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Promoting a safer household environment: a volunteer-based home visit programme

Key Message

The present study provides evidence supporting the effectiveness of home visits by paraprofessionals to promote active prevention strategies against injuries among caregivers of infants and toddlers. The present effort should be viewed as one of the first in a series of attempts addressing the tension between programme accountability and financial sustainability in affecting community prevention programmes involving trained volunteers.

Introduction

Injury in childhood is a major health problem in Hong Kong. Between 2001 and 2002, injury and poisoning led to 3.1 and 3.7 deaths per 100 000 among youngsters aged 1 to 4 years and 5 to 14 years, respectively. An estimated 50% of all injuries among preschool children attending local accident and emergency departments (A&E) are sustained in the home setting.¹ Furthermore, unintentional residential childhood injuries (URCI) are projected to incur annual health care costs of HK\$60 million,² which is very likely an understatement, given this estimate excludes indirect and intangible costs.

Converging evidence now suggests that home visitation are a more potent means of preventing URCI than alternatives, such as media campaigns and primary care setting consultations.^{3,4}

Objectives

This study aimed to prevent or at least reduce the impact of URCI among children with a history of medically attended injuries in the past 6 months by: (a) increasing caregiver knowledge about URCI severity, consequences, and appropriate first-aid procedures; (b) modifying their preventive behaviour and beliefs, and (c) monitoring/modifying the household environments as necessary.

Methods

Design

This was a multi-centre randomised controlled trial involving a protocol approved by relevant committees of the two participating hospitals.

Participants

Families with a child younger than 3 years old attending the A&E of the Prince of Wales Hospital or Princess Margaret Hospital were recruited if that child was: (1) admitted for an unintentional episode of injury or poisoning sustained at home, or (2) diagnosed to have incurred 'domestic' or 'unclassified' trauma. Between 1 April 2002 and 31 December 2002, a total of 7713 families enduring such traumatic episodes were encountered. Written and informed consent was sought from all participating families prior to the commencement of all scheduled home visits.

Procedure and material

Eligible consenting participants were randomly assigned to the intervention and control groups. A rolling recruitment process was adopted for randomised group assignment to shorten the time lag between A&E discharge and the commencement of home visit. Control families received a package of educational material on injury prevention and two assessment-only visits in the first and 12th month following enrolment. Intervention families received the educational package, as well as four-quarterly home visits (1st, 4th, 7th, and 10th month) with active guidance on injury prevention, and regular monthly telephone follow-ups on months with no scheduled visits during the programme period. Volunteer home visitors, with child-rearing experience and training in

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injury prevention knowledge/skills, conducted all the visits. Each visitor was assigned to one of four supervisors (4 to 6 per supervisor). The supervisors were experienced human service professionals in nursing or social work.

Main outcome measures

Participants were evaluated in injury prevention knowledge, injury belief, preventive behaviours, and home hazards reduction. Knowledge was assessed with a five-item Injury Knowledge Test (IKT). Trained home visitors making on-site observations, assessed behaviour and home hazard reduction using an Injury Behaviour Checklist (IBC) and Home Environment Checklist (HEC) respectively. The HEC covers various injury morbidities and external causes: falls, crushing injuries, asphyxiation/suffocation, poisoning, burns/scalds, and piercing injuries.

An interview version of a 20-item Injury Belief Questionnaire (IBQ) assessed five domains in both physical and psychological terms.^{5,6} These included perceived injury susceptibility, severity of child injuries, as well as benefits and barriers to implementing injury prevention at home.

Among participating hospitals, the following data fields were extracted from the Accident and Emergency Information System of the Hospital Authority: gender, age, district of residence, triage category, trauma type, discharge destination, and specialty attention referred to.

Statistical tabulations and analyses

Variables of interest derived from this study were subjected to appropriate analyses: Cronbach's alpha coefficient for instruments' internal consistencies, χ^2 tests on categorical variables (demographics), independent sample *t* tests on continuous variables (maternal age), and logistic regression on categorical process outcomes of volunteer retention. Main outcome variables (IKT, IBQ-SF, IBC, HEC) were analysed with repeated measures in general linear models (GLM).

All statistical calculations were performed using the Statistical Package for the Social Sciences (Windows version 12.0; SPSS Inc, Chicago [IL], United States). The significance level for all statistical tabulations and tests was set at $P=0.05$, while 95% confidence intervals (CI) were constructed where appropriate.

Results

Process outcomes: case recruitment and attrition

Of 7713 A&E intakes accumulated during the 9-month case recruitment period, 405 (5%) attendees conformed to the prescribed inclusion criteria. Written consent was obtained from members of 193 (48%) eligible families. A total of 23 participants withdrew after giving consent due to various practical considerations, including scheduling conflicts, language barriers, and reservations from other family

members. Consequently, 170 families were enrolled and were randomly assigned to either the intervention group (86; 51%) or the control group (84; 49%). Over the visitation period, 64 (74%) intervention group families and 58 (69%) control group families completed all baseline, interim, and final assessments and visitations.

Participants and caregivers demographics

Most of the participating primary caregivers were mothers in their mid-thirties with upper secondary school education. At the outset, the intervention and control groups were mostly comparable in terms of the primary caregiver's relationship with injured child and educational level; the child's age, gender; and the injury mechanism of the episode leading to study inclusion.

Injury knowledge, belief, and behaviour

A repeated measures in GLM on IKT analysis, controlling for age and gender of the injured child, did not reach statistical significance ($F=2.75$, $df=1$, $P=0.101$). A repeated measures in GLM on IBQ analysis, controlling for age and gender of the injured child, also did not reach statistical significance ($F=0.176$, $df=1$, $P=0.175$). A repeated measures in GLM on IBC analysis, controlling for age and gender of the injured child, revealed a statistically significant difference in terms of behavioural change between the intervention group and controls ($F=890.56$, $df=1$, $P<0.01$).

Home hazards reduction

A repeated measures in GLM on HEC, controlling for age and gender of the injured child, revealed a statistically significant difference in terms of home hazard reductions between the intervention families and controls ($F=235.04$, $df=1$, $P<0.01$).

Discussion

Significant improvement with respect to caregivers' injury prevention and reduction behaviours as well as home hazard reductions we demonstrated corroborates previous findings⁴ in evaluating home visitation as an intervention on child injury prevention. Lack of any significant difference in terms of injury knowledge and belief, meanwhile, was also consistent with findings in previous reports.⁷⁻⁹ Families tend to receive abundant local injury prevention knowledge and educational material through available interpersonal and media channels.¹⁰ The absence of any observed association between injury belief and prevention practice at home suggests a greater influence via other factors that moderate the practice of injury prevention beyond individual belief and efficacy.¹¹ Hitherto, there was little attention directed at previous investigations using volunteer home visitors. However, now that there is an increasing focus directed at the implementation and maintenance of health behavioural changes in targeted populations in terms of community health promotion,¹² serious consideration should be given to follow-up studies to behavioural outcomes ensuing from client-visitor and client interactions.

The home environment in Hong Kong is characterised by a concentration of high-rise condominiums at a relatively high density,¹ resulting in a unique set of home injury prevention priorities, quite different from those in developed western societies. In this study, improvements such as tidying cluttering objects on the floor, was more related to active prevention strategies promoting injury prevention in the home setting, in contrast to prevailing outcomes in the international literature that focus primarily on environmental modifications of the household environment.¹³ Compared to findings reporting the relative ineffectiveness of other active measures in the prevention of child injury,⁷ the active prevention strategy we adopted provides one more piece of encouraging evidence in support of injury prevention to the research literature.

Analysis of retention patterns of families and volunteer home visitors

The overall retention rate of families enrolled into the intervention trial was 72%, which compares favourably to attrition in similar studies.¹⁴ Dropout and completed participants were not significantly different in terms of baseline injury belief scores, age of the injured child, or the primary caregiver.

Home visitors' attrition was analysed by logistic regression on the programme's 58 volunteers. After controlling for age and participating hospital, home visitors with moderate levels of educational attainment were more likely to dropout (respective odds ratios being 47.8 [P<0.01; 95% CI, 4.0-573.6] and 17.4 [P=0.02; 95% CI, 1.5-197.3]). Competing commitments and additional opportunities to serve the community in other capacities seemed to be the main reason for attrition. Lower dropout rate for volunteers with the low educational attainment could also be related to the attraction of social recognition derived from volunteering in this programme.

Cost-effectiveness of the intervention

The number of injuries avoided per 1000 was 11.3 and the subsequent average cost effectiveness ratio for each injury avoided was HK\$447. Given that the direct medical cost per head for URCI in 0-to-4-year-old children was estimated to be around HK\$1500,² the present programme appears to indicate a cost-effective intervention.

Limitation of the study

Data collection was interrupted during the severe acute respiratory syndrome (SARS) epidemic (23 March to 13 July 2003). In consideration of the emerging threat of infection during that time frame, participants were allowed to opt for a telephone assessment instead of a home visitation at the end of programme. Subsequently 29 (50%) of control families and 28 (44%) intervention families opted for the telephone assessment. Nevertheless, *t* tests on the study measures revealed no statistically significant differences between participants assessed by home visits or telephone at the end of programme.

In this study loss to follow-up was substantial, and the observed power for analyses of injury knowledge (IKT) and belief (IBQ) were low. However, the sample size was sufficient to support the analyses on behaviour (IBC) and home hazard (HEC) and was comparable to similar studies.¹⁴

Conclusions

The present study provided evidence supporting the efficacy of home visitation by trained volunteers as an effective approach to preventing URCI in Hong Kong. Restrictions imposed by the limited funding, as well as the SARS epidemic in Hong Kong probably contributed to a substantial attrition rate.

Notwithstanding these problems, compared to controls our intervention families showed significant improvements in various injury prevention and hazard modification behaviours relevant to childhood injuries. The present study lent support to promoting active home injury prevention strategies among caregivers of infants and toddlers by resorting to paraprofessional home visitors. The present study should be viewed as one of the first earnest attempts to address the tension between programme accountability and financial sustainability in any community prevention programme involving trained volunteers.

Policy implications

This study/pilot programme was featured a highlighted activity under the Kwai Tsing Healthy City and Safe Community campaign, which was accredited by the World Health Organization in early 2003 as the world's 73rd recognised safe community.¹⁵

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References

1. Chan CC, Luis BP, Chow CB, Cheng JC, Wong TW, Chan K. Unin-

- tentional residential child injury surveillance in Hong Kong. *J Paediatr Child Health* 2003;39:420-6.
2. Cost of unintentional residential childhood injury morbidity in Hong Kong. Proceedings of the 6th World Conference on Injury Prevention and Control; 2002 May 12-15; Montreal, Canada.
 3. Olds DL, Henderson CR Jr, Kitzman H. Does prenatal and infancy nurse home visitation have enduring effects on qualities of parental caregiving and child health at 25 to 50 months of life? *Pediatrics* 1994;93:89-98.
 4. Roberts I, Kramer MS, Suissa S. Does home visiting prevent childhood injury? A systematic review of randomised controlled trials. *BMJ* 1996;312:29-33.
 5. Becker MH. The Health Belief Model and personal health behavior. *Health Educ Monogr* 1974;2:324-508.
 6. Janz NK, Becker MH. The Health Belief Model: a decade later. *Health Educ Q* 1984;11:1-47.
 7. Damashek A, Peterson L. Unintentional injury prevention efforts for young children: levels, methods, types, and targets. *J Dev Behav Pediatr* 2002;23:443-55.
 8. King WJ, Klassen TP, LeBlanc J, et al. The effectiveness of a home visit to prevent childhood injury. *Pediatrics* 2001;108:382-8.
 9. Morrongiello BA, Kiriakou S. Mothers' home-safety practices for preventing six types of childhood injuries: what do they do, and why? *J Pediatr Psychol* 2004;29:285-97.
 10. Wortel E, Ooijendijk WT, De Geus GH, Stompedissel I. Volunteers as safety educations in a community campaign on child safety. *Health Promot Int* 1991;16:173-80.
 11. Stokols D. Establishing and maintaining healthy environments. Toward a social ecology of health promotion. *Am Psychol* 1992;47:6-22.
 12. Dziewaltowski DA, Estabrooks PA, Klesges LM, Bull S, Glasgow RE. Behavior change intervention research in community settings: how generalizable are the results? *Health Promot Int* 2004;19:235-45.
 13. Gielen AC, McDonald EM, Wilson ME, et al. Effects of improved access to safety counseling, products, and home visits on parents' safety practices: results of a randomized trial. *Arch Pediatr Adolesc Med* 2002;156:33-40.
 14. Paul CL, Sanson-Fisher RW, Redman S. Preventing accidental injury to young children in the home using volunteers. *Health Promot Int* 1994;9:241-9.
 15. Kwai Tsing Healthy City and Safe Community. Kwai Tsing Healthy City and Safe Community Report: 2000 to 2004. Hong Kong: Kwai Tsing Healthy and Safe Community; 2004:48.