Teaching Residents Established Guidelines And Standards of Care To Strengthen Their Cost-Containment Practices

A program that outlined the concepts of evidence-based medicine improved residents' knowledge about treatment costs

Greg P. Marconi, MD, clinical instructor of pediatrics at the Keck School of Medicine at the University of Southern California, and Alan L. Nager, MD, MHA, associate professor of clinical pediatrics at the Keck School of Medicine at the University of Southern California

ABSTRACT

Purpose

This small-scale, preliminary study was intended to evaluate the effectiveness of a structured educational intervention designed to enhance cost-awareness in medicine residents.

Design

The study took place at a large tertiary care children's hospital between March 2007 and December 2008. Participants randomly participated in the intervention group and were enrolled during resident noon conference time slots; the control group participated one by one as schedules allowed.

Methodology

The educational intervention, a one-hour PowerPoint tutorial based on current published practice guidelines from the American Academy of Pediatrics (AAP), was given only to the intervention group. Both control and intervention groups were evaluated pre- and post-intervention using a self-administered questionnaire that utilized clinical case vignettes to assess their understanding of practice guidelines as a proxy for cost awareness.

Principal findings

Eighty pediatric residents participated in the study, 40 in each group. The average number of correct answers on pre- and post-intervention questionnaires increased from 8.32 to 13.62 of 19 questions for the intervention group, compared to an increase from 8.35 to 9.85 for the control group. The increase in the intervention group was significantly higher than the increase in the control group ($P<.001$).

Conclusions

Following structured teaching that outlined the concepts of evidence-based medicine, an increase was seen in residents' knowledge of strategies for containing costs.

Corresponding author:
Greg P. Marconi, MD
Division of Emergency and Transport Medicine
Children's Hospital Los Angeles
4650 Sunset Blvd, Mailstop #113
Los Angeles, CA 90027
Phone: (323) 361-2109
Fax: (323) 361-3891
E-mail: gmarconi@chla.usc.edu

INTRODUCTION

According to the American Hospital Association and the Agency for Healthcare Research and Quality (AHRQ), the charge for an average hospital stay in the United States increased by 24% from $13,900 in 1997 to $17,300 in 2002, after adjusting for inflation (American Hospital Association 2002). The charge for the average hospital stay has been shown to be more than 60% higher in teaching hospitals than in nonteaching hospitals (Frick 1985). More recently, teaching hospitals were found to be 44% more expensive than nonteaching hospitals, after adjusting for case mix, wage levels, and direct educational costs (Mechanic 1998). In another study, only about 10% of teaching hospitals were found to be as efficient as nonteaching hospitals, based on their provision of patient services (Grosskopf 2001). In today's economy, teaching hospitals, challenged by managed care, are forced to cut costs and compete with nonteaching hospitals to be profitable.

There is an ongoing push to encourage physicians to follow evidence-based medicine (Chessare 1998, Frazier 1998). With a changing health care system, there also has been a push to encourage more cost-effective care (Miyakis 2006, Reichert 2000). The Accreditation Council for Graduate Medical Education (ACGME), in its 2007 Common Program Requirements on system-based practices, states that "residents are expected to incorporate considerations of cost-awareness and risk-benefit analysis in patient and/or population based care as appropriate" (ACGME 2007). Although it is clear that evidence-based medicine and cost-effective care are not the same, they are not mutually exclusive either. Drummond adds, "In many ways, evidence-based medicine and cost-effectiveness address the same issues … cost-effectiveness studies are

built on clinical data conforming to the quality criteria proposed by advocates of evidence-based medicine" (Drummond 1998).

The McMaster University group states that "evidence-based health care promotes the collection, interpretation, and integration of valid, important, and applicable patient-reported, clinician-observed, and research-derived evidence. The best available evidence, moderated by patient circumstances and preferences, is applied to improve the quality of clinical judgments and facilitate cost-effective health care" (Fink 2002).

In general, published practice guidelines that were developed through the use of evidence-based medicine may promote cost-effective care by outlining a standard for a particular problem within relatively defined boundaries. For instance, minor head trauma may require observation of a patient — not observation in addition to computed axial tomography (brain), laboratory studies, etc. Following practice guidelines may dissuade the physician from unnecessary or anecdotal medical practices, thus eliminating unneeded costs.

Teaching evidence-based medicine to residents has become commonplace, with a national survey in 2000 finding journal clubs in 95% of internal medicine residencies and free-standing evidence-based medicine curriculum in 37% of residencies(Green 2000). Even with the push to promote evidence-based medicine, there is still less known about how training programs are promoting cost-containment practices to physicians in training, as the ACGME recommends in its 2007 program requirements. One method that could enhance this awareness of cost-containment is to provide an increase in structured education for medical residents to learn cost-effective strategies. By delivering quality, standard-practice medical care, the utilization of the limited supply of medical resources is optimized, which will ultimately improve quality of care and may at the same time encourage cost containment.

The purpose of this small-scale, preliminary study, known as a pilot study, was to evaluate the effectiveness of a structured educational intervention designed to enhance cost-awareness in medicine to physicians in training.

METHODS

This prospective interventional study evaluated change in knowledge regarding focused practice guidelines before and after a structured educational intervention — in this case, a lecture. The study took place at Children's Hospital Los Angeles, a large tertiary care hospital, between March 2007 and December 2008. The target study population was pediatric residents. Any categorical pediatric resident enrolled in the pediatric residency program who did not have post-medical school training at another institution was included.

Exclusions were any pediatric resident not in the categorical pediatric residency program, any visiting medical resident, any pediatric resident who had any post-medical school training at another institution, and any pediatric resident with prior cost-effectiveness education.

The intervention group was randomly enrolled during resident noon conference, and controls were enrolled on an individual basis when they were free of clinical duties. All participants completed informed-consent forms according to Institutional Review Board procedures at our institution. The residents who attended the noon conference educational lecture functioned as the intervention group and those who did not became the control group. All participants were blinded to study endpoints.

The tutorial, a one-hour PowerPoint presentation developed by the principal investigator, was based on current practice guidelines published by the AAP and Centers for Disease Control and Prevention (CDC). The AAP and CDC guidelines included: Managing Acute Gastroenteritis Among Children (CDC 2003), Management of Minor Closed Head Injury in Children (Committee on Quality Improvement 1999), Management of Hyperbilirubinemia in Newborns (Subcommittee on Hyperbilirubinemia 2004), Evaluation of Child with Simple Febrile Seizure (Subcommittee on Febrile Seizures 1996), and Diagnosis and Treatment of Initial Urinary Tract Infection in Infant or Young Child (Subcommittee on Urinary Tract Infection 1999). The tutorial and questionnaires were peer-reviewed by representatives from the AAP to ensure that they were appropriate instruments.

All participants were evaluated before the intervention using a self-administered questionnaire that contained clinical case vignettes designed to assess their knowledge of medically focused practice guidelines. The intervention group attended a structured lecture detailing established guidelines published by the AAP. All participants were again evaluated using a post-intervention questionnaire on the same day as the pre-intervention questionnaire. The pre-intervention and post-intervention questionnaires given to all subjects evaluated the same concepts and were administered over the same approximate time interval, but were phrased differently to reduce answers from memory.

STATISTICAL ANALYSIS

Since both the pre- and post-intervention questionnaires had 19 questions, the number of correct answers was used as the outcome measure for this study. We compared the demographic characteristics of the intervention and control groups using two-sample t-test and Mann-Whitney rank-sum test for means

and chi-square test for proportions. A comparison was made by examining the difference of the mean number of correct answers pre/post-intervention and the difference seen between these intervals for both the intervention group and control group using 2-sample t-test and analysis of variance wherever appropriate. A 2-factor analysis of variance to assess any interaction between postgraduate year (PGY) level and gender was also used.

RESULTS

Table 1 compares the demographic characteristics of the control and intervention groups. There was no statistical difference in level of training (P=.72), gender (P=.63), and average age (P=.27) between control and intervention groups.

A comparison of the average number of correct answers out of 19 questions for each group on the pre-intervention questionnaire and post-intervention questionnaire and the change between both intervals is shown on Table 2. The table further provides the results stratified by PGY and gender.

Before the intervention there were no significant differences between the control and intervention groups for all PGY levels and for both genders. The average number of correct answers in the control group was 8.35, and the average in the intervention group was 8.32.

After the intervention, the average number of correct answers increased to 13.62 for the intervention group, compared to 9.85 for the control group. The increase in the intervention group was significantly greater than the increase in the control group (P<.001).

Analysis of variance showed no interaction between PGY level and group and no interaction between gender and group. It also showed no significant difference either among PGY levels or between genders with respect to the number of correct answers at pre- and post-intervention, as well as differences seen between each interval.

DISCUSSION

In the era of a changing health care system, quality medical practice should involve caregiver knowledge and expertise, as well as adherence to established and accepted practice guidelines, standard of care and cost-effectiveness strategies.

The Evidence-Based Medicine Working Group states, "Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient ground for clinical decision making and stresses the examination of evidence from clinical research"(Evidence-Based Medicine Working Group 1992).

Evidence-based medicine outlined by clinical research and practice guidelines and policies is a critical path that physicians must follow and practice to achieve cost-effective medicine. Evidence-based medicine requires the use of the best available evidence for optimal care and the increasing scarcity of resources has led to increased emphasis on effective treatments (Panda 2007). A structured curriculum that follows established practice parameters and weaves in cost-containment practices will ultimately help physicians in training to be more cost-conscious. Integrating clinical knowledge and caregiver expertise with widely accepted practice guidelines in clinical decision making may create a new emphasis on more efficient and effective care.

A few residency-training programs have found creative ways to promote cost effectiveness to their residents (Doyle 1995, Kelly 2001). These methods include encouraging residents to discuss desired diagnostic tests and procedures with attending physicians to limit unnecessary studies and restricting medications on formulary to those that are most cost-effective (e.g., generics). Previous studies demonstrate that residents, more than attending physicians, have poor knowledge of medication costs (Reichert 2000, Weber 1986). Other studies have demonstrated that providing physicians with price information may lead to significant savings (Seguin 2002, Rudy 2001). Another study used an inpatient order entry system to limit unnecessary testing, with daily computer prompts questioning the need for future testing and for unbundled labo-

TABLE 1
Comparison of demographic characteristics between groups

Trainee characteristics	Control group number (n=40) (%)	Intervention group number (n=40) (%)	*P* value
Post graduate year (PGY) level			
PGY1	16 (40.0%)	13 (32.5%)	.72
PGY2	12 (30.0%)	15 (37.5%)	
PGY3	12 (30.0%)	12 (30.0%)	
Gender			
Male	14 (35.0%)	12 (30.0%)	.63
Female	26 (65.0%)	28 (70.0%)	
Average age ± SD	28.3 ± 2.00	28.9 ± 2.60	.27

ratory tests (i.e., serum metabolic panel into single components), thereby encouraging physicians to order only necessary tests (Neilson 2004).

As noted, training in evidence-based practices is common according to available literature, but studies evaluating the knowledge of residents before and after structured cost-effectiveness education show inconsistent findings (Schroeder 1984, Bill 1987, Bill 1992). These studies did not blind participants to the fact that they were evaluating cost efficiency, which could have biased results. Our study looked instead at improving the knowledge of residents regarding practice guidelines developed from evidence-based methods.

This pilot study provides an initial

TABLE 2
Differences between groups, pre- and post-intervention, and difference from pre- to post-intervention

Pre-intervention			
Trainee characteristics	**Control group mean ± SD (n)**	**Intervention group mean ± SD (n)**	***P* value**
Total	8.35 ± 1.83 (40)	8.32 ± 2.18 (40)	.96
PGY level			
PGY1	8.00 ± 1.86 (16)	8.54 ± 2.54 (13)	.52
PGY2	8.50 ± 1.44 (12)	7.60 ± 2.03 (15)	.21
PGY3	8.67 ± 2.19 (12)	9.00 ± 1.81 (12)	.69
Gender			
Male	8.36 ± 1.50 (14)	8.50 ± 2.24 (12)	.85
Female	8.35 ± 2.02 (26)	8.25 ± 2.19 (28)	.87
Post-intervention			
Trainee characteristics	**Control group mean ± SD (n)**	**Intervention group mean ± SD (n)**	***P* value**
Total	9.85 ± 2.15 (40)	13.62 ± 2.24 (40)	<.001
PGY level			
PGY1	9.25 ± 1.69 (16)	13.15 ± 2.30 (13)	<.001
PGY2	9.92 ± 2.43 (12)	13.40 ± 2.29 (15)	<.001
PGY3	10.58 ± 2.35 (12)	14.42 ± 2.07 (12)	<.001
Gender			
Male	9.36 ± 2.21 (14)	13.83 ± 2.72 (12)	<.001
Female	10.12 ± 2.12 (26)	13.54 ± 2.05 (28)	<.001
Difference (post – pre)			
Trainee characteristics	**Control group mean ± SD (n)**	**Intervention group mean ± SD (n)**	***P* value**
Total	+1.50 ± 1.80 (40)	+5.23 ± 2.48 (40)	<.001
PGY level			
PGY1	+1.25 ± 2.02 (16)	+4.62 ± 2.47 (13)	<.001
PGY2	+1.42 ± 1.68 (12)	+5.80 ± 2.51 (15)	<.001
PGY3	+1.92 ± 1.68 (12)	+5.42 ± 2.50 (12)	<.001
Gender			
Male	+1.00 ± 2.35 (14)	+5.33 ± 2.87 (12)	<.001
Female	+1.77 ± 1.39 (26)	+5.29 ± 2.35 (28)	<.001

insight into whether a one-hour educational tutorial may improve residents' knowledge pertaining to cost-effectiveness. The results show the ability of residents to correctly answer questions about practice guidelines after an intervention, which may have a benefit on cost-containment, although this has not been measured directly. Streamlining care would save money by eliminating needless diagnostic studies (laboratory tests, radiographic imaging, etc.) in certain situations, as well allow residents to conduct cost-awareness and risk-benefit analyses. The residents in the intervention group clearly had a greater increase in their scores on the post-intervention questionnaire than did the control group. With continued re-enforcement through a structured curriculum, physicians in training might change their delivery of health care by adhering to guidelines, possibly improving the quality of care while at the same time decreasing costs.

This study has several limitations. Pediatric residents were evaluated once after one intervention and not over a period of time. We acknowledge that a resident or physician cannot learn to follow evidence-based medicine after one 1-hour session outlining practice guidelines. Although our results may seem intuitive, we are attempting to take the first step toward a more long-term study looking specifically at behavior retention rather than change in knowledge. It is unclear whether residents would continue to treat patients with cost containment in mind or would revert to their earlier patterns.

The outcome measure of our study was change in participants' knowledge, measured by the ability to answer test questions correctly. Future studies of change in participant behavior are needed to evaluate the conclusion that a structured curriculum of evidence-based medicine is useful for encouraging cost-effective medicine.

Only one type of intervention was evaluated during this study. It remains unclear what other interventions may be useful in teaching cost-effective medicine. Such modalities might include: bedside teaching, didactics, group lectures, drilling, and clinical tutorials, among others. Future studies that evaluate the best practices for teaching cost-effective care may enable regulatory groups, such as the ACGME, to set requirements for curricula. This may place further emphasis on cost-efficient care at the bedside and contribute to the efficiency of health care in general.

The principal investigator created the tools used for this study. The educational tutorial and the questionnaires were reviewed by representatives of the AAP to ensure proper interpretation of the guidelines. Scores were lower than expected on both the pre- and post-intervention questionnaires. This may suggest that the questions were too difficult or that resident knowledge of established AAP guidelines is incomplete. Further analysis of these tools is needed to establish their validity.

CONCLUSION

System-based practices and education regarding evidence-based medicine may promote cost-effective care. This pilot study shows that structured teaching can strengthen residents' understanding of cost-containment strategies through enhanced knowledge of established guidelines and standards of care. Knowledge and quality care delivered at the bedside may help to create economic awareness regarding patient care that may ultimately change the outcome of health economics in general.

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