia (139), and diabetes (420).

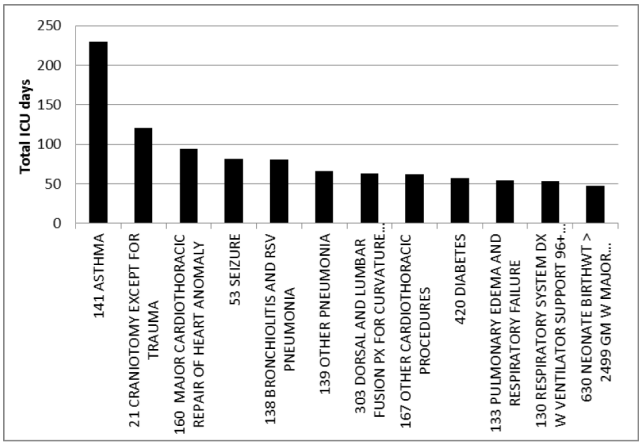

Figure 1: Top admitting APR DRG ranked per cases.

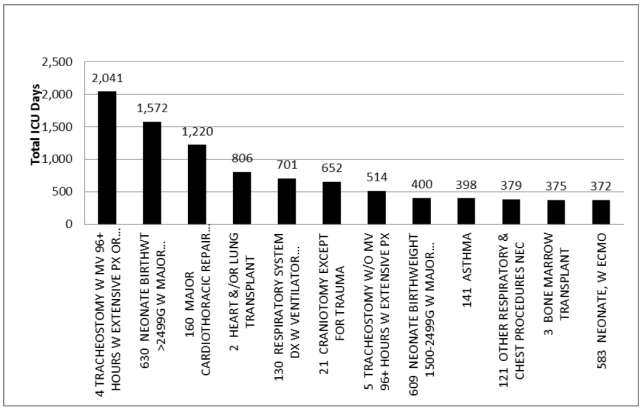

Figure 2: APR DRG ranking by Total Number of Patient Days.

The top 5 respiratory-related APR DRGs admitted to the PICU account for approximately 24% of all PICU and 45% of all PICU medical admissions, respectively. There were 227 asthma patients, accounting for 21% of the medical PICU admissions (47% of respiratory-related cases). The Asthma APR DRG admissions only accounted for 398 ICU days (5% of medical PICU patient days) with a mean PICU length of stay of 1.8 days and a total VDC of $ 1,045,338. The major cost-centers were Nursing, Respiratory Therapy, Pharmacy, Laboratory and other. While common, the asthma admissions were not included in this evaluation because: 1) they are relatively short admissions with lower costs, 2) the duration leads to limited opportunities for inpatient intervention, 3) numerous outpatient and emergency department interventions designed to reduce inpatient

admissions, and 4) as singular disease there are likely specific disease-related cost-management approaches.

The remaining 4 respiratory-related APR DRGs, accounted for a combined 254 patients, 53% of respiratory-related admissions and 23% of all medical PICU admissions. They accounted for 1,357 ICU days, 18% of all medical PICU patient days, with an average LOS of 5.3 days. Their total VDC was $ 2,988,349. These 4 non-asthma respiratory-related APR DRGs accounted 4x greater ICU days and 3x more VDC than asthma. Nursing accounted for 54% of VDC, which cannot be further delineated due to the way nursing costs are captured. Respiratory therapy services accounted for 20% VDC in this group. Pharmacy and laboratory only accounted for 7% and 3% of ICU VDC, respectively (Figure 3).

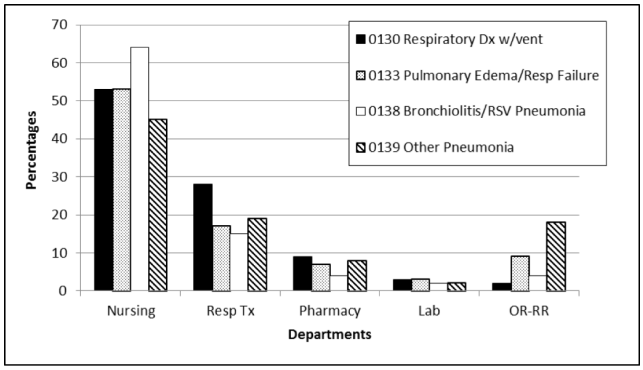

Figure 3: Variable cost distribution by APR DRGs.

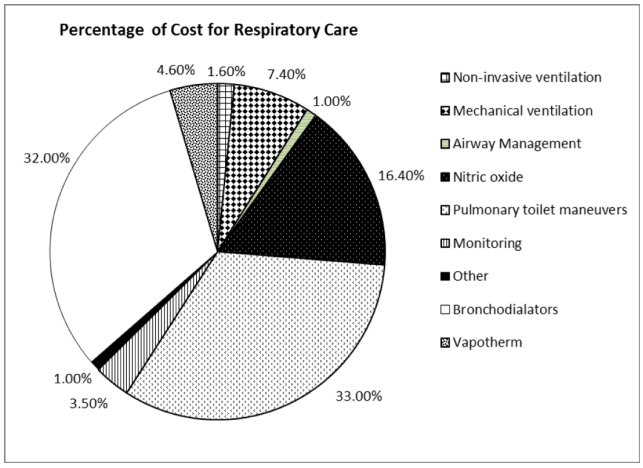

Figure 4: Percentage of Distribution of Respiratory Care Costs.

Respiratory therapy encompasses a wide range of services and products with a total VDC of $734,500 for these four ARP DRGs. About one-third of these costs cover pulmonary hygiene which includes chest physiotherapy, mucous clearance therapies, and vest therapies (an overall VDC of $202,000). Another third ($230,000) covers the delivery of bronchodilator therapy (not including the cost of the drug). Mechanical ventilation (both conventional and high frequency) accounted for 16.4% of the respiratory therapy costs (an overall VDC of $120,000). While notoriously expensive, nitric oxide therapy (drug cost and delivery) accounts for 15% of the total respiratory VDC or $109,000 (Figure 4).

Discussion

"Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it," is a well-known management axiom, by Harrington.

Healthcare in the United States is in crisis. Americans spend almost twice the proportion of Gross Domestic Product as many European nations resulting in approximately $8,900 per person in 2012 [3]. Administrators' attempts to reduce healthcare costs are a common occurrence; however, this should be done in a way that maintains the quality of care. To attain these goals, we must find a way to improve the efficiency of healthcare delivery and reduce inappropriate utilization of healthcare resources. It is challenging for many members of the healthcare team to include cost/benefit analysis in management decisions because of the general lack of understanding by healthcare providers of the complex system of true healthcare costs [9]. Yet, the American College of Physicians' code of ethics sets an expectation for physicians to use healthcare resources responsibly [10].

This analysis of variable direct costs for respiratory-related PICU admissions identifies several areas of potential cost-management strategies. In particular it identified that considerable resources are spent providing pulmonary toilet and bronchodilator therapy ($432,000 for the 4 APRDRGs analyzed). These interventions are different than other costly therapies like nitric oxide. Nitric oxide often has a protocol in place and is used for salvage or refractory disease where limitations are difficult to put in place. Pulmonary toilet and bronchodilators are often started "because they might help and can't hurt." There is little clinical evidence that these therapies are beneficial [11-13]. While they may not cause patient harm, they may add unnecessary costs because they require a highly qualified human presence required to administer the specific treatments. Therefore, using APR DRGs with their variable direct costs helped identify expensive respiratory care interventions. Perhaps similar analysis could be conducted for other patient groups to identify care that is provided without consideration of its cost effectiveness.

According to the American Hospital Association statistics, 50% of total health care costs are attributed to personnel costs [2,14]. In this study personnel cost exceeded this estimate because of the requirements of constant bedside care in PICU patients. While it is tempting to consider nursing staffing as a target for cost-management (as it is 54% of VDC), analyzing balance of excessive bedside care and inadequate care is difficult because nursing is a lump charge. One interpretation of this analysis might be that fewer respiratory therapists are needed and reductions in staffing would cut costs. We would argue that appropriate interpretation actually should target the inefficient use of respiratory care time delivering expensive therapy that is wasteful, not the number of staff. Hospital systems often attempt to implement cost-management strategies that downsize personnel. Yet, in the absence of effective medical interventions to restructure the care delivery model, this strategy will have the undesired effect. If the staffing ratio is altered, this will delay care and subsequently potentially lengthen the hospital stay and increase the readmissions.

This strategy for identifying cost-management targets has several limitations. This analysis utilized APR DRGs to classify patients into groups that received similar care. APR DRGs are based on the International Diagnosis Coding, version 9 (ICD-9) system and then are modified based on other care provided. The same primary ICD-9 code might end up in one of several APR DRGs based on the care provided to that patient. An example would be a child admitted with bronchiolitis who would be grouped into APR DRG 138 unless they required mechanical ventilation for more than 96 hours at which point they would be grouped in APR DRG 130. Similar examples occur with the ICD-9 code for acute respiratory failure, which can be grouped into either APR DRG 130 to 133 based on the care provided. While this methodology is imperfect, it does provide an alternative perspective to evaluate the care provided to patients. This analysis also reflects a single institution's practice patterns, which may not be generalizable to other institutions. Even if another institution may not utilize pulmonary clearance maneuvers, it is likely that a similar analysis of the VDCs would find alternative expenditures with similar documented clinical efficacy. Additionally, the APR DRG VDC data includes all segments of care (from admission to discharge). Critical care is only one segment in the continuum of pediatric care ranging from admission via the emergency department or operating room to inpatient care and final discharge, which is difficult to isolate in this data. This could only be accomplished if each encounter would be analyzed separately; a more time consuming and therefore, expensive project which limits its utility in identification of potential targets. Such a detailed analysis would be more useful in assessing the efficacy of the implementation of a cost-management strategy.

This cost break-down strategy can offer clinicians a medically meaningful glance at the cost of care. Using the respiratory-related APR DRGs as a case study, the data suggests that personnel costs to provide care and administer medications trumps other areas of care. Thus, partnering with the medical team and working actively towards improved care coordination, reduction in overtreatment, implementing better care processes offers better odds for success. These are a few of the main areas proposed by Berwick et al. as best strategies to reduce expenditures and keep pace with the rising cost of health care [15]. The current health care challenge can only be met with physician participation. It is past time that the bedside physicians engage in understanding the structure of the cost of care and design cost-conscious care processes.

Conclusion

The expectation to use healthcare resources responsibly demands better understanding of costs associated with delivering various medical interventions. Cost analysis using APR DRGs to group patients into similar patterns of care can provide meaningful financial data that could trigger cost-management interventions. This complex process has best chances to succeed with the participation of the entire medical team and with direct physician leadership.

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