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*Comparing Different Models of the Public/Private Sector Mix in the
Delivery of Healthcare Services*

**Conceptualizing oral health care systems for comparative analysis
– public, private and statutory**

Author(s)

*Dr Carmen Huckel Schneider, University of Sydney, Menzies Centre for Health Policy
carmen.huckelschneider@sydney.edu.au*

Ms Richa Jaswal, University of Sydney, Menzies Centre for Health Policy.

Prof. Joerg Eberhard, University of Sydney, Charles Perkins Centre.

Ms Kate Ruiz, Charles University of Sydney, Charles Perkins Centre.

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Abstract

Socio-demographics, diets, age profile and oral hygiene habits are all known contributing factors for the most common oral diseases, dental decay and gum disease. However, little is known about how oral health policy - including dental health care systems - influence oral health outcomes. This paper proposes a framework for a comprehensive comparison of oral health policy systems by working through key lessons from the established oral health policy literature and insights from complexity science institutional theory. The resulting framework has three planes: First, core system elements describing system functioning; second, connections to determine level of complexity and links to oral health outcomes; and third drivers, to understanding change and continuity in the system as manifestations of core values and institutions.

Keywords

Oral health policy, policy analysis frameworks, complexity, institutions

Introduction

Oral diseases are a burden to Australia and the world. Every year approximately 100,000 disability adjusted life years are lost in Australia due to oral health disorders (AIHW, 2016). The Global Burden of Disease Study 2010 put the worldwide figure at 15 million disability adjusted life years (Marcenes et al., 2013).

Socio-demographics, diets, age profile and oral hygiene habits are all known contributing factors for the most common oral diseases, dental decay and gum disease (Petersen et al., 2005; Sheiham, 2005; Sheiham & Watt, 2000). However, little is known about how oral health policy - including dental health care systems - influence oral health outcomes. This includes factors such as how dental care is financed; preventative oral health policies and practice; the composition and task-mix of the oral healthcare workforce; and service user preferences (Kandelman et al., 2012).

This paper proposes a framework for a comprehensive comparison of oral health policy systems. We begin with a focus on financing structures as a defining property, and then work towards the development of a framework that captures the tributaries and flow on effects of oral health care financing. The purpose of this paper for discussion, at the 3rd International Conference on Public Policy, is to document the various considerations we worked through to create a framework that embraces different approaches to understanding health policy and systems; including attempts to bring together contrasting research paradigms and epistemologies. The aim is to examine what lessons can be learnt from recent literature that conceptualizes health systems as complex adaptive systems; as well as literature on institutional theory in public policy and apply them to oral health. The resulting proposed framework is intended to capture how major structural health system elements, in particular system financing, is constituent with nuanced, emergent, unintended and compounding oral health system features that impact on the oral health outcomes of populations.

Background

In most advanced health care systems, medicine and dentistry have remained distinct practices that have been treated differently in policy debate (Russell, 2014). Public provision or subsidy of dental care is

frequently (at least partly) run under separate schemes to that of primary, secondary, tertiary or allied health care (Grytten, 2005).

In Australia for example, oral health is not included in the public health care system Medicare. Some emergency care is provided in hospital settings and various schemes have been implemented to subsidize dental visits for children and disadvantaged populations (Chrisopoulos, Harford & Ellershaw, 2016). For the vast majority of Australians however, dental care is either paid for at the point of service use or purchased as part of a private health insurance package. Although private health insurance is partly subsidized by the Australian government, dental care in Australia can be categorized as a private oral health insurance system, with some public safety net.

In contrast, in Germany, statutory sickness funds (*Krankenkassen*) are required to pay fixed rates to providers for most oral health related costs, with additional private insurance as an auxiliary option to cover some items. While the coverage of oral health services within this system is not as comprehensive as other medical services, we can still categorize Germany as having a statutory oral health insurance system (Ziller, Eaton & Widstrom, 2015).

The United Kingdom represents a third contrasting model of dental care system. All treatments that in the dentist's opinion are required to maintain good oral health are available through the National Health Service, the publicly funded health care system. Services are provided without service user contributions for certain populations groups (eg. children, youth and students, low income) and attracts a standardized co-payment for most other users (the highest tier payment for a treatment in 2016 being GBP233.70 (approx. US\$300). Providers are obliged to maintain the payment levels. We can therefore categorise the UK models as a public oral health care system (Whittaker & Birch, 2012).

There are clear differences between the oral health status of Australian, German and British citizens. While the mean decayed, missing or filled teeth (DMFT) in people 65+ in Germany is 17.7, in Australia it is 23, in England the mean DMFT of people 75+ is 19.5. The rate of complete tooth loss is 12.4 percent in the German population over the age of 65, in Australia the rate in the same age category is 20%. The proportion of adults in England who suffered from complete tooth loss 85+ was 47 per cent

in 2009 (AIHW, 2016; Jordan et al., 2016; Steele & O'Sullivan, 2011).

On the other hand periodontal disease is more frequent in Germany compared to Australia. In 2014, 64.6 percent of adults aged 65 to 75 years suffered from moderate or severe periodontitis, (Jordan et al., 2016) compared to 54 percent of the population in Australia (AIHW, 2016). In England only 83 per cent of dentate adults had evidence of periodontal disease at the most stringent threshold (Steele & O'Sullivan, 2011). Changes over time also have been observed, in the UK for example complete tooth loss in people at the age of 65 to 75 years old was reduced from 24.8 percent in 1997 to 12.4 percent in 2014. In Australia the edentulous population has reduced from 50.2 percent in 1988 to 20 percent in 2015 (AIHW, 2016). In addition, a minority of children and adults experience substantial levels of disease (AIHW, 2016).

There therefore appears to be some relationships between the contrasting oral health systems and oral health outcomes, potentially through links of out-of-pocket costs and service provider autonomy. However, a simple comparison between the broad health financing structure and oral health outcomes gives a mixed picture. We are therefore motivated to develop a framework that will enable a deeper understanding of how oral health systems work to shed further light on the relationships between systems and outcomes.

Comparative oral health policy analysis – can we compare complex systems?

Complexity in oral health systems

Like all health outcomes, we can assume that there are multiple and complex causes of variation in oral health status. Accordingly, there is an increasing understanding that health care systems need to be understood as complex systems; defined as systems of human interaction governed by non-linear interaction laws, self-organization and emergent phenomena (Martínez-García & Lemus, 2013). A core element of a complex system is the influence of core values and drivers that influence behaviour and steer, explicitly or implicitly, decisions and action within the system. Health care policy can therefore

also be seen as constitutive of institutions, or accepted sets of practices, rules and norms “that structure social interactions in particular ways” (Knight, 1992, p. 2). When analyzing oral health systems as complex systems, we therefore seek to pay particular attention to relationships and interdependences, as well as the ‘unseen’ values norms and rules is therefore considered vital (McDaniel, Driebe & Lanham, 2013). We can expect, for example, that there are relationships between financing and workforce composition; between dental practice business models and values around free enterprise; between patterns of networking between dental health professionals and cultures of professional education and training; and between cultural attitudes towards dental health and willingness to visit a dentist or engage in good oral hygiene at home.

There has been an increasing amount of scholarship in recent years dedicated to the conceptualization of health care systems as complex systems and institutions; and the use of tools to increase understanding, explanation and predictability of the outcomes that emerge within them (Kannampallil et al., 2011; Lipsitz, 2012; Martínez-García & Lemus, 2013; McDaniel, Driebe & Lanham, 2013). As yet, however there has been no attempts that we know of to comprehensively apply institutional theory and complexity concepts to oral health systems; although there some use of agent based modelling to predict workforce needs and describe complexities of health care systems to health practitioners have been used in the past (Bronkhorst, Wiersma & Truin, 1990; Hirsch & Killingsworth, 1975). The absence of clear linear relationships between broad oral health policy and oral health outcomes suggests that complexity and institutional perspectives can offer new insights not only to explain trends in oral health status in the population, but to identify why oral health systems function as they do.

Comparative analysis

Comparative policy analysis has expanded as a discipline over the past 20 years with the concurrent increase in the availability of health outcomes data through information technology (Blank & Burau, 2014). While the vast majority of comparative policy analysis compares health care system *performance* (Forde, Morgan & Klazinga, 2013; Oderkirk, Ronchi & Klazinga, 2013) and *population oral health status* (Crocombe et al., 2009) across countries, there have less thorough descriptive comparisons of oral health care systems. Some recent exceptions have been pan-European comparisons (Widström,

Eaton & Vanobbergen, 2004; Ziller, Eaton & Widstrom, 2015) however comparatively little analysis of the ways in which the different components of a complex system, as well as the drivers, and relationships between components within health care systems can be compared. Oral health systems have particular characteristics that need to be accounted for in comparative policy analysis. This includes the nature of the workforce and the type and use of technologies, as well as the pathways of disease and the impact of preventative measures.

There is therefore a threefold challenge for comparing oral health systems: 1) there is no existing developed standard of the basic elemental system features that offer the starting point for mapping an oral health system; 2) in acknowledging system complexity, there is a limit to the extent to which a comparison of elemental system features can offer explanation of cause, effects and outcomes and 3) there are factors unique to oral health prevention and treatment that cannot be transferred directly from broader comparative analysis of broader health policy.

Comparative policy analysis however remains an important endeavor for health policy development and design. All health systems are effectively combinations of different policy principles, incentives, and mechanisms. “Although no two political systems are identical, many share characteristics that allow us to develop typologies or ideal models” (Blank & Burau, 2014, p. 13).

We therefore seek to develop a framework that will allow for the identification of commonalities in oral health systems, not only in terms of structural elements, but also those instances where there are similar patterns of relationships, drivers, institutions, interdependence, feedback and flow on effects within the system. We therefore aimed to take a multi-pronged approach to examine the relationships between oral health financing, other core system elements as well as the broader cultural context (political and societal) that may influence the relationships between, and emergent effects from, core elements.

The framework

Scholars of oral health policy have investigated a wide array of factors that influence service delivery and oral health outcomes. These include technologies and treatments (Brignardello-Petersen et al., 2014); frequency of dental visits (Thomson et al., 2010); preventative oral health interventions,

(Beirne, Clarkson & Worthington, 2007; Petersen & Lennon, 2004; Watt, 2005); work-force mix, (Dyer, Humphris & Robinson, 2010; Wright et al., 2013); workforce training (Kay & Locker, 1996); service user preferences (Meyerhoefer, Zuvekas & Manski, 2014); cultural preferences, (Allison et al., 1999); standing costs (Manski, Moeller & Chen, 2013; Teusner, Brennan & Spencer, 2015); out-of-pocket costs (Locker, Maggiriias & Quiñonez, 2011); and service availability (Whittaker & Birch, 2012).

This range of scholarship forms the foundation of our framework, which first concentrates on the core health system elements that can be mapped and on which a study of interdependencies, relationships, values and drivers would follow.

Core system elements

We take the WHO health systems buildings blocks as a starting point¹, adapting this conceptualisation, (originally intended for monitoring progress of health systems as they grow in developing country settings), to describe core elements of an oral health system. We choose the ‘building blocks’ concept, rather than more hierarchical conceptualisations of health systems (such as micro, meso, macro levels (Kapiriri, Norheim & Martin, 2007); or primary, secondary tertiary services) to later enable deeper exploration of links between elements. The core system elements are chosen to allow for a *description of how the system is functioning* (See figure 1). In describing the elements, we keep key unique features of oral health prevention and treatment in mind.

- 1) **Oral health financing.** This element includes the location, or combination of principles in terms of free market vs state controlled systems (Palència et al., 2014); pooling of (financial) risk vs user pay (Raittio et al., 2015) and service provider payment models (fee-per-service, performance, capitation, salaried) (Grytten, 2016; Harris & Bridgman, 2010).

¹ The six core components or “building blocks” in the original conceptualisation are: (i) service delivery, (ii) health workforce, (iii) health information systems, (iv) access to essential medicines, (v) financing, and (vi) leadership/governance.

- 2) **Health service access.** This element includes both availability and real-level access of different types of services, density of services (McDonald & Conde, 2010) and number of dental practitioners.
- 3) **Oral health workforce.** This element includes the mix of dental health professions, training received, certification and the tasks performed in practice (Dyer, Humphris & Robinson, 2010; Wright et al., 2013).
- 4) **Oral health science and technologies.** This element includes the treatment technologies used, including oral surgical techniques, prevention methods delivered (Natapov, Sasson & Zusman, 2016) and materials and equipment used (Baelum, 2008). This element links closely with drivers for use, or non-use, of methods and techniques in clinical practice.
- 5) **Health information systems.** This element includes information available to consumers as well as dental practitioners at the level of: individual patients (oral health and treatment history); services - as used for monitoring and feedback purposes; jurisdictions (such as variations in population oral health status for policy development (Tomar & Cohen, 2010)).
- 6) **Leadership and governance.** This element includes system level oral health strategies, (National Oral Health Promotion Clearing House, 2011) health system user participation in policy, feedback and complaint systems, (Emmert, Halling & Meier, 2015) accountability mechanisms for performance, decision making structures for policing quality, safety and innovation (Thusu, Panesar & Bedi, 2012) and practitioner networks.

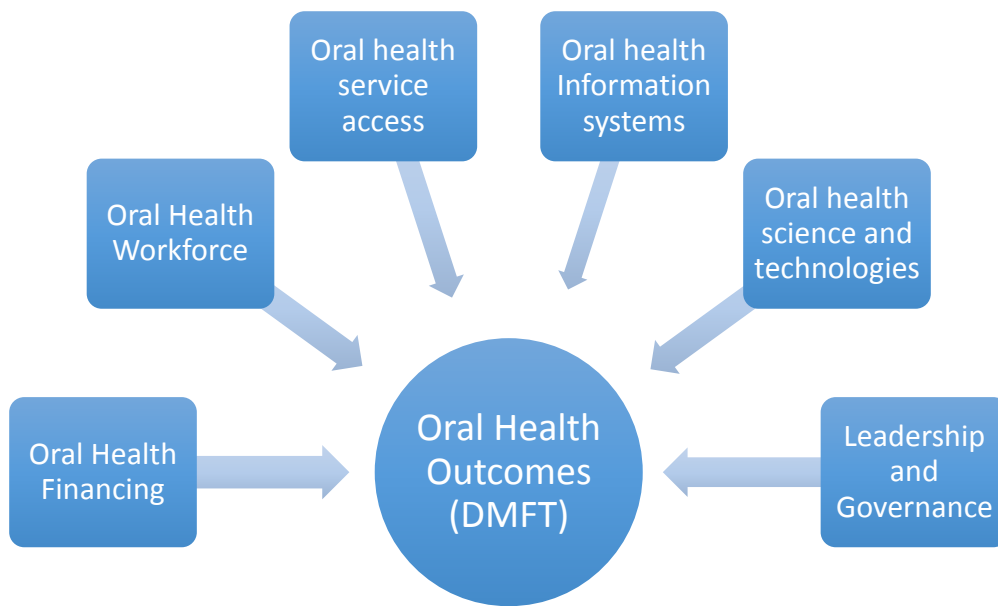


Figure 1: Oral health system core elements

Taking into account complexity and institutions

Insights from complexity science suggest that it is the relationships between agents and core system elements that are key to understanding how, and why a health system functions as it does (Kannampallil et al., 2011; Lipsitz, 2012; Martínez-García & Lemus, 2013; McDaniel, Driebe & Lanham, 2013). The capacity to predict outcomes from a complex system is limited due to its properties, mainly non-linearity and context-dependency (Salvador-Carulla et al., 2017) Accordingly, in addition to core elements a complexity based framework will also feature connections and context.

Connections describe the relationships between agents (or actors – such as service users, decision makers and practitioners) and elements in a system. These connections together characterise the level of complexity of the system. Our framework therefore places a strong focus on determining how characteristics of one core element influences each and every other core element. The components, such as leadership/governance and health information systems are cross cutting and provide the basis for the overall policy and regulation of all the other health system elements. Key input components to the health system include specifically, financing and the health workforce. Finally the service delivery

with its parameters such as availability, accessibility and affordability, reflects the immediate outputs of the health system. This focus on connections in the framework is to determine the *level of complexity of the system and how this links to oral health outcomes*.

Finally, taking a complexity approach we would expect there to be constitutive relationships between each core element and contextual factors. We draw on institutional theory literature examining the role of history (path dependency) (Bevan & Robinson, 2005; Oliver & Mossialos, 2005; Wilsford, 1994); external shocks (punctuated equilibrium) (Birkland, 2006); societal norms (cultural theory)(Poss, 2001); and shared belief systems (normative framing) (Sheikh et al., 2011; Updegraff & Rothman, 2013) to draw out four contextual factors for our oral health policy analysis framework.

- 1) History of oral health practice. This includes both clinical practice standards and cultures.
- 2) Cultural value placed on oral health in the population. This includes standard norms regarding oral health, facial/dental appearance, commitment to prevention and normalisation of regular dental practice visits (Thomson et al., 2010).
- 3) Broader political and societal preferences. This includes preferences for state-led welfare, risk pooling and expectations of equal opportunity and equality; this can also be reflected in broader welfare systems.
- 4) Punctuating events – such as crises of health workforce, prominent negative outcomes that lie outside acceptable limits of the society context; or major external events that impact on the core values of society and thus the system

The contextual factors are chosen to allow for an understanding of *why the system functions as it does*. We place these contextual factors on a plane surrounding the core system elements described above. The framework is thus designed to aid a thick description of the mutually constituting relationship between context and the core elements, translated through the identification of drivers, values and institutions.

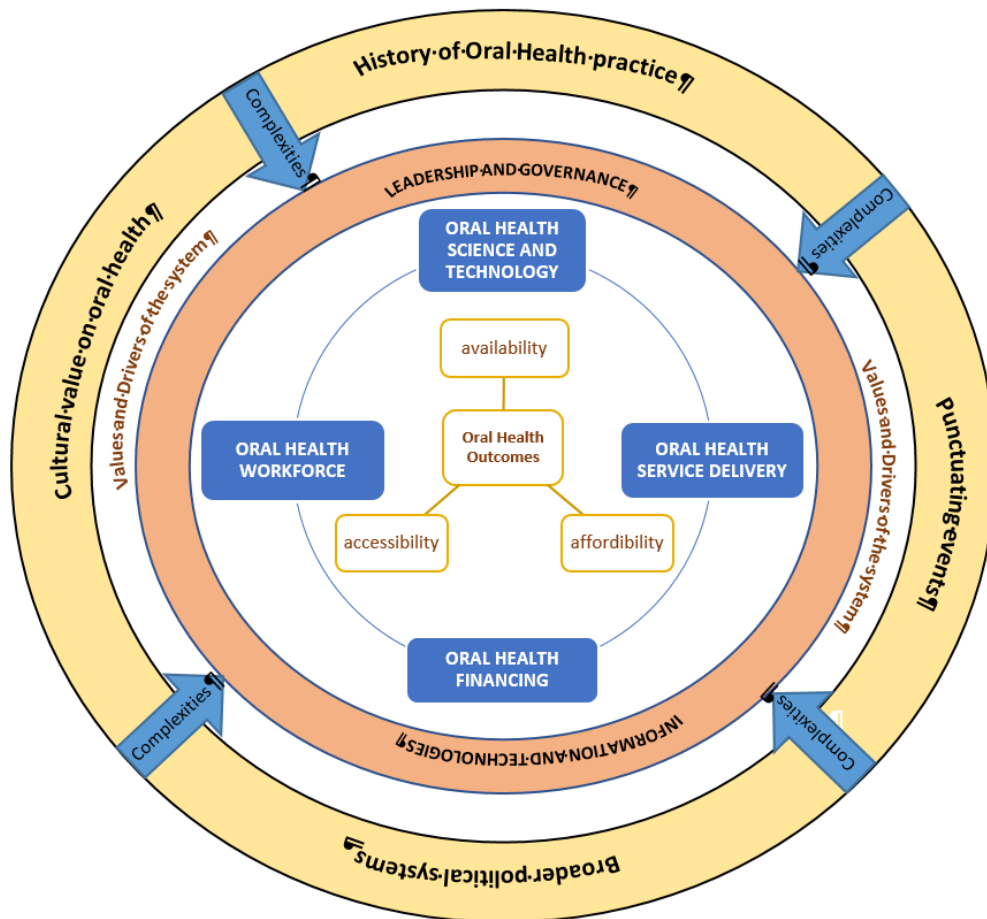


Figure 2: Oral health system framework

Analysis implications of complexity based frameworks: mixed research paradigms and methods

Our framework is designed to allow for comparative analysis of health policy systems along three broad planes. First, core system elements that allow for a description of how the system is functioning; second, connections to determine the level of complexity of the system and how this links to oral health outcomes; and third drivers, to understanding change and continuity in the system as manifestations of core values and institutions which guide, implicitly or explicitly, decisions and actions.

Each of these planes links to fundamentally different understandings of knowledge of health systems. Whereas we can reduce core system elements to potential quantifiable indicators; drivers, values and institutions need to be inferred, drawing on theories from the field and from behaviors, actions and discourses; rendering it incompatible with a reductionist approach.

Our analysis framework is designed to allow to multiple understandings of science and knowledge to be combined for a fuller understanding of an oral health system; we therefore propose that different epistemological approaches should be combined to make most fruitful use of the proposed framework.

Quantitative approaches

Whilst the oral tributary of oral health system elements to oral health outcomes has yet to be revealed, there is ample evidence on core elements of health systems as a whole – with multiple indicators from many comparative policy analysis studies (Anderson & Hussey, 2001; Chen et al., 1997). Our framework is intended to facilitate the study of how resources are generated, pooled or distributed for oral health and how they are utilised at different levels of care. For example, each country has different Primordial (school dental health education, advertisements), Primary Preventive (Fluoride application, fissure sealants, scaling) Secondary therapeutic (Fillings, scaling and curettage for periodontitis) Tertiary treatment (Root canal Treatment, Extraction, Partial and complete dentures, Crown and Bridge, Implant). Our framework can thus be combined with key indicators of these types of variables to accurately describe core elements. (See Table 1).

Table 1: Indicators and connections for core oral health system elements

Core Elements	Example quantitative indicators	Example of qualitative indicators	Potential connections with other elements and values
Oral Health Financing	<ul style="list-style-type: none"> - Oral health expenditure as a proportion of total health care expenditure - The ratio of household out-of-pocket payments for dental health to total expenditure on health - Number of sole practitioners vs number of salaried practitioners 	<ul style="list-style-type: none"> - Business models of private and subsidized dental care practices 	Influence on health workforce mix and practice culture.

Oral health science and technologies	<ul style="list-style-type: none"> - Size of oral health technology economy 	<ul style="list-style-type: none"> - Real and perceived reasons for use and non-use of technologies 	Ability to task shift; out of pockets costs, treatments effectiveness, prevention/treatment mix
Oral Health Workforce	<ul style="list-style-type: none"> - No. of Dentists per 10000 population - Distribution of dentists by specialization, region - Annual no. of dental graduates per 100,000 - No. of auxiliary dental professionals (Oral hygienist, Oral therapist etc.) - Role played by auxiliary dental professionals in sample of practices 	<ul style="list-style-type: none"> - Relationships between oral health professionals - Workforce task mix 	Costs to service users, risk management, prevention/treatment mix, consumer preferences
Health Service Access	<ul style="list-style-type: none"> - No. and distribution of dental facilities per 10000 population - Distribution of primary/secondary/tertiary services 	<ul style="list-style-type: none"> - Real and perceived barriers to accessing oral health services 	Range of service provision, service use demographics,
Leadership and Governance		<ul style="list-style-type: none"> - Review and compare existing oral health policies - Review and compare standard treatment guidelines for essential oral health conditions - Attitudes of key influencers 	
Health Information systems	<ul style="list-style-type: none"> - Review, relate and compare National information systems for continuum of care of dental treatment 	<ul style="list-style-type: none"> - Interviews with various stakeholders involved - Published Literature 	Integrated oral health care, systems of referral, task mix, prophylactic oral health service visits

Qualitative approaches

A qualitative approach is also required to complete the mapping of core system elements, but importantly describe, trace and understand connections between core elements. Models of financing, relationships between different professions within the workforce mix, jurisdiction wide oral health strategies, may be more easily compared when described rather than quantified. The types of methods that may need to be deployed for full use of the framework might therefore entail document and historical analysis and surveying.

Interpretivist/critical approaches

Finally interpretivist approaches are likely to be required to draw out difficult-to-measure systems factors, such as the values, ideas, norms and institutions that shape the health system; and importantly

their mutually constituted form within any one system. Interpretivist approaches put a central focus on uncovering meaning (Russell et al., 2008; Shaw, 2010; Wagenaar, 2014). In the case of our framework, this will be manifested as uncovering the values, rules and expectations within the oral health system and the incentives, either designed or unintended, that steer the behaviour of service users, policy makers and service providers (Whittaker & Birch, 2012). An interpretivist approach, for example, could be used draw out these meanings from analysis of behaviour and public and private discourses. Critical approaches may also be used to examine the locations of power that shape values and norms (Rein & Schön, 1996; Sally C. Stearns, 2012).

Conclusion

Despite the increasing availability of data to compare oral health system performance, little is known about how oral health policy - including dental health care systems - influence oral health outcomes. Comparative policy analysis has the potential to shed light on those shared characteristics of oral health systems that work well; however simple comparisons of defining components with outcomes provides an inadequate picture in terms of how oral health systems actually work. We therefore suggest incorporating insights from institutional theory and complexity sciences. This includes the interdependent connections between factors such as how dental care is financed, preventative oral health policies and practice, cultural values regarding oral health and the role of the state to provide services.

Our framework therefore seeks to capture how major structural health system elements; in particular system financing, is constituent with nuanced, emergent, unintended and compounding oral health system features that impact on oral health outcomes. We welcome discussion at the International Conference on Public Policy on the challenges of bringing together multiple approaches within a comprehensive framework and the application of such a framework in comparative analysis.

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