Safety and Operational Efficiency of Anesthesiology Directed Sedation for Pediatric Diagnostic Imaging

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Introduction: Safe sedation is essential for pediatric radiological imaging (1-3). In September 2005, anesthesiologists at our institution organized a sedation service for all children undergoing diagnostic imaging. The purpose of this study was to examine the effect of this service on patient safety and operational efficiency in a tertiary care pediatric center.

Methods: The sedation service was staffed by 2.5 FTE physicians (1.5 FTE anesthesiologists and 1 FTE critical care medicine physician) and 25.8 FTE nurses. The service established a process where patients were triaged to receive sedation by nurses or physicians, based on their health status. Nurses used sedation regimens consisting of chloral hydrate for infants and a combination of midazolam (0.1mg/kg) and pentobarbital 3mg/kg IV (maximum 3 doses) for older children. Anesthesiologists administered propofol infusions at 125-175 mcg/kg/min for most patients and inhalation agents for selected cases. Critical care medicine physicians were credentialed to administer propofol for deep IV sedation after training in airway management and sedation. All patients were monitored during and after the study per ASA and AAP guidelines. Nurses were cross-trained to provide both sedation and PACU care. Data were extracted from hospital databases: (1) adverse events from hospital QI (2) productivity and patient backlog from Radiology scheduling and (3) billing information. For statistical analysis, patients were divided into: group 1 (before) and group 2 (after the sedation service was started).

Results: The average daily census of completed cases increased by 19.6% and the backlog for routine cases significantly decreased by 24.3% after the start of the sedation service. The incidence of hypoxemia decreased significantly from 0.45% to 0.1% ($p=0.0002$). Hypotension was noted more often in group 2, probably related to the use of propofol. Fewer patients in group 2 required rescheduling of an imaging study for failed sedation. Nine of the 13 patients with failed nurse-administered sedation received general anesthesia on the same day. Hospital billings increased by 20%. Anecdotal comments from physicians and nurses suggested that the availability of anesthesiologists in the sedation service provided the opportunity for better coordination between multiple specialists and the operating room for urgent procedures.

Discussion: The reluctance of some pediatric anesthesiology departments to provide procedural sedation has led nurses or other specialists to meet this demand (2,3). In this study, we have shown that operational efficiency and patient safety improved in an anesthesiologist-led service model. The reduced incidence of hypoxemia suggests the sedation service detected airway obstruction and intervened earlier. Data from this study can be used to negotiate hospital contracts between the anesthesiology department and the institution.

Conclusions: Patient safety, work flow efficiency and institutional billings increased with the establishment of an anesthesiologist-run sedation service.

References:

(1) AAP Committee on Drugs. Pediatrics 1992;89:1110-15
(2) Yaster M, Cravero J, Journal of Pediatrics 2004;145:10-12
(3) Wetzel R, Anesth Analg 2006;103:859-62

Table 1

Group	Group 1 (Oct 04-Sept 05)	Group 2 (Nov 05-Oct 06)
N	5146	5967
Nurse administered sedation	4389	2769
Physician administered sedation	757	3198
Average daily census (total)	78.7±2.7	87.7±9.8∗
Average daily census (sedated)	13.0±1.1	16.0±2.4∗
Backlog for routine study with sedation (days)	25.6±1.9	19.4±4.6∗
Rescheduled for failed sedation	18	4∗
Hypoxemia	23	6∗
Hypotension	0	7∗

∗$p < 0.01$