



A Reduction in Emergency Department Use by Children From a Parent Educational Intervention

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BACKGROUND AND OBJECTIVES: A substantial proportion of emergency department (ED) visits by children are for non-urgent care. The objective of this research is to determine whether a parent-focused educational intervention can reduce non-urgent ED visits.

METHODS: A regional hospital system (which includes a central hospital, four satellite hospitals, and two primary care clinics) provided monthly data retrospectively from January 2006 to October 2007 on ED visits by children. The same information was provided prospectively from November 2007 to April 2009. Starting in November 2007, a family medicine residency program affiliated with the same hospital network distributed a 6.7 grade reading level booklet on non-urgent care of children to the parents who brought their children to the outpatient clinic. The number of ED visits as a proportion of outpatient clinic visits at the residency program was calculated for each month and compared to historical and geographic trends.

RESULTS: Long-term changes were observed only among the intervention group. There was a substantial and statistically significant reduction in ED use for non-urgent care of children. There was also a proportional reduction in ED charges for this group.

CONCLUSION: An educational intervention among parents can substantially reduce non-urgent ED visits for their children.

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A large proportion of pediatric visits to emergency departments (EDs) are for non-urgent care.¹ Use of EDs to provide services to children is influenced by many factors. Among the factors that have been studied are family centeredness (a variation on patient centeredness in which the focus is on the family as a whole rather than the individual patient or the provider) in the primary care setting,²

waiting time to be seen,³ having a medical home,⁴ continuity of care,⁵ convenience (eg, travel time),⁶ and availability of extended primary care clinic hours.⁷ Such studies are important because non-urgent pediatric visits make up a significant portion of all ED visits,⁸ and the charges for delivering non-urgent care in the ED are higher than in the primary care setting.⁹ Further, these visits use a highly specialized environment and

skill level with associated higher cost to meet routine pediatric medical problems.

Possibly the most important factor that determines whether or not parents seek care for their children in an ED is their ability to differentiate the urgent from the non-urgent status of their child's health problem. This is a problem of knowledge. Parents without the knowledge to make such differentiation lack the competence and confidence to make correct decisions as to whether their child's condition is self-limiting, can be treated at home, should be seen in a primary care setting, or requires immediate attention in an ED. This factor, like the others, has been the subject of research. For example, parents of children in a Head Start program were provided with a self-help booklet. ED visits in the following 6 months were reduced by 48%.¹⁰ Computerized tutorials have also been used to increase parents'

See related commentary on page 112.

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knowledge about caring for their young children.¹¹ Face-to-face education in the ED instructing parents on the importance of identifying a primary care provider for their child decreased ED utilization for non-urgent care in a Medicaid population.¹² When parents seek advice, whether from a physician or nonphysician, prior to going to the ED, rates of ED utilization for non-urgent care are lower.¹³ Some studies focus on specific diagnoses or symptoms, such as a fever education intervention that reduced unnecessary return visits to the ED.¹⁴ Therefore, we believe a proper educational approach can make a difference in ED utilization.

However, not every study of educational interventions shows reductions of pediatric ED use. In one study, a pamphlet and a videotape presentation were provided for parents who had taken their child to the ED at least twice in the preceding year. These materials were provided while they were at the ED. Over the following year there was no significant difference in ED use when compared to a control group of similar parents. Likewise, a study of a one-time educational intervention of parents while in the ED did not alter long-term ED utilization habits.¹⁵ Finally, a randomized trial in which parents of young children received or did not receive health promotion teaching showed no difference in ED use over a 12-month period.¹⁶ Interventions vary in the degree to which they take into account issues of literacy of parents and readability of materials used and to cultural issues, which could have substantial effect on educational interventions and can represent a significant confounding factor.

This project focuses on use of a booklet designed to be given to parents in a primary care setting. The purpose of the booklet is to make available to parents information that will help them make better decisions treating common, non-emergency conditions. The premise of the study is that educating parents with this educational booklet will reduce

the utilization of emergency department resources by children.

Methods

The design of this research is in the tradition of what is called “realistic evaluation.”¹⁷⁻¹⁹ When experimental designs are not feasible for evaluation of project interventions due to costs or human subject considerations, an alternative strategy must be used. In realistic evaluation, a variable or outcome of interest is identified. The context (cultural, historical, geographical, organizational, etc) in which the observations are being made is documented. A “mechanism” or intervention to change the outcome is introduced. If no change is observed, the inference is that the intervention has no effect. If there is a change that cannot be otherwise explained, the inference is that the intervention is having an effect on the outcome variable. Recent examples of application of realistic evaluation in health care settings include reports by Lhussier et al²⁰ and by Black.²¹ The design is similar to before-and-after intervention with concurrent geographical comparisons with which readers may be more familiar.

The main settings for this research are a family medicine residency program, the Texas A&M Family Medicine Residency (TAM-FMR); a community health center, Brazos Valley Community Action Agency (BVCAA); and a regional hospital, St. Joseph Regional Health Center (SJ), all located in Bryan, TX. Data were also gathered from surrounding counties to provide population-based context and from primary care clinics and hospitals in those counties to provide comparisons with other clinical settings.

The key observations of the study were made prospectively between November 2007 and April 2009. To provide historical and geographic context, data were gathered retrospectively for the surrounding counties and area clinics from January 2006 through December 2008.

The variables studied were as follows. First, we counted the number of unduplicated pediatric primary care encounters for children ages 10 and under each month at TAMFMR, BVCAA, and the other clinical settings. Second, we counted the number of emergency room discharges of these children each month at SJ and the emergency rooms in the surrounding counties. Children admitted for inpatient care or special procedures were excluded from the count. Census population estimates of children age 10 and under in each county were used to calculate population-based utilization rates. Emergency room utilization rates were calculated as the percent of children discharged from the ED compared to the number seen in the primary care setting for each month, eg, rate of ED use = 100 X number of children seen in the ED / number of children seen in the PC clinic. A ratio of the utilization rates of TAM-FMR, BVCAA, and the other clinics was calculated. Total and ED average charges each month were also calculated.

The intervention took place at the TAMFMR primary care clinic. A 20-page booklet²² was given to the parents of all children age 10 and under with the instruction that the information it contained could help parents (1) provide non-emergency care for their children at home and (2) make better decisions about when emergency services may be needed. Content was based on a 146-page book by the same author that had been used in private pediatric practice. The length of the booklet was a compromise between the more comprehensive book and the need to address the most common ailments of childhood with specific information that parents could use.

The booklet had two versions based on readability measures. One version had a Flesch-Kincaid Grade Level²³ readability estimate of 6.7 and this is the edition utilized for this study. Subsequently a 4.2 Flesch-Kincaid grade level readability booklet has been developed

for patients with lower literacy capabilities. The language in the booklet is informal, brand names are used rather than generic names for over-the-counter medications, and humor is included as a teaching tool and to help the readers maintain interest. A Spanish version of the booklet was also available. The decision to make the booklet available at varying levels of readability was based on local perceptions of the literacy levels of the patients seen at TAMFMR. Readability assessment was based on the English version only. When translated, the Spanish version was reviewed by Spanish-speaking clinic staff for clarity and accuracy.

Before the intervention, a draft of the booklet was evaluated in focus groups of both clinicians and parents. Clinicians were asked to evaluate the booklet's content for accuracy of information and suitability for their patients. Their feedback was integrated into revisions of the booklet.

In addition, 100 parents of children seen at TAMFMR were asked whether they thought the information provided was clear and understandable. They were also asked whether they thought the information would help them care for their child at home and make better decisions about when their child needed to be seen in the ED. Ninety percent believed that the booklet would reduce after-hours telephone calls. Ninety percent believed that the booklet would reduce office visits. Ninety-five percent believed that the booklet would reduce ED visits.

Data from other clinical settings were combined into an overall outcome measure for non-TAMFMR primary care clinics. These clinical settings vary in their patient population characteristics. We are less interested in comparisons between clinical settings and more interested in the before and after intervention patterns of ED use, regardless of the characteristics of the patient populations. The regional medical center continuously markets its services in both its urban and rural markets.

A two-factor mixed model analysis of variance was used to test the null hypothesis that there was no change in the TAMFMR (intervention) setting when compared to the non-intervention settings. The level of statistical significance is .05.

This research was approved by the Institutional Review Board of St. Joseph Regional Medical Center.

Results

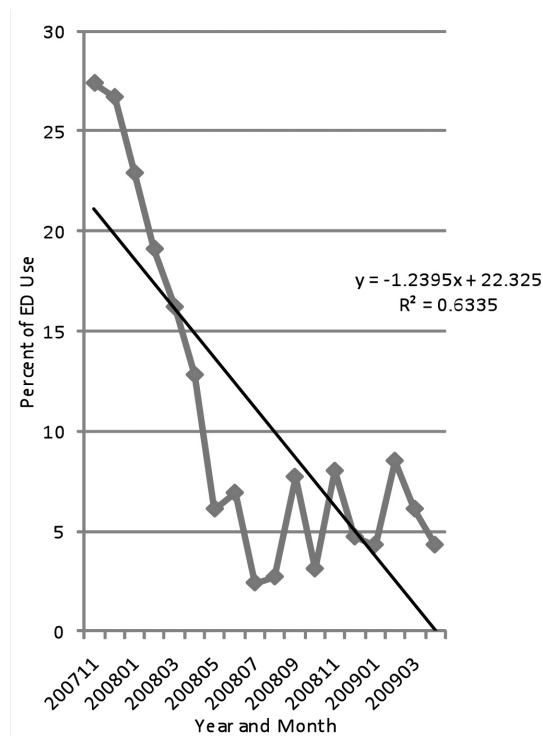
Figure A can be accessed at <http://www.stfm.org/fmhub/fm2011/February/Fig A Yoffe.pdf> and shows the geographic and historical context in which the observations were made. Population-based ED utilization rates for children age 10 and under from January 2006 to December 2008 are shown. The counties vary in their rate of ED use by children. Seasonal variations are evident. Trend lines (regression) are shown that indicate slight increases in use over time in three of the counties and a slight decrease in one. Aside from the seasonal variation, there is no indication of sustained substantial change in these counties during the 3-year period that preceded and included the time when observations were being prospectively gathered.

Figure B can be accessed at <http://www.stfm.org/fmhub/fm2011/February/Fig B Yoffe.pdf> and shows the utilization rates in two primary care clinics in surrounding communities, Madisonville (Madison County) and Caldwell (Burlington County). The rates of ED utilization based on these clinical samples are

much higher than the population-based rates shown in Figure A. Seasonal variations are also evident. The trend lines show a slight increase in ED utilization during this period, but there is no evidence of large sustained change over time.

Figure 1 shows the utilization rates for the intervention setting, TAMFMR, from November 2007 through April 2009. The project was initially scheduled to end in October 2008 but was extended for 6 months to allow year-to-year comparisons to rule out seasonal variation and to assess sustainability of the effects. By visual inspection we see that there was a dramatic drop in ED utilization rates by children seen in the clinic in which the booklet was distributed. The steepest part of the decline occurred during the fall and winter period when seasonal variations shown in Figures A and B suggest ED utilization rates at TAMFMR should have been rising

Figure 1: TAMFMR ED Admission Percent by Month, November 2007–December 2008



TAMFMR—Texas A&M Family Medicine Residency

ED—emergency department

as they were in other clinics and communities. No decline comparable to that at TAMFMR is evident in those figures.

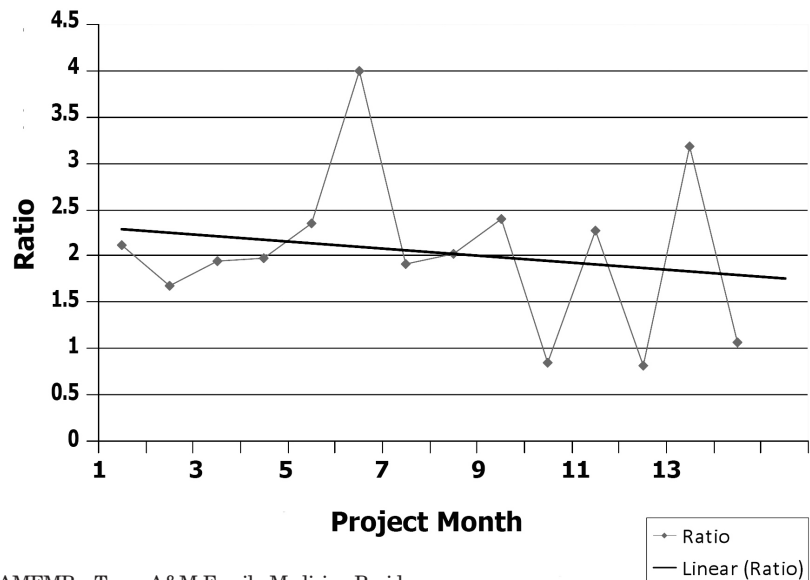
Figure 2 is based on a comparison of TAMFMR to BVCAA. The BVCAA utilization rates (not shown) were generally lower than the TAMFMR rates. Additionally, the BVCAA rates declined during this period as did TAMFMR rates even though the booklets were not distributed in the BVCAA. The data points in Figure 2 cover a 14-month period, from November 2008 through December 2009. They represent the ratio of TAMFMR patients' use of the ED to the BVCAA patients' use of the ED. That is, they are the ratio of the TAMFMR rate divided by the BVCAA rate. The downward slope of the trend line indicates that while both samples reduced their rate of ED use, TAMFMR was accelerating downward at a faster rate than BVCAA.

Figure C (<http://www.stfm.org/fmhub/fm2011/February/Fig C Yoffe.pdf>) shows the average ED charges per child, by month. Values ranged from \$405 to \$1,267 per visit. While there are wide month-to-month differences, there is no evidence of a reduction of average ED charge over time in the intervention group. Figure D (<http://www.stfm.org/fmhub/fm2011/February/Fig A Yoffe.pdf>) shows the total ED charges (in thousands of dollars) for children whose parents received the booklet. A dramatic reduction in total charges is evident, as would be expected since fewer children from TAMFMR are being taken to the ED by their parents.

Figure 3 shows the number of children seen at TAMFMR as a percentage of the total number of children seen in the SJ emergency room for the first 14 months of the study. Their proportion of the total dropped from the range of one in six to one in 25 or less.

Year-to-year changes in ED use by children seen at TAMFMR were calculated starting in November 2008 and continuing through April 2009.

Figure 2: Ratio of TAMFMR Percent Seen in ED to BVCAA Percent Seen in ED, With Trend Line, for the First 14 Months of the Study

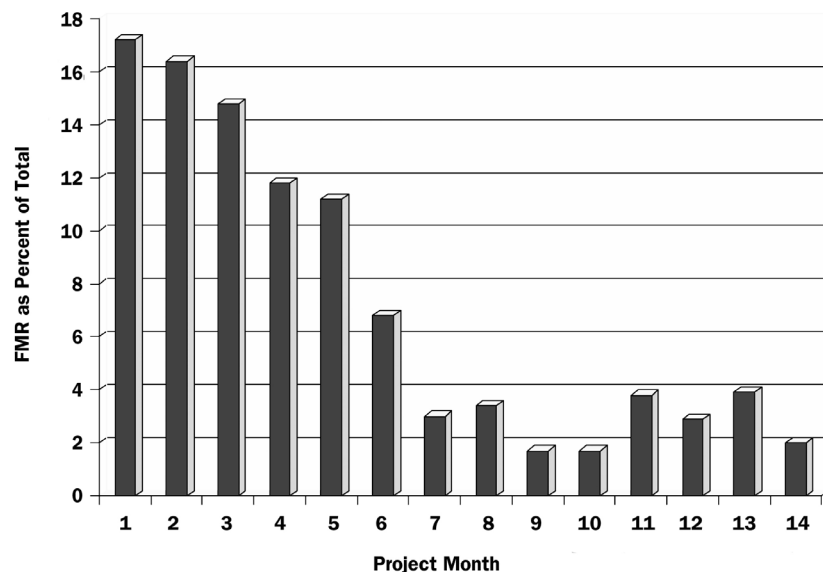


TAMFMR—Texas A&M Family Medicine Residency

ED—emergency department

BVCAA—Brazos Valley Community Action Agency

Figure 3: Children Seen at TAMFMR as Percent of Total Number Who Visited the ED, by Month



TAMFMR—Texas A&M Family Medicine Residency

ED—emergency department

The reductions range from 55% to 81% compared to the same month of the previous year.

The two-factor, mixed model analysis of variance showed that compared to the control groups, the decline in utilization rates by TAM-FMR patients is statistically significant ($P<.001$). Thus the null hypothesis of no difference between the intervention group and the control groups is rejected.

Discussion

Our findings lead us to conclude that the intervention, in this context, has the effect of substantially and significantly reducing pediatric use of the ED. This was the intent of the intervention. Total charges for ED use were also reduced substantially, commensurate with the reduction of use by the children.

As with every research design, there are some cautions that should be noted. In this setting, a randomized experiment was not feasible. Realistic evaluation was chosen as an alternative strategy. Historical and geographic context were described and comparisons among clinics were made.

Unobserved factors may have accounted for the findings. We judge this to be unlikely, though further research is always desirable. The crucial point to keep in mind when considering the possible effects of confounding factors is that the purpose of this research is not to make comparisons between groups but comparisons in condition, eg, before intervention and after intervention. All of the information on other settings is for the purpose of providing a context in which to place our results. Careful, purposeful consideration and inquiry have not revealed any likely confounding factors that could account for these findings. The close proximity of the clinics, the demographic similarity of the populations studied, and the stability of the medical programs being evaluated all favor the conclusion that the educational booklet induced modification in parent behavior, resulting in

Table 1: A Comparison of Features of TAMFMR and BVCAA

	TAMFMR	BVCAA
Distributed Booklet (Intervened)	Yes	No
Governance	Nonprofit organization with independent board of directors	Program of a community action agency
University affiliated	Yes	No
Distance from SJ ED	Two blocks	Two miles
Physicians have admitting privileges at SJ	Yes	No
Population served	Generally lower income	Almost exclusively lower income
Clinic open after hours/weekends	No	No
Nurse on call service offered	No	Yes (introduced at about the time observations began)
Admitting privileges at a second hospital across town that operates an ED	Yes	Yes
Started new primary care clinic during observation period	No	Yes
Offers family medicine residency program	Yes	No
Reduced ED use rates at SJ	Yes	Yes

TAMFMR—Texas A&M Family Medicine Residency

ED—emergency department

BVCAA— Brazos Valley Community Action Agency

SJ—St. Joseph Regional Health Center, Bryan, TX

a reduction in ED use in the study group. Any changes in Medicaid or other insurance coverage that occurred during this study would have affected all groups equally.

Alternate analytical approaches could have been taken. The use of statistical process control charts to plot this time-dependent data might provide more information on what constitutes noise and what constitutes significant change. This would eliminate the need for trend lines. The data gathered in this project are available for those who want to attempt this additional analysis.

We attribute the effects of the intervention to the content of the booklet and the manner of presentation of that information. However, for the booklet to be in use, it must have a clinical advocate to instruct parents

on its use and benefits. The stronger the advocate, we believe, the greater the effects of the booklet are likely to be. Initially, the booklets were distributed to the parents by the non-nursing front office staff. Later it became apparent that involving both nurses and physicians in the distribution of the booklets increased the parents' perceived value of what they were being given. Nurses and physicians were instructed on how to present the booklet in a positive manner, emphasizing the content that would help them care for their child at home. They report that most parents were appreciative and accepted the encouragement to use it, though in some situations the press of time on patients resulted in abbreviated presentations. A total of 6,000 booklets were distributed over

the course of the project. By the end, all had been used.

Educating patients on how to navigate the health system is important. Our study suggests this educational intervention allows parents to more effectively utilize the level of care appropriate for their child's medical needs.

Inclusion of poetry, cartoons, and humor made for a more reader-friendly environment, lowered parental anxiety, and encouraged re-reading material relevant to their situation. We suggest that this book is successful because of the increased likelihood that it will be read and re-read. Therefore, we feel certain attributes are a necessity for a successful educational intervention: readability, specificity of instructions, clarity, comprehensibility, and the ability to create a sense of parental value for the specific educational tool.

The comparison between TAM-FMR and BVCAA clinics makes us aware that there is more than one way to produce an effect (reduce pediatric ED use in this case). Table 1 shows several similarities and differences between the two primary care programs.

No new ED services were introduced in the region during the period of this study. However, it is notable that during the study period BVCAA introduced a nurse-on-call service. BVCAA also opened a new primary care clinic in close proximity to another hospital that provides ED services. We expect that opening the second BVCAA clinic is likely to decrease the number of children using the SJ ED. In spite of this unintended event, the rate of TAMFMR decline in ER use was still greater than that of the BVCAA program. These differences,

nevertheless, weaken the validity of comparing these two providers. However, by providing a larger context of surrounding counties and two other primary care clinics as negative controls, we strengthen the argument that parent education with well-designed materials and strong advocacy can reduce dependence on ED services for non-urgent pediatric care. We are continuing to explore this topic with additional research in another study population.

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References

1. Young GP, Waner MB, Kellerman AL, Ellis J, Bouley D. Ambulatory visits to hospital emergency departments: patterns and reasons for use. *JAMA* 1996;276(6):460-5.
2. Brousseau DC, Hoffman RG, Nattinger A, Flores G, Zhang Y, Gorelick M. Quality of primary care and subsequent pediatric emergency department utilization. *Pediatrics* 2007;119(6):1131-8.
3. Brousseau DC, Bergholte J, Gorelick MH. The effect of prior interactions with a primary care provider on non-urgent pediatric emergency department use. *Arch Pediatr Adolesc Med* 2004;158:78-82.
4. Piehl MD, Clemens CJ, Joinesw JD. "Narrowing the Gap": decreasing emergency department use by children enrolled in the Medicaid program by improving access to primary care. *Arch Pediatr Adolesc Med* 2000;154(8):791-5.
5. McBurney PG, Simpson KN, Darden PM. Potential cost savings of decreased emergency department visits through increased continuity in a pediatric medical home. *Ambul Pediatr* 2004;4(3):204-8.
6. Doobinin KA, Heidt-Davis PE, Gross TX, Isaacman DJ. Nonurgent pediatric emergency department visits: care-seeking behavior and parental knowledge of insurance. *Pediatr Emerg Care*. 2003;19(1):10-14.
7. Wang C, Villar ME, Mulligan DA, Hansen T. Cost and utilization analysis of a pediatric emergency department diversion project. *Pediatrics* 2005;116(5):1075-9.
8. McCaig LF, Nawar EW. National Hospital Ambulatory Medical Survey: 2004 emergency department summary. *Adv Data* 2006;372:1-30.
9. Martin BC. Emergency medicine versus primary care: a case study of three prevalent, costly, and non-emergent diagnoses at a community teaching hospital. *J Health Care Finance* 2000;27(2):51-65.
10. Harman AD, Mayer GG. *J Community Health* 2004;29(3):197-208.
11. Sanghavi DM. Taking well-child care into the 21st century: a novel, effective method for improving parent knowledge using computerized tutorials. *Arch Pediatr Adolesc Med* 2005;159(5):482-5.
12. Grossman LK, Rich LN, Johnson C. Decreasing non-urgent emergency department utilization by Medicaid children. *Pediatrics* 1998;102(1 Pt 1):20-4.
13. Oberlander TF, Pless IB, Dougherty GE. Advice seeking and appropriate use of a pediatric emergency department. *Am J Dis Child* 1993;147(8):863-7.
14. O'Neill-Murphy K, Liebman M, Barnsteiner JH. *Pediatr Emerg Care* 2001;17(1):47-51.
15. Chande VT, Wyss N, Exum V. *Arch Pediatr Adolesc Med* 1996;150(5):525-8.
16. Chande VT, Kimes D. A health promotion intervention for families in a Medicaid managed care plan. *Acad Emerg Med* 1999;6(8):823-7.
17. Pawson R, Tilley N. *Realistic evaluation*. London: Sage Publications Ltd, 1997.
18. Tilley N. *Realistic evaluation: an overview*. Presented at the Founding Conference of the Danish Evaluation Society, September 2008. Accessed April 9, 2009 at www.danskevalueringsselskab.dk/pdf/Nick%20Tilley.pdf.
19. Berwick DM. *The science of improvement*. American Medical Association. *JAMA* 2008;10:1182-4.
20. Lhussier M, Carr SM, Robson A. The potential contribution of realistic evaluation to small-scale community interventions. *Community Pract* 2008;81(9):25-8.
21. Black J. Transforming the patient care environment with lean six sigma and realistic evaluation. *J Healthc Qual* 2009;31(3):29-35.
22. Yoffe SJ. *The pediatric after-hours non-life and death almost-an-emergency booklet*. Bryan, TX: The Insite Group, 2006.
23. Flesch R. A new readability yardstick. *J Appl Psychol* 1948;32:221-33.