Published in final edited form as:

Patient Educ Couns. 2002 March ; 46(3): 175–190.

Baby, Be Safe: the effect of tailored communications for pediatric injury prevention provided in a primary care setting

Tonja R. Nansel^{a,*}, Nancy Weaver^b, Maureen Donlin^b, Heather Jacobsen^b, Matthew W. Kreuter^b, and Bruce Simons-Morton^a

a National Institute of Child Health and Human Development, Division of Epidemiology, Statistics, and Prevention Research, 6100 Executive Blvd., Room 7B05, MSC 7510, Bethesda, MD 20892-7510, USA

b Health Communications Research Laboratory, Saint Louis University, St. Louis, MO, USA

Abstract

Injuries are a major cause of morbidity and mortality in young children. The provision of individually tailored educational materials in primary care settings may be an effective and efficient way to promote adoption of injury prevention measures by parents. A randomized controlled study compared the effectiveness of tailored and generic persuasive communications delivered in a primary care setting on the adoption of home and car safety behaviors. During routine well-child visits, a primarily African-American sample of parents of children ages 6–20 months ($n = 213$) was randomized to receive either tailored or generic information regarding the prevention of injuries to their child. At follow-up, participants who received tailored information reported greater adoption of home and car safety behaviors than those receiving generic information. In addition, within the tailored information group, those who discussed the information with their physician showed significantly greater change than those who did not. However, this difference was not observed among those receiving generic information. Findings support the use of office-based tailored injury prevention education as a component of routine well-child care.

Keywords

Injury prevention; Tailored communications; Anticipatory guidance

1. Introduction

Unintentional injuries are the leading cause of death among US children over 1 year [1,2]. Moreover, they account for a high rate of childhood morbidity. For every injury-related death, it is estimated that 18 hospitalizations and 233 emergency department visits occur [3]. Ninety-one percent of all unintentional injuries to children <5 years of age occur in and around the home [4]. The specific types and causes of injury vary by age; as children develop, their risk for some types of injuries decreases, while their risk for other injuries increases [5–7]. Thus, effective prevention requires evaluating the most likely causes of injury at a child's particular age and using effective counter measures for those injuries. Yet many parents lack knowledge about the threat of injury to their children and effective means of prevention [8,9]. Many injuries to young children could be prevented through the routine use of recommended home and car safety devices; however, utilization of these strategies is less than optimal [10–14]. Therefore, it is expected that the occurrence of childhood injury could be reduced through more widespread use of appropriate safety measures.

*Corresponding author. Tel.: +1-301-435-6937; fax: +1-301-402-2084. E-mail address: nanselt@mail.nih.gov (T.R. Nansel).

Parent-directed interventions within the clinical setting offer a potentially efficacious route for the promotion of safety behaviors [15–21]. Children are routinely seen for well-child visits, and health care providers are viewed by parents as a credible and valued source of information on health practices [8,9]. Studies involving a range of health behaviors have found that even brief education and counseling provided by physicians may positively impact health-related behaviors, including smoking [22–24], alcohol abuse [25], and parent safety behaviors [15]. As a consequence, professional societies [26–28], government agencies [29], and national task forces [30,31] have recommended the provision of guidance in the clinical setting on the prevention of injuries.

In spite of these recommendations, several studies have indicated that injury prevention is either not discussed at all or covered only briefly during the course of routine visits [32,33]. This is not an uncommon finding for preventive service delivery in clinical settings. Time constraints and other competing demands result in the delivery of most types of preventive services by physicians falling far below recommended levels [34].

The use of educational materials delivered within the primary care setting offers a useful method for addressing the time constraints and competing demands faced by primary health care providers. In-office health communications, particularly when reinforced by the provider, extend the referent authority of the provider and increase the extent to which health education and health promotion needs may be addressed in the clinical setting [35–37].

Educational materials used in the clinical setting have traditionally been standard, population-based print media such as pamphlets or fact sheets (e.g. the American Academy of Pediatrics' "TIPP sheets"—injury prevention handouts developed as part of the Injury Prevention Project [26]). When the audience and its informational needs are fairly homogeneous, such generic materials may be sufficient to promote behavior change. However, it is more typically the case that a clinical population varies considerably in terms of behavior, motivation, learning needs, and other characteristics. In such cases, tailored educational materials often prove to be more effective than generic media [38–40]. Tailored messages are those that are individually customized and can, for example, address a person's particular diagnostic, motivational, or behavioral characteristics. They can target a person's specific needs on key mediators of behavior, such as self-efficacy or perceived barriers to behavior change. Tailored messages may exhibit greater effectiveness by offering greater relevance to the recipient, less redundant information, more attention to the health message, more involvement with the message, greater message recall, and message adaptation to the motivational stage of the respondent [41,42]. A number of studies involving various health behaviors have found that tailored messages result in greater behavior change than generic, or non-tailored messages [39,41,43–46].

Given the time constraints and competing demands faced by primary care providers, the use of tailored educational information provided within the clinical setting may be a particularly useful tool. It offers a potential means to remedy the current state of infrequent provision of injury prevention anticipatory guidance and variable use of general print media, and a method to more closely reach the recommended ideal of individual physician counseling with caregivers about injury prevention. The present study was conducted to evaluate the effect of tailored communications delivered within the primary care setting on parent injury prevention practices.

2. Methods

2.1. Design

A two-group randomized controlled design with pre- and post-intervention measures was used to determine the effectiveness of tailored communications for promoting the adoption of child

injury prevention measures by parents. Outcome measures of interest included parents' child safety behaviors relevant to prevention of car injuries, burns, drowning, falls, and poisoning; intentions to adopt child safety behaviors; and beliefs about preventive behaviors. Parents visiting a pediatric clinic for well child visits were recruited while in the waiting room and randomized to receive either tailored or generic injury prevention information during their current visit. Data collection was conducted at recruitment and approximately 3 weeks following the clinic visit.

2.2. Participants

Participants were 213 parents of children ages 6–20 months visiting a medical center-based pediatric clinic in Washington, DC, for a well-child visit. A total of 370 parents of children in the study age range who were scheduled for a routine well-child visit were invited to participate in the study. Of these, 284 (76.8%) agreed to participate in the study, and 86 (23.2%) declined. Among those who agreed to participate, 69 (24.3%) were unable to complete the baseline assessment and receive their intervention handout before being called back to their appointment, and therefore, were excluded from the study. Two additional participants experienced a printer error that resulted in their handout not being printed, and were also excluded from the study. The baseline sample, then, was 213. Of these participants, 174 (81.7%) completed the follow-up telephone interview approximately 3 weeks later. This included 85 participants in the tailored group and 89 in the non-tailored group. Lost to follow-up were 7 refusals, 19 disconnected telephone numbers, 12 participants who could not be reached, and 1 participant who was no longer the child's primary caregiver. There were no significant differences in the baseline risk score of respondents who completed follow-up versus those who did not. In addition, there were no significant differences between the two study groups in the percent of respondents lost to follow-up. The final analytic sample was comprised of the 174 participants for whom both baseline and follow-up data were available. Demographic information is provided in Table 1.

2.3. Procedures

Parents were recruited to the study over a 6-month period when they arrived at the pediatric clinic for their well-child visit. Written consent was obtained from each participating parent, and parents were assured of the confidentiality of their responses. Participants then completed the baseline assessment using a computer located in the clinic waiting room. The computer station was placed away from the main waiting area, so that participant responses would not be observed by others in the waiting room. The research assistant explained how to use the computer and was available to participants should they request assistance, but remained at a distance to provide privacy as they completed the assessment. Upon entry into the computer system, participants were randomized via computer to receive either tailored or generic information regarding injury prevention practices. The assessment questions took 10–15 min for most participants to finish. Upon completion of the assessment, the injury prevention handout pages were immediately printed on a printer located at the computer station. The follow-up assessment was conducted as a telephone interview approximately 3 weeks following each participant's well-child visit.

2.4. Measures

The baseline and follow-up assessments consisted of items measuring injury risk behaviors, injury prevention behaviors, and relevant psychosocial constructs (see Appendix). These psychosocial constructs included injury-related locus of control (five items; $\alpha = 0.58$), perceived susceptibility (one item), self-efficacy for injury prevention (one item), perceived effectiveness of injury prevention devices (one item for each of five devices), and items querying the perceived difficulty of implementing each safety practice that the parent was not

currently using (up to 16 items possible). Injury risk and preventive behaviors were measured by items assessing behaviors relevant to each of five child injury risk areas—car injuries, burns, drowning, falls, and poisoning. Injury risk and preventive behaviors were selected for inclusion in the assessment and subsequent injury prevention information based on the current recommendations of the American Academy of Pediatrics at the time of the study. The follow-up assessment, in addition to the above items, queried perceived usefulness of the injury prevention handout (response options—very useful, useful, somewhat useful, not useful), and caregiver response to the handout. These dichotomous questions included reading and keeping of the handout, communication with physician and others regarding the handout, intention to change any injury prevention-related behavior based on the handout, and implementation of those intended changes.

2.5. Intervention system

The computer program for the assessment and provision of tailored information, entitled *Baby, Be Safe*, was created using the database Filemaker Pro[®]. Participants completed the assessment on-screen, with one assessment question per screen presented to the participant. Skip patterns were used to omit non-applicable questions. Participants used a mouse to click on their answer choices, and their responses were written directly to the database. Algorithms for determining the injury prevention handout content were created using calculation fields. The layout and messages for the handout were created and stored in a database file. When the parents finished the questionnaire, a script was triggered which filled the text boxes in the blank template with the tailored messages and then printed the corresponding handout. The database was compiled as an executable file so that it could be run using either Microsoft Windows[®] or Macintosh[®] operating systems.

2.6. Injury risk scores and prioritization of feedback

A scoring and prioritization process was utilized to generate a decision rule for providing the tailored handout. Within each injury outcome (i.e. car injury, burns, falls, poisoning, and drowning), response options for each risk item were assigned numeric values to reflect the relative contribution of that item to the injury risk for that outcome (see Table 2). This process was based upon a review of the literature [6,12,47–49] and consensus of the project team. To facilitate comparison and prioritization of these injury-specific risk scores across injury types, a total value of 10 was set as the maximum risk score a respondent could receive for each type of injury. Accordingly, each injury risk area was scored based on the participant's baseline assessment responses and the importance of those baseline risk responses. The two injury areas with the highest risk score were designated as priority areas, and the tailored handout provided to the respondent was specific to risk reduction in those two areas.

2.7. Intervention materials

The tailored injury prevention handout consisted of three pages printed on two-color stationery with appealing graphics. The title “Baby, Be Safe”, followed by “Made Just For (child's name)” was at the top of the first page. The first page contained a bar graph of the participant's injury risk score for each of the five risk areas (Fig. 1). A description of the respondent's injury risk scores, along with motivational messages tailored to the respondent's injury-related locus of control and self-efficacy were also presented on page one. Pages two and three (Fig. 2) provided respondents with information pertaining to injury risks in their two highest scoring areas (one page for each injury risk). This included sections with general information on the importance and relevance of the injury area, specific information about the highest priority behavior contributing to the child's risk for injury, and specific steps to take to reduce risk. Each page also contained a role-modeling scenario of a parent describing why and how she or he decided to use the specific safety practice being recommended to the participant. The role-modeling

scenario was tailored to the individual's beliefs about the effectiveness of the particular safety practice and the difficulty of implementing the safety practice. A total of 107 messages, which could be combined in numerous ways based on the participants' assessment responses, were developed for these various sections of the tailored handout. Many of the messages included "micro-tailoring" that inserted the child's name, correct gender, or other child-specific information.

The generic injury prevention handout (control condition) was two pages and contained general information about injury risks to children, along with behavioral recommendations for safety practices for the same five risk areas—burns, falls, poisoning, car injury, and drowning. It contained information and recommendations on all the safety practices assessed in this study, and was designed to be similar to the types of brochures and handouts that are frequently used in clinical practice. It was printed on the same stationery as the tailored handout.

2.8. Analyses

Descriptive analyses were conducted to determine parents' use of safety devices and behaviors at baseline. Chi-square analyses were conducted to determine study group differences in respondents' reports of having read and kept the safety handout, having discussed the handout with their physician or others, having decided to change their injury prevention practices based on the handout, and having actually implemented those changes.

The primary outcome of interest in this study was care-givers' adoption of child injury prevention behaviors. An overall injury risk score was calculated for each participant at baseline and follow-up by summing each respondent's injury risk scores for the five areas assessed (car injury, burns, drowning, falls, and poisoning). This overall risk score was used as the primary outcome measure, as it allowed for comparison of subjects in spite of individual differences in the specific recommended behavior changes. (Analysis of each individual behavior change would not only require a large number of comparisons, but would also result in too small a sample for many behaviors and a significant reduction in power.) In preliminary analyses, a change score consisting of baseline risk score minus follow-up risk score was computed. Differences between the two study groups on this change score were tested using a *t*-test. Next, analysis of covariance was conducted to determine differences between the two study groups on the follow-up injury risk score, with the pre-test injury risk score as a covariate. Analysis of covariance increases the sensitivity of the test of main effects and interactions by reducing the error term, because the error term is adjusted for the relationship between the dependent variable and the covariate. The analysis also adjusts the means on the dependent variable (follow-up injury risk score) to their expected levels if all subjects had scored equally on the covariate (baseline injury risk score) [50]. Analysis of covariance was also conducted on each of the injury-related beliefs at follow-up, using baseline scores as covariates.

Further analyses were conducted to determine whether patients who discussed the injury prevention handout with their physician demonstrated a greater decrease in injury risk score than those who did not discuss the handout with their physician. Separate analyses were conducted for tailored and non-tailored groups. The *t*-tests were used to determine whether injury risk change scores were significantly different between those who had and those who had not discussed the handout with their physician. An analysis of covariance was conducted for each study group to determine differences on the injury risk score at follow-up between those who had and those who had not discussed the handout with their physician.

3. Results

3.1. Baseline rates of risk behaviors

Rates of injury risk behaviors reported at the baseline assessment are presented in Table 3. The most prevalent risks reported were lack of syrup of ipecac in the home, or for those who did have it, not knowing when to give it; unchecked hot water temperature; storage of medicine and household products in unlocked cabinets; lack of stair gate use; and use of a walker. In addition, over one-fourth of respondents reported not always having their child in a car seat, using the incorrect car seat for the child's weight, not checking smoke detector batteries in the past 6 months, and not having the telephone number of the poison control center posted in their home. There were no significant relationships between overall injury risk score at baseline and socio-economic status, parent's age, number of parents in the home, or whether the family owned or rented their home.

3.2. Caregiver response to handout

At follow-up, 95.3% of the tailored group and 89.9% of the non-tailored group (ns) stated that they had read the injury prevention handout; 96.5% of the tailored group and 92.1% of the non-tailored group (ns) had kept the handout. There was no significant difference between groups in their rating of usefulness of the handout. Both groups rated it highly, with 56.8% of the tailored group and 52.5% of the non-tailored group rating it "very useful", and 30.9% of the tailored group and 33.8% of the non-tailored group rating it "useful". A minority of participants chose to discuss the handout with their physicians (20.0% of the tailored group and 17.2% of the non-tailored group; ns). However, most persons did discuss the handout with family or a friend (71.6% of the tailored group and 65.0% of the non-tailored group; ns).

Participants were asked whether they had decided to make any specific changes in their safety practices as a result of the information in the handout, and if so, whether they had implemented those changes. A total of 81.3% of the tailored group, compared to 63.8% of the non-tailored group stated that they had decided to make one or more changes (chi-square = 6.14, $P = 0.013$). In addition, 65.0% of the tailored group reported having implemented one or more behavior changes, compared to 40.5% of the non-tailored group (chi-square = 9.57, $P = 0.002$).

3.3. Change in injury risk score associated with intervention group

Overall risk score at baseline ranged from 2 to 36, with a mean of 15.13 (S.D., 6.90). Participants in the tailored group showed a greater decrease in overall injury risk score from baseline to follow-up than those in the non-tailored group. Those receiving non-tailored information showed a mean decrease in risk score of 1.54 (S.D., 5.58), while those receiving tailored information had a mean decrease of 4.68 (S.D., 6.44) ($t = -3.45$, $P = 0.001$). As shown in Table 4, an analysis of covariance on risk score at follow-up, with baseline risk score as a covariate, showed a significant effect for study group ($F = 9.22$, $P = 0.003$). After adjusting for baseline injury risk score, those receiving tailored information had a significantly lower injury risk score at follow-up than those receiving generic information. Unadjusted and adjusted means are displayed in Table 5. There was no significant effect of study group on follow-up measures of injury susceptibility, injury-related locus of control, self-efficacy for injury prevention, or perceived effectiveness of injury prevention devices.

3.4. Relationship between discussion with physician and behavior change

While there were no differences between study groups in the percent of persons who discussed the injury prevention handout with their physician, different effects by study group were observed for the effect of this variable on behavior change. Participants in the tailored group who discussed the handout with their physician demonstrated a significantly greater decrease

in injury risk score than those who did not discuss the handout with their physician (mean decrease of 10.00 for those who discussed with their physician versus mean decrease of 2.98 for those who did not; $t = -4.39$, $P < 0.001$). However, this was not the case for the non-tailored group. For the non-tailored group, there was no significant difference in risk score change between those who did and those who did not discuss the handout with their physician (mean risk score decrease of 1.80 for those who discussed with their physician versus 0.77 for those who did not; $t = -0.38$, ns). An analysis of covariance on risk score at follow-up for each group showed a significant effect of discussion with physician for the tailored group ($F = 10.19$, $P = 0.002$), but not for the non-tailored group ($F = 0.57$, ns). A summary of results is provided in Table 6.

4. Discussion

4.1. Utility of tailored communications

In this study, parents who received tailored injury prevention information demonstrated a significantly greater decrease in injury risk to their child, based on an assessment of their use of injury prevention behaviors, than those receiving generic information. This difference in behavior change was not accounted for by differences in participants' reading or keeping the handout, perceived usefulness of the handout, or discussion of the handout with others; nor was it accounted for by differences in beliefs regarding injury prevention. Several other factors may account for the superiority of the tailored information. Those receiving tailored information were given visual and verbal feedback as to their child's level of risk for injury, based on the assessment information they had just provided. The messages were tailored to their particular beliefs about their ability to prevent injury to their child, potentially increasing receptivity to the messages. The tailored messages were highly focused, with parents receiving information on the two highest priority specific changes for reducing their child's injury risk and concrete steps to implement those changes. In addition, parents were provided a "role model" scenario about each specific behavior, as told by another parent, tailored to their beliefs about the effectiveness of the behavior and the difficulty of implementing it. The goal of this approach was to increase the perceived relevance of the message, increase the motivational quality of the message, and eliminate the provision of non-relevant information.

It is important to note that the smaller decrease in injury risk associated with the provision of generic information observed in this study may overestimate the amount of change that can be brought about with a brochure or similar type of handout. Subjects receiving generic messages in this study also completed a detailed assessment of their home and car safety behaviors, which may have served to heighten awareness of injury risks to their child and prompt attention to the information provided subsequently. During pilot testing of the questionnaire, several pilot subjects noted that just completing the assessment was beneficial to them, as it helped them think about things that they needed to do to protect their child. Nevertheless, the difference in the magnitude of change observed between the non-tailored and tailored groups suggests that the increased effect associated with tailored messages is not attributable only to a heightening of awareness created through the assessment process.

Even though participants were provided with the injury prevention handout while at the primary care setting for a well-child visit, only about one-fifth of them discussed the handout with their physician during the visit. This discussion with the physician was associated with significantly greater behavior change for those receiving tailored information, but not for those receiving generic information. The reason for this difference cannot be determined from this study. It may be that the tailored messages stimulated greater patient interest in subsequent discussion with their physician, promoted greater readiness for any subsequent information provided by the physician, or created an increased likelihood to act based on that information. It may be that the provision of tailored messages resulted in differences in the quality of the interaction

with the physician, providing a more focused and productive discussion. A previous study has demonstrated a priming effect of physician advice given prior to the receipt of educational materials [51]. Physician advice provided after receipt may function in a similar manner, priming the parent to pay closer attention to the handout after the visit.

4.2. Practice implications

Findings from this study support the utility of a patient education approach involving the provision of tailored educational information that is reinforced through interaction with the physician or other health care provider. Tailored communications were found to be more effective in promoting injury prevention behaviors than generic print media. When paired with physician interaction, even greater behavior change was observed. Such an approach offers several potential advantages over provider counseling alone. It is time-efficient, as it relieves the health care provider of the time burden of individual assessment. Moreover, the patient can be given information of greater depth and specificity than could be covered in a brief interaction. Once developed, this approach would be cost-efficient, and could be easily integrated within the regular patient flow in the primary care setting.

4.3. Future research

Continued research in this area is needed to better understand the potential role of tailored persuasive communications in the primary care setting. Studies addressing the primary care setting itself and mechanisms to integrate tailored health education into routine practice would be beneficial. In addition, future research should explore the utility and effectiveness of systematic provider reinforcement of tailored educational messages, as well as follow-up booster intervention components.

4.4. Limitations

Several limitations to this study should be recognized. The study relied on self-reporting of injury prevention behavior, as opposed to actual observation of the behaviors. However, several of the behaviors assessed, such as frequency of stair gate use or checking of smoke detector batteries, could only be measured through self-report. This was a small study involving a convenience sample of primarily African-American parents obtained from one primary care clinic in an urban setting. Nevertheless, a range of ages, household composition, income, and education levels were represented, supporting the potential generalizability of the findings. The reality of being a “guest” in a clinical setting also presented a sampling limitation. A number of participants could not be included in the study because they did not have sufficient waiting room time to complete the baseline assessment before being called to their appointment. While this is a less than ideal situation, it was necessary that the study not interfere with clinic appointments. However, this condition probably did not affect the characteristics of the sample, as the flow of a clinic is somewhat random and not likely associated with any characteristics of the persons who had insufficient waiting room time to complete the baseline assessment. Finally, a fairly substantial number of disconnected telephone numbers were encountered during the follow-up assessments, perhaps reflecting a highly mobile population.

5. Conclusions

This study offers promising findings regarding the use of tailored communications for the prevention of injuries to young children. Incorporated as a routine component of well-child care, such an approach would offer a way to efficiently and effectively provide injury prevention education despite the very real time and personnel limitations experienced by primary care practices. This approach could be an exciting new direction for the provision of health education in the primary care setting.

Acknowledgements

The authors wish to thank Dr. Rachel Moon and the Children's National Medical Center for their involvement in this study, as well as the staff of the Children's Health Center for their willingness to accommodate the research team.

References

- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Atlanta, Georgia: US Injury Mortality Statistics; 1997.
- Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Vital statistics system for numbers of deaths, bureau of census for population estimates. National Center for Health Statistics advance data; 1997.
- Burt CW, Fingerhut LA. Injury-related visits to hospital emergency departments. *Vital Health Stat* 1992;13:1–76.
- Rivara FP, Calonge N, Thompson RS. Population-based study of unintentional injury incidence and impact during childhood. *Am J Pub Health* 1989;79:990–4. [PubMed: 2751038]
- Rivara FP. Developmental and behavioral issues in childhood injury prevention. *Dev Beh Ped* 1995;16:362–70.
- Rivara FP, Mueller BA. The epidemiology and causes of childhood injuries. *J Soc Issues* 1987;43:13–31.
- Sleet, DA.; Mercy, JA. Promotion of safety, security, and well-being. In: Bornstein, MH.; Davidson, L.; Keyes, CLM.; Moore, KA., editors. *The center for child well-being. Well-being: positive development across the life course*. Mahway, NJ: Erlbaum; 2002.
- Eichelberger MR, Gotschall CS, Feely HB, Harstad P, Bowman LM. Parental attitudes and knowledge of child safety. *Child Safety* 1990;144:714–20.
- Hu X, Wesson D, Parkin P, Rootman I. Pediatric injuries: parental knowledge, attitudes and needs. *Can J Pub Health* 1996;87:101–5. [PubMed: 8753637]
- Bass JL, Mehta KA. Developmentally-oriented safety surveys. *Accident Prevention* 1980;19:350–6.
- Gielen AC, Wilson MEH, Faden RR, Wissow L, Harvilchuck JD. In-home injury prevention practices for infants and toddlers: the role of parental beliefs, barriers, and housing quality. *Health Edu Quart* 1995;22:85–95.
- Glik DC, Greaves PE, Kronenfeld JJ, Jackson KL. Safety hazards in households with young children. *J Ped Psych* 1993;18:115–31.
- Gofin R, Palti H. Injury prevention practices of mothers of 0–2 years old: a developmental approach. *Early Child Dev Care* 1991;71:117–26.
- Halperin SF, Bass JL, Mehta KA. Knowledge of accident prevention among parents of young children in nine Massachusetts towns. *Pub Health Rep* 1983;98:549–52.
- Bass JL, Christoffel KK, Widome M, Boyle W, Scheldt P, Stanwick R, et al. Childhood injury prevention counseling in primary care settings: critical review of the literature. *Injury Prevention* 1993;92:544–50.
- Clamp M, Kendrick D. A randomised controlled trial of general practitioner safety advice for families with children under 5 years. *Br Med J* 1998;16:1576–9. [PubMed: 9596598]
- DiGuseppi C, Higgins JP. Systematic review of controlled trials of interventions to promote smoke alarms. *Arch Dis Child* 1999;82:341–8. [PubMed: 10799419]
- DiGuseppi C, Roberts IG. Individual-level injury prevention strategies in the clinical setting. *The Future of Children* 2000;10(1):53–8. [PubMed: 10911688]
- Liberate CP, Eriacho B, Schmiesing J, Krump M. Safesmart safety seat intervention project: a successful program for the medically-indigent. *Patient Edu Couns* 1989;13:161–70.
- Miller TR, Galbraith M. Injury prevention counseling by pediatricians: a benefit-cost comparison. *Pediatrics* 1995;96:1–4. [PubMed: 7596695]
- Reisinger K, Bires J. Anticipatory guidance in pediatric practice. *Pediatrics* 2000;66:889–92. [PubMed: 7454479]
- Demars RY, Neale AV, Adams R, Trembath C, Herman SC. The impact of physicians' brief smoking cessation counseling: a MIRNET study. *J Fam Pract* 1990;31:625–9. [PubMed: 2246637]

23. Janz NK, Becker MH, Kirscht JP, Eraker SA, Billi JE, Woolliscroft JO. Evaluation of a minimal-contact smoking cessation intervention in an outpatient setting. *Am J Pub Health* 1987;77:805–9. [PubMed: 3592033]
24. Russell MAH, Wilson C, Taylor C, Baker CD. Effects of general practitioners' advice against smoking. *Br Med J* 1979;2:231–5. [PubMed: 476401]
25. Fleming MF, Barry KL, Manwell LB, Johnson K, London R. Brief physician advice for problem alcohol drinkers: a randomized controlled trial in community based primary care practices. *J Am Med Assoc* 1997;277:1039–45.
26. The injury prevention program (TIPP). American Academy of Pediatrics; Chicago, IL: 1996.
27. American Medical Association. Guidelines for adolescent preventive services (GAPS): recommendations and rationale. American Medical Association; 1994.
28. Committee on Injury and Poison Prevention and Committee on Adolescence. Office-based counseling for injury prevention. *Pediatrics* 1994;94:566–7. [PubMed: 7936874]
29. US Department of Health and Human Services. Healthy people 2000: National health promotion and disease prevention objectives. US Department of Health and Human Services; 1991. p. 286–7.
30. US Preventive Services Task Force. Guide to clinical preventive services. 2. Alexandria, Virginia: International Medical Publishing; 1996.
31. Green, M. Guidelines for health supervision of infants, children, and adolescents. National Center for Education in Maternal and Child Health; 1994.
32. Gielen AC, McDonald EM, Forrest CB, Harvilchuck JD, Wissow L. Injury prevention counseling in an urban pediatric clinic. *Arch Pediatr Adolesc Med* 1997;151:146–51.
33. Morrongiello BA, Hillier L, Bass M. What I said versus what you heard: a comparison of physicians and parents reporting of anticipatory guidance on child safety issues. *Injury Prevention* 1995;1:223–7. [PubMed: 9346035]
34. Jaen CR, Stange KC, Nutting PA. Competing demands of primary care: a model for the delivery of clinical prevention services. *J Fam Pract* 1994;38:166–71. [PubMed: 8308509]
35. Skinner CS, Siegfried JC, Kegler MC, Strecher VJ. The potential of computers in patient education. *Patient Edu Couns* 1993;22:27–34.
36. Sleet, DA.; Gielen, A. Health behavior: injury prevention. In: Arnold, J.; Gorin, S., editors. *Health Promotion Handbook*. St Louis: Mosby &Co; 1998. p. 247–75.
37. Williams RB, Boles M, Johnson RE. Patient use of a computer for prevention in primary care practice. *Patient Edu Couns* 1995;25:283–92.
38. Kreuter, MW.; Farrell, D.; Olevitch, L.; Brennan, L. Tailoring health messages: customizing communication using computer technology. Mahwah, NJ: Lawrence Erlbaum Associates; 2000.
39. Kreuter MW, Strecher VJ, Glass B. One size does not fit all: the case for tailored print materials. *Ann Beh Med* 1999;21:276–83.
40. Kreuter M, Oswald DL, Bull FC, Clark EM. Are tailored health education materials always more effective than non-tailored materials? *Health Edu* 2000;15:305–15.
41. Brug J, Campbell M, Van Assema P. The application and impact of computer-generated personalized nutrition education: a review of the literature. *Patient Edu Couns* 1999;36:145–56.
42. Dijkstra A, DeVries H. The development of computer-generated tailored interventions. *Patient Edu Couns* 1999;36:193–203.
43. Brug J, Glanz K, Van Assema P, Kok G, Van Breukelen GJP. The impact of computer-tailored feedback and iterative feedback on fat, fruit, and vegetable intake. *Health Edu Beh* 1998;25:517–31.
44. Campbell MK, DeVellis BM, Strecher VJ, Ammerman AS, DeVellis RF, Sandier RS, et al. Improving dietary behavior: the effectiveness of tailored messages in primary care settings. *Am J Pub Health* 1994;84:783–7. [PubMed: 8179049]
45. Kreuter MW, Strecher VJ. Changing inaccurate perceptions of health risk: results from a randomized trial. *Health Psych* 1995;14:56–63.
46. Strecher VJ, Kreuter M, Boer DD, Kobrin S, Hoppers HJ, Skinner CS. The effects of computer-tailored smoking cessation messages in family practice settings. *J Fam Pract* 1994;39:262–70. [PubMed: 8077905]

47. Cohen LR, Runyan CW, Downs SM, Bowling JM. Pediatric injury prevention counseling priorities. *Pediatrics* 1997;99:704–10. [PubMed: 9113947]
48. Committee on Injury and Poison Prevention and Committee on Adolescence. Injuries associated with infant walkers. *Pediatrics* 1995;95:778–80. [PubMed: 7724325]
49. Grossman DC. The history of injury control and the epidemiology of child and adolescent injuries. *The Future of Children* 2000;10(1):23–52. [PubMed: 10911687]
50. Tabachnick, BG.; Fidel, LS. Using multivariate statistics. Harper Collins College; 1996.
51. Kreuter MW, Chedda SG, Bull FC. How does physician advice influence patient behavior? Evidence for a priming effect. *Arch Fam Med* 2000;9:426–33. [PubMed: 10810947]

Appendix. Child Injury Prevention Assessment

The first few questions are about your child.

What is your child's first name? _____

Is your child a boy or a girl?

- ☐ Boy
- ☐ Girl

How old is [FirstName]?

☐ 6 months	☐ 14 months
☐ 7 months	☐ 15 months
☐ 8 months	☐ 16 months
☐ 9 months	☐ 17 months
☐ 10 months	☐ 18 months
☐ 11 months	☐ 19 months
☐ 12 months	☐ 20 months
☐ 13 months	

How much does [FirstName] weigh?

- ☐ Less than 20 pounds
- ☐ 20 pounds or more

Next, you will be asked some questions about injuries to children—that is, children getting hurt in an accident. For each question, pick the answer that is closest to what you think.

How much do you agree or disagree with each of the following?

Injuries are an important risk to my child's health.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

Most childhood injuries can be prevented (stopped before they happen).

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

If I am careful and safeguard my home, [FirstName] can keep from getting hurt in an accident when [he/she] is in my care.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

For [FirstName], not getting hurt in an accident is largely a matter of good luck.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

Parents don't have much control over whether their children get hurt in an accident.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

No matter what I do, if [FirstName] is going to get hurt in an accident, it will happen.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

How sure are you that you can make your home safe for your child?

- ☐ Very sure
- ☐ Somewhat sure
- ☐ Not very sure
- ☐ Not at all sure

Next, you will be asked some questions about different types of safety measures that parents may or may not take. Each parent chooses different things. There are no right or wrong answers. For each question, please pick the answer that is most right for you.

Do you have a smoke detector in your home?

- ☐ Yes
- ☐ No

[IF NO]

Have you thought about getting a smoke detector?

- ☐ No, I haven't really thought about it
- ☐ I've thought about it
- ☐ I'm going to get one soon

[IF YES]

When was the last time you either checked or changed the battery in your smoke detector?

- ☐ Less than 6 months ago
- ☐ Between 6 months and 1 year ago
- ☐ More than 1 year ago
- ☐ My smoke detector does not require batteries

What is the temperature setting on your hot water heater? (That is, what is the temperature of the water that comes out of your hot water faucet?)

- ☐ 120 degrees or less (*skip to Question #16*)
- ☐ Over 120 degrees but under 130 degrees
- ☐ More than 130 degrees
- ☐ I don't know

[IF DON'T KNOW]

Have you ever thought about checking the temperature of the hot water?

- ☐ No, I haven't really thought about it
- ☐ I've thought about doing it
- ☐ I'm plan to check it soon

[IF OVER 120 DEGREES]

Have you thought about changing the hot water heater setting to reduce the temperature to 120 degrees or less?

- ☐ No, I haven't really thought about changing the temperature.
- ☐ I've thought about doing it.
- ☐ I plan to change it soon.
- ☐ I don't have access to the hot water heater.

To the best of your knowledge, has anyone in your family ever held [FirstName], even once or twice, while cooking or holding a hot liquid? (for example, holding a coffee cup or pan of hot water?)

- ☐ Yes
- ☐ No

Do you have a stair gate put in front of any set of steps or stairways that your child can get to?

- ☐ Yes
- ☐ No
- ☐ There are no stairs in my home

[IF NO]

Have you thought about putting a stair gate in your home?

- ☐ No, I haven't really thought about using them
- ☐ I've thought about using them
- ☐ I'm going to get one soon

[IF YES]

How often do you have stair gate put up?

- ☐ Rarely or never
- ☐ Some of the time
- ☐ Most of the time
- ☐ Always

Do you use the stair gate(s) at the top of the stairs, the bottom of the stairs, or both?

- ☐ Top
- ☐ Bottom
- ☐ Both

Does [FirstName] use a walker with wheels that roll?

- ☐ Yes
- ☐ No

[IF NO]

Have you thought about getting a walker?

- ☐ No, I'm not going to get one
- ☐ I've thought about getting one
- ☐ I'm going to get one

In your home, where are cleaning products kept?

- ☐ Out on top of counters or tables
- ☐ In cabinets below waist level
- ☐ In cabinets above waist level

[IF IN CABINETS]

Are there cabinet locks on these cabinets?

- ☐ Yes
- ☐ No

[IF NO]

Have you thought about putting locks on these cabinets

- ☐ No, I've not really thought about using them
- ☐ I've thought about using them
- ☐ I plan to put them on soon

In your home, where are medicines kept?

- ☐ Out on top of counters or tables
- ☐ In cabinets below waist level
- ☐ In cabinets above waist level

[IF IN CABINETS]

Are there cabinet locks on these cabinets?

- ☐ Yes
- ☐ No

[IF NO]

Have you thought about putting locks on these cabinets

- ☐ No, I've not really thought about using them
- ☐ I've thought about using them
- ☐ I'm plan to put them on soon

Syrup of Ipecac is a liquid that makes a child throw up. Do you have syrup of Ipecac in your home?

- ☐ Yes
- ☐ No

[IF NO]

Have you thought about buying syrup of Ipecac?

- ☐ No, I haven't really thought about it
- ☐ I've thought about it
- ☐ I'm going to get it soon

[IF YES]

When would you give [FirstName] the syrup of Ipecac?

- ☐ I would give it right away if [FirstName] swallowed something poisonous.
- ☐ I would give it if [FirstName] swallowed something poisonous and the poison control center told me to give it.
- ☐ I'm not sure when I would give it.

Do you know how to contact the poison control center?

- ☐ Yes, and I have the number put up in my home
- ☐ Yes, but I do not have the number put up in my home
- ☐ I would have to look it up, but I would know where to look
- ☐ No, I'm not sure how to get a hold of them

Does [FirstName] have [his/her] own car seat?

- ☐ Yes
- ☐ No

When [FirstName] is riding in a car, how often is [he/she] in a car seat?

- ☐ Rarely or never
- ☐ Some of the time
- ☐ Most of the time
- ☐ Always

[IF RARELY OR NEVER]

Have you thought about using a car seat?

- ☐ No, I haven't thought about using a car seat
- ☐ I've thought about it
- ☐ I'm going to begin using one soon

[IF SOMETIMES]

Have you thought about using a car seat more often?

- ☐ No, I haven't really thought about it
- ☐ I've thought about it
- ☐ I'm going to begin using it more often

[IF SOMETIMES, MOST OF THE TIME OR ALWAYS]

Does the car seat face the front or back of the car?

- ☐ Front facing ([FirstName] looks towards the front of the car)
- ☐ Rear facing ([FirstName] looks towards the back of the car)

Where in the car is [FirstName] usually seated?

- ☐ In the front seat
- ☐ In the back seat

[IF ALWAYS]

Do you ever take [FirstName] out of the car seat for a short time, like to feed [him/her] or if [he/she] is fussy?

- ☐ Yes
- ☐ No

Has anyone in your family ever left [FirstName] alone in a tub of water, even for a moment? (with or without a bathtub ring)

- ☐ Yes
- ☐ No

Does your home have a swimming pool? (not a "kiddie pool")

- ☐ Yes
- ☐ No

[IF YES]

Does your swimming pool have a fence with a locked gate around it?

- ☐ Yes
- ☐ No

Has anyone in your family ever left [FirstName] alone in the area of the swimming pool, even for a moment?

- ☐ Yes
- ☐ No

Do you have a "kiddie pool"?

- ☐ Yes
- ☐ No

[IF YES]

Has anyone in your family ever left [FirstName] alone in the area of the kiddie pool, even for a moment?

- ☐ Yes
- ☐ No

Has water even been left in the kiddie pool after [FirstName is / your children are] done playing in it?

- ☐ Yes
- ☐ No

Every parent is different in the safety measures they decide to use. For example, parents may believe that some safety measures are more important than others, or they may find that some devices are a problem to use. The next questions ask how you feel about certain child safety measures.

How much do you think each of the following would help keep [FirstName] from getting hurt in an accident?

	Not At All	Some	A Lot
Car seats	☐	☐	☐
Smoke detectors	☐	☐	☐
Cabinet locks	☐	☐	☐
Syrup of Ipecac	☐	☐	☐
Stair gates	☐	☐	☐
<i>[ask only if have stairs]</i>			
Fence with a locked gate around swimming pools <i>[ask only if have a pool]</i>	☐	☐	☐

[Each components of question 32 is asked **only if the parent does not have the device or is not doing the safety behavior.**]

How easy or difficult would it be for you to do each of the following?

	Easy	Somewhat Difficult	Difficult
Put in the car seat facing [the correct direction] rather than [the incorrect direction]?	☐	☐	☐
Put the car seat in the back seat?	☐	☐	☐
Always keep your child in the car seat when the car is moving?	☐	☐	☐
Put a smoke detector in your home?	☐	☐	☐
Change the batteries in your smoke detector every 6 months?	☐	☐	☐
Check or change the temperature setting on your hot water heater?	☐	☐	☐
Never hold your child while cooking or holding a hot liquid?	☐	☐	☐
Have a stair gate put up at all times?	☐	☐	☐
Never let your child use a walker?	☐	☐	☐
Keep medicines above waist level in locked cabinets?	☐	☐	☐
Keep cleaners above waist level in locked cabinets?	☐	☐	☐
Learn when and how to use syrup of Ipecac?	☐	☐	☐
Keep the poison control number put up in your home?	☐	☐	☐
Never leave your child alone in a tub of water?	☐	☐	☐
Never leave your child alone by a pool?	☐	☐	☐
Never leave water in a kiddie pool when not being used?	☐	☐	☐

Fig. 1.
Sample page 1 of the tailored handout.

Poisoning risks in your home

Products that you may use every day like medicine, cleaners, make-up, and vitamins need to be kept away from Ryan. If he tried to eat them, he would get very sick. Because medicines are stored below waist level in unlocked cabinets, Ryan is in greater danger of getting hurt by being poisoned.

Did you know?

- ❖ More than 90% of all poisonings happen at home.
- ❖ Most calls to poison control centers are between 4 p.m. and 10 p.m.
- ❖ When a child is poisoned by eating medicine, sometimes the medicine is brought into the home by a grandparent or someone else

Locked cabinets are lifesavers

The biggest poisoning risk for Ryan is your medicines aren't stored in a locked cabinet above waist level. Because Ryan can get to these things just by opening a cabinet door, he's more likely to try to eat them. Children have little bodies that can't handle poison as well as an adult. Also, poisons get into children's bodies faster because they're so little. Keeping your medicines in a locked cabinet above waist level is the best way to keep Ryan from eating things that could poison him.

What to do

1. If you can, move medicines to cabinets above waist level and put cabinet locks on them. You can buy cabinet locks at any baby supply store for under \$1 each.
2. When visitors come over, remember that they may have brought medicines with them. Ask visitors to keep them in a safe place away from Ryan.
3. Don't take pills in front of Ryan and don't confuse him by calling the medicine "candy."

"If it's not locked, it's not safe"

From an early age I taught Justin not to open the cabinets where I kept my cleaners and medicines. If he tried to open them I gave him a scolding. I didn't need cabinet locks. But once Justin was able to get around on his own it got harder. Never forget how sneaky toddlers can be! The minute I turned my back Justin tried to get into those cabinets. I realized that just saying no wasn't going to work. I bought some cabinet locks and put them on every cabinet that I didn't want Justin getting into. They were cheap and easy to install. I can still open the cabinets, but Justin can't. Problem solved!

Fig. 2.
Sample page 2 or 3 of the tailored handout.

Table 1
Participant demographics

	Tailored		Non-tailored	
	<i>N</i>	Percent	<i>N</i>	Percent
Relationship to child				
Mother	65	78.3	66	74.2
Father	9	10.8	13	14.6
Other	9	10.8	10	11.2
Caregiver age				
20 or under	15	17.6	16	18.0
21–25	25	29.4	29	32.6
26–30	15	17.6	17	19.1
31–35	14	16.5	11	12.4
Over 35	14	16.5	16	18.0
Number of adults in home				
One	19	22.9	14	15.7
Two	40	48.2	46	51.7
Three or more	24	28.9	29	32.6
Race/ethnicity				
African–American	69	83.1	75	86.2
Caucasian	5	6.0	4	4.6
Other	9	10.9	8	9.2
Education				
Less than high school	6	7.2	8	9.2
High school or GED	32	38.6	45	51.7
Some college	31	37.3	23	26.4
College graduate	13	15.7	9	10.3
Post-graduate work	1	1.2	2	2.3
Income				
Under US\$ 10,000	21	29.2	16	20.5
US\$ 10,000–24,999	20	27.8	25	32.0
US\$ 25,000–49,000	20	27.8	18	23.1
US\$ 50,000 and over	11	15.3	19	24.3
Home				
Rent	18	23.7	25	29.4
Own	58	76.3	60	70.6

Table 2

Risk scores assigned to injury risk behaviors

Injury risk behavior	Score
Car injury	
Rarely/never uses car seat	10
Uses car seat some of the time	8
Uses car seat most of the time	6
Has taken child out of car seat	4
Incorrect location of car seat	2
Car seat incorrect direction	2
Burns/fire	
No smoke detector (SD) in home	6
SD battery not checked in over a year	3
SD battery not checked in over 6 months	2
Hot water temperature over 130 °C	4
Does not know hot water temperature	4
Hot water temperature 120–130 °C	2
Has held child while holding a hot liquid	1
Falls	
Uses a walker	5
Planning to get a walker	5
Considering getting a walker	4
No stair gate in home	4
Rarely latches stair gate	4
Latches stair gate some of the time	3
Latches stair gate most of the time	2
Poisoning	
Products stored on counter	3
Products stored in unlocked low cabinets	3
Products stored in unlocked high cabinets	1
Products stored in locked low cabinets	1
Medicines stored on counter	3
Medicines stored in unlocked low cabinets	3
Medicines stored in unlocked high cabinets	1
Medicines stored in locked low cabinets	1
No ipecac in home	2
Improper use of ipecac	2
Unsure how to contact poison control	2
Poison control number not posted	1
Drowning	
Pool with no fence	6
Has left alone near pool	3
Has left alone near “kiddie pool”	3
Has left water in “kiddie pool”	2
Has left alone in tub	3

Table 3

Baseline rates of injury risk behaviors

Injury risk behavior	Proportion	Percent
Car injury risk		
Uses car seat never, rarely or some of the time	10/174	5.7
Uses car seat most of the time, or sometimes takes child out of car seat to feed or if fussy	45/174	26.2
Incorrect car seat for weight	48/174	27.6
Car seat placed in the front seat	3/174	1.8
Burn/fire risk		
No smoke detector in home	2/174	1.1
Smoke detector batteries not checked or changed in over 6 months	46/174	26.7
Has not checked hot water temperature, or temperature over 130 °C	113/174	65.0
Has held child while holding a hot liquid	30/174	17.2
Fall risk		
Does not have a stair gate (of those with stairs in home)	42/106	39.6
Does not always use stair gate (of those with stair gates)	27/64	42.2
Does not use stair gate at both top and bottom of stairs (of those with stair gates)	31/64	48.4
Child uses a walker	38/174	39.1
Poisoning risk		
Products stored out on counter/table	13/174	7.5
Products stored in unlocked low cabinets	53/174	30.5
Products stored in unlocked high cabinets	37/174	21.3
Medicines stored out on counter/table	25/174	14.4
Medicines stored in unlocked low cabinets	2/174	1.1
Medicines stored in unlocked high cabinets	108/174	62.1
No syrup of ipecac in home	139/174	79.9
Does not know to call poison control before giving ipecac (of those with ipecac in home)	17/35	48.6
Poison control number not posted in home	47/174	27.0
Unsure how to contact poison control	18/174	10.3
Drowning risk		
Has left child unattended in tub	8/174	4.6
Has left child unattended in "kiddie pool"(of those who have a "kiddie pool")	2/174	7.4
Has left water in "kiddie pool" after using (of those who have a "kiddie pool")	2/174	7.4

Table 4

Analysis of covariance of injury risk score at follow-up by study group

Source of variance	SS	d.f.	MS	F
Baseline risk score	2091.11	1	2091.11	83.23**
Study group	231.65	1	231.65	9.22**
Error	4296.05	171	25.12	

**
 $P = 0.01$.

Table 5

Baseline and unadjusted and adjusted follow-up means on injury risk score

	Baseline Mean	S.D.	Follow-up; unadjusted Mean	S.D.	Follow-up; adjusted Mean	S.E.
Tailored (<i>n</i> = 85)	15.98	6.81	11.29	6.19	10.86	0.546
Non-tailored (<i>n</i> = 89)	14.31	6.91	12.77	6.00	13.19	0.533

Table 6

Analyses of covariance of injury risk score at follow-up by discussion with physician for tailored and non-tailored groups

Source of variance	SS	d.f.	MS	F
Tailored				
Baseline risk score	869.22	1	869.22	47.16**
Discussion with physician	187.85	1	187.87	10.19**
Error	1050.70	57	18.43	
Non-tailored				
Baseline risk score	467.78	1	467.78	17.49**
Discussion with physician	15.24	1	15.24	0.57 ^a
Error	1470.80	55	26.74	

**
P = 0.01.

^aNon-significant.