

# Utilization of Mobile Dental Vans at Post Graduate Dental Institutions in India

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## Abstract

**Background:** Mobile Dental Van (MDV) removes the barrier of accessibility and improves the care of underserved populations. Dental institutions across India, providing postgraduate training in dental public health organize and conduct MDV programs as part of their curriculum.

**Aim:** To describe the structure, conduct and utilization of MDV programs in consideration to duration of use by the academic institutions for oral health care delivery in rural areas.

**Methods:** Hundred postgraduates in Public Health Dentistry representing 27 dental institutions of India completed a 40 item questionnaire on MDV program and utilization. Descriptive statistics and Fisher's exact test were used for statistical analysis.

**Results:** The mobile dental van programs were more curative with limited orientation towards preventive services. The institutionally sponsored programs with experience of more than 10 years had better organized setup and adequate emergency management system together with electricity, water and storage facilities. Chair side assistants were employed in 90 percent of newer programs compared to only 50 percent of older programs. Dental hygienists were helping the dentists in only 60 percent of programs.

**Conclusions:** The utilization of MDV in treating rural underserved is indispensable, but revenue and high productivity is difficult to achieve as lower socioeconomic patients are predominantly served. MDV programs operational in postgraduate institutions have to improvise on correcting the shortcomings regarding the facilities and manpower to improve the utilization of the programs.

*Key Words: Dental Auxiliaries, Dental Health Services, Dental School, Mobile Health Units, Oral Health*

## Introduction

We are living in an era in which community experience for students is becoming a more essential component to the mission of dental education [1]. Dental Public Health aims to improve the oral health of the population through preventive and curative services.

The introduction of mobile clinics into dentistry dates back to 1924 [2]. They have been successfully used to provide dental treatment to schools, disabled patients, rural communities, industries and armed forces of various countries. Outreach programs using Mobile Dental Vans (MDV) are desirable model of clinical practice in a non-conventional setting, and help the student to disassociate the image that best dentistry can only be practiced in conventional clinical settings [3]. Confrontation with limited resources and economic barriers to dental care for patients requiring more extensive procedures also serve as an additional learning experience in community-based programs. Unlike stationary dental clinics, mobile clinics provide greater physical access to dental care for medically underserved populations in poor urban and remote rural communities [4].

A GOI-WHO (Government of India – World Health Organization) collaborative program (2008-09) studied the utility of MDV in rural population around Lucknow, India [5]. This government funded study compared the treatment performed in Community Health Centers (CHCs) of Bantra, Maati and Baksi-ka-talab with the treatment performed in fully equipped mobile dental van staffing one dental surgeon and one hygienist. It was found that oral-dental treatment performed as well as awareness generated through MDV during the

project period was significant. Based on the outcome, it was proposed that MDVs can be a useful adjunct to the existing system of health care delivery. Douglas [6] at Connecticut indicated that MDVs provide an innovative solution to bringing dental care to underserved children. Mulligan et al. [7] studied on migrant children in the US and concluded that mobile clinics provide a safety net for underserved migrant children who are unable or unwilling to access care within the general dental service.

In India, Dental Council of India (DCI) a regulatory body governing the dental education has clearly stated that the student should have the skill and competence to identify all oral health problems affecting the community and find solutions using multi-disciplinary approach at both individual and community levels [8]. In the year 2012-13, out of 289 dental institutions in India, 61 institutions offer post-graduation in Public Health Dentistry are admitting 173 students [8].

The DCI in its revised ordinance for Masters in Dental Surgery (MDS) in Public Health Dentistry have mandated each dental institution to procure a Mobile Dental Van (MDV) to provide services to the underserved population [9]. According to this ordinance, MDV should be fitted with two dental operators with all needed attachments and be self sufficient with water, compressor, electricity, sterilization and public addressing systems. The program curriculum for postgraduate training in dental public health in India includes community training and rural posting for interns and postgraduates

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[9]. The mobile dental vans are used by the institutions for the same purpose.

The MDVs are regularly used for providing dental health care to the poor, needy and rural population through dental camps. Dental camps as practiced in Indian institutions are usually a day long

visit to rural or remote places or school setting for the provision of services like preventive care, curative care, screening for diseases and health education [5]. Specialists, postgraduates and undergraduates attend these programs to provide curative, preventive and referral services. Course evaluations by University of Texas Health Science

**Table 1.** Description of the Mobile dental van (MDV) program in various post-graduate (Public Health Dentistry) institutions in India.

	Mobile dental van program		
	Less than 5 years	5 - 10 years	More than 10 years
<b>No. of institutions having MDV program</b>	10	11	6
<b>No. of Postgraduates</b>	20	52	28
<b>No. of Mobile Dental Van (MDV)</b>			
One	8	10	6
Two	2	1	Nil
<b>MDV Operational days in a Month</b>			
Once a Month	Nil	Nil	Nil
Twice a Month	Nil	1	Nil
Once a Week	3	3	1
More than once a week	7	7	5
<b>Average distance covered by MDV per visit</b>			
Less than 25 kms	1	Nil	Nil
25-50 kms	5	4	1
50-100kms	4	7	3
More than 100kms	Nil	Nil	2
<b>Average No. of People served in a day by MDV</b>			
Less than 25	2	Nil	2
25-50	5	7	1
50-100	3	2	1
More than 100	Nil	2	2
<b>Major purpose of MDV program</b>			
Screening	1	1	Nil
Treatment	2	3	1
Health Education	Nil	1	Nil
All the Above	7	6	5
<b>Mode of transport for staff and auxiliaries to reach camp site of MDV program</b>			
Sufficient seating capacity in MDV	8	7	6
Use of separate vehicle	1	3	Nil
use of Public Transport system	1	1	Nil
Ask Camp organizers to provide transport	Nil	Nil	Nil
<b>Resources for Emergency management in MDV</b>			
Adequate emergency equipment, medicine and manual	1	3	2
some equipment and medicine for basic life support	2	1	1
only some emergency medicine	6	7	2
No emergency kit or equipments	1	Nil	1
<b>Instruments autoclaved for treatment camps</b>			
Before the camp	5	7	4
During the camp	Nil	Nil	Nil
Both of the above	5	4	2
<b>Electricity and Water in MDV</b>			
Self sustainable through generator and overhead tank	1	6	1
External hookup line required at the camp site	2	1	2
Both of the above	5	4	3
Not Available	2	Nil	Nil
<b>Storage space in MDV</b>			
Sufficient	7	6	6
Insufficient	2	2	Nil
don't store instruments in MDV	1	3	Nil

Center at San Antonio (UTHSCSA) Dental School following the van programs showed that students perceived mobile dental van programs as an important educational activity and recommended the continuation of the programs [3]. In India, for over ten years, the department of Public Health Dentistry in postgraduate institutions of India is regularly conducting MDV programs, but the conduct of these programs is not yet evaluated.

### Aim

To describe the structure, conduct and utilization of mobile dental van programs in consideration to duration of use by the academic institutions for oral health care delivery in rural areas.

### Methods

A descriptive cross-sectional questionnaire study was conducted among postgraduate students of dental institutions in India. Approval was obtained from the Institutional Review Board (Ref No. KDDC/106/2009-10). Thirty two institutions were randomly selected from the list of 49 institutions offering post-graduation in public health dentistry. All the postgraduates from these institutions were invited to complete a 40 item structured questionnaire.

The questionnaire comprised items on the conduct of the MDV program in their institution, facilities available, services offered and MDV utilization. Experts in Public Health Dentistry from two other dental institutions reviewed the questionnaire for structure and content validity. For face validity and reliability, the questionnaire was administered on a small focus group of 10 postgraduates. Feedbacks from the subjects were considered and few questions were reformed to make it more meaningful. The reliability was assessed using Cronbach's alpha (0.9).

Out of 140 postgraduates 112 responded, out of which 12 questionnaires were having more than two items unanswered. So, responses of only 100 questionnaires from the students representing 27 postgraduate institutions were considered for final analysis.

The data collected was entered into Microsoft Excel and subjected to analysis using Statistical Package for Social Sciences version 16 software (SPSS Inc., Chicago, IL, USA). Based on the duration for which dental school operated a MDV, the respondents and programs were divided into three groups as newer (<5years), intermediate (5-10 years) and older (>10 years). This division was considered to assess the impact of the duration of the conduct of MDV program. In situations where more than one respondent is representing a single institution, their responses to questions pertaining to structure and conduct (*Tables 1 and 2*) of MDV program were combined together to form a single response. Descriptive statistics and Chi-square test were used to assess and compare the responses. P-value  $\leq 0.05$  was considered as statistically significant.

### Results

The results are based on the response to a 40 item questionnaire by 100 postgraduates, 52 males and 48 females with mean age of  $27 \pm 1.9$  years. Of these, 50, 31 and 19 were in first, second and third year respectively representing the three years Masters Program of Public Health Dentistry.

Most institutions were using one MDV, which was operational once or twice a week. The majority of MDV programs covered an average distance of 50 to 100 kilometers per visit providing services for 25 to 50, sometimes up-to 100 or more patients in a day (*Table 1*). These MDVs had ample seating capacity, adequate emergency

management system, together with electricity, water and storage facilities. Generally, the complete operational and maintenance cost was supported by the respective dental institutions. Some programs collected money from camp organizers towards fuel expenses (36-50%).

Curative services like amalgam restorations, oral prophylaxis and extractions were provided by all the MDV programs (100%) (*Table 2*). Older programs were found providing preventive services like sealants (50%) and fluoride application (83.3%). Chair side assistants were employed in 90 percent of the newer programs followed by intermediate (81.8%) and older (50%) programs. Dental hygienists were helping the dentists in only 60 percent of programs. Some intermediate programs had dental health educators (27.3%), dental laboratory technicians (18.2%) and social workers (36.4%).

All programs were providing creative services including extractions and restorations like amalgam, glass ionomer cements (100%). Atraumatic Restorative Treatments (ART) were offered by all the older MDV programs compared to only 70% of new programs. Preventive services like oral prophylaxis was practiced in all programs (100%) compared to fluoride application (55-83%) and fissure sealants (40-55%). The majority of MDV programs used charts, models (90-100%) and pamphlets (60-72%) for oral health education. Inbuilt public addressing systems for mass education (mike, loud-speaker) was found in 81.8% of intermediate programs followed by newer (50%) and older (16.6%) programs.

The portable dental unit with micromotor or air-rotor attachment was used more commonly in the older MDV programs (100%) compared to intermediate (72.7%) and newer (50%) programs. Older programs also had a mobile generator (66.6%) and mobile compressor (50%). For field site sterilization, autoclaving was practiced in 66 percent of the older programs compared to 40% of newer and 36.4% of intermediate programs. Cold (chemical) sterilization was used by 30 to 50 percent of programs. Use of boiler or sterilizer (70-83%) where the instruments are placed in boiling water for 10 to 15 minutes was also found. In the present study, almost all the Mobile dental programs were part of institution sponsored programs.

Considering the experience with a MDV program of their institution, the postgraduates recommended MDV to possess two dental operatories (64%) with Intra Oral Periapical (IOPA) radiography facility (73%) and provisions for the care of pediatric (79%) and handicapped (85%) patients. They also insisted to have a separate sterilization area (83%); provision of toilet facilities (67%) in the mobile dental van (*Table 3*). Although it was not statistically significant, the disposal of biomedical waste through incineration back in the institution was suggested by postgraduates. Since postgraduates are regularly involved in organizing and conducting of rural dental treatment and screening camps, they were asked to express their views on utilization of MDV (*Table 4*). The utility of MDV for screening and treatment at camp site showed no significant ( $p > 0.05$ ) difference between responses. All older and 94 percent of newer programs suggested use of MDV for treatment camps. The role of MDV in increasing outpatient at the institutions was agreed upon by 92 percent of postgraduates although the finding was not statistically significant among the duration of MDV programs.

### Discussion

Accessibility of oral health care services has been identified as a key barrier or challenge for rural-dwelling individuals and those living in long term care facilities [3,10]. In India, the distribution of dentists

**Table 2.** Facilities available in the mobile dental van program of various postgraduate dental institutions of India.

	Mobile dental van program		
	Less than 5 years (N=10) n%	5 - 10 years (N=11) n%	More than 10 years (N=6) n%
<b>Auxiliaries availability in MDV program</b>			
<b>Chair side assistant</b>	9 (90)	9 (81.8)	3 (50)
Dental Hygienist	6 (60)	2 (18.2)	4 (66.6)
Dental Health Educator	2 (20)	3 (27.3)	1 (16.6)
Lab Technician	- -	2 (18.2)	1 (16.6)
Attender/ peon / Social Worker	2 (20)	4 (36.4)	1 (16.6)
<b>Preventive and curative services in MDV</b>			
Pit and Fissure sealants	4 (40)	6 (54.5)	3 (50)
Fluoride Application	6 (60)	6 (54.5)	4 (83.3)
Atraumatic Restorative Treatment	7 (70)	8 (72.7)	6 (100)
Extractions	10 (100)	11 (100)	6 (100)
Oral Prophylaxis	10 (100)	11 (100)	6 (100)
Composites	3 (30)	3 (27.3)	--
Restorations (Amalgam, GIC)	10 (100)	11 (100)	6 (100)
Root canal Treatment	2 (20)	--	--
Prosthesis	--	--	--
<b>health education facilities available in MDV</b>			
Television	2 (20)	3 (27.3)	2 (33.3)
VCD / DVD	2 (20)	3 (27.3)	3 (50)
Charts / Models	9 (90)	10 (90.9)	6 (100)
Pamphlets	6 (60)	8 (72.7)	4 (66.6)
LCD Projectors	1 (10)	1 (9.1)	1 (16.6)
Public Addressing Systems	5 (50)	9 (81.8)	1 (16.6)
<b>Portable dental units / equipments</b>			
None	3 (30)	1 (9.1)	--
Portable Field Dental Chair	2 (20)	4 (36.4)	2 (33.3)
Mobile compressor	3 (30)	4 (36.4)	3 (50)
Mobile generator	1 (10)	2 (18.2)	4 (66.6)
Portable dental unit with micromotor or Airtor attachment	5 (50)	8 (72.7)	6 (100)
Portable dental unit with Ultrasonic scalar attachment	3 (30)	7 (63.6)	3 (50)
<b>Sterilization</b>			
Autoclave	4 (40)	4 (36.4)	4 (66.6)
Ultrasonic Cleaner	1 (10)	3 (27.3)	--
Cold sterilization	3 (30)	4 (36.4)	3 (50)
Boiler or sterilizer	7 (70)	10 (90.9)	5 (83.3)
<b>Operational cost of MDV</b>			
Institution	10 (100)	11 (100)	6 (100)
Camp organizers	1 (10)	5 (45.4)	3 (50)
Collected from Patients	--	1 (9.1)	--
<b>Fuel cost of MDV Program</b>			
Institution	9 (90)	10 (90.9)	10 (100)
Camp organizers	1 (10)	4 (36.4)	3 (50)
Collected from Patients	--	--	--
Not Available	2	Nil	Nil
<b>Storage space in MDV</b>			
Sufficient	7	6	6
Insufficient	2	2	Nil
don't store instruments in MDV	1	3	Nil

is grossly uneven with more than 90% of dentists available in urban settings and only 10% available for 72% of the rural population [11]. There are no dentists posted at the level of primary and community health centers in most of the states [10,11]. Besides this, an acute

shortage of equipment, materials and other essential facilities to run the minimal curative services for such vast population have intensified the need for alternate delivery systems. Mobile dental delivery models are said to increase access and utilization of dental

**Table 3.** Facilities recommended in mobile dental van program according to personal perception by the postgraduates of Public Health Dentistry.

Facilities		Present in MDV program of institution (%)	Recommend to be in MDV program (%)
Dental Chairs	One	47	4
	Two	51	64
	More	2	19
IOPA radiography		35	73
Reception area		34	54
Patient Waiting area		38	51
Health Education area		14	63
Radiograph processing facility		10	62
Changing room		3	45
Pediatric care facilities		40	79
Facilities for handicapped patients		12	85
Sterilization area		38	83
Toilet		3	67

**Table 4.** Comparison of responses of postgraduates on utilization of Mobile dental van.

Utilization of Mobile Dental Van	Postgraduates in MDV programme			Chi square and p-value
	Less than 5 years (N=20) n %	5 - 6 years (N=52) n %	More than 10 years (N=28) n %	
<b>In Screening camps</b>				
Indispensable	3 (15)	11 (21.1)	3 (10.7)	11.313
p > 0.05				
Preferred	8 (40)	22 (42.3)	8 (28.6)	
Optional	8 (40)	7 (13.5)	11 (39.3)	
Not required	1 (5)	12 (23.1)	6 (21.4)	
<b>In Treatment Camps</b>				
Indispensable	5 (25)	29 (55.8)	13 (46.4)	19.420
p < 0.001*				
Preferred	11 (55)	23 (44.2)	15 (53.6)	
Optional	4 (20)	0 (6.5)	0 (-)	
Not required	0 (-)	0 (-)	0 (-)	
<b>Role in increasing OPD patients at institution</b>				
Definitely Yes	14 (70)	32 (61.5)	15 (53.6)	7.911
p > 0.05				
Yes	5 (25)	13 (25)	13 (46.4)	
I Don't know	1 (5)	7 (13.5)	0 (-)	
NO / Definitely No	0 (-)	0 (-)	0 (-)	

\*p ≤ 0.05 is considered as statistically significant.

services for those otherwise not accessing care in traditional dental settings [12-14].

In the present study, we found that MDVs were predominantly used for curative services in rural areas. Compared to newer and intermediate MDV programs, older programs with experience of more than 10 years had better organized setup. Most programs were operational on once or twice weekly covering an average of hundred patients per visit. This type of scheduling can be expected because MDV programs are considered as a partial requirement of academic activity by the staff, postgraduates and students. The financial constraints may also contribute for such practice as most of the programs are solely funded by institutions.

In dental institutions across India, MDV program staffing consists of faculty, postgraduates, interns and auxiliary staff. Mobile dental van staffing depended on the type of services delivered, however in all programs the staff had to function well as an independent team and assume a wide range of duties [15]. The present study found limited availability of auxiliary staff in MDV programs. Personnel with no qualification or training were seen to perform dual duties as chair-side assistant and peon in many programs. Dental hygienists

were found in only sixty percent of programs. On the contrary, Douglass [6] suggests more hygienists than dentists to be appropriate for outreach programs which emphasize screening and preventive services. The team effort was an important factor when working with large groups and resulted in satisfactory productivity and efficiency of care.

The MDV programs in the present study were more curative oriented than preventive. The preventive services like fissure sealant and fluoride applications were available in only half of the program. Whereas, curative services like restorations and extractions were practiced in all the MDV programs. The quality of treatment provided through MDV has to be studied in detail. A study in southern Thai school children suggests that mobile clinic fillings are of highest priority [16]. Evidence from the literature suggests that more children accepted treatment in mobile clinic than a fixed clinic. Pattern of dental care in a mobile dental clinic suggests fewer patients, more fillings, less prophylaxis and no broken appointments [12]. On the contrary, it is also reported that mobile service may be less effective in secondary prevention [17].

The maintenance of mobile clinics and portable dental

equipments has been reported as problematic, mainly due to use of highly specialized equipment and limited access to technical and mechanical backup [18]. The revenue stream was limited as high productivity is difficult to achieve and lower socioeconomic patients are predominantly served. The maintenance and fuel cost are important aspects for the success of MDV programs [19]. The cost of implementing and maintaining mobile dental van programs varies and historically has been perceived as higher than fixed clinics like permanent community health care setup [3,19]. A dollar cost analysis showed leasing a MDV at prima facie seem appealing, but was a more costly alternative [20]. Studies on costs of mobile dental programs organized by academic institutions were not found.

The postgraduates in the present study recommend the MDV programs to have a radiographs facility along with handicapped and pediatric care facilities. Literature suggests that the portable X-ray system is easy for positioning and less space consuming [21,22]. Some program also suggests pediatric dentist to be part of the team as the majority of patients are schoolchildren [6,15]. The need for separate sterilization and a health education area was also expressed. The postgraduates desired to have provision for toilet and a changing room for staff in MDV. This may be because- in India the MDV programs are held as a day long program at rural areas. The basic sanitary provisions may not be available at all places.

The respondents of the present study believe that the biomedical waste generated at camp site should be collected and disposed by incineration back in the institution. Waste disposal by the camp organizers should be strongly discouraged as the organizers may not be well informed about safe handling and disposing of biomedical waste. Grant and Milner recommend using disposable items only as it will be less time consuming and easy to manage. But, this practice will be very expensive [21].

The postgraduates definitely recommended the utilization of MDV for treatment camps. The role of MDV in increasing the outpatient number at the institution is not being studied previously. In the present study, postgraduates reported that MDV would certainly have an impact in increasing the patients at institutions. At camp venue, presence of MDV with sophisticated equipments definitely increases the patients registering for dental treatments, which may add to the number of referrals to the institution. The results reflect on the educational benefit for the postgraduates in terms of exposure to different community settings and the provision of curative and preventive services.

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## Recommendations

Ideally, MDV is suggested to have at least two fully equipped dental operatories with self sustainable electricity and water supply through the generator and overhead tank [23]. At campsite where electricity and water supply is available, it can be used through external power sources or hookup lines. Adequate emergency equipments, medicines and a manual should be present in the MDV for management of basic emergencies during dental procedures. The MDV should have sufficient space for storage of autoclaved instruments and other materials required during the conduct of rural dental camps [7]. Infection control is very essential during rendering dental services to the vast population in one setup. Sufficient instruments should be autoclaved before and during the camp. Use of only boiler or cold sterilization is discouraged as it is not effective in removing all forms of microorganisms including spores. It is suggested to fumigate the MDV at least once every month as the dental personnel who are working in the MDV are found to be more prone to cross-infections, because of the limited dimensions and poor ventilation [24].

## Limitations

The results of the present study should be carefully generalized, for the reason that the sources of funding and other sample characteristics pertaining to MDV programs may vary creating a threat to the external validity of the study. However, the approach would be a useful aid in resource allocation planning and improving the mobile dental programs.

## Conclusions

Utilization of MDV is indispensable for the treatment camps, but preventive services should also be given importance. MDV programs operational in postgraduate institutions have to rectify shortcomings regarding the facilities and manpower to improve the efficiency. Infection control measures should be adhered strictly.

Further studies should be considered overcoming these issues and addressing the cost benefit evaluation of MDV programs. The MDVs along with the use of portable equipments provide an innovative solution for providing care to the underserved.

## Conflict of Interest

None declared.

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