Effectiveness of home visitation by public-health nurses in prevention of the recurrence of child physical abuse and neglect: a randomised controlled trial

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Summary

Background Recurrence of child maltreatment is a major problem, yet little is known about approaches to reduce this risk in families referred to child protection agencies. Since home visitation by nurses for disadvantaged first-time mothers has proven effective in prevention of child abuse and neglect, we aimed to investigate whether this approach might reduce recidivism.

Methods We enrolled in a randomised controlled trial 163 families with a history of one index child being exposed to physical abuse or neglect to compare standard treatment with a programme of home visitation by nurses in addition to standard treatment. The main outcome was recurrence of child physical abuse and neglect based on a standardised review of child protection records. Analysis was by intention to treat.

Findings At 3-years' follow-up, records were available for 160 of 163 (98%) families randomised. 139 (85%) completed follow-up. Recurrence of child physical abuse (31 [43%] in the control group *vs* 29 [33%] in the intervention group) and neglect (37 [51%] *vs* 41 [47%]) did not differ between groups. However, hospital records showed significantly higher recurrence of either physical abuse or neglect in the intervention group than in the control group (21 [24%] *vs* 8 [11%]). There were no differences between groups for the other secondary outcome measures.

Interpretation Despite the positive results of home visitation by nurses as an early prevention strategy, this visit-based strategy does not seem to be effective in prevention of recidivism of physical abuse and neglect in families associated with the child protection system. Much more effort needs to be directed towards prevention before a pattern of abuse or neglect is established in a family.

Introduction

During the past two decades, interventions to prevent child abuse and neglect have been assessed increasingly in high-risk community samples in randomised controlled trials.[1–3] Although recurrence of child abuse and neglect is common[4–6] and is associated with negative health outcomes for children, most programmes aimed at preventing recidivism in families have not undergone such rigorous investigation.[7] Wolfe and Wekerle[7] have reviewed studies of interventions provided to families in which child maltreatment has occurred, but they draw attention to the "relative paucity of carefully designed studies". They emphasise that the measure of success in home-based interventions is usually avoidance of alternative placement. Although important, this outcome is distinct from recurrence of maltreatment. Services provided to families associated with the child protection system are sometimes implemented without determining whether they prevent child abuse and neglect from happening again.[8]

Rates of recurrence in child protection system populations vary because of differences in methods and definitions.[5] Some studies examined rates of reabuse by the perpetrator,[4] whereas others examined revictimisation of children[6,9] or recurrence within families.[5] In a review, DePanfilis and Zuravin[10] concluded that there is no standard method for assessing recidivism of child

maltreatment. Reported recurrence rates of child abuse and neglect in published work range from 9% to 67%.[4–6,8,9,11,12] Clearly there is a need to develop interventions that prevent recurrence of child abuse and neglect. Since the best evidence for prevention of physical abuse and neglect in high-risk groups before it occurs comes from the nurse home visitation programme developed by Olds and colleagues,[13,14] we investigated whether a programme of home visiting by nurses would be effective in preventing recurrence of physical abuse or neglect in families in which it had already occurred.

Methods

Setting and participants

The study was done in Hamilton, Canada, a city in the south-central region of Ontario with a population of about 300 000 at the time of the study. We invited consecutive eligible families who were referred to the two local child protection agencies (CPAs) between Mar 24, 1995, and Oct 30, 1996, to participate in the study. Families were eligible if they met the following criteria: (1) the index child was younger than 13 years, (2) the reported episode of physical abuse or neglect occurred within the previous 3 months, (3) the child identified as physically abused or neglected was still living with his or her family or was to be returned home within 30 days of the incident, and (4) families were able to speak English. Families in which the

abuse was committed by a foster parent, or in whom the reported incident included sexual abuse, were not eligible. All participants provided written informed consent before enrolment. The ethics review board of the Chedoke-McMaster Hospitals approved the study.

We randomly allocated families to control or intervention groups using a computer program sequence generated by our statistician, blocked after every eight allocations. We aimed to do secondary analyses within the intervention group, albeit with modest power, on the basis of the number of nurse visits. Therefore, to increase the numbers in the intervention group, towards the end of recruitment we randomly allocated families using a 5 to 3 ratio (intervention to control). Randomisation was stratified by the age of the index child—ie, younger than 4 years and 4–12 years—since there is evidence that preschool children are at increased risk for recurrence of physical abuse and neglect.[15] Group assignment was placed in numbered sequential sealed envelopes opened by participants after the baseline interview was completed.

The intervention

Control families received standard services arranged by the agency. These included routine follow-up by CPA caseworkers whose focus was on assessment of risk of recidivism, provision of education about parenting, and arrangement of referrals to community-based parent education programmes and other services. The intervention group of families received the same standard care plus home visitation by a public-health nurse every week for 6 months, then every 2 weeks for 6 months, then monthly for 12 months. The nurses visited for 1·5 h, and met with at least one parent during the visit, attempting to meet with both parents in two-parent families. The nurses tailored their home visits to the individual needs of the families. Their three main activities were intensive family support, parent education about infant and child development, and linkage of family members with other health and social services that were specific to the family's situation.[13,14,16] Their aim was to reduce stressors and increase support on the basis of the ecological model.[17] Nurses used goal-attainment scaling with parents to assess progress. Additionally, six process factors were rated by the public-health nurse at every visit: involvement in the visit, problem-solving processes, environmental distractions, parent's preoccupation with other events or crises, conflict with the material discussed, and understanding of the material. Nurses were expected to follow up the same families over the course of the trial. They kept detailed records and reviewed their work with the families through supervision at group meetings every 2 weeks.

A manual was developed for the public-health nurse training programme during a pilot study[18] and was further refined for this trial. Nurses received a 1-week educational programme that was didactic and based on experience, which included: mutual problem identification and goal setting; common attributes of abusive and neglecting parents and strategies to address them; provincial legislation for child maltreatment; strategies to improve parent–child interactions; and methods of empowering families to solve problems that were related to inadequate income, housing, neighbourhood safety, and other issues identified by the families. The public-health nurses who implemented this intervention had previous experience working with socially disadvantaged families and many of

	Basis	Target	Reliability	Validity
CAPI[19,20] Range of score 0–486; raised cut points either 166 or 215	Abusive parenting	Parents	Internal consistency: K-R 20 correlations=0·92–0·98; 3-month test-retest reliability=0·75	Predictive validity Construct validity
AAPI[21,22] Range 32–160	Child-rearing attitudes	Parents	2 week test-retest reliability=0·76	Construct validity
HOME[23] Converted to common metric (% score)	Home environment	Three inventories: 1) infants & toddlers, range 0–45 2) preschool children, range 0–55 3) elementary, range 0–59	K-R 20 correlations =0·84–0·93 Test-retest reliability =0·57–0·76	Construct validity
General functioning scale of family assessment device[24] Range 1—4; dysfuntional=≥2·17	Family function	Parents	Internal consistency=0·86 Split-half coefficient =0·83	Construct validity
Social provisions scale[25,26] Range 24–96	Supportive social relationships	Parents	Subscale reliability=0·65–0·76 6-month test-retest reliability=0·55	Predictive validity Construct validity
RBPC[27]	Child behaviour Attention problems-immaturity, range 0–32 Anxiety-withdrawal 0–22 Psychotic behaviour 0–12 Conduct disorder 0–44 Socialised aggression 0–34 Excessive motor tension 0–10	Children	Inter-rater reliability=0·55–0·93 2-month test-retest reliability=0·49–0·83	Construct validity

CAPI=child abuse potential inventory; AAPI=adult-adolescent parenting inventory; HOME=home observation for measurement of the environment; RBPC=revised behaviour problem checklist; K-R20=Kuder-Richardson formula 20.
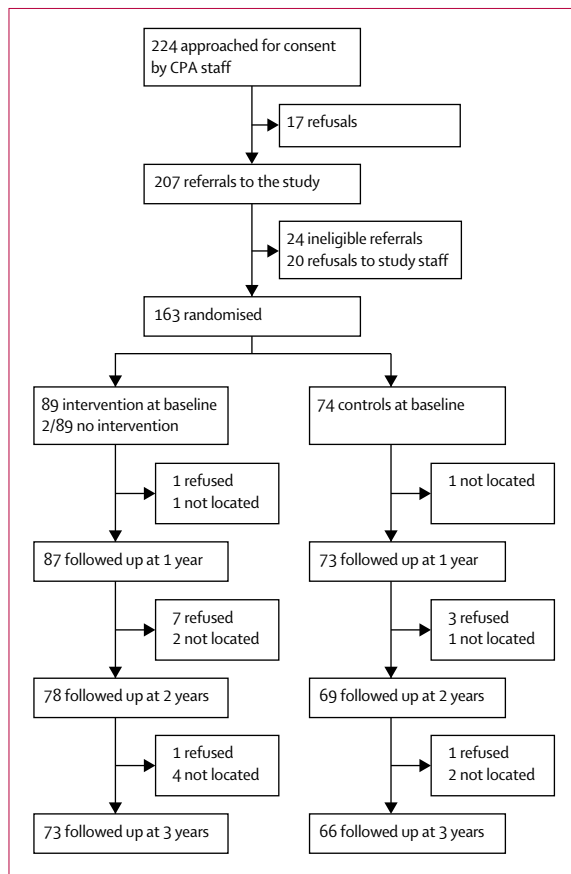
Table 1: Interview measures

Figure 1: Trial profile
CPA=child protection agency.

	Control (n=74)	Intervention (n=89)	Total (n=163)
Adults			
Female respondents	70 (95%)	85 (96%)	155 (95%)
Natural father or mother of index child	68 (92%)	83 (93%)	151 (93%)
Currently living with spouse/partner	28 (38%)	38 (43%)	66 (41%)
Past year worked at job or business	17 (23%)	24 (27%)	41 (25%)
Finished high school	22 (30%)	35 (39%)	57 (35%)
Received income from family benefits	58 (78%)	75 (84%)	133 (82%)
Annual family income , CDN$30 000	67 (91%)	78 (89%)	145 (90%)
Permanent/long-term medical condition	28 (38%)	45 (51%)	73 (45%)
Limited activity due to medical condition or health	13 (18%)	22 (25%)	35 (22%)
Ever treated for nerves	20 (27%)	39 (44%)	59 (36%)
Ever had a problem with alcohol	9 (12%)	12 (14%)	21 (13%)
Ever had a problem with drugs	12 (16%)	12 (14%)	24 (15%)
Age of respondent, mean (SD)	28·9 (6·7)	29·5 (8·0)	29·2 (7·4)
Number of children in family, mean (SD)	2·5 (1·5)	2·6 (1·5)	2·6 (1·5)
Index child			
Male	45 (61%)	37 (42%)	82 (50%)
One or more long-term medical condition (such as asthma, heart problems, diabetes)	22 (30%)	31 (35%)	53 (33%)
Admitted to hospital in past 6 months	6 (8%)	12 (16%)	18 (14%)
Emergency room visit in past 6 months	18 (24%)	37 (44%)	55 (35%)
Age, mean (SD)	5·2 (3·3)	5·1 (3·9)	5·1 (3·6)
Birthweight in g, mean (SD)	3043 (713)	2976 (680)	3007 (694)

Data are number (%) unless otherwise stated.

Table 2: Baseline characteristics of families, by group

the nurses had been involved with the child protection system so they were very familiar with the parenting challenges that arise in such situations. Even so, within the training programme, there was specific emphasis on risk factors found in maltreating families and approaches to dealing with issues such as parental experiences of maltreatment while growing up, parental mental illness including substance abuse, and intimate partner violence.

Measures and procedures

The main outcome was subsequent physical abuse or neglect of any child in the family, based on CPA reports. Records from both local CPAs for all children in the study, including those born after randomisation, from enrolment date to 3 years after enrolment were summarised by trained research assistants masked to group assignment, by a standardised, pilot-tested data extraction form. For all children, they also abstracted hospital visits and stays at the four area hospitals, as a secondary measure. Two experts in child maltreatment (adjudicators), masked to group assignment, independently assessed the summaries for every incident or visit to determine whether they represented occurrence of physical abuse or neglect. Adjudicators also rated the severity of the abuse or neglect: mild, moderate, or severe (coded 1–3). When adjudicators disagreed about a case or the severity of abuse or neglect, consensus was reached through discussion.

Table 1 provides detailed information on measures regarded as proxies for child maltreatment. These are instruments with proven reliability and validity, which measure parenting capacity, child behaviour, and quality of the home environment. Intermediate outcomes, such as social support and family functioning, were also assessed. Child behaviour was reported by the caregiver. These outcomes were measured identically in both groups, in home interviews by trained interviewers masked to group assignment at baseline, and at 1, 2, and 3 years' follow-up.

Statistical analysis

Sample size was based on a reduction from 50% to 25% in the recurrence of physical abuse or neglect with $\alpha=0.05$ (2-tailed test) and power set at $1-\beta=0.80$. Allowing for a 20% attrition rate, the minimum required sample was 72 families per group. Analysis was based on the intention-to-treat principle. We used discrete-time survival analysis[28] to compare groups for the time to first incident of physical abuse or neglect in the CPA records. Two Cox regression models were tested: the first with only group; the second model adjusted for risk factors identified a priori (age and sex). We did not combine data from CPA and hospital records in the analysis because we could not ascertain whether hospital records referred to the same incident of maltreatment as CPA records. Differences between groups in measures of parenting, home environment, and children's behaviour were tested

	Control (n=72)	Intervention (n=88)	Total (n=160)
Physical abuse			
0	41 (57%)	59 (67%)	100 (63%)
1	19 (26%)	17 (19%)	36 (23%)
2	3 (4%)	4 (5%)	7 (4%)
3	6 (8%)	3 (3%)	9 (6%)
4	3 (4%)	2 (2%)	5 (3%)
5	0	2 (2%)	2 (1%)
6	0	1 (1%)	1 (1%)
Neglect			
0	35 (49%)	47 (53%)	82 (51%)
1	15 (21%)	15 (17%)	30 (19%)
2	7 (10%)	9 (10%)	16 (10%)
3	2 (3%)	4 (5%)	6 (4%)
4	3 (4%)	4 (5%)	7 (4%)
5	1 (1%)	4 (5%)	5 (3%)
6	5 (7%)	2 (2%)	7 (4%)
7	1 (1%)	2 (2%)	3 (2%)
8	0	1 (1%)	1 (1%)
13	1 (1%)	0	1 (1%)
14	2 (3%)	0	2 (1%)
Either physical abuse or neglect			
0	24 (33%)	38 (43%)	62 (39%)
1	17 (24%)	17 (19%)	34 (21%)
2	10 (14%)	13 (15%)	23 (14%)
3	6 (8%)	4 (5%)	10 (6%)
4	3 (4%)	5 (6%)	8 (5%)
5	3 (4%)	4 (5%)	7 (4%)
6	4 (6%)	3 (3%)	7 (4%)
7	2 (3%)	1 (1%)	3 (2%)
8	0	1 (1%)	1 (1%)
9	0	1 (1%)	1 (1%)
10	0	1 (1%)	1 (1%)
13	1 (1%)	0	1 (1%)
14	2 (3%)	0	2 (1%)

Table 3: Number (%) of incidents of physical abuse, neglect, and total incidents (physical abuse or neglect) per family by group, over the 3-year follow-up, based on CPA records

	Baseline	1 year	2 years	3 years
Control	72 (100%)	36 (50·0%)	28 (38·9%)	24 (33·3%)
Intervention	88 (100%)	49 (55·7%)	43 (48·9%)	38 (43·2%)

Figure 2: Survival curve for control (n=72) and intervention (n=88) families, based on incidents in CPA records

with growth curve analysis. This modelling system uses all available data points in its estimation of the intercept and cases in which two or more measures are available for estimation of the slope.[29]

Role of the funding source

The sponsors of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data and final responsibility for the decision to submit for publication.

Results

Figure 1 shows the trial profile. Table 2 summarises the characteristics of the 163 families randomised. CPA records were available for 72 of 74 (97%) control families and 88 of 89 (99%) intervention families. For other measures, figure 1 shows the proportion of families who completed follow-up. Losses were small and similar between the two groups. Parent non-completers were similar to completers for age, marital status, work status, education, spouse's work status and education, but not for sex: four of eight men (50%) did not complete all measures, compared with 31 of 155 women (20%).
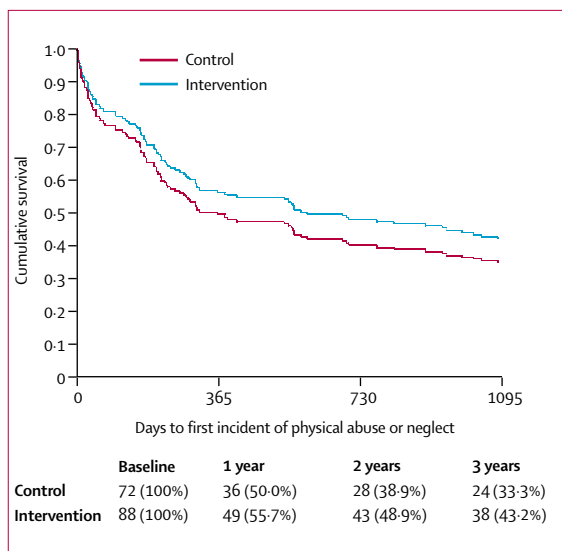
Completers and non-completers were similar in their reported health conditions, including nervous disorders, activity limitations, recent life events, and use of alcohol and other drugs. However, more non-completers than completers reported that they were very happy. Baseline scores for the child abuse potential inventory (CAPI),[19,20] adult adolescent parenting inventory (AAPI),[21,22] home observation of the environment (HOME),[23] family functioning,[24] and social provisions scale[25,26] were much the same for both groups. Parents' responses to the part of the interview about the child indicated that children with complete data were similar to non-completers for age, sex, birthweight, hospital admissions since birth, admissions and emergency room visits in the previous 6 months, and health conditions.

Table 3 shows the distribution of incidents of physical abuse, neglect, and either physical abuse or neglect per family for 160 families with 469 children. Of the 652

	Control (n=74)	Intervention (n=89)	Total (n=163)
Physical abuse			
0	74 (100%)	84 (94%)	158 (97%)
1	0	4 (5%)	4 (3%)
2	0	1 (1%)	1 (1%)
Neglect			
0	66 (89%)	71 (80%)	137 (84%)
1	2 (3%)	14 (16%)	16 (10%)
2	4 (5%)	2 (2%)	6 (4%)
3	2 (3%)	2 (2%)	4 (3%)
Either physical abuse or neglect			
0	66 (89%)	68 (76%)	134 (82%)
1	2 (3%)	15 (17%)	17 (10%)
2	4 (5%)	4 (5%)	8 (5%)
3	2 (3%)	2 (2%)	4 (3%)

Table 4: Number of incidents of physical abuse, neglect, and total incidents (physical abuse or neglect) per family by group, over the 3-year follow-up period, based on hospital records

	Baseline		1-year follow-up		2-year follow-up		3-year follow-up	
	Control (n=74)	Intervention (n=89)	Control (n=73)	Intervention (n=87)	Control (n=69)	Intervention (n=78)	Control (n=66)	Intervention (n=73)
CAPI score								
Mean	202·6	195·1	165·6	166·1	168·2	156·5	149·2	149·3
SD	111·1	109·6	109·9	115·9	112·6	114·7	116·3	118·2
AAPI score								
Mean	123·1	122·3	129·1	127·0	130·6	129·5	132·4	133·1
SD	14·7	17·6	13·3	16·3	15·2	16·3	16·3	18·3
HOME inventory score (percent)								
Mean	71·5	68·9	71·1	70·2	70·2	71·8	73·6	76·2
SD	12·3	16·5	11·6	15·4	11·8	13·2	14·7	13·6
Family function score								
Mean	2·12	2·12	1·95	2·05	1·93	1·97	1·90	2·01
SD	0·44	0·45	0·35	0·46	0·45	0·44	0·36	0·46
Social provisions score								
Mean	71·3	71·7	74·1	73·3	73·9	73·5	75·6	75·1
SD	8·2	9·1	8·1	8·4	8·8	8·9	9·2	8·8

CAPI=child abuse potential inventory; AAPI=adult-adolescent parenting inventory; HOME=home observation for measurement of the environment.

Table 5: **Secondary outcome measures for families**

events abstracted from CPA records, 308 were judged to be incidents of physical abuse or neglect in that period: 63 of physical abuse, 195 of neglect, and 50 involving both physical abuse and neglect. When dichotomised (no incidents *vs* any incidents), none of the three measures differed significantly by group. About half the control (51·4% [37]) and intervention (46·6% [41]) groups had an incident of neglect (difference 4·8% [95% CI −12·0 to 21·6]); 43·1% (31) of control families and 33·0% (29) of the intervention group had an incident of physical abuse (10·1% [−6·2 to 26·4]).

When group baseline differences were tested, sex of index child, child visits to emergency room, or adult treatment for nervous complaints had no significant

effect on recurrence rates of physical abuse, neglect, or either type of maltreatment. Secondary analyses showed no effect on group differences in the three recurrence rates for stratum of index child, level of personal disadvantage or socioeconomic disadvantage of the adult, or chronicity of maltreatment (measured by time since first contact with CPA and number of contacts before the study). Figure 2 shows the unadjusted survival curves for the control and intervention groups. Groups did not differ with respect to days to first incident of physical abuse or neglect (Wald χ^2 test=1·06, p=0·303; hazard ratio=0·81 [95% CI 0·55–1·21]). Adjustment for age and sex of the child had a negligible effect on these findings (Wald χ^2=1·02, p=0·312; 0·81[0·55–1·21]). We did not record

	Baseline				1-year follow-up				2-year follow-up				3-year follow-up			
	Boy		Girl		Boy		Girl		Boy		Girl		Boy		Girl	
	Control (n=27)*	Intervention (n=21)*	Control (n=17)	Intervention (n=25)	Control (n=30)	Intervention (n=22)	Control (n=20)	Intervention (n=33)	Control (n=31)	Intervention (n=24)	Control (n=23)	Intervention (n=32)	Control (n=32)	Intervention (n=24)	Control (n=21)	Intervention (n=29)
Attention problems - immaturity score																
Mean	12·8	12·2	10·4	8·8	8·1	9·3	10·2	6·3	10·4	10·1	9·5	7·7	9·2	8·6	7·7	8·4
SD	8·2	5·7	5·8	6·8	7·2	6·6	6·2	6·1	8·0	6·9	7·9	6·4	7·0	7·3	5·9	7·2
Anxiety - withdrawal score																
Mean	7·1	6·4	6·5	4·7	3·7	5·4	5·5	3·3	4·9	5·2	4·4	4·5	4·8	3·9	4·4	5·0
SD	4·7	4·9	4·3	3·6	4·2	5·5	5·0	3·7	4·5	4·4	4·6	4·1	5·0	4·2	3·6	4·2
Psychotic behaviour score																
Mean	2·9	3·5	2·9	2·4	2·0	2·0	2·3	1·2	2·5	2·6	2·2	1·5	1·8	1·5	1·5	1·8
SD	2·7	2·5	2·8	2·6	1·9	2·2	2·7	1·6	3·0	2·7	2·4	1·8	2·2	1·8	1·6	2·2
Conduct disorder score																
Mean	21·4	24·9	19·5	16·3	15·0	17·7	15·2	13·5	17·0	19·0	13·8	15·4	14·7	13·8	12·0	11·7
SD	12·0	10·7	8·1	11·6	10·9	9·8	8·1	10·7	11·3	8·8	9·5	11·9	10·6	9·3	7·9	10·3
Socialised aggression score																
Mean	3·6	5·5	3·5	2·4	2·5	3·4	1·8	2·1	4·0	3·6	2·0	3·0	3·1	3·5	1·4	3·8
SD	3·3	6·2	4·8	2·8	3·5	4·4	1·9	2·9	6·2	4·5	2·9	6·0	5·6	6·1	2·1	7·4
Excessive motor tension score																
Mean	4·2	4·6	4·3	3·2	2·8	3·2	3·7	2·5	3·5	3·5	2·9	2·8	3·5	2·7	2·1	2·9
SD	2·9	2·6	2·4	2·7	2·4	2·3	2·5	2·0	3·0	2·2	2·4	2·7	2·7	2·3	2·0	2·5

*Since the questionnaire is age-dependent, numbers vary with time.

Table 6: **Secondary outcome measures for index children from the revised behaviour problem checklist**

any significant group difference for severity of incidents of physical abuse: incidents in the control group had a mean severity of 1·6 (SD=0·6) compared with 1·7 (0·6) for intervention incidents (t=–0·48, p=0·631). Differences in the severity of neglect incidents (1·9 [0·6]; 1·7 [0·6]; t=1·94, p=0·053) were not clinically important between the control and intervention groups.

Table 4 shows the distribution of incidents of physical abuse and neglect based on hospital records. Of 881 (406 control and 475 intervention) reported hospital visits or stays, 45 were adjudicated as incidents of physical abuse or neglect. Intervention families showed significantly higher recurrence of either physical abuse or neglect than did control families: 23·6% (21) versus 10·8% (8) (difference 12·8% [95% CI 1·5–24·1]). Tables 5 and 6 show the observed mean and SD on proxy measures for control and intervention groups at baseline and at 1, 2, and 3 years' follow-up. The CAPI, AAPI, social provisions scale, and family functioning showed some improvement over time. The HOME scores showed little change. No significant differences between groups were recorded. For index children within the 4–16 years age-range of the revised behaviour problem checklist questionnaire, with two or more observations (control n=58 and intervention n=60), some improvement over time was seen in all behavioural measures, apart from socialised aggression, with no significant differences between groups.

Discussion

On the basis of CPA records, the intensive 2-year programme of home visitation by nurses was not more effective than standard services in preventing recurrence. The incident severity findings and the proxy measures are consistent with this finding. We were surprised by the hospital data that showed a higher rate of physical abuse or neglect in the intervention group. This finding could have been the result of nurses identifying the need for medical care in children in the visited families, producing an ascertainment bias. However, we could not establish whether this was the case. The potential for harm should not be overlooked, although the hospital record results, taken in the context of the other findings, lend support to the conclusion that, on balance, there were no clinically meaningful differences between groups. Although the results of this trial are disappointing, they are very important. They suggest that prevention of recurrence of child physical abuse and neglect is very difficult in families within the child protection system. The effectiveness of CPA standard services is unproven; typically, they do not have the intensity or duration of the intervention assessed in our study.

Since the results of this trial have potentially far-reaching implications for clinicians, policymakers, and society in general, difficulties in methods that could threaten the validity of our study should be assessed carefully. First, randomisation was done appropriately. Baseline comparisons suggested that there were no

major differences between the control and intervention groups. Those differences that did exist were not significantly associated with recurrence. Second, rates of follow-up for both primary and secondary measures were excellent, especially considering the difficulty of retaining this sample over 3 years.

Measurement of child physical abuse and neglect represents a third major challenge. Were appropriate and equivalent measures used to detect child maltreatment in the control and intervention groups? The primary outcome was based on review of CPA records with a standardised process; any biases in the reporting of abuse by individuals outside the CPA, for example, based on severity of abuse or socioeconomic status of the parent, would have applied equally to both groups. The exception is surveillance bias.[30] In the control group, five reports of physical abuse or neglect occurring in three families were made by public-health nurses who visited as part of standard services, compared with nine incidents occurring in seven families in the intervention group; this finding suggests differential detection. The three families in the control group had incidents other than those reported by a public-health nurse, so their recurrence status did not change. However, two of the seven families in the intervention group had no incidents of physical abuse or neglect other than those reported by a public-health nurse. Omission of these two families gave a recurrence rate of 31% rather than 33% in the intervention group. Significance of the difference between groups was not affected. Both adjudicators and chart abstractors were thoroughly trained and all were masked to group assignment. In the judgment of incidents of maltreatment, adjudicators' inter-rater reliability (intra-class correlation) ranged from 0·55 to 0·81 for physical abuse and from 0·54 to 0·58 for neglect. Consensus needed thoughtful and often lengthy discussion. Intra-class correlation coefficients for the research staff who summarised CPA chart entries ranged from 0·93 to 1·0 for number of injuries and from 0·76 to 0·84 for type of injury (the term injury included entries associated with inadequate supervision).

A fourth issue is the extent to which intervention families actually received the intervention. Adherence to the protocol was good: the median number of visits by a public-health nurse per family was 46 (the intended number of visits was 48), and ranged from 0 (two families had no visits) to 60. A related issue is the delivery of standard services: we have no reason to believe that CPA services to either group were enhanced or diminished as a result of the study being undertaken. Thus there is no evidence of a major design or measurement problem to suggest that the results are invalid.

Since the study design and implementation were methodologically sound, why was the intervention not more effective than standard services? One reason could stem from the nature of the sample. The study was designed to recruit newly identified cases of

maltreatment: the reported incident of maltreatment of the index child had to have occurred in the previous 3 months. However, data later extracted from the CPAs' records indicated that, before enrolment, families in the control group had an average of 2·9 case openings, and in those in the intervention group the mean was 3·0 (a case opening occurs when a new report of suspected maltreatment is made on a closed case or new case). Our initial analyses examined interactions of group with chronicity, measured in two ways: number of previous CPA case openings and number of days since first case opening, both square-root-transformed. Neither interaction was significant. In further post-hoc analyses, we tested several dichotomous variables representing chronicity: number of previous CPA case openings, cut at 0–1 and ⩾2 openings, as well as number of days since first CPA case opening with three different cut points (<3 months and ⩾3 months, <6 months and ⩾6 months, and <12 months and ⩾12 months). The 3-month dichotomy showed a significant interaction by group: the less chronic families in the intervention group had better outcomes for physical abuse, but not for neglect. This early intervention hypothesis could be tested in a trial in which the focus is specifically on preventing recurrence of physical abuse and in which only those families new to the child protection system are included. Additionally, the intervention might not have been of sufficient intensity or duration. The dilemma here is about cost; although on clinical grounds assessment of a more intensive or a longer home-visitation intervention than described here would be reasonable, the costs of implementing such a programme are prohibitive.

We cannot conclude that the intervention was more effective than standard services in prevention of the recurrence of physical abuse or neglect or improving any associated parental or child outcomes measured. CPA personnel assess families to determine whether a child should be removed from their home after exposure to physical abuse or neglect. When a child remains in the home, interventions are expected to reduce the risk of subsequent maltreatment. The results of this study indicate that there is a high risk of recurrence when children remain in the home, and up to now there is no intervention proven to reduce that risk. Although a specific programme of home visitation by nurses[13,14,16] has proven effective in reducing child maltreatment in disadvantaged first-time mothers, a programme designed to prevent recurrence shows little promise, especially for families with children who have experienced neglect and that have a longstanding involvement with child protection. Successful remediation with families in which child maltreatment has already occurred might need very different services from those offered in early prevention programmes. Furthermore, the high rates of recurrence in this study suggest that substantive efforts must be invested in prevention of child abuse or neglect before a pattern is established.

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