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Is it cost-beneficial to society? Measuring the economic worth of dental residency training

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ABSTRACT

This study estimated whether continued programming of a highly specialized four-year dentistry residency training in Saudi Arabia was cost-beneficial. We utilized a purposive sampling to administer a survey to trainees in major cities. Additionally, we used publically available market information about general practitioners. We employed *Benefit-Cost Analysis accounting* approach as a conceptual framework. Using general practitioners as the base category, we grouped overall social analytical perspectives into resident trainees and rest of society. The residency program was cost-beneficial to trainees, realizing an estimated return of SR 4.07 per SR 1 invested. The overall societal return was SR 0.98 per SR 1 invested, slightly shy of a bang for the buck, in part because the public sector largely runs the training. Benefits included increased earnings and enhanced restorative dentistry skills accruing to trainees; increased charitable contributions and programming-related payments accruing to programs and the public; and practice-related payments accruing to governmental, professional, and insurance agencies. Rest of society, notably government underwrote much of the cost of programming. A sensitivity analysis revealed the results were robust to uncertainties in the data and estimation. Our findings offer evidence to evaluate whether continued residency training is cost-beneficial to trainees and potentially to overall society.

1. Introduction

Educational programs that lead to certain competencies and licensure have been shown to be beneficial not only to participants but also to the rest of society (Royal College of General Practitioners, 2013; Lewis, 1990; Nash & Pfeifer, 2005a, 2005b; O'Connor, Cameron, & Kumar, 2014). Dental education is important as it relates to public safety, practitioner competency, and the general availability of dental services. According to American Dental Association (ADA) recognizes that training dental professionals in greater numbers could dramatically improve oral health among people by reducing untreated diseases. However, it has been acknowledged that general practice skills are not enough to meet the needs of an increasingly diverse and challenging population (Royal College of General Practitioners, 2013). The availability of specialized clinical knowledge or technical skills is often perceived to be of more value to the health economy than generalist medical expertise (Royal College of General Practitioners, 2013).

Studies show that the quality specialized treatments performed in general dental practice are inferior to ideal, and some instances, by as much as 35% (Bos, Hoogstraten, & Prahl-Andersen, 2003; De Cleen, Schuurs, Wesselink, & Wu, 1993; Eckerbom, 1993). In many respects, such characterization of general practice is a reflection of less than optimal quality care provided by generalists. As a result, with a decrease in the quality of treatment, there is a remarkable increase in the number of medical errors and complications eventually leading to increased treatment cost claimed against general practitioners (ADA). Further, some cross-sectional trials of different populations in different countries have shown a high rate of lesser quality work (22–61%) and a high rate of radiographic evidence of substandard root canal filings of up to 47%–86% by general practitioners (Kerekes & Tronstad, 1979). Moreover, other studies show that the standards of complicated treatments accomplished in general dental clinic are defective (Marsh, Phillips, Fordham, Bertranou, & Hale, 2012).

While the view that generalist care has less value to the health economy is contested, further training is often preferred and encouraged in society. Dentistry residency programs prepare residents as practitioners by imparting knowledge and practical experience over and above general practice. That experience presents dentists with real-world practical challenges in their profession. ADA considers dental residency training not only as dental health education but also as public

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health given that it prevents and controls dental diseases and promotes dental health through organized community efforts (ADA).

There is evidence in the literature about the importance of having an additional training of dental specialists in the community, including positive rate of economic return on specialized dental training (Nash & Pfeifer, 2005a, 2005b), private practice increased net income, and increased earnings over and above general practice (Nash & Pfeifer, 2005a, 2005b). In addition, studies evaluating the outcome of the specialized dental treatment performed in controlled clinical environments (e.g., dental institute) have shown a high level of success rates up to 95% (Buckley & Spangberg, 1995; Caplan, Reams, & Weintraub, 1999). Clinical procedures performed by dentists with higher training provide benefits of quality treatment and patient satisfaction compared to general practitioners (De Cleen et al., 1993; deMoor RJG, De Boever, Delme, & Martens, 2000; Saunders, Saunders, Sadiq, & Cruickshank, 1997). Furthermore, dentists with higher skills and training such as Mandibular, two-Implant, perform advanced procedures that are cost-effective (deMoor RJG et al., 2000; Strindberg, 1956). At the same time, studies show that patients who undergo advanced dental procedures performed by skilled specialized practitioners receive benefits in terms of functional, aesthetic, and nutritional state with a greater degree of patients' satisfaction (deMoor RJG et al., 2000). Finally, studies indicate that clinical trials consider specialized training to improve quality of treatment, patient care, and better use of resources as well as decreasing incidence of retreatment complications (Kerekes & Tronstad, 1979; Strindberg, 1956).

There is no doubt that higher and additional dental training is beneficial to society as evidenced by the foregoing literature. However, there is evidence of a limited use of economic evaluation of health programs and healthcare interventions in Saudi Arabia. This problem is more pronounced in government health agencies and health care systems in developing countries.

1.1. Dental education in Saudi Arabia

Some colleges and universities in Saudi Arabia offer training in both Bachelor's degree in dental studies (BDS) and Postgraduate Programs. The BDS is a six-year program that includes a year of pre-dental and a mandatory internship. The Ministry of Higher Education (MHE) approves the offering of these programs. In addition, the Saudi Commission for Health Specialties (SCHS) approves colleges as training centers for Dental Residency Boards or Programs. Various agencies and professional societies such as Saudi Dental Society also carry out scientific activities, including continuing education courses, workshops, and annual meetings in order to provide additional and timely information to members.

The Saudi Specialty Certificate in Restorative Dentistry (SSCDR), the residency program this study evaluates was formerly known as Saudi Board Advanced Residency Dentistry (SBARD). The four-year training program started in 1999 to produce advanced postgraduate qualifications in restorative dentistry. The program is recognized by SCHS and qualifies residents for the rank of specialists and then as consultants. The training provides didactic, clinical, and hospital training to upgrade the level of dental profession in Saudi Arabia. The instruction and experience provided in SBARD prepare residents to be highly competent and qualified restorative dentists who are able to treat complex restorative cases in operative dentistry, endodontic and fixes prosthodontics. Resident trainees are capable of functioning independently to provide an educational environment that promotes quality delivery of health care.

The objective and structure of the SSCDR training are premised on the evidence that in order to provide high success rate in general dental clinics, continuing education in a specialized field should be given more consideration for the benefit of patients and society (Lynch & Burke, 2006). In this respect, general practitioners in Saudi Arabia go through a four-year advanced education residency in restorative dentistry to become consultants and meet the growing needs of the population. There is wide belief that the program produces competent dentists much more specialized than general practitioners. While SCHS continues to approve SSCDR residency programming based on the premise that it produces benefits, the cost of such program for a given level of program outcome is unknown. As a result, it is difficult to determine its relative value in order to justify its continued existence. This paper, therefore, attempts to document evidence of the economic worth of the training. That is, the paper raises the pertinent question: Is the residency training cost-beneficial to both participants and society? The organization of the rest of the paper presents methods, results, discussion, and conclusion.

2. Methods

The study is a cross-sectional that examined whether dental residency specialty training is cost-beneficial to society. In other words, the study sought to estimate the net benefits and/or benefit-cost ratio, a measure to gauge its return on investment (ROI) to society. The Institutional Review Board (IRB) of King Abdulaziz International Medical Research Center (KAIMRC) and KAIMRC research committee approved the study under the protocol number SP14/052. The study was also approved by the research committee of the College of Public Health and Health informatics, King Saud bin Abdulaziz University for Health Sciences and Ministry of Health (MOH).

We administered a questionnaire using a combination of mail, personal, and telephone surveys after a consent was granted. Data were collected in August 2014. A hundred and eight (108) past participants of dental residency training responded across four cities in the country. Using a purposive sampling we targeted 169 trainees based on sample frame, hence a response rate of 64%. The first part of the questionnaire captured information such as age, the number of years of schooling before joining the program, year of licensure, sector in which they worked, and salary before and after graduation. Skills acquired from the program, direct and indirect costs incurred because of attending the program were obtained. The second part of the questionnaire captured program centers' characteristics including the number of residents, graduating rates, labor force, equipment, skills taught and their value in society and program costs.

Additionally, information relating to consultants' knowledge and experience were obtained from the market in which they practice. This information helped supplement in determining the value of certain costs and benefits relating to the program and general practice dentistry. We obtained current and historical data relating to earnings, practice-related payments they make to professional, governmental, and insurance agencies since that the current study participants were themselves general practitioners as a precondition for the admission into the residency programs. Additionally, we computed increased charity contribution from the median resident specialist income by assuming a minimum of two months' income remains unspent or saved from out of their earnings as per statutory requirements.

In order to establish cost and benefits for whom, our study design identified analytical perspectives of interest, a key component when carrying out an economic evaluation of programs. The perspectives in the present study included dental specialists (trainees), residency program, government, insurance agencies, and other governmental and professional agencies. For simplicity, as reflected Table 1, societal perspective is assumed to comprise of resident trainees and rest of society.

We used general practitioners as the alternative group (base category) and employed a *Cost-Benefit Analysis (CBA) accounting* approach as a conceptual framework in order to capture costs and benefits and/or estimate benefit-cost ratios. Cost and benefits are all in Saudi Riyals (SR). Table 1 shows an exposition of the cost and benefits framework and perspectives. Similar approaches have previously been applied in educational residency training (Lewis, 1990). Such analytical