

# Interventional Study to Improve Performance of Selected Dental Clinics in a District of Sri Lanka through Training of Chair-side Dental Assistants

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## ABSTRACT

**Introduction:** Chair-side dental assistant (CSDA) is considered as most critical link between the patient and dentist for the successful delivery of treatment. Chair side dental assistants ability of prompt action with anticipation of need of ongoing clinical procedure which depends on their capacity, knowledge, and experience is identified as a key factor for the efficient and quality treatment.

**Objective:** This study intended to improve the performance of overall performance of selected dental clinics (DC) in a district of Sri Lanka through training of CSDAs, in the context of absence of formally trained CSDAs in the government health sector.

**Methodology:** This interventional study was conducted from 2018 June to 2019 June. Mixed qualitative and quantitative methods were used including interviewer administered questionnaire to assess knowledge of supporting healthcare workers (HCW) and a check-list was used to assess the practices of the DC. Study sample was assisting HCAs and nurses in the DC including the all-in relief pools. Designing and implementing of training program based on newly developed manual was done as the interventions.

**Results:** There was a statistically significant improvement in overall knowledge and all the measured knowledge components of both staff categories in post assessments, except one component, showing the positive impact of the training program.

Among assessed 19 practices, it was noted that only seven were practiced in a satisfactory level during the pre-assessment and it was improved up to 14 following the training including three new practices.

**Conclusions and recommendations:** The study revealed that most of CSDAs in the government health sector didn't have any formal training and they gained the required knowledge and skills through informal training or passively while working as the CSDA.

Performance of CSDA and overall performance of the dental clinic can be improved through properly arranged capacity building programs following a valid training needs analysis.

Arrange regular continuous development program targeting all dental staff, incorporation of this training manual to existing attendants training program and arrange a formal induction training targeting relevant HCW before start carrier as CSDA were the recommendation made to improve the performance of DC.

**Keywords:** Chair-side dental assistant, Dental clinic, Healthcare worker, Performance, Training manual.

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## INTRODUCTION

### Background

World Health Organization recommends chair-side dental assistant (CSDA) should be utilized in order to increase the quality of dental healthcare. The use of CSDAs is now considered as a crucial part of dentistry in delivering an efficient and quality service. It has become increasingly manifest that a well-trained CSDA is equally important as dental tools in a clinical set-up.<sup>1</sup>

The CSDA is the most critical link between dentist and the patient before, during, and after treatment. The CSDA must essentially develop a thorough understanding of the procedure, recognize the patient's needs, anticipate the operator's need, and recognize any procedure change.<sup>2</sup> The ability of the CSDA to anticipate the needs of the dentist in any procedure and to act promptly is a key factor which improves the efficiency in treating patients without compromising the quality of care.<sup>3</sup> The assistant's capacity, knowledge, and experience have a direct impact on the quality of care in "four-hand dentistry," a concept based on

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a trained, competent dental assistant's two hands assisting the dental surgeon's two hands, thereby increasing efficiency during clinical procedures.<sup>4,5</sup>

The CSDAs should give special attention on infection control, standard precautions, work-practice controls to enhance safer behaviors and hierarchy of controls that categorizes and prioritizes prevention strategies because the dental clinic usually deals with blood and body fluids, it is important to consider patient safety and occupational safety.<sup>6-8</sup>

### Justification

In Sri Lankan Government Health Sector, most hospitals do not have trained dental assistance other than in very few specialized hospitals.<sup>9</sup> This service gap is also filled by the healthcare assistants (HCA). They are the only responsible persons other than the dental surgeon for maintaining the dental clinic, arranging the patient record keeping, cleaning and chair side assisting related to the dental clinic. When that HCA is on leave or on her night roster or in day offs or transferred without proper replacement, it is very difficult to deliver the service with another HCA who is totally new to the setting. In such situations, dental surgeons had to do the mixing of material and other special steps by themselves. This leads to increase waiting time and affects the quality of care which can reduce the patient's satisfaction. There may be issues of maintenance of sterility. These conditions may lead to fatigue and exhaustion of the dental surgeon, which in turn greatly affect the efficiency and effectiveness of the treatment procedures.

Sometimes, there are one or two nursing officers to assist in dental care other than HCAs at base and general hospitals. Even for them, there's no proper training other than on the job training. This is an informal short-term training by their senior counterpart or by the dental surgeon only to match their current requirement. There's no comprehensive coverage or formal evaluation of the training. Therefore, it can affect the quality of care provided by them with many deviations from accepted and standard procedures rendering more chance to errors and adverse events.

Therefore, it is important to arrange formal training programs combined with a training manual for improving skills of supporting HCWs of DCs which may ultimately lead to improve the overall performance of DC. Training manual will improve the knowledge of CSDA required in assisting in the dental clinic and it can be used as a guide by the dental surgeon to improve the performance of new assistant. Dental surgeon or Regional Dental Surgeon can use this training manual as a guide to arrange the training programs to CSDA, selecting capable HCAs to maintain a pool of trained assistants ensuring a continues quality service.

## AIM AND OBJECTIVES

### Aim

To improve the performance of selected dental clinics in a district of Sri Lanka through training of CSDAs using a newly developed training manual and a checklist.

### Objectives

- To assess the knowledge, working experience, and practice of healthcare workers working as CSDA in selected dental clinics.
- To develop training manual and checklist for the CSDA to improve the quality of care in the selected dental clinics.

- To implement training program for HCWs who are working as CSDA in selected dental clinics.
- To evaluate the post-interventional performance of CSDA in selected dental clinics.

## METHODOLOGY

### Study Design

This was an interventional research project which was conducted in three phases.

1. Pre-intervention – assess pre-interventional situation.
2. Intervention – develop a training manual, implement the training program and provide managerial support to implement expected changes.
3. Post-intervention – assess impact of the intervention.

### Study Setting

The project was conducted in all the DCs of base hospitals (Balapitiya, Elpitiya, and Udugama) in Galle district.

### Study Period

Study period was 12 months from June 2018 to June 2019.

### Study Population, Inclusion, and Exclusion Criteria

The CSDA who are permanently attached to the dental clinics, i.e., nurses, HCA including attendants and any HCW who have done no relief work for last 2 years in the dental clinic were taken as study population sample.

### Calculation of Sample Size

All the study population was taken as the sample. There were 63 participants from three hospitals including 21 nurses and 42 HCAs who fulfill the inclusion criteria.

## Data Collection and Study Instruments

### Study Instruments

*Pre-interventional phase:* Interviewer-administered structured questionnaire was designed to assess the knowledge on selected important areas and experience of the study population on the field. Observational checklist was used to assess skills and practices. This was done as a training need analysis.

Focus group discussions and in-depth interviews captured qualitative data when developing the training manual and study population was a purposively selected sample of experts.

*Post-interventional phase:* Outcome of the intervention was assessed using the same questionnaire and observational checklist which used to assess pre-interventional phase. This was done as a training evaluation.

### Development of the Questionnaire and Checklist

Questionnaire was designed through literature review of many international and few available local studies. The checklist was developed by referring to the CDC Guidelines for "Infection Control in Dental Health-Care Settings – 2003" and CDC infection prevention checklist for dental setting was adopted accordingly to the Sri Lankan setting.<sup>10</sup>

These were further developed and adapted after consulting supervisor and conducting in-depth interviews with relevant experts in the field.

## Description of the Questionnaire and Checklist

### Questionnaire

Section 01 collected the details on demographic data, working experience, experience in the dental field, training during last 1 year and induction training as a dental assistant.

In Section 02, there were 25 questions to assess the knowledge on five selected most important areas, oral anatomy, common oral diseases, infection control, dental instruments and material handling, general clinic practice including concept of four hand dentistry, occupational safety, responsiveness, and ethics.

### Checklist

The checklist was used to observe the practices relevant to patient turn over procedures, infection control, and skill on material mixing. It was developed to be used in routine clinical work as a guideline and as a supervisory tool after the intervention, other than the data collecting instrument.

## Mode of Implementation

### Pre-interventional Phase

During this phase, collection of baseline data, analyzing them to identify existing gaps, project planning, development of training manual and arranging training sessions were done.

### Data Collection

Principal investigator collected the data from interviewer-administered questionnaire. Same questionnaire was used in post-interventional evaluation. To minimize the biasness of remembering and discussing among peers, answers were obtained individually within a short period.

Checklist was filled by the principal investigator through direct observations.

## Development of Training Manual

This was done by reviewing existing training manuals in other countries, getting expert opinion through the FGD, data obtained through analyzing questionnaire responses and checklist in pre-interventional phase. Training manual was developed to cover important and basic areas relevant to assisting the dental care. The aim of this manual was to provide general training for CSDA regarding clinic policies and procedures, detail their roles in facilitating efficient clinic operations as well as provide training on infection control practices, care of equipment, and clinical procedures.

## Arranging of Training Sessions

Training modules were developed and arranged base on the developed training manual.

## Interventional Phase

Three separate training sessions were conducted in study settings in 3 days to the target group which included lecture discussions with power-point presentation, video clips, and practical sessions inside the dental clinic. Additionally, institutional dental surgeons were made aware and a copy of manual was handed over to the clinic for future referral.

## Post-interventional Phase

Using the same questionnaire and checklist, outcome of the implemented training (intervention) was assessed following 3 months of the completion of the training (Table 1).

**Table 1:** Characteristics of the study sample for the questionnaire

Characteristics	HCA (N = 42)		Nurses (N = 21)	
	No	%	No	%
Age group				
Below 25 years	03	07.1%	00	00.0%
25–40 years	12	28.6%	15	71.4%
41–55 years	23	54.8%	06	28.6%
Above 55 years	04	09.5%	00	00.0%
Gender				
Female	30	71.4%	21	100%
Male	12	28.6%	00	00%
Educational level				
No formal education or up to grade 5	00	00.0%	00	00%
Up to O/L	19	45.2%	00	00%
Up to A/L	21	50.0%	00	00%
Diploma/higher education certificate	02	4.8%	20	85.3%
Degree or above	00	00.0%	01	4.8%
Service experience				
Below 5 years	11	26.2%	4	19.0%
5–10 years	15	35.7%	7	33.3%
10–15 years	10	23.8%	6	28.6%
Above 15 years	06	14.3%	4	19.0%
Working experience in a dental set-up				
Working full time in the dental-clinic	07	16.7%	3	14.3%
Working as relief worker in the DC	15	35.7%	5	23.8%
In relief pool, still not worked in the DC	20	47.6%	13	61.9%

## Data Analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) 21. Data regarding sociodemographic, service experience, and previous training exposure were described by using frequency distributions. Section 2 of the questionnaire was analyzed according to the marks obtained (Table 2). Means and standard deviation were calculated from the obtained marks for each component as well as for the total components to obtain the overall mean knowledge score. Significance for the different components in pre- and post-interventional phases was obtained using paired *t*-test and two categories were compared using independent *t*-test. The *p*-value less than 0.05 were considered as significant (Table 3).

## RESULTS

Interviewer-administered questionnaire and observational checklist were used to assess knowledge experiences and practices of selected HCW in pre- and post-interventional phases to assess the impact of the training (Table 4).

## Sociodemographic Features of the Participants

Majority of HCAs were females and were in 41–55 years age group. All nurses were females and majority were in 25–40 years age group. Highest educational level of majority of HCA was advanced level and for nurses it was diploma. Both groups had majority of 5–10 years' service experiences. Out of 63 participants (21 nurses and 42

**Table 2:** Previous training obtained relevant to dental practice

Characteristics	HCA (n = 42)		Nurses (n = 21)	
	No	%	No	%
Type of initial training as a DA				
Received formal induction training as a DA	00	00%	00	00%
Received informal induction training as a DA	08	19%	00	00%
No induction, trained while working as DA	14	33%	08	38%
No any training as DA up to now	20	48%	13	62%
Other type of training obtained during last 12 months relevant to dental care**				
Training on infection control	13	31%	05	24%
Training on waste management	17	40%	05	24%
Basic training on dental care	01	2.5%	00	00%
Training on communication skills	10	24%	03	14%
No any relevant training	22	52.4%	14	66.6%

\*\*Can exceed total due to one can have more than one training

### Results of the Pre-assessment of Knowledge

There was a significant difference ( $p = 0.000$ ) on overall mean knowledge score among nurses (73.52) and HCAs (50.69) in pre-interventional phase except for the component on handling of instrument and materials, knowledge on which both categories had relatively low mean scores (HCA = 5.428 and nurses = 8.00).

### Results of Post-assessment of Knowledge

There were significant mean knowledge differences only in oral anatomy ( $p = 0.000$ ), infection control ( $p = 0.028$ ), and in overall score ( $p = 0.000$ ) between nurses and HCA following the training.

### Impact of the Intervention – 3 Months after Implementation of the Training

There was statistically significant improvement in all the measured components of both staff categories in post assessments, except for one component (knowledge on infection control), which indicates the positive impact of the training program.

### Results of the Qualitative Assessment Using Observational Check-list

A qualitative assessment of practices of dental assistant was done using an observational checklist. Observational results before

**Table 3:** Pre- and post-intervention comparison of selected knowledge components

Knowledge component	Category	Mean pre-knowledge score	Mean post-knowledge score	Significance
Oral anatomy	HCA	04.857	10.38	$t = -5.73, p = 0.000$
	Nurses	15.047	17.71	$t = -3.16, p = 0.005$
Common oral diseases	HCA	15.905	17.809	$t = -1.114, p = 0.000$
	Nurses	17.714	19.047	$t = -2.646, p = 0.016$
Infection control	HCA	15.714	17.428	$t = -4.159, p = 0.000$
	Nurses	19.240	19.428	$t = -1.000, p = 0.329$
Dental instrument, material handling	HCA	05.428	14.571	$t = -5.724, p = 0.000$
	Nurses	08.000	15.809	$t = -7.436, p = 0.000$
General clinic practice	HCA	08.786	14.571	$t = -7.972, p = 0.000$
	Nurses	13.520	17.142	$t = -4.990, p = 0.000$
Overall knowledge	HCA	50.69	74.761	$t = -11.17, p = 0.000$
	Nurses	73.52	89.142	$t = -7.251, p = 0.000$

**Table 4:** Definition and symbol of the scale which used to measure the practices of dental assistants

Scale	Symbol	Definition
Nil	N	Not practicing at all
Poor	P	Practicing, but not up to the standard
Satisfactory	S	Practicing satisfactorily to achieve expected outcome

HCAs), 10 worked as full time in dental clinics, 20 as relief workers, and another 33 in common relief pool, but without experience on assisting in DCs (Table 5).

### Previous Training of Participants Relevant to Dental Practice

None of the participants (even for those who currently full time working as CSDA) had formal induction training. Only eight HCAs received informal training and fourteen HCAs and eight nurses were trained while working in the DC.

(pre) the training and three months following (post) the training programs were shown in Table 5.

Using same observational checklist, 19 elements were assessed in pre- and post-phases. Out of 19, seven elements (B,C,D,E,M,O,Q) were not practiced at all in the pre-interventional phase. Even though five elements (A,I,J,N,P) were practiced, it was not up to the standards. It was noted that seven elements (F,G,H,K,L,P,R) were practiced in a satisfactory level by the CSDAs of three hospitals in the pre-assessment phase.

During post-assessment, fourteen elements were practiced satisfactorily following the intervention and remaining five (C,D,E,N,O) were practiced, but below the standards.

When comparing pre- and post-results, it was noted that four elements (A,I,J,S) were improved from poorly practiced level to the satisfactory level and three elements (B,M,Q) which were not practiced improved to satisfactory level. Even though another three new elements (C,D,E) had started practicing, but still not up to the standard. Two elements (N,O) were remaining in the poorly practiced level.



**Table 5:** Direct observation of personnel and patient-care practices in the DC before and after the training

Assessed elements	Pre-Balapatiya	Post-Balapatiya	Pre-Alpitiya	Post-Alpitiya	Pre-Udugama	Post-Udugama
A. Clinical contact surfaces cleaned and disinfected with a standard hospital disinfectant after each patient	P	S	P	S	P	S
B. Surface barriers are used to protect clinical contact surfaces that are difficult to clean (e.g., switches, handles)	N	S	N	P	N	S
C. Those barriers are changed between patients	N	S	N	P	N	S
D. Handpiece burs are changed and use sterilized one for patient to patient	N	P	N	P	N	P
E. Use new sterilized apron/bib for each patient	N	P	N	P	N	P
F. Use new sterilized instrument and instrument tray for each patient	S	S	S	S	S	S
G. General waste and clinical waste segregations were done to facilitate the appropriate disposal of them	S	S	S	S	S	S
H. All sharps are disposed of in a puncture-resistant sharps container located as close as possible to the area in which the items are used	S	S	S	S	P	S
I. After sterilization, dental devices and instruments are stored properly so that sterility is not compromised	P	S	P	S	P	S
J. Regular lubrication of hand pieces are done according to the manufacturer's instructions	S	S	P	S	P	S
K. "Single discarded after one use" devices are not used for more than one patient	S	S	S	S	S	S
L. Needles and syringes are used for only one patient	S	S	S	S	S	S
M. The rubber septum on a multi-dose medication vial is disinfected with alcohol before piercing	N	S	N	S	N	S
N. Hand hygiene is performed correctly before and after treating each patient	P	S	P	P	P	S
O. Dental assistant changes gloves during patients' care; does not wear the same pair of gloves for the care of more than one patient	N	P	N	P	N	P
P. Dental assistant does not wash examination or sterile surgeon's gloves for the purpose of reuse	S	S	S	S	S	S
Q. Dental assistant wears puncture and chemical-resistant utility gloves when cleaning instruments and performing housekeeping tasks involving contact with blood or OPIIM	N	S	N	S	N	S
R. Dental assistant takes correct proportion of powder to liquid when preparing filling materials	S	S	S	S	S	S
S. Mixing of material done in correct way in correct time	P	S	P	S	P	S

## DISCUSSION

This research project intended to measure the impact of developing a "Training manual for CSDA" to use as a guide to train supporting dental staff as well as to design and implement a training program based on the manual and checklist to measure the working condition of DC to assess performance of assisting CSDA, in the context of absence of formally trained CSDAs in the government health sector.

There were three phases in the project, pre-interventional phase to assess current performance, interventional phase to develop training manual, and implement the training and post-interventional phase to assess the impact of the intervention.

Majority of HCAs were female (71.4%) and all nurses were female. Kracher et al. also described more attraction of females toward dental assisting.<sup>11</sup> One explanation would be that, managers promote to female CSDA to overcome the ethical problems of treating female patients especially in one-man stations.

None had obtained formal induction training as a CSDAs, Few HCAs (19%) received informal induction and 33% of HCAs and 38% nurses trained while working. Those findings are similar to the survey conducted in USA.<sup>12</sup> Accordingly, even though many training courses are available and majority of CSDAs were developed through on-the job training and 48 and 62% HCAs and nurses, respectively, were not received any training as CSDA. Similarly, the study sample included all the HCAs and nurses currently in the common relief pool, have not got any training on assisting in DC. Aim of this intervention was to keep a trained pool of staff to facilitate a continuous quality dental care without service interruptions, when routine assistants are unavailable.

Pre-assessment overall mean knowledge score of nurses was significantly higher than that of HCAs. Measured components of oral anatomy, oral diseases, infection control, and general practice were significantly higher in nurses than HCAs. This can be due to that the nurses received a 3-year pre-recruitment training including above areas relevant in providing patient care in the DC. Nevertheless, this type of induction training was not received by the HCAs. Nurses get more educational and training opportunities than HCAs may be another explanation. However, mean knowledge score on dental instrument and material handling was low in both groups as none of them had any awareness or training on procedures and instruments specialized to the dental field during their routine work unless they attached to a DC. The DC usually depends on their routine CSDA and does not like to change the CSDA frequently due to difficulty of working with an untrained assistant. This creates less opportunity for HCWs in other fields to be exposed.

When considering post-assessment results, there was a significant difference of overall knowledge score between two groups. Contrasts to pre-assessment, significant difference of mean scores of two groups were noted only for the oral anatomy and infection control. Knowledge on oral anatomy is highly theoretical and HCA may have less capacity of retention following such isolated short-term training. Moreover, nurses have more academic background and usually keen on infection control.

All the measured components in both categories were improved significantly following the training except for infection control of nurses, which was high even in pre-assessment. Mean knowledge score for dental instrument and material handling was achieved in relatively higher values by both groups in post-test and this may be due to the conducted practical sessions as small groups during the training. Mean difference of the overall knowledge

scores of both staff categories in pre- and post-assessments was statistically significant showing the positive impact of the training on both categories.

Kracher et al. mentioned well-trained and qualified CSDA, will significantly contribute to provide optimum care with best practices in dentistry.<sup>11</sup> Survey conducted by DNAB described CSDA's ability to bring tremendous value through continuous training and education to the dental practice.<sup>13</sup>

Improvement of some practices was noted following the training including cleaning of contact surfaces, storing of sterilized instrument, protecting sterility, lubrication of hand-pieces, and material mixing. Maintenance of hand hygiene element was improved following the training, but still not up to the standards. Some practices were improved but not to the standards due to inadequate resources such as changing of handpiece burs and using new sterile apron for each patient. Some practices such as changing surface barriers were not adopted because there was no facilitating environment or organizational culture to practice.

More importantly, routine practice of some new practices introduced during the training, was observed such as use of surface barriers for difficult cleaning areas, disinfection of multi-dose vial before piercing and use of utility gloves for cleaning and housekeeping work, which improved the quality of patient care and occupational safety within the dental clinic.

### Limitations of the Study

This was an interventional research project targeting assessment of impact of an intervention. However, there was no control group to compare and identify the absolute impact of the intervention excluding other confounding factors.

Questionnaire may not include total area of knowledge needed to be acquired by the CSDA. However, considering time and resource constraints as well as level of literacy, competency of concentrating and understanding the questions by two different groups to get reliable responses, only a short-interviewer-administered questionnaire focusing on main important areas were used.

Expected outcome of the training depends on timely supply of adequate resources (adequate aprons for patients, handpiece burs, polythene covers). Therefore, it is important to get managerial support and it can act as a limitation to acquire desired results.

### CONCLUSION AND RECOMMENDATIONS

The research project was done at selected DCs of Galle district, was a good indicator to assess individual HCW performance in the DC as well as overall performance of the dental care provided by the institution to the public. During the study, a training manual was developed on chair-side assisting in the DC for the self-referral by the CSDAs as well as to use as a guide to train CSDAs.

The study revealed that most of CSDAs in the government health sector didn't have any formal training and they gained the required knowledge and skills through informal training in the clinic settings or passively while working as the CSDA through trial and error.

Performance of this type of individual CSDA as well as overall performance of the dental clinic can be improved through properly arranged capacity building programs following a valid training need analysis.

Considering above findings and conclusions following recommendations can be made:

- The project was limited to improve the performance of CSDAs of three selected hospitals. Considering positive impact of the intervention, training programs can be scaled-up to the other DCs. Regional Dental Surgeon can arrange training programs based on developed training manual regularly to sustain the positive impact and improve the quality of service provided by the other regional DCs.
- The training manual can be incorporated to the attendants training program conducted by the Education and Training unit of the health ministry.
- The training was targeted to improve the performance of the CSDAs. However, provision of dental care is a collective responsibility and highly influenced by the skill and attitude of dental surgeons. Therefore, to improve the dental care, it is necessary to conduct continuous development programs to the DS parallel to this training. Then they will be promoted to support and facilitate the implemented changes through the training.
- Use of HCAs as CSDAs is cost effective and minimizes conflicts between health categories. However, as a long-term solution it is recommended to initiate formal induction training to selected HCW before starting dental assisting career.

### Ethical Approval

Ethical approval for the project was obtained from ethical review committee of Post Graduate Institute of Medicine, University of Colombo.

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