This is the first article from a nursing journal for our journal club. Does that bias you? Should it? One of the greatest recent advances in hospital care (the central line bundle) came from previously ignored & overlooked studies in nursing journals.

Pain Management of Children Aged 5 to 10 Years After Adenotonsillectomy

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Purpose: *The undertreatment of pediatric pain has been widely researched and continues to be a concern for health care professionals. Adenotonsillectomy is a common pediatric surgery associated with a moderate-to-high level of postoperative pain. The purpose of this study was to increase understanding of the current pain management practices provided to children aged 5 to 10 years undergoing adenotonsillectomy and identify areas for improvement.*

Design: *A retrospective descriptive design was used.*

Methods: *An extensive review of the literature on pediatric pain management after adenotonsillectomy provided the evidence to compare against the care currently provided at our institution. A retrospective chart review of 100 children who have undergone outpatient adenotonsillectomy surgery over a 6-month period was conducted.*

Findings: *Patients who received combination opioid analgesic medications either intraoperatively or during Phase I had significantly lower pain scores in Phase II than those who received monotherapy in either setting.*

Conclusions: *The combination of drug therapy and parental presence may be helpful in decreasing pain and postanesthesia care unit length of stay. Exploration of the role of nonpharmacologic pain management techniques such as distraction, guided imagery, music, and the use of ice collars in conjunction with analgesic therapy is needed.*

Keywords: *pain management, pediatric, tonsillectomy, surgery, perianesthesia nursing, research.*

PEDIATRIC PAIN MANAGEMENT is and has been a concern for health care professionals. At times, the management of pain in children is suboptimal. Research has shown that pain medications in the pediatric population are underused.[1-3] This underutilization can be attributed to several factors including nursing and parental concerns.

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No external funding

Conflict of interest: None to report.

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1089-9472/$36.00

http://dx.doi.org/10.1016/j.jopan.2013.05.010

Impact Factor 1.125 (Pediatrics is 5.1)

The Impact Factor of journal J in the calendar year X is the number of citations received by J in X to any item published in J in (X-1) or (X-2), divided by the number of source items published in J in (X-1) or (X-2).

Adenotonsillectomy is an extremely common, painful surgical intervention in the pediatric population.[1,3-6] It is also a surgery where many of the patients go home the same day or within 23 hours after the procedure. Pain management for these patients is one of the primary nursing concerns in the pediatric postanesthesia care unit (PACU). Preparing caregivers to continue adequate pain management at home is vital. Recent clinical practice guidelines for tonsillectomy in children emphasize the importance of educating caregivers about managing pain.[1]

Adequate pain control can be challenging to achieve.[4,5,7,8] The nursing staff on the study unit had not recently examined the pain practices in the PACU in a systematic way. This research was designed to identify areas for improvement and refine our pain management strategies in children undergoing adenotonsillectomy.

No clear hypothesis here. This is the closest.

Purpose

Here's an objective.

The purpose of this study was to describe the current pain management of children (aged 5 to 10 years) in the PACU after adenotonsillectomy. Exploring relationships between demographics and pain management variables were the key areas of focus for this study.

Literature Review

Use of a sample of children undergoing adenotonsillectomy is a powerful model for the study of postoperative pain because of the large numbers of children undergoing this procedure.[3,7] Approximately, 1,500 children undergo adenotonsillectomy annually in this pediatric tertiary care center. In addition to being a common surgery, adenotonsillectomy is a procedure associated with moderate-to-high complaints of pain postoperatively and for the first few days after the procedure.[3-6] Children have more pain after adenotonsillectomy as compared with other types of outpatient surgery.[9-11] Because this is a high volume procedure with a high incidence of pain, examining pain management in this population is valuable to many pediatric patients and their health care providers.

most common peds surgery and painful to boot. What a great subject for a peds pain study!

Despite advances in pain management, research shows that children's pain is often undertreated.[10] Researchers report that children in the hospital often receive analgesics in subtherapeutic doses and at less than optimal intervals.[3] Children are not always able to participate in addressing their pain concerns and are dependent on health care professionals for pain reduction interventions. In one study, pediatric nurses attributed higher pain scores to children who expressed their pain vocally and were more likely to administer analgesics to children who were more vocal about their pain.[10]

Based on the study institution's pain standard of care, children aged between 5 and 10 years can provide self-report of pain using the Wong/Baker Faces tool[12] or a numeric visual analog scale. The use of various pain measurement tools has aided nurses in identifying levels of pain for patients who are less vocal. Behavioral pain observation tools are also used by health care professionals to determine the need for analgesics.[10] Because children cannot always take an active role in their pain management, it is imperative that nurses have a better understanding and knowledge of pain management. Pain management issues unique to the pediatric PACU include heightened anxiety, a potentially altered sensorium making it difficult for self-report of pain, and an unfamiliar environment that can appear very frightening (eg, face masks).[4,13]

Being able to report and discuss pain issues is a valuable way to address concerns and develop a pain management plan. However, nurses cannot or do not always assess children's pain effectively.[14] To improve pain management, nurses need to acknowledge the relevance of pain assessment and management.[4,14,15] Some reasons cited in the literature for inadequate pain management in children include:

- Child's age and difficulty with self-report
- Nurses' clinical judgment (can be influenced by their beliefs and attitudes)
- Pain assessment, rather than total amount of analgesic, should be the outcome of choice to evaluate pain management
- Myths and misconceptions regarding pediatric pain management (eg, fear of addiction)[3,4,6]

wonder if holding this myth correlates with vaccine mvths

In the hospital setting, nurses often underestimate children's pain after adenotonsillectomy.[10] So, of no surprise, studies still report that children experience significant pain postoperatively.[4,14]

Additional research regarding patterns of pain intensity and analgesic use in the hospital may be helpful in developing interventions to improve pain management in children after adenotonsillectomy.[10] The impetus to critically examine current practice and to implement improvements in practice is an important developmental goal for nursing staff.

Study Design

So why did they choose '100'? Is it just a nice number since we evolved 10 fingers and therefore use a base-10 number system?

An exploratory retrospective chart review was used to assess clinical practice for pain management of adenotonsillectomy patients. To gather information about the nature of pain and its treatment, 100 charts of patients aged between 5 and 10 years who had an adenotonsillectomy over a 6-month period were reviewed. The study was approved by The Children's Hospital of Philadelphia institutional review board.

Setting

A pt must score 10 out of 12 items on the Post-Anesthetic Recovery Scoring System to move from Ph1 -> 2

This study was conducted in a PACU located in a free-standing, 400-bed tertiary care children's hospital at an academic medical center. Approximately, 1,500 adenotonsillectomies are done per year at the main hospital. Patients receive Phase I and Phase II care in the same space without transfer. Patients are discharged home after completing recovery in this unit. Parental visitation in the PACU is the norm.

Sample

These authors write as if they did not intend non-PACU RNs to read this! There are accepted definitions of Phase 1 & 2 using the (although a convenience sample of 3 3 West RNs did not know them).

Of the nearly 1,500 children who underwent adenotonsillectomy in 2008, more than 800 were aged between 5 and 10 years. With the goal of exploring pain management practice for this target population, we decided to review charts from the previous 6 months, January 2009 to July 2009, or 400 patients. Inclusion and exclusion criteria for chart selection are listed below.

Inclusion criteria were:

1. Children aged 5 to 10 years
2. Outpatient adenotonsillectomy between January 1, 2009 and June 30, 2009
3. Complete chart, that is, 100% of the documentation present for variables being collected

so the kid who coded and the paperwork was lost in the kerfuffle was probably excluded....

Exclusion criteria included:

1. American Society of Anesthesiologists status of III or higher (anesthesia classification system) OK - they're looking for typical kids
2. Developmental delays (ie, Down syndrome, mental retardation, or cerebral palsy)
3. Patients admitted pre- or postoperatively
4. Patients on pain medication for chronic pain
5. Children with behavioral issues (eg, autism)
6. Allergy to all narcotics bummer. I hope they're not one of those kids who has a biochemical reason so that 'tylenol and motrin don't work'
7. History of surgical or postanesthetic complications

One investigator screened a convenience sample of approximately 400 charts to yield 100 charts meeting the above-listed study criteria. Starting with the most current date, July 2009, charts were screened and included until 100 charts were obtained. A total of 100 charts, or one quarter of the patients cared for in this 6-month period, were considered to be representative of pain management practice for this target population.

what was convenient about it? Were these the 400 or so charts stacked on her desk b/c she's behind on her paperwork? Were they from another study? Does it make a difference?

we usually expect a table or stat to back this up... actually we should always expect it

Data Collection Tool

A data collection tool for chart review was developed, piloted, and revised. The data collection process was comprehensive starting with preoperative care through discharge from the PACU to home. Information collected included pain management; dose, time, and route of pain medications; and basic demographic information about the subject. One demographic variable, body mass index (BMI), was of interest because of the current attention to obesity in children as a major public health problem and the link between obesity and adenotonsillectomy, especially used to treat obstructive sleep apnea (OSA) in current research literature.[16,17]

key variables collected. Wait and see if they list their outcome variables anywhere.

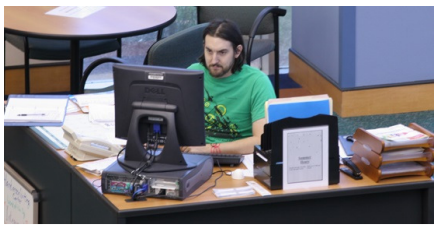
nice thought. should have mentioned it in objectives though, as well as the other surprise objective they'll spring on us later on

Procedure

The focus was on children aged 5 to 10 years because this is the average age of the adenotonsillectomy patient population at the study institution. To achieve effective pain management, all aspects of pain management that could lead to greater patient and family satisfaction were examined. To understand pain management in this group, surgical techniques; medications given before, during, and after surgery; and the response to these medications were examined. Pain assessment scales

which pain-assessment scales?

really?? 'all' aspects? did they measure whether a kid brought his teddy bear or not?



here he is, toiling away checking inter-rater reliability

GOOD STUFF HERE!

Nice Table 1!

used to identify pain aided in understanding the severity of pain. An important aspect in pain management is the child's previous experience with pain. This can give needed information that aids in helping to enhance the pain management for the patient. The chart review documentation tool was organized to encompass all of these variables.

this could be strict agreement or the kappa statistic which takes chance agreement into account. No details though on what that work-study student did

To assure inter-rater reliability, two of the coinvestigators piloted the chart review tool until 90% consistency was reached. The study investigators trained a work-study student to perform chart audits and established inter-rater reliability. Frequent audits of extracted data were performed for consistency and reliability.

The data were retrieved from both electronic and paper sources and entered into an electronic database. During the data collection process, one coinvestigator randomly audited 10% of the charts to assess that our data collection remained consistent and accurate.

these could of/should of been combined into the same sentence, or at least the same section.

Data Analysis

one of the 3 big stats software along w/ Stata & SAS

Data from the chart review were entered into an Excel (Microsoft Office, 2003, Microsoft, Redmond, WA) spreadsheet and then imported into SPSS version 16.0 (SPSS Inc, Chicago, IL) for analysis. Descriptive statistics (mean, median, and standard deviation) were used to report data for each relevant variable. Relevant data about the pain medication provided the recorded pain scores, and the amount of time the child needed to recover from surgery were also calculated using descriptive statistics. In cases when pain scores were elevated over time, factors such as patient age and the adequacy of medications ordered and administered to relieve pain were analyzed using correlational statistics and analysis of variance (ANOVA). These data provided important information that identified variables influencing adequate or inadequate pain management for this group of children.

Here's the outcome, but you'd like more detail right? Is there any objective means to determine when they were 'recovered'?

Results

The charts of 100 children aged 5 to 10 years (mean: 7.2 years ± 17 months, 52% male, 46% White, 37% Black/African American, and 2% Asian) provided data for analysis. Most children (82%) were surgery naive and 68% had no previous hospitalizations. Cautery was by far the most common surgical technique used (91% of the sample; Table 1).

Table 1. Sample Characteristics (N = 100)

Variables	%
Gender	
Male	52
Female	48
Race	
White	46
Black/AA	37
Asian	2
Age (y)	M = 7.2 (±17 mo)
Previous hospitalizations	
0	68
1	27
2	2
>2	2
Previous surgeries	
0	82
1	11
2	4
3	3
Surgical technique	
Cautery	91
Coblation	6
Other	3

AA, African American.

Video of Cautery T&A with cool background music

technically a method. Just the results please.

The BMI was calculated for each subject based on their recorded height and weight (Table 2). Of interest was to discover if the current increase in pediatric obesity would be reflected in this population of children undergoing adenotonsillectomy. One-quarter of the children were above the 97th percentile for BMI and an additional 13% were between the 90th and 97th percentile, whereas only nine children were at or below the 10th percentile. More than half the subjects (52%) were at or above the 75th percentile. Girls (n = 20) and

Table 2. Subject's Body Mass Index by Percentile and Gender (N = 98)

Percentile	Male (N = 51)	Female (N = 47)	Total (%)
<3	2	1	3
3-10	0	6	6
10-90 (Normal)	31	26	57
90-97	2	11	13
>97	16	9	25

uh..where's the other 2 kids?

Why choose these categories? Are they standard? But then again, they don't use these categories anyway for their analysis.

boys (n = 18) were equally distributed in the BMI groups at or above the 90th percentile, whereas of the nine children at or below the 10th percentile, seven were girls and two were boys. Subjects were grouped by low (9%), normal (57%), or high (38%) BMI for analysis.

Pain Scores and Analgesic Administration

In the PACU, in both Phases I and II, nurses used the Faces, Legs, Activity, Cry, and Consolability (FLACC) scale to assess pain in 66% of the patients.[18] This behavioral pain assessment scale provides a metric of 0 to 10 with no pain equal to zero up to a maximum of 10. Because many of the patients are sleeping or groggy from anesthesia, self-report is often difficult. Self-report pain scales used included the Wong/Baker Faces scale, a series of cartoon faces with a 0 to 10 metric or a 0 to 10 numeric rating scale. Each of the scales used has a common metric of 0 to 10. Nurses' judgment determined the scale choice at the time of assessment.

Pain assessments were completed when the child arrived from the operating room (OR) and frequently (as often as every 15 minutes) during their PACU stay in an effort to determine the effectiveness of analgesic medication and the progression of the patient's status. Pain assessments followed the child's recovery and pain management trajectory so that timing of assessments was variable. To compare pain assessments during the recovery period with other relevant variables, the first score recorded in Phase I and the first score recorded when the patient reached Phase II were analyzed to assure consistency and equivalency of the comparisons. Mean pain scores did not differ significantly by gender in either Phase I (males, M = 2.96; females, M = 3.32; $P = .647$) or Phase II (males, M = 1.28; females, M = 1.33; $P = .920$) time points. As such, gender was not included as a covariate in any further analysis. Additionally, no significant differences were found for pain scores at the start of Phases I and II based on race, number of previous hospitalizations, or surgeries.

so we can assume they know the proper times to use a t-test and when not to use it.

Total time in PACU was analyzed using nonparametric statistics owing to unequal numbers and indicated no statistically significant difference by surgical technique ($P = .12$). Average time in the PACU was 122.2 minutes (median: 115, range: 60-229 minutes) for the 91 patients who had cautery compared with the average time of 139.5 minutes for the six patients with coblation (median: 134.5, range: 110-183 minutes).

Pain scores at the start of Phase I recovery ranged from 0 to 10 with a slight bimodal distribution (M = 3.43, standard deviation [SD] = 3.83). A total of 56 of the children had a score of zero with an additional 4 at a score of 4 or less, 16 children scored between 5 and 7, and 23 children scored between 8 and 10. Thus, one-third of the children had a score ranging 5 or greater, interpreted as moderate-to-severe pain. The first pain assessment in Phase II recovery indicated lower pain scores on average (M = 1.3, SD = 2.22) with 76 children at or below a score of 4 and only eight children at 5 or above.

doesnt sound like a normal distribution to me

All pain medications administered to the children were recorded including drug, dose, route, and time. Most patients (61%) received intravenous (IV) morphine only in the OR, 14 patients received IV fentanyl only, whereas one-quarter (n = 25) of the patients received a combination of IV morphine and fentanyl. Average pain scores by group were

Hey! What's this doing here? This section seems to have been abducted from the Methods Section!

how did they compare means? probably a t-test, but should mention that.But where are the SD? sloppy..

Table 3. Relationship Between Analgesics Administered in the Operating Room (OR) and Phases I and II Pain Scores and Length of Stay (LOS)

Medications Administered in OR	Number of Patients	Phase I Pain Score (Mean)*	Phase II Pain Score (Mean)*,†	LOS in PACU, min (Mean [Minimum-Maximum])
Morphine IV (0.1-0.2 mg/kg)	61	2.73	1.2	124.3 (60-229)
Fentanyl IV (0.5-2 mcg/kg/dose)	14	2.86	2.6	119.9 (80-190)
Morphine IV and fentanyl IV	25	4.29	0.7	123.6 (80-195)

mean goes w/ SD. median probably would have been better

PACU, postanesthesia care unit; IV, intravenous.
*Average of first pain score at beginning of Phases I and II.
†$P < .05$.

are the FLACC and Wong-Baker scores equivalent? Can you match them up & combine them like this? We should want to see both. Also, how many pain assessments total? How many for each kid? What types for each kid? Journal-reading minds want to know.

Table 4. Relationship Between Analgesics Administered in Phase I on Pain Scores and Length of Stay (LOS)

Medications Administered in Phase I	Number of Patients	Phase I Pain Score (Mean)*,†	Phase II Pain Score (Mean)*,‡	LOS in PACU, min (Mean [Minimum-Maximum])
Morphine IV (0.1-0.2 mg/kg)	25	2.88	1.74	124.7 (80-229)
Oxycodone PO (0.05-0.1 mg/kg)	9	0.56	2.44	125.8 (93-150)
Morphine IV and oxycodone PO	49	3.94	0.54	121.1 (60-203)

PACU, postanesthesia care unit; IV, intravenous; PO, by mouth.
*Average of first pain score at beginning of Phases I and II.
†$P < .05$.
‡$P = .01$.

notice how the kids in most pain got the most drug, and how they had the best Phase 2.

compared at both the start of Phase I and Phase II to determine the effect of intraoperative analgesics on pain score. As can be seen in Table 3, subjects who received combination opioid analgesic medications intraoperatively had significantly lower average pain scores in Phase II (M = 0.7, $P < .045$, $F = 3.22$) than those who received monotherapy. Those same subjects had higher mean pain scores at the start of Phase I (M = 4.29), which may explain why they were rigorously treated for pain during Phase I, resulting in a lower mean pain score in Phase II. Mean length of stay in the PACU was not significantly different based on analgesics provided in the OR. Length of stay was based on when the patient arrived into the PACU for Phase I to when they left to go home.

how did they determine this?

A similar difference was seen when comparing Phase II pain scores with analgesics administered during Phase I (Table 4). In this case, subjects (n = 49) who received both morphine IV and oxycodone by mouth (PO) had significantly lower pain scores at the start of Phase II (M = 0.54, $P = .01$) than did subjects receiving either analgesic alone. Length of stay did not differ.

Analgesics administered during Phase II included oxycodone alone (n = 32) or in combination with acetaminophen (n = 2); the remaining three subjects received both IV morphine and oxycodone PO during Phase II (Table 5). Because of the small numbers of subjects in two of the three groups, statistical analysis by group was not appropriate.

Mean pain scores from Phases I and II were compared with subject BMI data using ANOVA to examine the relationship between BMI and pain levels. There was no significant relationship by BMI group and mean pain scores at either Phase I or Phase II, indicating that assessed levels of pain did not differ by patient size (BMI; Phase I, $F = 0.77$, $P = .47$; Phase II, $F = 0.24$, $P = .79$).

more methods in the results section!

all of a sudden they want to report stats and go overboard. Weird that they report a few F statistic (that derive the p-value for ANOVA) yet over 20 SD's are missing throughout

Parental Presence

Parents usually wait in a designated waiting area proximal to the PACU. Parents are encouraged to join their child in the PACU as soon as possible.[19] Parents arrived at the bedside in an average of 18 minutes with a range between 0 and 48 minutes. Children whose parents arrived to the bedside within 18 minutes of their child's PACU admission had a significantly shorter total length of stay (M = 113.59 minutes) compared with those

where'd this come from? Guess this was covered when the methods said 'all' factors. Let's submit an IRB proposal to study 'all' things in the hospital and see how it flies

Table 5. Relationship Between Analgesics Administered in Phase II on Pain Scores and Length of Stay (LOS)

Medications Administered in Phase II	Number of Patients	Phase II Pain Score (Mean)*	LOS in PACU, min (Mean [Minimum-Maximum])
Oxycodone PO	32	1.93	127.5 (80-211)
Oxycodone PO and acetaminophen (15-20 mg/kg)	2	0	126.5 (91-162)
Oxycodone PO and morphine IV	3	2.33	102.6 (80-143)

PACU, postanesthesia care unit; PO, by mouth; IV, intravenous.
*Average of first pain score at beginning of Phase II.

these are the same things. Waste of ink as Edward Tufte would say

Here is a pic of the 'later arrivals'

Very cool but who would have know this was being studied???

Table 6. Total Time in PACU by Early Versus Later Arrival of Parent at Bedside

Parameters	Early Arrival ≤18.3 min	Later Arrival >18.3 min
Mean*/Median (SD)	113.6*/110.5 (27.2)	137.3*/132.0 (36.6)
Range	60-211	80-229
25th Percentile	94	105
50th Percentile	110.5	132
75th Percentile	128	162

finally!

how many in each group? about half?

You'd hope your mom or dad could hold off on getting a smoke so they could get to your bedside sooner than 20 min..

PACU, postanesthesia care unit; SD, standard deviation.
*$P = .02$.

whose parents came after 18 minutes (M = 137.27 minutes, $P = .02$; Table 6).

In summary, reports of pain after adenotonsillectomy were lower when combination opioid analgesic medication was provided either in the OR or during Phase I and Phase II recovery. The PACU length of stay was not significantly different by either type or combination of analgesic medications received. Data also support the positive effect of early parental presence in the PACU with regard to earlier discharge to home for children whose parents are at the bedside sooner.

probably the most useful tidbit from the whole paper

Discussion

One of the purposes of this study was to understand the current pain management of children (ages 5-10 years) in the PACU after adenotonsillectomy. Results showed that pain management throughout the perioperative experience for children undergoing adenotonsillectomy varied considerably. Pain management can be clinician dependent. Based on the results of this study, patients who received combination opioid analgesic medications either intraoperatively or during Phase I had significantly lower pain scores in Phase II than those who received monotherapy in either setting. Multimodal treatments can improve postoperative pain relief.[20]

still was in this study. How would you design a study to take the next step in this field?

In this study, the relationships between demographic and surgical variables and the child's pain outcomes were also explored. Of note, based on calculated BMI data, 50% of the children were at or above the 75th percentile and 25% were at or above the 90th percentile regardless of gender. OSA linked to being overweight is a common indication for adenotonsillectomy. Interestingly, however, no differences were seen in pain scores by BMI group, indicating pain management did not seem to be influenced by patient size.

Overall, the PACU length of stay was not significantly different either by type or combination of analgesic medications received. This finding is similar to that found by Smith et al[21] when comparing morphine only to a morphine combo pain management therapy.[22] However, results did show that early parental presence at the bedside resulted in a decreased PACU length of stay. This is supported by current literature supporting that parental presence in the PACU enhances collaboration between the family and staff. This leads to increased satisfaction, better patient outcomes, and potentially decreased recovery times.[20]

Limitations

The greatest limitation of this study was reliance on charted data without the ability to clarify. For example, although we know anecdotally that nonpharmacologic pain management techniques such as music and positioning are used, they were not charted and therefore were not captured. Additionally, the data represent practice at one institution, although demographic characteristics have been described so like institutions can compare these findings to their patient population.

..but didn't they say 'all' things were captured?

Implications

One of the purposes of this study was the identification of areas for improving pain management. The combination of drug therapy and parental presence may be helpful in decreasing pain and PACU length of stay. Exploration of the role of nonpharmacologic pain management techniques such as distraction, guided imagery, music, and the use of ice collars in conjunction with analgesic therapy

another interesting tidbit...

ice collars are 1930s tech

here's the Cochrane on music as an analgesic

is needed. Future research directions could include identification of patient characteristics and interventions, which lead to effectively managed or undermanaged pain. This data will also guide staff in pilot testing different pain management nursing interventions.

not a single self-stimulatory reference. good.

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