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Review Article

Dentistry Section

Reach the Unreached – A Systematic Review on Mobile Dental Units

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ABSTRACT

Provision of health care facilities and the extent of their utilization is one of the indices of human development. The services for the masses need to be designed with the basic objective of alleviating and preventing the vast amounts of diseases of the mass. This could be achieved by mobile dental units (MDUs). The present systemic review access the efficacy of MDUs for community settings. A review of literature was performed both electronically and manually using MeSH Terms- Mobile Dental Units/clinics.

Eight articles, which fulfilled inclusion and exclusion criteria were selected for the review. MDUs help in overcoming the accessibility, affordability and sustainability barrier. They are able to reach more people than fixed-site clinics. Even in Government sector, mobile dental vans can help reach the underserved at an affordable cost.The present systematic review revealed that MDUs prove to be an effective adjunct to the oral health service providers like dental colleges and private practitioners.

Keywords: Dental ambulances, Emergency mobile dental units, Mobile dental clinic, Oral health

INTRODUCTION

Provision of health care facilities and the extent of their utilization is one of the indices of human development [1]. There are various means of providing these facilities. Medical and Dental colleges play an important role in providing health care services and even educating new professionals to provide these services. The services for the masses need to be designed with the basic objective of alleviating and preventing the vast amounts of diseases in our society [2]. India is a vast country with a population of more than one billion. Like anywhere else in the world, urban bias exists in here too. Government hospitals and establishments treat 25% to 30% of the population for their dental ailments, while the remainder seeks treatment through private clinics. Children and elderly from low socio-economic families exhibit significant levels of decay, experience limited access to care, often lack transportation and have high "no show" rates. Research also suggests that some children, despite having dental insurance, are not always receiving dental care because their parents are not able to take their children to dentist or not motivated enough to seek dental care for children. Typically, the options available for the delivery of services are traditional stationary clinics; portable equipment; or mobile dental clinics (van or truck). Mobile dental clinics provide an innovative solution to providing dental care [3]. Unlike stationary dental clinics, mobile clinics provide greater physical access to dental care for medically underserved population in poor urban and remote rural communities and many existing dental clinics services at lower or no cost to the user. School based mobile dental clinics gives access for children living in geographic areas which are difficult to reach [4].

The units provide the flexibility that stationary sites do not, often operating in ways that address temporal, geographic and cultural barriers to health care utilization. The units can travel to locations that are convenient for the population in need, making services more accessible. Operating in rural communities, Mobile Dental Units (MDU) address the geographic barriers to accessibility [5]. In urban communities, such portable facilities have been used to address cultural, temporal and other access barriers via community outreach to hard-to-reach populations such as low income families, new immigrants, the homeless and persons with mental illnesses or substance abuse problems, vulnerable population as well as pregnant women and the elderly [6].

Types of services provided by mobile health/ Dental units

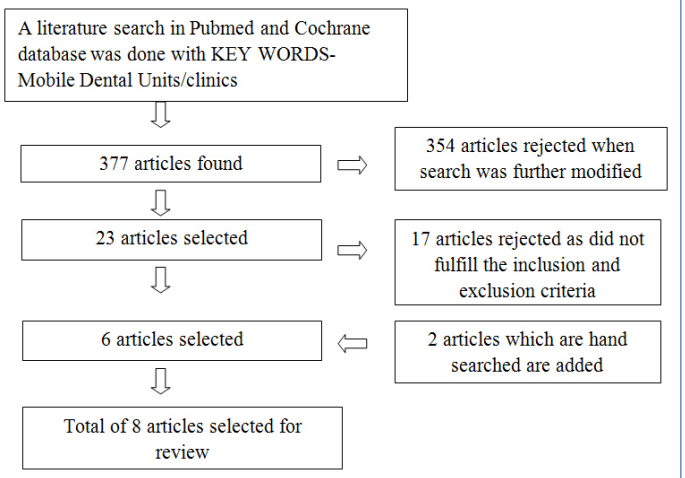
Basic function of Mobile Health/ Dental Units is "To serve as ancillary services to the operations of the recipient hospitals most especially in priority, underserved, hard to reach and remote areas." There are a variety of service delivery configurations utilized by organizations that operate mobile health units. Services range from comprehensive primary care to discrete selected services. For example, tertiary care facilities (hospitals) and stationary clinics may use MDUs to provide basic primary care services or specific screening services such as oral cancer screening , hypertension and diabetes screening, and to extend wellness services (e.g., provision of immunizations -- childhood, influenza and pneumonia) to vulnerable populations (children and the elderly) [7]. Similarly, MDUs have also been used to serve the remote areas to provide basic dental health care including oral prophylaxis, restorations, extractions. MDUs have also been found good in imparting oral health education, oral hygiene instructions etc. In India primary health care services are provided with help of MDUs. Vulnerable and hard-to-reach populations have been found to be more responsive to "alternative" health care delivery venues and methods [8].

Following barriers are crossed by mobile dental services

A number of other social, cultural and environmental factors limit access to health care in many countries especially for the growing minority population which includes transportation, discrimination, cultural values, lack of culturally appropriate services, language barriers, religious differences, and dissatisfaction with health provider in particular or distrust of health system in general [9]. According to Shobha Tandon et al., mobile dental services have proved to be an effective adjunct to the oral health service providers like dental colleges and private practitioners. They act as the first form of exposure to educate the rural people and alleviate them of their oral health care needs. MDUs is also a mean of comprehensive oral health care provider with oral health treatment and education being provided to the rural population at the same place [10].

Evaluation of MDUs

The efficacy of MDUs appears to be generally accepted though few reports of evaluation studies were found in the literature.



[Table/Fig-1]: A literature review was performed in pubmed central and cochrane library

However, when assessed the evaluation of mobile health units tend to be formative in nature. These evaluations provide descriptive reports on the population using mobile health units, the types of services provided, and the outreach and service delivery strategies employed by these units for the "target" population, as well as report information on the perception of services received. However, such evaluations do not report on the outcome or impact of services. Formative evaluations of mobile health units have substantiated the assumption that providing educational and clinical services via a mobile health unit is a viable outreach method for accessing marginalized populations. Mobile units have been found to address the need for flexibility in service delivery that overcomes geographic, temporal, perceptual, cultural, personal and other barriers to access (Daiski) [11].

However, there is no significant evidence present regarding the efficacy and utilization of MDUs for community purpose. Hence, an attempt has been made through this systematic review to assess the utilization and efficacy of the MDUs for community outreach programme.

MATERIALS AND METHOD

Search strategy

A review of literature was performed in Pubmed and Cochrane library depicted in [Table/Fig-1]. MeSH Terms - "mobile dental units/clinics" were combined in the search. With this combination, a total of 337 abstracts appeared. Out of these 337 abstracts, 23 titles/abstracts were related to research question. Further search criteria (inclusion and exclusion criteria's) were applied to the articles, out of which six articles, which fulfilled the criteria, were selected for the review. Also, two hand searched article were included in the review.

MESH Terms –

Inclusion criteria

1. Original research and review articles.
2. The articles emphasizing the efficacy of MDUs in oral health care.
3. Efficacy of MDU to outskirts patients.

Exclusion criteria

1. Articles whose abstract only readable.
2. Articles which did not mention services provided by MDU.
3. Articles in which need for utilization of MDU to improve condition was not emphasized.

RESULTS

1. **Howard Bailit, Tryfon Beazoglou, and Margaret Drozdowski [12]:** Analysed a model for a school-based program designed to reduce dental access disparities examining its financial feasibility Hygienists provided screening and preventive services in schools using portable/mobile equipment and generated surplus funds that were used to supplement payments to community clinics and private practices for treating children thus, showing considerable promise for reducing access disparities.
2. **Erika Dawkins, Akihiko Michimi, Gregory Ellis-Griffith [13]:** Conducted a study on children aged 6 to 15 years who participated in the school-based dental sealant program through the mobile dental clinic. The proportion of untreated dental caries was higher in children with no insurance and living in rural residential locations.
3. **Jackson DM [14]:** Describes the creation and evolution of the St. David's Dental Program, a mobile school-based dental program for children. Since 1998, the program has provided 132,791 screenings for oral health treatment needs and 38,634 encounters for sealants or treatment.
4. **Werner CW, Gragg PP, Geurink KM [15]:** At the Saint Philip of Jesus Clinic, and at the Willows Development Center for Severely and Profoundly Mentally Retarded, used dental van to provide preventive and restorative care. An average of eight preventive procedures, seven fillings, two sealants and one extraction or referral were provided each working day. Dental van programs promoted access to dental care and increase the visibility of dental schools within the university and community.
5. **Rudolph MJ, Chikte UM, Lewis HA [16]:** Conducted a study which indicated a great need for dental treatment and preventive services in dentally underserved communities in southern Africa. This project described the evolution and utilization of a unique, purpose-built, MDU. From a compact 2 x 2.5 meter box trailer, an enclosed area of 8 x 9 meters is formed by deploying a cover system housed on top of the trailer. Once deployed, the unit becomes four fully equipped dental operatories and a combined waiting and educational area, with all-weather protection.
6. **Douglass JM [17]:** Conducted a study on many children, especially those from lower socio-economic families with. Mobile dental clinics have been implemented in many communities to address their issues. Structured surveys were sent to the three mobile programs in Connecticut to collect information on the age of the program, issues encountered in planning and implementation, and ongoing costs and productivity.
7. **Shobha Tandon et al., [10]:** Had undertaken the study with the objective to assess the utility of a Mobile Dental Clinic to provide oral health services to the rural population. Mobile dental clinic proved to be an effective adjunct to the oral health service providers like dental colleges and private practitioners.
8. **Mulligan R [18]:** Investigated the oral health status, access, and the role of mobile dental clinics in improving the oral health of migrant children. It was observed that dental needs are high among migrant children and Mobile clinics provided a safety net for them.

[Table/Fig-2] show studies undertaken on MDUs treatment provided and barriers.

DISCUSSION

The present review revealed a growing interest in the use of portable dental units especially for public health services. In fact, the efficacy of Mobile dental vans in the treatment of oral health problems was found to be high in community outreach programmes. In the study

Study	Health care facility	Treatments provided	Barriers	Results/Response
Shobha Tandon et al., [10]	Mobile dental van	Oral screening and treatment	Accessibility barrier, ffordability barrier, manpower issues	The mobile dental clinic proved to be an effective adjunct to the oral health service providers like dental colleges and private practitioners. They act as the first form of exposure to educate the rural people and alleviate their apprehensions towards oral health care.
Howard Bailit, Tryfon beazoglou, Margaret Drozdowski [12]	Mobile dental clinic	Primary health care	Accessibility barrier, financial barrier	Promised for reducing access disparities at a lower cost per child than current Medicaid programs.
Erika Dawkins, Akihiko Michimi, Gregory Ellis-Griffith [13]	Mobile dental clinic	Dental sealant application	Geographic disparities.	Reduced geographic disparities in untreated dental caries in South Central Kentucky.
Jackson DM, Jahnke LR, Kerber L, Nyer G, Siemens K, Clark C [14]	Mobile dental clinics	Oral health treatment needs and sealants or treatment	Dental care to low-income children in schools	Factors important to the program's success included sustained funding for general operating costs
Werner CW, Gragg PP, Geurink KM [15]	Mobile dental van	Preventive and restorative care like sealants, fillings ,extraction.	Limited accessibility to primary oral health.	Dental van programs promote access to dental care and increase the visibility of dental schools within the university and community.
Rudolph MJ , Chikte UM, Lewis HA [16]	Mobile dental unit(MDU)	Primary oral health care	Geographicinaccessibility, limited financial resources, and a maldistribution	Assessment of the MDU indicates that it is an effective and viable alternative oral health delivery system.
Douglass JM [17]	Mobile Dental Clinics	Diagnostic and preventive procedures	limited access to dental care, transportation problems and poor appointment attendance.	Innovative solution to bringing dental care to underserved children.
Mulligan R, Seirawan H, Faust S [18]	Mobile dental clinics	Questionnaire about children's access to dental care to assess role of mobile dental clinics in improving the oral health of migrant children.	Accessibility barrier	Mobile clinics provide a safety net for migrant children.

[Table/Fig-2]: Review of studies undertaken on mobile dental units, the treatment provided and barriers

done by Howard Bailit et al., [12] it was found that the proposed school-based dental program based on MDUs had a reasonably good chance of being successful financially if Medicaid fees are at a certain level. That implies that with the government support mobile dental units can easily overcome the affordability barrier along with the accessibility barrier. In another study by Shobha Tandon et al., [10] it was found that MDU act as the first form of exposure to educate the rural people and alleviate their apprehensions towards oral health care. Although, MDUs and Mobile dental services have been found to benefit people especially the rural population which is generally underserved because of lack of transportation Daiski I [11]. The decision to utilize mobile dental clinics should be made cautiously as there are many pitfalls and failed programs. In a national survey of dental school mobile units, nine were operational, three were being planned and two were discontinued. It is important during planning to speak to managers of other programs that are similar in terms of climate; geographic area; target population; services delivered; and parent organization. Each of these factors has unique implications for the design, implementation, management and sustainability of programs [19]. Preventive services are typically more cost effective and easier to deliver than restorative services. A program in Pender County, North Carolina abandoned providing restorative services as the limited space hampered the effectiveness of the dentist. They now utilize a fixed site that works in conjunction with their mobile program [19]. Mobile dental clinics provide an innovative solution to providing dental care to underserved children. They decrease missed appointments when run in conjunction with schools, and directly address transportation problems, a frequently cited factor contributing to "no shows".

Government of India have provided mobile dental vans (MDV) to many dental colleges which is fully equipped to deliver necessary health care at the doorstep of villages, school and community. This is the perfect example of Public –Private partnership which has helped to cater the needs of underserved [20]. A GOI-WHO (Government of India – World Health Organization) collaborative program (2008-09) studied the utility of MDV in rural population around Lucknow, India [21]. 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. The Dental council of India in its revised ordinance for Masters in Dental Surgery (MDS) in Public Health Dentistry has mandated each dental institution to procure a MDV to provide services to the underserved population [22].Thus, active participation of Government sector can markedly improve the health status of our community.

CONCLUSION

The present systematic review revealed that MDUs prove to be an effective adjunct to the oral health service providers like dental colleges and private practitioners. They act as the first form of exposure to educate the rural people and alleviate them of their oral health care needs. They can also be used as a means to provide comprehensive oral health care which includes oral health treatment and education being provided to the underserved population at the same place and same time. However, the limitations of the systematic review was that it did not evaluated the efficacy of MDUs specifically to determine if there is evidence that the presence of such programs could contribute positively to the overall oral health outcomes. Further, longitudinal clinical studies are required to assess the long term benefits of the use of MDUs at community level. However, even with the limited literature available at present regarding the efficacy and role of mobile dental units independently, their future looks promising regarding filling the gap between health care facilities provision and utilization.

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