

# Improving the Provision of the Basic Package of Oral Care (BPOC) in Cambodia

T Chher, S Hak, F Courtel and C Durward  
Phnom Penh, Cambodia

Since 1992, 324 medical nurses have been trained to provide basic oral health care (including ART restorations and dental extractions) in remote areas of Cambodia. However, a range of barriers prevent dental nurses from providing these services, especially a lack of dental materials and instruments. **Objectives:** To increase dental nurse (DN) outputs through the regular provision of dental materials and instruments. To improve cross-infection control procedures through the provision of necessary equipment, supplies and training. **Methods:** Six health centres with active DN participated; three (experimental) health centres received sufficient supplies of dental instruments and materials for one year, and 3-monthly visits by a dentist from the Ministry of Health. The other three DN (control) did not. **Results:** During the project period in the experimental group extractions increased to an average of 119 extractions per quarter (a three-fold increase compared to the baseline), 51 ART restorations, and improved compliance with cross-infection infection control protocols. In the control group the number of extractions remained similar to baseline and no ART restorations were placed. **Conclusions:** The provision of the BPOC increased in the health centres when sufficient supplies of dental materials and instruments were provided. Increased monitoring and communication with MOH dental colleagues was also associated with the increased outputs and resulted in improved compliance with cross-infection control protocols. The MOH should increase supplies to DN and provide ongoing monitoring and support in order to improve the access to and quality of dental care provided in rural Cambodia.

*Key words: Health Centre, Basic Package of Oral Care, Primary Oral Health Care, dental nurse, primary oral health care worker, dental materials, dental instruments.*

In recent years the World Health Organisation has promoted the Basic Package of Oral Care (BPOC) for developing countries. This comprises Oral Urgent Treatment (OUT), Atraumatic Restorative Treatment (ART), and Affordable Fluoride Toothpaste (AFT)<sup>1,2</sup>. Provision of the BPOC is an emerging priority for the Ministry of Health in Cambodia as part of its commitment to improving the health of rural Cambodians. Since 1998 oral health services have been recognised as part of the Cambodian Ministry of Health's 'Minimum Package of Activities' (MPA), however implementation is still in the early stages<sup>3,4</sup>. There is little data available describing the oral health status of people living in rural areas of Cambodia. A national oral health survey carried out in Phnom Penh and six provinces in 1990<sup>5</sup> found

a mean DMFT for adults aged 35-44 years of 6.4, and for adults aged 65-74 years of 16.4. A more recent study in three provinces (Kampong Thom, Kratie and Pailin) showed that 6-year-old children had a mean dmft of 7.9 (SD 5.6) and 12-year-old children had a mean DMFT of 1.1 (SD 1.6)<sup>6</sup>. A study by Nhoung<sup>7</sup> (unpublished) in 2007 of 16-18-year-old adolescents living in and around Phnom Penh found a mean DMFT of 6.0 (SD 3.6). These studies show that most cavities in rural areas of Cambodia go untreated, and that decayed teeth are often extracted rather than restored. The demand for dental care however is relatively low, as has been found in other rural populations in the developing world<sup>8,9</sup>.

Between 1992 and 2006, the Ministry of Health (MOH) in Cambodia trained 324 dental nurses (medical

nurses with additional dental training) to provide basic oral health care to people in remote communities. A permanent training centre for this cadre was established in 1997 in collaboration with the non-governmental organisation (NGO) World Concern (later part of the NGO International Cooperation for Cambodia (ICC)). The training centre is equipped with basic instruments and supplies similar to those which dental nurses use in the field after graduation. The equipment at the training school also includes 'dental couches' (narrow flat tables with head-rests) and simple fold-up chairs to which wooden padded head-rests are attached. The duration of training has varied from 6 to 10 months. The dental nurses perform OOT (mainly extractions), ART, and scaling, as well as conducting preventive dental programmes in primary schools, including oral health education and daily brushing with fluoride toothpaste. On graduation students are supplied with a basic set of instruments and materials, including: one set of ART instruments; one set of approximately six dental forceps; two dental syringes; four dental elevators; one suture set; one pressure cooker; one set of glass ionomer cement (Fuji IX); one box of dental needles; and 50 dental local anaesthetic cartridges. However, students do not receive a dental chair.

Once back in their villages, the 'normal' process of supply of consumables involves:

- The dental nurse requesting supplies from the Operational District Office
- The Operational District Office submitting this request to the Provincial Health Department
- The MOH purchasing supplies and sending these to the Operational District Office
- The Operational District Office distributing these supplies to the health centre.

The supplies provided by the MOH to the dental nurses include: gloves, masks, needles, local anaesthetic, glass ionomer cement, cotton, gauze, disinfectant, and sutures. However, the process can break down at one or more levels. Sometimes the supplies may be delivered very late, or missing some items. In some health centres, international non-governmental organisations help to provide additional instruments and supplies.

Between 1992 and 2005 the Dental Nurse School was evaluated by external consultants five times<sup>10-14</sup>. The evaluations confirmed that those trained were able to carry out high quality basic dental care if provided with suitable facilities, equipment and materials. However concerns were raised about what happened after graduation when the dental nurses returned to work in their rural Health Centres.

There are 960 health centres in Cambodia<sup>15</sup>, with each serving an average of 8,000 to 10,000 people<sup>16</sup>, although the number currently employing a dental nurse is just over 100. Only about one-third of those trained

are currently working in health centres. This is because some of the dental nurse graduates work at referral hospitals, or have stopped work.

An evaluation of dental nurse outputs in 1999, showed that on average dental nurses carried out approximately 15 extractions, 10 ART treatments and 9 scalings per month<sup>12</sup>. Dental nurses are expected to work in a 'bifunctional' role in that they are trained both as general community nurses and dental nurses. The division of their time depends on local circumstances. An evaluation of the work of a sample of 86 dental nurses in 2002, for example, showed that 16% were no longer providing dental care, 70% were providing both dental and medical care, and 14% were providing only dental care<sup>17</sup>. This evaluation also showed that 90% of the patients treated were satisfied with the services provided by the dental nurses; however overall the amount of care provided was low.

When asked about their work in the 2002 study, most dental nurses reported barriers to the delivery of dental care. These included insufficient materials and instruments, lack of a suitable chair, and lack of professional support, such as regular visits by and communication with the local dentist or MOH dental officers. Most lacked the opportunity to discuss problems in their daily work with more experienced dentally-trained colleagues. Other barriers identified by the dental nurses included: low salary, lack of budget support for travelling about the community, the lack of knowledge of the community members about oral disease and its prevention and busyness with other duties (e.g. community health activities, attending to patients requiring medical treatment, vaccinations, etc). The dental nurses suggested that addressing these issues would be an effective way of improving dental care delivery<sup>17</sup>.

In 2005, the Oral Health Office (MOH) decided to conduct a pilot study to see whether dental care provision would improve if the main barriers previously identified were addressed. The hypothesis of the study was that the provision of sufficient dental materials, instruments and support would increase dental productivity. The lack of these items, it was believed, was hampering productivity and not any inherent laziness on the part of the dental nurses.

The objectives of the study were:

- To provide dental nurses at three health centres with support over a one year period (including regular supplies of dental materials and monitoring and support visits by MOH staff), and record whether dental care outputs would increase
- To compare these outputs with three control health centres which did not receive additional support and supplies
- To improve cross-infection control practices.

## Methods

### Sample selection

Three health centres (HCs) were selected to be in the experimental group, and three in the control group. The selection criterion for the health centres was the presence of a dental nurse carrying out oral health activities (at least 5 extractions per month) who was willing to participate in the project. All the HCs selected were located in similar rural communities with similar working environments and similar dental service outputs. Two experimental HCs were from Battambang province and one from Prey Veng province, while the controls were two from Battambang province one from Takeo province. MOH staff met with provincial health directors and operational district directors to discuss the purpose and activities of the project and to seek their cooperation.

### Baseline evaluation of experimental group clinic

Baseline treatment outputs at all the selected HCs were obtained from clinic records. For the control clinics, the only other information collected during the study period was the treatment outputs over the one year period. For the experimental group, a list of all instruments, equipment and supplies (dental materials) was made during the first visit to the clinic. A questionnaire was developed (with input from several dental nurses outside the project) which recorded information on their background, number of dental patients treated, supply situation, support from and communication with the local dentist, HC director, and MOH, and perceived barriers to providing dental care. The level of unmet demand for dental services was not recorded.

A checklist to measure the cleanliness of the clinic and adequacy of cross infection control measures was also completed by Oral Health Office staff. The checklist measured on a scale of 1-10 the following aspects: cleanliness of the room, windows, floor, table, dental chair; and basin. The presence of items and methods for cross-infection control were also recorded, including: pressure cooker, disinfecting solutions, personal protection equipment, instrument storage containers, sharps container, hand washing procedures, and disposal of infectious wastes.

### Intervention in experimental group clinics

Following the baseline evaluations and discussions with the provincial health directors, in July 2005, the Oral Health Office (OHO) staff began to support the work of the dental nurses at the three HCs. Essential instruments, materials and supplies for basic oral health care, including a dental chair and a pressure cooker (for sterilisation), were provided to each dental nurse based on their needs. For the duration of the project, dental

materials were delivered quarterly. The dental nurses also received advice on clinic cleanliness and cross-infection control.

Monitoring visits took place every three months over a one year period. During these visits, OHO staff spent two days at the health centre: one day for evaluation of oral health activities and the other day to discuss and provide feedback to the dental nurses in order to improve their performance. The evaluation focused on the cleanliness of the working environment and cross-infection control procedures (using the checklist developed during the baseline study). The numbers of different types of BPOC activities and oral health education services that were provided by each dental nurse were also recorded. The final evaluation was conducted in August 2006.

## Results

### Baseline interviews

Interviews with the dental nurses identified a range of barriers to the provision of dental care within the health centres. The most common was a lack of equipment, instruments and supplies. One HC was missing most items needed for providing dental treatment, including a suitable dental chair. Another was missing almost all restorative instruments. In three HCs pressure cookers were not working properly due to inadequate seals. Although limited amounts of local anaesthetic and needles were available at the HCs, no GIC was found. There was also a perceived lack of support and communication with local dentists and the MOH.

### Baseline oral health care activities

Baseline and three-monthly results over a one year period were obtained from the three experimental (EHC) and three controls (CHC). The activity reports from the HCs showed that the number of extractions and ART restorations provided by dental nurses in the experimental group increased significantly compared to the baseline data ( $p < 0.001$ ). During the project, on average, each dental nurse at the experimental clinics carried out 45 extractions and 26 fillings per month. This compares with the baseline three month period when the average monthly outputs were 13 extractions and no fillings per month (*Table 1*).

In the control group no increases in the number of extractions carried out were noted over the duration of the study. At baseline the dental nurses carried out an average of 10 extractions per month and during the study period 14 extractions per month ( $P > 0.05$ ). The number of extractions remained stable over the study period, except for the final quarter in CHC 1 when the number of extractions doubled. No ART restorations had been placed in the control clinics at baseline, and this did not change during the project (*Table 1*).

**Table 1** Number of services provided at experimental and control health centres

Period of implementation and health centre	Number of treatments		Total
	OUT Extraction	ART Simple filling	
<b>EHC 1</b>			
Baseline	33	0	33
Quarter 1	144	42	186
Quarter 2	176	53	229
Quarter 3	87	19	106
Quarter 4	107	49	156
<b>EHC 2</b>			
Baseline	25	0	25
Quarter 1	44	18	62
Quarter 2	104	54	158
Quarter 3	130	17	147
Quarter 4	143	27	170
<b>EHC 3</b>			
Baseline	62	0	62
Quarter 1	118	84	202
Quarter 2	110	78	188
Quarter 3	104	103	207
Quarter 4	165	74	239
<b>CHC 1</b>			
Baseline	48	0	48
Quarter 1	53	0	53
Quarter 2	63	0	63
Quarter 3	51	0	51
Quarter 4	103	0	103
<b>CHC 2</b>			
Baseline	25	0	25
Quarter 1	26	0	26
Quarter 2	31	0	31
Quarter 3	31	0	31
Quarter 4	31	0	31
<b>CHC 3</b>			
Baseline	20	0	20
Quarter 1	20	0	20
Quarter 2	30	0	30
Quarter 3	30	0	30
Quarter 4	21	0	21

### Clinic cleanliness

The cleanliness of the room and working environment at the three experimental health centres was evaluated at baseline and then quarterly for one year, using the checklist developed during the baseline study. The results are shown in *Figure 1*. The first follow-up revealed a very good improvement in cleanliness. In general, the floor, table, chair and window of the working environment were much cleaner compared with the baseline results. However, the level of cleanliness at EHC1 and EHC3

at the 2<sup>nd</sup> and 3<sup>rd</sup> quarter follow up visits was lower than at the first quarter evaluation.

### Sterilisation

During the baseline period, one of the pressure cookers in the EHCs was found to be in disrepair, with an imperfect seal. After having received a new pressure cooker and instruction on the correct procedure for sterilisation, the dental nurse improved his sterilisation procedures. At the final evaluation, all pressure cookers at the EHCs were still in good condition and in regular use.

### Discussion

The results of the study support the hypothesis that it was not an inherent laziness of the dental nurses, but the lack of sufficient dental materials, instruments and support that was hampering productivity, and that by addressing these issues, outputs increased.

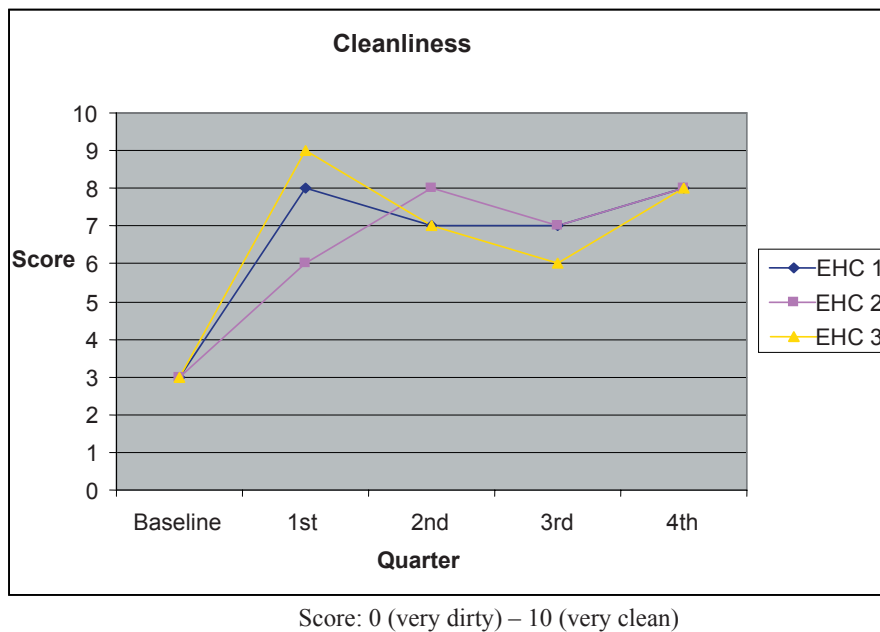
The control and experimental HCs chosen for this project were intentionally (not randomly) selected to include only 'active' dental nurses. It cannot therefore be assumed that the increased outputs found in this study when additional support and supplies were provided would necessarily be the same in all health centres around Cambodia.

The increase in both the number of extractions and ART restorations seems to be directly related to the provision of local anaesthetic and glass ionomer filling materials, both of which were lacking at baseline. However, the support provided by 3-monthly visits by staff from the Oral Health Office of the MOH may also have contributed to the increased productivity, as well as improving compliance with cross-infection control protocols. In addition, patients may have been attracted by a functioning, cleaner clinic with its new dental chair. In this study it was not possible to determine which of these factors contributed most to the observed increase in outputs.

Visits by dental officers from the provincial and MOH levels could serve a variety of useful purposes, including:

- Evaluating the work of the dental nurse
- Monitoring productivity
- Providing education and advice on materials, treatment, and patient management
- Assisting with referral of patients
- Monitoring cross-infection procedures
- Monitoring clinic facilities and supplies
- Providing encouragement and guidance
- Bringing supplies and instruments
- Collecting output data.

At baseline no ART restorations were being provided at the control and experimental clinics. There may be



**Figure 1.** The cleanliness inside the clinic at health centres

several reasons for this. Most dental nurses did not receive supplies of glass ionomer filling material from the government, even though these were ordered each year. It is difficult for dental nurses to purchase such items themselves as they are not available in the local markets, and the cost of one set of GIC filling material is about half their basic monthly salary. Although dental nurses are supplied with instruments and a pressure cooker on graduation, there is no reliable system in place to replace or repair these if they are lost or damaged. The visiting dentists from the Ministry of Health observed that one of the pressure cookers and some of the instruments were in need of replacement or repair, and were able to address this problem directly.

Another reason for the low outputs prior to the intervention, especially of ART restorations, could be the lack of demand from the villagers for dental treatment. Traditionally, rural Cambodians have only sought treatment when in pain and even then traditional and pharmacological cures may be tried first before seeking conventional medical and dental care<sup>17</sup>. In general, rural Cambodians are reluctant to have teeth extracted, even when the tooth is broken down or very mobile. Many will self-medicate with antibiotics and analgesics to control pain and infections, but retain the teeth in a chronically infected state. Some community members may be unaware that dental services are available at the health centre. Some may lack understanding of the types of dental treatment provided by the dental nurse, or of the different types of dental providers e.g. dental nurse, dentist and traditional dentist.

In some rural areas, lack of productivity may be related to the work-load of the bifunctional nurses. There are generally five to eight nurses within a health

centre, and their responsibilities include pre- and post natal care, immunisations, assessment and simple treatment for a whole range of medical problems, and public health programmes. Time to carry out dental treatment in some health centres may be very limited. Also, compared to some of the activities of the nurses, for example immunisations, dental treatment generates less income.

The restoration/extraction ratio (1:2.2) in the experimental group of this study was much higher than that found in a recent study from South Africa<sup>18</sup>. In that study of deciduous and permanent teeth, the restoration:extraction ratios were 1:8.5 and 1:8.7 respectively. The different results found in these studies may reflect local circumstances and individual patients' preferences.

Cross-infection control is a very important issue within in all the health services in Cambodia, as Hepatitis B and HIV are highly prevalent<sup>19</sup>. During dental nurse training students are taught to sterilise instruments and employ good aseptic techniques, however without reinforcement, adherence to correct procedure may be lost over time. Although there were observed improvements in cross-infection control procedures following training during the first part of the study, and supply of a new pressure cooker to one dental nurse, further efforts are needed to ensure the correct cleaning of the working environment between patients, maintenance of dental instruments after sterilisation, and storage of sterilised instruments. Regular supervisory visits and monitoring of infection control procedures seem to be beneficial in this regard.

Since the study was completed, the regular supervisory visits have ceased and the old system of supplies

has been reinstated. The risk is that the dental nurses will gradually revert to the baseline level of activities, cross-infection control procedures will deteriorate, and supplies will once again be inadequate. It is essential that the Ministry of Health considers the results of this study carefully, institutes improvements in the supply chain, and introduces regular provincial or central support for the dental nurses in all parts of Cambodia.

The results of this study should encourage the development of appropriate training materials, training programmes and supervisory procedures to improve the current situation.

## Conclusions

The provision of the BPOC improved in health centres when sufficient dental materials, instruments, and support from MOH staff were provided. Increased monitoring was also associated with improved compliance with cross-infection control protocols. Decision-makers in the Ministry of Health should improve the distribution of dental materials to dental nurses, and put in place regular professional support from the provincial and central levels.

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Correspondence to: Dr Tepirou Chher, Deputy Head, Oral Health Office, Preventive Medicine Department, Ministry of Health, No. 151-153 Avenue Kampuchea Krom, Phnom Penh, Cambodia. Email: tepirou@yahoo.com