‘Many voices, one song’: a model for an oral health programme as a first step in establishing a health promoting school

ANDREW MACNAB1,2* and ARABAT KASANGAKI2,3

1Department of Paediatrics, University of British Columbia, British Columbia, Canada, 2Stellenbosch Institute for Advanced Study (STIAS), Wallenberg Research Centre at Stellenbosch University, Marais Street, Stellenbosch 7600, South Africa and 3College of Health Sciences, Makerere University, Kampala, Uganda

*Corresponding author. Room C323, British Columbia Children’s Hospital, 4500 Oak Street, Vancouver, BC, Canada V6H 3N1. E-mail: amacnab@cw.bc.ca

SUMMARY

Four health promoting (HP) schools were established in rural communities in Uganda by a joint Ugandan/Canadian university team. The model was based on a successful Canadian health promotion initiative designed to address poor oral health in Aboriginal children in rural and remote communities. Careful situation analysis, orientation of partner schools and collaborative development of educational materials and evaluation methodology preceded implementation. The intervention had three elements: inclusion of health topics by teachers in regular classroom activities; health education delivered by the university team to reinforce key educational concepts; and daily in-school tooth brushing to develop healthy practices. All children entering Grade 1 at four schools were recruited for 4 years; evaluation included year 1 pre-intervention and annual end-of-year data collection of quantitative and qualitative measures. Principal findings at 4 years included: an increase from baseline in those brushing at least once daily (p < 0.05) and before bed (p < 0.05); improved oral health (less ‘bad breath’, pain and absences for emergency dental treatment); more comprehensive health knowledge. Other positive observations were change in the schools’ health culture; children sharing new health knowledge and advocating for health practices learned; and evolution of health promotion activity to address other community-identified issues following success with the initial oral health component. University faculty and students learned from participation in programme delivery and community-based educational opportunities. School-based health promotion using this oral health model was readily accepted, implemented, sustained and evaluated; all communities took ownership, and all schools continue their programmes. Addressing oral health through HP schools is novel in Africa, and several lessons learned are of potential value for similar health promotion initiatives in sub-Saharan Africa.

Key words: community-based education; determinants of health; health promoting school; oral health education

INTRODUCTION

Health promotion uses a range of complementary approaches to provide individuals and communities with knowledge that will enable them to improve their own health and well-being (St Leger, 2001; Davidson et al., 2007; WHO, 2009) Encouraging children to adopt healthy lifestyle habits is a central objective of health promotion. Health promoting (HP) schools use
‘a whole-school approach to enhance the health and educational outcomes of children and adolescents through teaching and learning experiences initiated in the schools’ (Nutbeam, 2000; St Leger, 2001), and establishes the school ‘as a healthy setting for living, learning and working’ (WHO, 1997). HP schools have the potential to positively impact over 1 billion children worldwide (Kwan et al., 2005). The positive environment created in the school fundamentally influences attitudes, beliefs and behaviours, and promotes resilience. The positive messages and practical interventions can be reinforced throughout the years children remain in school. It is recognized that schools strongly influence how children develop in terms of their self-esteem, self efficacy and sense of control over their lives; some believe more so than families because of positive exposure to the powerful influence of teacher support and peer networks (Stewart et al., 2004). In Africa, this influence applies all the more where a long walk to and from school and lack of light in many homes shortens the hours of direct family contact.

To date, most publications evaluating health promotion in schools describe projects addressing health issues other than oral health, although a few studies have addressed this topic (Worthington et al., 2001; Kwan et al., 2005; Harrison et al., 2006; Lee et al., 2008; Macnab et al., 2008). Good oral health is central to general health and well-being. ‘A healthy mouth enables an individual to speak, eat and socialize without experiencing active disease, discomfort or embarrassment’ (Kwan et al., 2005). Children with poor oral health are significantly compromised in terms of their school attendance, school performance and success in later life (Gift et al., 1992). In Uganda, as in other developing countries, the burden of disease from poor oral health is significant (Muwazi et al., 2005), and changes in dietary habits attributed to higher soft drink consumption will likely increase the burden further (Moynihan and Petersen, 2004).

Children in poor countries and from disadvantaged sectors of society lack many of the necessities for good health (Wagstaff, 2002; Davidson et al., 2007). From individual parents to the WHO (WHO, 2009), there is an almost universal call to invest in improving the health of children. However, where national resources for health care and promotion are sparse, and agendas are dominated by priorities such as HIV/AIDS, health promotion at a community level, particularly through HP schools, may be an effective strategy. HP schools are well within the capacity of even poor countries, as they focus on the school and its culture. Establishing HP schools requires a change in mind set and refinement of educational investment rather than the provision of major resources, engagement of non-government organizations (NGOs), or obtaining international funding.

The concepts underlying health promotion in schools, factors that contribute to success or failure and process for documenting impact are described (WHO, 1997; Lister-Sharp et al., 1999; Stewart-Brown, 2006; St Leger et al., 2009; WHO, 2009), although the majority of published evaluations relate to first world experience, and in a review in 2004, Mukoma found no evaluation from Africa (Mukoma and Flisher, 2004). We report our experience with the adaptation of a successful HP school project, Brighter Smiles, in a Canadian aboriginal community into an effective model for engaging schools in rural Ugandan communities.

The Brighter Smiles Canada programme is a progressive model based on the principles of respect, different ways of knowing (Macnab et al., 2008), symbiosis (input from, and benefits to both the community and the university team members), collaboration, shared leadership, and community-set priorities and pace of change. Successful health promotion using this model requires a trusting relationship between the partners (community and university), a desire to learn from each other and agreement to collaborate to address community-identified health issues. Selection of a single health issue is both relevant to the community and feasible to address, since success with simpler issues often leads to the confidence and ability to address other or more major concerns. Oral health was chosen by the community and for the programme in Uganda. Dental caries is the most common infectious disease affecting children worldwide and contributes to significant morbidity, but substantive improvement is possible through a simple, inexpensive intervention.

METHODS

The oral health model used to establish the HP schools is an education programme where teachers add in-class topics to the curriculum,
visiting medical/dental trainees reinforce key concepts, teachers supervise conduct of healthy practices (daily in-school tooth brushing) and annual evaluation and examination of participating children is conducted.

The project had ethics approval from both the University of British Columbia and Makerere University.

Setting
We selected four schools; one in each of four rural communities in different geographic regions of Uganda where the College of Health Sciences at Makerere University had placement sites for community-based training for students; the principal criteria for being a HP school (Stewart-Brown, 2006; St Leger et al., 2009) could be met; and situation analysis indicated than an oral health promotion programme would be relevant.

Engagement and implementation
A joint Ugandan Canadian university team (medical/dental faculty and students) collaborated to design and implement the HP school initiative. The health issue chosen by the university teams to address was oral health because of the high morbidity caused by cavities (dental caries), gum disease (gingivitis) and chronic inflammation (periodontal disease) among Ugandan children (Muwazi et al., 2005) and the success of this topic as the initial intervention in the index Canadian community (Harrison et al., 2006; Macnab et al., 2008).

At each school, the head teacher and all teachers involved in the classes who were invited to participate (on average, three teachers initially per school) were oriented to ensure that they understood the purpose of HP schools, the project’s goals, the processes involved in the planned health promotion and their individual responsibilities. Their roles in conducting the school-based interventions and administering the annual questionnaires to the children were particularly emphasized. All agreed to collaborate in spite of the commitment of time required. Each school was given books and sports equipment and teachers were given toothpaste for personal use to compensate for this.

Parental consent was obtained for all children in Grade 1 in each school to participate, and 600 were enrolled in the initial cohort. All children were supplied with a tooth brush. A numbering and storage system was devised to ensure that each child used his or her own brush. Fluoride toothpaste, donated or bought at cost, was supplied to the class teachers, with delivery of subsequent supplies and replacement toothbrushes coordinated via the medical students going to the sites for community-based learning. Programme t-shirts were distributed to teachers and university staff and worn during programme activities to promote ‘team identity’.

Each year, the programme evolved to include more children. As the original cohort of Grade 1 pupils progressed to higher grades, they continued to participate in the educational, interventional and evaluation components of the programme, and new students entering Grade 1 joined the programme. Thus, although some children left each school and were lost from the original cohort, the overall number involved in health promotion activities grew each year. Baseline (normative) data were collected pre-intervention and at the end of years 1–4 using a questionnaire (Figure 1) administered privately to individual children by teachers, and a score of decayed missing and filled teeth completed by dental students.

Intervention
There were four components to the intervention.

(i) Oral health promotion was added to the school curriculum by teachers including health education topics in classroom activities. The key concepts were provided by the University team and visual aids (posters and written materials) developed collaboratively.

(ii) Members of the university team delivered education in scheduled visits approximately every 3 months and at least once a term. Content was developed with teachers, and included local language and culturally appropriate participatory activities with the children included:

(a) play acting to emphasize the roles played by food, sugars, bacteria, a toothbrush and toothpaste in relation to caries;
(b) songs with actions the children could learn;
(c) practical demonstrations that children could replicate showing how teeth decay using eggs and agents such as cola that soften the shell.

(iii) Initiation of daily at-school health practices (tooth brushing) led by the teachers.
Correct brushing techniques were taught in participatory group activities using a dental tooth model, and reinforced with individual children during the at-school brushing.

(iv) The application of topical fluoride by medical students every 6 months to the initial cohort of children recruited for 4 years.

Fig. 1: Continued
Data

Demographic and quantitative and qualitative data were collected prior to programme initiation, and annually for 4 years (see the Engagement and implementation section). Analysis of data from questionnaires (95% confidence intervals; unpaired Student’s t-test), feedback from teacher interviews and the conclusions of programme stakeholders participating in a workshop held in Kampala, Uganda, 19/20 February 2010 (after 4 years of HP school activity) are reported here. Questionnaires addressed each child’s dental history, oral health practices and behaviours. Annual teacher interviews assessed changes in children’s health knowledge and practices, and data from year 4 are used to describe the perceived impact of the programme and its evolution in the schools as a whole, and neighbouring communities. Oral health knowledge was assessed informally during education sessions involving medical/dental student participation, and compared at subsequent annual visits where sessions containing similar content were presented, i.e. a variety of approaches were used to evaluate different aspects of the programme (pluralistic evaluation) (Petersen and Kwan, 2004). Findings previously reported include the educational value of the programme for medical trainees described in anonymous post-participation written questionnaires (Macnab et al., 2010); with summaries of content-coded videotaped interviews of teachers conducted in year 4 of the programme under review (Ross et al., 2009; Macnab et al., 2010, under review); and the ongoing research ongoing documenting change in oral examination scores and first use of topical fluoride prophylaxis in sub-Saharan Africa to be reported in the dental literature.

RESULTS

Questionnaires

Table 1 summarizes demographic data and questionnaire variables comparing pre-intervention and year 4 responses of the original cohort of 600 Grade 1 children enrolled at the four schools in year 1. With progression of children to higher grades, and annual entry into the programme of new pupils joining Grade 1, over 2500 children were exposed to the programme over the 4 years.

Table 1: Summary of questionnaire data regarding oral health behaviours

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-intervention</th>
<th>4-year follow-up</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children in Grade 1</td>
<td>600</td>
<td>473</td>
<td>-</td>
</tr>
<tr>
<td>Age, years (mean ± SD)</td>
<td>6.9 (1.9)</td>
<td>11.1 (1.4)</td>
<td>-</td>
</tr>
<tr>
<td>Gender, female/male</td>
<td>49.6/50.4%</td>
<td>51.8/48.2%</td>
<td>NS</td>
</tr>
<tr>
<td>Clean teeth × 1 daily</td>
<td>58%</td>
<td>84%</td>
<td>$p &lt; 0.05$</td>
</tr>
<tr>
<td>Brush before bed</td>
<td>19%</td>
<td>52%</td>
<td>$p &lt; 0.05$</td>
</tr>
<tr>
<td>Use a ‘tooth stick’</td>
<td>32%</td>
<td>27%</td>
<td>NS</td>
</tr>
<tr>
<td>Use agents other than toothpaste</td>
<td>16%</td>
<td>2.5%</td>
<td>$p &lt; 0.05$</td>
</tr>
</tbody>
</table>

Demographic data and responses (% answering yes) from evaluations of the original study cohort pre and post (4 years) intervention, with significance at 95% confidence limits.

Many enrolled children inevitably left each school over time or were absent for the year 4 evaluation, and one school in an area where employment is seasonal lost >50% of the initial cohort. Hence, data (Table 1) are presented for the combined population of the four schools as overall percentage responses intended to show trends of change from baseline over 4 years of health promotion. The proportion of children who brushed their teeth at least once daily increased significantly ($p < 0.05$), as did the number brushing before bed ($p < 0.05$). More children reported using toothpaste, but may have done so because of the in-school brushing after lunch. The use of alternatives to toothpaste (soap, ash, charcoal and sand) effectively ceased, but some use of traditional ‘tooth sticks’ continued.

Teachers who administered the questionnaires also reported that when asked what changes the programme had made, the predominant response from children was that their mouths no longer ‘smelled bad’. Also that many said that they now cleaned their teeth more often at home, and most indicated they had shared their knowledge with siblings and parents.

Interviews

The classroom teachers who originally committed to the programme all remained involved, but all head teachers moved on to other
schools, with up to three replacements at each site over the 4 years. In addition to supporting the core elements of the programme, teachers in all four schools also provided suggestions to improve participation and delivery, and contributed ideas of how the programme could expand to meet other health needs specific to their community.

Over the 4 years, parents and many other community members (hospital medical superintendents, councillors and Rotarians) became aware of the health promotion programme taking place, which led to their support and, in some instances, active involvement.

All teachers spoke of positive benefits from becoming a health-promoting school. The changes reported after 4 years of programme implementation encompassed all the children participating, and included greater knowledge and awareness about health; regular and enthusiastic participation in activities to promote healthy practices; fewer absences from school due to ‘pain’ or the need for emergency dental treatment; and greater overall knowledge and competence regarding oral health and tooth brushing. The pride that children now expressed in their own and their school’s achievements was also mentioned, and teachers frequently stated that confidence gained from success with the oral health component led them to feeling able to ask for extension of the programme’s activities to address other health issues of importance to the community. Teachers credited the programme’s success to the efforts and visits of the university team, changes in policy within their schools and to the level of motivation achieved among the children. Problems reported mainly centred on early difficulties related to the irregular delivery of supplies, and that only a proportion of the children in each school were included in the daily at-school tooth brushing. Clear messages were: continue the programme in our school; enrol more and preferably all students and add further health promotion topics and practices.

Workshop evaluation

Attendees included:

(i) Project stakeholders, including each school’s head boy, teachers, head teachers, participating Ugandan dental students, Ugandan and Canadian university faculty and the Deans of the School of Health Sciences and School of Medicine at Makerere University.

Others not directly involved with the HP school programme including teachers from other schools, a variety of health professionals, administrators in public health and from the Ministry of Health and international participants (Kigali School of Health Sciences).

Data and reports were presented by the project stakeholders, primarily the university teams. Other participants provided comments based on the data and reports presented, and their own expertise and experience. This input provided an element of independent perspective on the impact, relevance and future potential for this and comparable HP school programmes.

Stakeholders emphasized their enthusiasm for school-based health promotion and expanded on their comments documented during evaluation interviews. Independent contributors commented on the successful replication of the Canadian HP school intervention, and extension of health promotion to other issues, and suggested that this was evidence of the value and potential of the model. Ugandan educators, the Deans and university students spoke about the educational value for the health professionals involved; the strength of the model as a means of health promotion; the value of the research and evaluation components and the merits of establishing more HP school sites in Uganda to increase child health promotion and enable more students to be exposed to this form of community-based learning.

Programme components identified by participants as key factors for success when establishing similar HP schools were:

(i) The choice of oral health as a relevant but non-stigmatized issue that is amenable to simple interventions.

(ii) The selection of one school in each community as a starting point, which they found to be a non-threatening approach for the community, and thus more likely to garner support.

(iii) The combination of health education with the acquisition of healthy practices, a health promotion strategy that they thought was likely to alter behaviour in the long term.
(iv) The flexible nature of the model, which was seen to encourage refinement and expansion by individual schools and to promote ownership and sustainability.

(v) Initiation, oversight and ongoing involvement by healthcare providers/educators, as a means of providing necessary background knowledge, motivation, direction, practical support and evaluation.

Additional comments that are worth noting are that:

(i) The national Department of Education representative reported that children at one school told the inspectorate team that one of the best things about their school was the programme that had improved their teeth and taught them about their health.

(ii) Teachers and parents commented that the children’s mouths no longer ‘smelled bad’.

(iii) Teachers noted a decrease in the number of children missing school for emergency dental treatment (subjective observation).

(iv) Parents confirmed that the children had shared knowledge with siblings and parents.

DISCUSSION

Health promotion and disease prevention are essential to reducing the healthcare burden, particularly in the developing countries and disadvantaged populations. The messages need to be delivered by ‘many voices’—educators, health professionals, policy makers and parents. HP schools are a recognized model for achieving positive change, but the specific elements included, and the effects achieved, vary (Stewart-Brown, 2006). In addition, since most evaluations of HP schools are from the developed world, the relevance to an African setting is unclear.

Our four-year experience with a programme involving four rural Ugandan schools provides qualitative and quantitative evidence that health promotion initiatives were readily integrated into the school setting, and can be effective in promoting behavioural change, promoting healthy practices and improved health knowledge.

The teachers in the schools involved in our programme collaborated with the university team in advocating the programme. They promoted acquisition of new knowledge, instituted activities to teach and reinforce behaviours, and progressively took ownership of the initiative. Importantly, over time, a school-based culture surrounding health and sound practices evolved at each site. Children shared what they were learning with children in classes not directly involved in the programme, and with siblings and families in the larger community. In addition, the content of the programme expanded beyond the health issue initially addressed, enabling each school to pursue a health agenda specific to their own perceived priorities. The positive change in children’s knowledge and behaviours that we observed is consistent with many evaluations of HP school activities addressing a range of health topics (Mukoma and Flisher, 2004; Kwan et al., 2005; Stewart-Brown, 2006; St Leger et al., 2009); and the evolution of the programme to address other community-identified topics mirrors our experience with this model in Canadian aboriginal communities (Macnab et al., 2008).

During project evaluation, it was consistently reported that children’s mouths no longer ‘smelled bad’. The smell, or halitosis, that many children reported having prior to their involvement in the programme occurs as a direct consequence of bacterial activity on the tongue and in plaque biofilm, and of inflammation in the mouth secondary to poor oral hygiene, gingivitis and periodontal disease (Quirynen et al., 2009). Hence, these children had a noticeable improvement in their oral health as a consequence of health practices acquired through the programme. Significantly, consequences of the inflammatory processes associated with halitosis are not limited to the mouth. Systemic effects are mediated by circulating inflammatory products (cytokines) which increase the risk of heart disease, stroke, diabetes and premature labour. Consequently, the improvement generated is far from just cosmetic or socially desirable.

The reported reduction in the incidence of pain and the need for emergency dental care equate with less time lost from school for many children, and a cost benefit related to the provision of health services and for families. The increase in the number of children brushing
their teeth at least once daily and in those brushing at home indicates a positive change in health behaviour strongly linked to improved future health. The evidence that children had effectively stopped using agents that negatively influence oral flora (soap) or cause abrasion of tooth enamel (sand/ash) also constitutes positive behavioural change. Sharing knowledge with siblings and parents, and advocacy for all family members to brush at home indicate knowledge transfer and promotion of healthy practices.

Reports of the children’s sustained participation, positive enthusiasm and motivation related to health endeavour, and sharing of learned concepts and practices with the broader community are evidence of a change in health culture within the school. The positive health culture generated implies higher levels of health literacy, which should translate into greater competence for participating children when addressing determinants of health (Nutbeam, 2000; St Leger, 2001). The clear expressions of pride in being part of a programme at a HP school equate with improved self-esteem (Lee, 2009), a recognized characteristic of children who are more likely to ‘thrive despite exposure to adversity and deficiencies in the settings of their daily lives’ (Stewart et al., 2004).

Teachers’ comprehension of the goals for HP schools, willingness to participate and sustained commitment speaks to the resonance of this form of health promotion with educators. Their confidence following success with the oral health component led to clear ownership of the programme that drove new health promotion initiatives at all four schools. Other topics addressed included: personal hygiene, hand washing, prevention of diarrheal diseases, clean water and sanitation, malaria prevention and nutrition. This progression to address other community-specific issues speaks to the flexibility and relevance of this health promotion model.

Parental awareness and support, and broader community involvement indicate that HP schools can effect community-wide change. In one community, coming to understand the negative effects of poor nutrition on children’s education led to a school-driven initiative to provide food for children who were coming to school hungry: 70 parents volunteered, donating the labour and money required to clear land and plant a garden to grow the produce required.

We recognize the limitations in our study. Comprehensive and pluralistic evaluation methodology and independent evaluation have been called for (Lister-Sharp et al., 1999; Mukoma and Flisher, 2004; Petersen and Kwan, 2004) and to date our programme has only included some of the recommended elements, although our evaluation did include both quantitative (Park et al., 2009; Moodley et al., under review; Kasangaki and Macnab, in preparation), and qualitative elements (Macnab et al., 2010; Wang et al., 2010; Macnab, Cannon and Kasangaki, under review). The quantitative data from the ongoing study of decayed missing and filled teeth scores will provide important additional evaluation.

Our overall funding allowed for an initial 4-year intervention period and evaluation and research components, but limited our direct intervention to annual recruitment of a single grade class (Primary 1) in each school, and did not allow inclusion of ‘control’ schools with no intervention. Only modest funding was required for supplies, and transportation and accommodation for the university teams in the communities.

Although health promotion is used in African countries as a means of increasing societal responsibility for health, programme delivery is often compromised by limited collaboration between the disciplines acting as health educators (Nyamwaya, 2003). In Uganda, establishing more HP schools would provide a real opportunity for collaboration with the district government officers responsible for community engagement related to health, education, gender, nutrition and agriculture. As a team, this group could implement school-based health promotion and deliver components provided by the university in our programme. Such engagement would also enable these officials to become more student centred, and potentially enhance integration within the healthcare system. Importantly, adding more HP schools would benefit the age group recognized to be most at risk, and with the greatest potential to improve their healthy literacy (Lee et al., 2008). Health promotion has been described as the provision of a set of tools rather than a process (Nyamwaya, 2003); our experience in Uganda suggests that HP schools go further, creating
communities where ‘many voices promote one song’.

The lessons learned reiterate many elements of the experience of others, but also provide insights of potential value for wider application of HP schools in sub-Saharan Africa. These include:

(i) the benefits of beginning by addressing a simple and non-stigmatized health issue;
(ii) that a modest level of intervention involving a single school can lead to broad community engagement;
(iii) that rural schools can effectively incorporate the education and health practices components of promotion;
(iv) that success with the initial topic/intervention generates change in school ‘health culture’ and policies that leads to expansion of health promotion activity to address other community-identified issues.

CONCLUSION

Overall, our evaluation reinforces many principles derived from other successful school-based health promotion initiatives, and suggests that the oral health model described offers simple and easily adoptable strategies for establishing more HP schools in Uganda and elsewhere in sub-Saharan Africa. The broad positive impact of our programme, coupled with the way rural school communities accepted it, sustained it and took ownership of it, point to such schools having particular relevance in countries looking for a simple, viable and effective means of achieving change, and improving child health in a way that should reduce the future burden of disease.

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