

# International comparisons of health care systems: Conceptual and methodological developments over half a century

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This paper builds on the health care systems comparisons undertaken by Ragnar Berfenstam and his colleagues in the 1960's. It describes the original health systems model guiding that early work and a developed health systems model that we have constructed based on more recent international comparative health systems work. We provide examples to elucidate the original model and the developed model. Using a selective literature review we note changes and developments in comparative studies over the past 40 or 50 years. We conclude by suggesting the major advances in the field and continuing major challenges to doing international health systems comparisons.

In 1962, the Director General of the National Board of Health in Sweden, Arthur Engel, received a visit from two American researchers, Odin W. Anderson from the University of Chicago and Olser L. Peterson from Harvard Medical School. Odin Anderson, a sociologist known for nationwide social surveys of medical costs and voluntary health insurance in the U.S., and Osler Peterson, a pioneer in the study of health care quality through a classical study of general practitioners in North Carolina, shared an interest in what today is called health systems research. They suggested to Dr. Engel an international comparative study of the health care systems in the U.S., U.K. and Sweden aiming at elucidating the effects of

the health system on medical care use and health outcomes. The centralized and socialized National Health Service, introduced by Aneurin Bevan in the U.K. after World War II, should be contrasted with the American pluralistic and mainly private system. In this comparison, Sweden could offer a system with an intermediate position on the scale from central financing and control as in England to the American insurance based and multifaceted health care system, sometimes described as a “non-system”.

Dr. Engel contacted Ragnar Berfenstam, then newly appointed professor of Social Medicine at the Uppsala University, and asked him to take responsibility for the Swedish

part of the study. He, in turn, drew Björn Smedby into the project at the same time as Odin Anderson recruited Ronald Andersen for the American part, both to work as project directors for national health surveys in the two countries using the results as part of their doctoral theses. Other persons were also involved in our three-country project, which was the first or at least among the earliest comparisons of health care systems to be undertaken, a field that later has developed into a research field of its own called health systems research.

In this paper we build on the health care systems work of Ragnar Berfenstam and his colleagues beginning in the 1960's and the many developments and changes over the past 40 or 50 years. We will comment on, and document these changes with a limited, selective literature review based on published international comparisons. We depart from the model for analysis and understanding that we employed in our early work – “the original model” – and continue to what we describe as “the developed model” which is our attempt to describe what can be said to be valid for current international comparative health care systems work. While we will not provide detailed comparisons of international systems, we do plan to provide some examples to elucidate the original model and the developed model.

Whether we consider the early efforts at international comparisons of the 1960's or the more current work,

some challenges as well as justification for systems comparisons appear consistent (Andersen 1976, Schiötz et al. 2010). International comparisons are often used as arguments in the health policy debate. Comparisons of health systems performance in different countries may generate hypotheses and explanations that can be used for strategy development at national level. Health policy norms and goals must be grounded on reality and not only on theories and ideology. What is possible to achieve in one country is at least reality based. Comparative system studies can reveal successful elements of one system that might be applicable in another and also problems that seem generic to most systems that will be most difficult to solve everywhere (Anderson 1972).

The policy implications are perhaps more challenging from international comparisons than from corresponding national studies. No health care system can be directly transferred from one country to another, however, for historic, political and cultural reasons, but there are, of course, experiences in one country that could be thought-provoking for others and provide a useful perspective of one's own health services system.

## Early international comparisons of health care systems

Odin Anderson was an original formulator of the concept of “health care systems” and the opportunities for international comparisons of those

systems (Anderson 1963, 1967). His thinking was central to the early comparative studies of Sweden, the U.S. and the U.K. (Peterson et al. 1967, Pearson et al. 1968, Anderson 1972). We also performed two comparable social surveys in Sweden and the U.S. with the objective of revealing some of the structural, demographic, social and biological variables accounting for the striking international differences in health services use (Andersen, Smedby & Anderson 1970).

Our Swedish-American comparison was the first based on national representative samples. It should be noted, however, that at same time a WHO supported study of medical care utilization was initiated in twelve study areas representing parts of sev-

en countries (Kohn & White 1976). A cadre of other researchers in the 1960's were also at work on various aspects of international health systems comparisons. Some of these were mainly descriptions of general characteristics of health care systems (Abel-Smith 1965, Follman 1963, Hogarth 1963, Mechanic 1968; Roemer 1963). Other work began to show patterns of use and expenditures as related to other characteristics of the countries considered (Abel-Smith 1967, Andersen & Hull 1969, Bice & Kalimo 1969, Lembcke 1959, Logan 1968, NCHS 1969, White et al. 1967).

## The original model – components and measures

Figure 1 displays the health systems comparative model that guided our

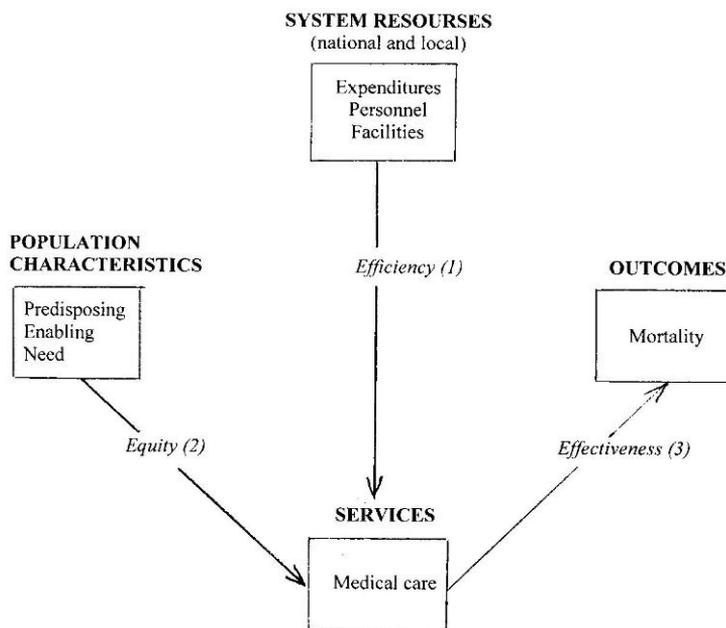


Figure 1. The original health systems model.

original work and which was based in part on a model first developed for an assessment of the U.S. system (Andersen 1968). This model attempts to capture the overall systems approach generally used in these early studies. It described four major components and their relationships: (1) the system resources; (2) the people served by the system; (3) services provided by the system; and (4) outcomes from those services.

### **1. System resources**

System resources were described at both the national level and the regional level since variation at the regional level might affect the services and outcomes for people living in different regions of a nation. Systems were described according to their total expenditures and the types, numbers and distribution of personnel providing services as well as the types, sizes and distribution of the facilities in the system.

There were obvious differences in the economic input to health services. In the early 1960's the U.K. devoted about 4 percent of GNP on health, Sweden about 5 percent and the U.S. more than 6 percent. Sweden had the lowest physician–population ratio, about 20 percent lower than the other countries. However, Sweden had the highest hospital bed–population ratio. The majority of Swedish physicians were working in hospitals and Sweden, thus, had a much stronger emphasis on hospital inpatient and outpatient care.

### **2. Population characteristics**

The population served by the system was described according to three kinds of characteristics: (a) those that predispose some persons to use more services than others even though those characteristics are not directly responsible for service use – these characteristics were measured by demographic variables (e.g., age and gender) and social variables (e.g., education, occupation and ethnicity); (b) those that enable people to obtain services as measured by variables including income, health insurance, having a regular source of care and geographic accessibility to service; and (c) those that indicate the need for service as measured in the original model by people's reports of symptoms and perceived general health status (Andersen 2008).

### **3. Use of services**

In the original health systems model, services received were mostly limited to medical care services. Included were measures of number of hospital admissions and number of bed days and, for ambulatory services, proportion of the populations with at least one physician visit during the year and number of visits, as well as use of drugs and dental services. The average number of physician visits was much lower in Sweden than in the other two countries. In spite of a lower hospital bed–population ratio in the U.S. than in Sweden the admission rate to short term hospitals was about the same that was explained by a much shorter length of stay in the U.S. The U.K. had both fewer hos-

pital beds and fewer admissions than the other countries and longer average length of stay.

#### 4. Outcomes

The original model restricted outcome measures that might be related to the health system to those associated with mortality. Variables included infant mortality, age specific mortality and life expectancy. Comparisons among the countries showed some variation with Sweden tending to have the lowest mortality rates and the U.S. the highest.

### Some linkages among the original model components

The arrows in Figure 1 suggest the linkages among the system components considered in the original model and the expected causal direction of these linkages. We realize that the direction of the arrows in Figure 1 (and in Figure 2 to follow) can "go both ways" and, empirically, establishing causality will always be a challenge. However, these directional arrows suggest the rationale for assessing and comparing health care systems' performance.

Efficiency (arrow 1) – sometimes referred to as productivity – of the

system was judged by comparing the resources used by the system to the kinds and volume of services it provided. Equity (arrow 2) – or equality – was assessed by comparing the services received by people of different social and economic characteristics.

Effectiveness (arrow 3) was considered by comparing the services the population received to its mortality rates.

#### 1. Efficiency

Average number of physician visits per person per year were much higher in the U.K. than in Sweden and the U.S. but the number of physicians per 100,000 population was much lower in the U.K. than in the U.S. and was similar to the number in Sweden. These gross comparisons of resources to volume of services were at least suggestive that the English system might be more efficient by these productivity related measures (Anderson 1972).

#### 2. Equity

We found in our social survey comparisons in 1963 that income was much more important in determining who received health services in the U.S. than in Sweden. Further, how people perceived their health (a measure of need) was more closely related to the kinds and amounts of medical care they received in Sweden than in the U.S. These findings suggested more equity in the Swedish system than in the U.S. (Andersen, Smedby & Anderson 1970).

#### 3. Effectiveness

When we compared medical care use (measured by ambulatory visits and hospital admissions) we found the United States to be highest on use but also highest on mortality rates. This, at least, calls into question the effectiveness of the U.S. system (Peterson et al. 1967). Of course, many other de-

terminants of death rates need to be taken into account in trying to draw conclusions about effectiveness of medical care systems.

## Conclusions regarding the original model

One conclusion from our very first comparisons (Peterson et al. 1967) was that there were good reasons to ask if the three countries got value for money for the resources they spent on health care. For an answer to that question more profound studies were needed, based on better and more comparable data. Our further studies were a first step on this road. Another conclusion was that the model that we used turned out to function well for analyzing and comparing health systems in different countries.

## The development of international health systems comparisons

The development of international comparative health systems research since the 1960's has moved towards more comprehensive analyses that has emphasized partly new aspects. The different components of the system are described in more detail and with additional new measures. The availability of statistical data has increased greatly. It has been emphasized that the health of the population is determined by many other factors than the efforts of the health services. Inequality in health and utilization has been increasingly observed (Fox 1989, WHO 2008). The importance of health policy has been emphasized

(Saltman 2002) and new aspects such as quality of care and patient safety have been added to the comparisons (OECD 2010a). The methods for measuring performance, results and efficiency of the systems have been developed (Hollingsworth 2008, Murray & Frenk 2000, Tandon et al. 2003). Model building has also progressed (Andersen 2008).

In 2000 WHO published its World Health Report 2000, a major effort to establish a comprehensive framework for health systems performance assessment and to develop tools to measure performance (WHO 2000). That report generated considerable media attention, not least because it ranked countries by health care performance, which evoked political protests from low ranked countries. Also in academic journals the report was criticized for poor data quality, methodological shortcomings and underlying ideology (Braveman et al. 2001, McKee 2001, Navarro 2000, Williams 2001). As a result WHO established an independent scientific peer review group to review the techniques proposed by the report. It was also recommended not to rank countries in the future.

The positive effects of the report were that it showed the difficulties in comparing health systems performance and activated health services researchers toward improved theory and methods in health care systems comparisons. Of special importance was the fact that it led to a subsequent 900 pages book bringing together in one place many of the debates and re-

ports, methodological advances, new empirical studies, and a revised WHO framework for future work (Murray & Evans 2003).

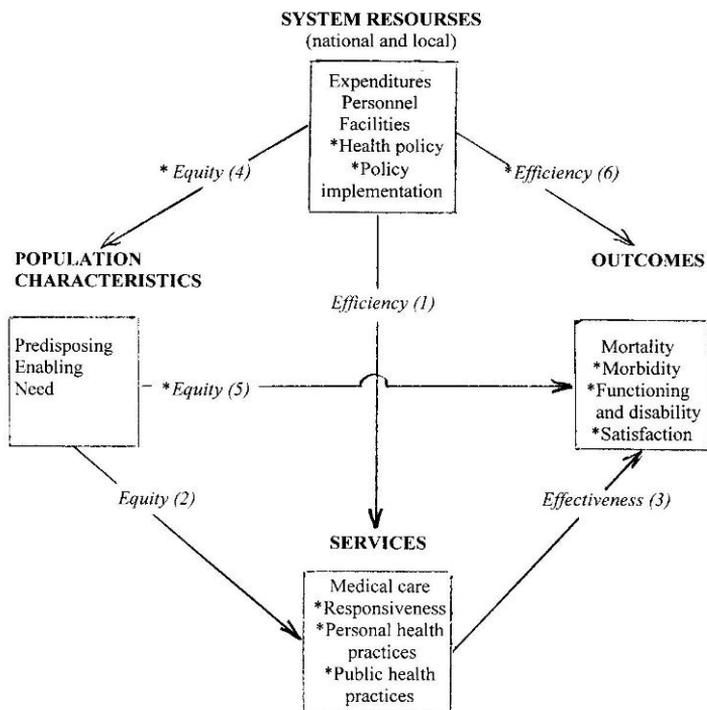
Figure 2 shows a developed model in which we have attempted to include the development of theories and methods made during the last four decades in studies of health systems. It is an extension of the model employed in our early studies (Figure 1). Our review of international comparative health systems work since then suggests that the major components (system resources, population characteristics, services and outcomes) of the original model are probably still

sufficient to adequately describe the development. What has changed and where developments have occurred are in the variables used to measure the model components and the linkages among them (as illustrated by the arrows in Figure 2).

## The developed model – components and measures

### 1. System resources

Measures of the expenditures and the financial input into the system have been refined by the many economists studying factors explaining the increasing health care costs



\* Additions emphasized in the developed model marked with asterisk

Figure 2. The developed health systems model.

(Gerdtham & Jönsson 2000, Reinhart et al. 2004). Better definitions of types of hospitals and kind of health personnel through the OECD System of Health Accounts (2000) have made available statistics on these resources more comparable (OECD 2010b, Reinhardt et al. 2002). System resources now include health policy and policy implementation. Health policy includes the laws, plans and protocols made at the national or local level concerning how the expenditures, personnel and facilities of the health care system should be used. Measures of policy implementation have been incorporated in the model because how policy is implemented or not implemented can have substantial impact on how the system influences services provided and outcomes (Magnussen et al. 2009, Saltman et al. 2007).

## 2. Population characteristics

Important advances have been made with respect to describing and measuring the predisposing socioeconomic factors and their distribution in the population. Increasing attention is paid to measures of health beliefs as a predisposing population characteristic (Salomon et al. 2003). These beliefs include population values, attitudes and knowledge about health and the health care system. Measures of population need have also been expanded to include those provided by health professionals through tests and examinations (evaluated need) as well as perceptions of patients.

## 3. Use of services

The services emphasized in the de-

veloped model have greatly expanded beyond medical care. Furthermore, services may be specified as primary health care and specialist care, day care and other ambulatory care (Schoen et al. 2009). Groupings of diagnoses adapted for international comparisons have been developed (ISHMT 2008) as well as more homogeneously defined surgical procedures. One new measure includes responsiveness of the system (Valentine et al. 2003). Responsiveness measures the quality of basic amenities of the system, its client orientation and to what extent patients' needs and expectations are met – beside the production of health. It assesses experiences patients actually have with the system but is not the same as patient satisfaction. Other measures that are part of the comprehensive effort to include all major determinants of health in a broader perspective of "health care system" are: (a) personal health practices – including diet, exercise and self care; and (b) public health practices – including environmental health programs and population based treatment and prevention activities.

## 4. Outcomes

In developing models traditional mortality measures have been refined to better reflect the effect of medical care through the concept of avoidable or amenable mortality as has been described more thoroughly by Westerling in this issue (Charlton & Welez 1986; Nolte & McKee 2003; Nolte & McKee 2008, Westerling 2010). Outcome measures also emphasize a much broader array of potential

products of health care systems than traditional measures of mortality and life expectancy. They emphasize that health care systems have responsibilities beyond quantity of life for quality of life as well. Studies include measures of functioning and disability and combined measures such as quality-adjusted life years (QALYs) and, at the population level, disability-adjusted life years (DALYs), disability-free life expectancy (DFLE) and health-adjusted life expectancy (HALE) (Mathers et al. 2003). The distribution of health within populations is seen as an increasingly important aspect (Murray & Frenk 2000). Satisfaction with services received from the health care system is also seen as an outcome measure (Blendon et al. 1990, Blendon et al. 2002).

## Some linkages among components in developed models

Additional linkages increasingly modeled in comparative health systems work include two associated with equity and one with efficiency. They have been shown as new arrows in Figure 2.

### 1. Equity

The equity linkages in both the original and developed model are based on some notion of “fair” distribution according to population characteristics. In the original model (arrow 2 in Figure 1) equity was determined by the extent to which services were distributed according to the needs of individuals in the population. The

same arrow in Figure 2 refers in a corresponding way to inequality in utilization of care in relation to income and other socioeconomic conditions (Rasmussen et al. 2004, van Doorslaer et al. 1997, 2004, Whitehead et al. 1997).

In the developed model equity is established according to two additional distributions. One relationship (arrow 4 in Figure 2) represents the extent to which the system resources are equitably distributed in the population served according to predisposing and enabling characteristics of that population, e.g., expenditures in the system are equal for individuals of different education and income levels controlling for need (Andersen 2008). Another equity relationship in the developed model (arrow 5 in Figure 2) represents increasing efforts to include in comprehensive systems analyses the relationship between population characteristics and outcomes that might be independent of the medical care services people receive (Mackenbach et al. 2008, Vågerö & Lundberg 1989, WHO 2008, Wilkinson & Pickett 2009). There is a long tradition of research linking social and economic factors to mortality, morbidity and functioning, sometimes emphasizing the importance of these factors compared to the possible influence of medical care (McKeown 1979). What is newer are the comprehensive efforts to systematically partial out the relative contributions of medical care and socioeconomic characteristics (Murray & Evans 2003).

From a health policy point of view the effects on health of the socioeconomic factors are of special interest. It means that health can be influenced by efforts that guide people's health-related living customs, e.g., education and income, which are outside the area of traditional health care (Gerdtham 2010).

## 2. Efficiency

Since the crude efforts to measure efficiency in the original model (arrow 1 in Figure 1) concerted activities have been undertaken to refine and measure health care system efficiency linking system resources to the services provided by the system (arrow 1 in Figure 2) (Tandon et al. 2003). An additional relationship of efficiency has also been increasingly employed examining the extent to which system resources might directly improve outcomes (arrow 6 in Figure 2) (Mackenbach 1991). These efforts to measure comprehensive efficiency in health care systems analyses as ratios of outcome measures to system resources employed have been aided significantly by advances in multilevel and contextual analyses (Evans et al. 2003).

## 3. Effectiveness

While there have been no new linkages in the developed health systems model for effectiveness (arrow 3 in Figure 1 and 2), the greater diversity of measures of services and outcomes compared to those in the original model allows many more ways to assess effectiveness in comparative systems research. Thus, it is possible to

compare effectiveness among health care systems using various ratios made up of outcome measures in the numerator (mortality, morbidity, functioning, satisfaction) and measures of services in the denominator (medical care, responsiveness, personal health practices, public health practices). Above all, the development is characterized by efforts to measure and compare effectiveness of the total health care systems (Smith 2010).

## Conclusions

Since our early work of the 1960's opportunities for international comparisons of health services systems have changed considerably. Improvements are based on a number of methodological developments including: (a) collection of comparable data on multiple countries by several organizations including the WHO, OECD, Eurostat, the American Commonwealth Fund and the Nordic NO-MESCO; (b) more comprehensive and sophisticated models for international comparisons of health systems; (c) more and improved measures of health care system components; (d) advanced statistical analyses, e.g., efforts at causal modeling and efforts to separate influence of health care systems from other determinants of outcomes; and (e) efforts to include health policy and politics directly in the models for international comparisons of health care systems.

Despite these advances major challenges remain to doing international comparisons. These include: (a) adequate resources for the often

expensive process of collecting international data; (b) gathering comparable data across countries; (c) developing valid and reliable measures to represent the complex components of comprehensive health care systems models; (d) determining the relative contributions of medical care and other components to the outcomes of comprehensive health care systems models; and (e) dealing with the political sensitivities of directly comparing or ranking countries on the services and outcomes of their health care systems.

The authors of the seminal work *Health Systems Performance Assessment* acknowledged at the time the book was published that their objective for improving international comparisons had been “only partially realized” (Murray & Evans 2003, p. 5). That certainly remains true today. We concur that these remain important objectives in future work of international comparisons of health care systems. We hope that future assessments of work in the field can conclude that the objectives have been at least “more completely realized”.

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