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Conclusions: The Global Diffusion of Casemix

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Abstract
The previous chapters have presented summaries of the adoption of patient classification systems (PCS) in fifteen countries around the globe, starting with the US in 1983 and continuing through to Germany in 2005. The purpose of this final chapter is to stand back from the details of each country's experience with patient classification systems and analyze patterns of convergence and divergence in these experiences. The chapters describe some similarities, but also a great deal of variation in the definition, goals, and purposes of PCS from one country to the next as well as in the processes by which these systems were adopted. These differences lead us to ask the following questions:

Why do some nations use PCS extensively, including, for example, as a payment method for health care providers, while others rely relatively little on these systems?

What accounts for variation in the difficulty and duration of adoption and implementation of PCS across nations?

What accounts for variation in the timing of adoption?Why have some nations just begun to use PCS, while others have used them for more than twenty years?

Addressing these and related questions is important because the adoption and implementation of these systems remains incomplete both within and across nations. There may well be key lessons to be learned from examining adoption patterns, and these lessons can inform decision makers who are both current and potential users of this technology.

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16 Conclusions: The global diffusion of casemix

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Introduction

The previous chapters have presented summaries of the adoption of patient classification systems (PCS) in fifteen countries around the globe, starting with the US in 1983 and continuing through to Germany in 2005. The purpose of this final chapter is to stand back from the details of each country's experience with patient classification systems and analyze patterns of convergence and divergence in these experiences. The chapters describe some similarities, but also a great deal of variation in the definition, goals, and purposes of PCS from one country to the next as well as in the processes by which these systems were adopted. These differences lead us to ask the following questions:

- Why do some nations use PCS extensively, including, for example, as a payment method for health care providers, while others rely relatively little on these systems?
- What accounts for variation in the difficulty and duration of adoption and implementation of PCS across nations?
- What accounts for variation in the timing of adoption? Why have some nations just begun to use PCS, while others have used them for more than twenty years?

Addressing these and related questions is important because the adoption and implementation of these systems remains incomplete both within and across nations. There may well be key lessons to be learned from examining adoption patterns, and these lessons can inform decision makers who are both current and potential users of this technology.

Similarly, health care systems around the world are now experimenting, or soon will be, with many new management technologies, aiming to

improve system effectiveness and efficiency. Comparing the experiences of various countries with PCS may yield knowledge about what factors promote or inhibit the adoption of new management technologies in the health sector. Finally, we believe that understanding the adoption of a new management technology in a complex and turbulent setting, such as the health sector, can serve as a basis for understanding of the diffusion of management innovations more generally.

Of course, a large amount of literature on the adoption and diffusion of management innovations (e.g. Rogers 2003; Guler, Guillen and MacPherson 2002) already exists as does an earlier book on the diffusion of Diagnostic Related Groups (DRGs), the first PCS, from the US to Western Europe (Kimberly and de Pouvourville 1993). The account we develop below draws on this literature. We consider sociological, economic, political, and social–psychological factors that may account for the variation we observe in PCS adoption.

The chapter is divided into four sections. First, we discuss PCS as an innovation: what are its distinctive features and how might these affect its migration around the world? Second, we examine the variation in the adoption of PCS across nations (see Table 16.1 below), focusing on key dimensions of adoption, such as timing (early vs. late adopters); extent of PCS use (e.g. is PCS used for outpatient or only inpatient services?); difficulty and duration of adoption process (how long did adoption take?); differences in the uses of the systems; and differences in the origin of national PCS (primarily home-grown vs. primarily adopted from external sources). Third, we develop an analytic framework to account for PCS diffusion drawing on a range of relevant literature. And finally, the chapter concludes with a discussion of implications for policy makers, managers, and researchers in the health sector and other sectors as well.

Characteristics of PCS as an innovation

The social aspects of PCS

We begin by arguing that PCS, like all innovations, has both social and technical aspects (Callon 1987 and Latour 1987). Further, we argue that PCS is primarily a managerial, rather than a purely technical innovation and, as such, its social characteristics matter more for its use than its technical

Table 16.1 Variation in patient classification system adoption

Country	Year of adoption	Origin of system	Goals and purpose of the system	Difficulty and duration of adoption and implementation	Extent of system use
Australia	Exposure since 1981; 1993	Based on US model and adapted to Australian clinical practice data	Allocation of public hospital budgets; cost efficiency	*Easy* 5 months in State of Victoria; 2-year period staged implementation; casemix community	Inpatient hospital care, outpatient and emergency care
Belgium	1990 Implementation of ICD–9–CM coding 1995 adopted APR DRG	US model translated into French and Flemish	Financial comparisons; control of length of stay	*Difficult* Opposition from physicians	Inpatient hospital care; experiments/research projects with ER, nursing, psychiatric, ICU, geriatrics, rehabilitation and dependency services
Canada	1983 ICD–9–CM codes Late 1980s Canadian-specific version developed 1993 Day Procedure Groupings	Adjustment of US DRG system	Utilization management and financial, LOS comparisons; financial comparability of hospitals	*Easy* No delays or strong opposition	Inpatient, day surgery, ER, ambulatory care, home care, psychiatric care, functional abilities
Denmark	Late 1980s–early 1990s Pilot studies 1994 White Paper using NORD DRGs 2002 DkDRG implemented	Based on NORD DRGs, Danish-specific version developed	Productivity analysis of hospitals; financing; consumer free choice across country	*Moderate* System not used nationwide	All hospital activity

France	1982–1989 US DRG research projects 1986 French DRG project–French grouper based on HCFA 1985 DRG system 1994 Implemented 1996 Full data 1998 Productivity report available 1997–1998 Discharge data recorded	US Yale systems, with adaptation and refinements	Financing hospitals (recent goal)	*Difficult* Conflicting policy, different payment rules for for-profit and non-profit providers	Acute hospital care (medical, surgical and obstetrics)
Germany	2005 DRGs introduced in phases, beginning in 2002; much preparation work completed earlier	Australian DRG system; Australian procedure code mapped to German code	Increase hospital efficiency; contain health spending; reduce length of stay	*Moderate* Change to DRGs was phased in; idea considered much earlier than 2002; stakeholders have varying views	All hospital activity
Hungary	1993 Adopted US DRG system (USAID project) 1999 Hungarian-specific system 2005 Adds reimbursement for chemotherapy and minor surgery	ICD–9 coding system	Financing of hospitals excluding investment costs	*Easy–Moderate* International literature scan, debate and engagement of stakeholders	Acute hospital care, ICF for long-term chronic care, same-day treatment, ER care, extended to chronic hospital care
Italy	1994 Capitation Act and related funding – Italian version of ICD–9–CM codes	Based on US model	Financial system to control growth of hospital costs, increase accountability for production	*Difficult* 1994–2002 choppy uptake, differences among regions in	Inpatient hospital activity; extends to nursing homes

Table 16.1 (*cont.*)

Country	Year of adoption	Origin of system	Goals and purpose of the system	Difficulty and duration of adoption and implementation	Extent of system use
				diffusion and use / regional autonomy	
Japan	2001 International scan and study for a casemix system 2003 Implemented for payment using ICD–10 codes	Influenced by French and Australian systems for regional health planning and Belgium and Britain for incremental development	Process oriented to reflect medical practice; hospital profiling and improved efficiency	*Moderate* Incremental rollout; strong IT system development, still opposition from physicians and hospitals	Acute hospital care
Portugal	1984 Feasibility study to adapt US DRGs (USAID project with Yale) 1987 50% public hospitals 1990 90% public hospitals	US DRG system Maryland cost-weight system Input from Irish ICD–9 codes for ambulatory surgery	Rationalization of resource allocation for inpatient care production; hospital budgets; hospital comparisons; national tariffs for inpatient and ambulatory surgery	*Easy* But, at hospital level, limited analytic use	Acute hospital care including ambulatory surgery in public (NHS) hospitals
Singapore	1997 began assessing international experience 1999 Casemix introduced in public hospitals	Australian National DRG V. 3.1	Financing tool, expanded to cost efficiency and effectiveness	*Easy* Engagement of professionals, IT support and pilot coding training May 1998; full implementation in October 1998	Public hospitals only; covers acute care, utilization management, benchmarking for costs of inpatient stay

Sweden	Mid-1980s Benchmarking and cost analysis 1991 Payment system for acute inpatient care in 3 counties	NORD DRG (Swedish version). Based on HCFA-DRGs, 1995 version	Increase hospital productivity; support policy goal of patient free choice; funds follow the patient	*Moderate* 50% of all inpatient care is reimbursed under the NORD DRG system; administered by counties, 2 do not use DRG system; tiers of use, varies by location, size, type of service, analysis tools	Acute inpatient hospital care, excluding psychiatry; 2005 version adds mental health and day surgery services
Switzerland	1989–1990 Study on the applicability of DRGs to Swiss health care system 1989 Association formed to promote 1997 APDRG (a private association) formed to promote DRG use 2002 Funding of services in 2 cantons 2004 Swiss DRG group formed to implement national casemix based funding	Based on ICD–10 codes Software developed by 3M HIS	Contain costs by moving from *per diem* to prospective payment; benchmarking and funding	*Difficult* Federalist system, not supported by government; APDRG is a private group responsible for developing and implementing casemix and supporting IT systems; variable uptake among the Cantons	Acute somatic inpatient care; attempts failed to extend to outpatient treatment; exploring feasibility for rehabilitation services

Table 16.1 (*cont.*)

Country	Year of adoption	Origin of system	Goals and purpose of the system	Difficulty and duration of adoption and implementation	Extent of system use
United Kingdom	1981–late 1980s National Casemix Office 1991 English version of DRGs created 1991–1997 Health Care Resource Groups created HBG-Healthcare Budget Group, for primary diagnoses 2003 Payment by Results	Initially based on US DRG system, refined for UK practice situation	Increase transparency, reward efficiency, support patient choice for service location and focus on quality	1 April 2005 implementing Payment by Results, a prospective, casemix payment system. 60% of total NHS budget (most ambitious in terms of scope)	Acute inpatient, outpatient, emergency, adult critical care HRGs for pediatrics, chronic illness, specialized services and cancer
United States	1967 Yale University research project based on ICD codes of 10,000 diagnoses then organized into 383 cases 1980–1982 72 hospitals in New Jersey came under DRG payment 1983 Congressional law using DRGs as payment for Medicare beneficiaries	Length of Stay as a standard measure; DRGs identified as the 'product of the hospital'	Forecast hospital costs Government health care budget control tool	*Moderate* 1980–1982 New Jersey hospitals 1983–1994 diffused to every region in the US 1991–2000 states using DRG-based payment systems	Inpatient care for Medicare beneficiaries (government sponsored health insurance for individuals over 65 years or disabled) 1992 prospective payment system 1997 extended to outpatient, skilled nursing, long-term care, home care and rehabilitation Current APR-DRGs development of refined DRGs to capture severity and risk of mortality

features. Specifically, the use of any type of PCS requires key actors in a health care system, especially hospital managers and clinicians, to change their behavior. Perhaps more importantly, the use of a PCS requires changes in interaction *between* actors both inside organizations (between hospital managers and physicians) and across organizational boundaries (public authorities, insurers, providers, professional organizations, and others).

Even for technical innovations, such as a CAT scanner, social factors matter a great deal (Barley 1986). Clearly, technical characteristics are the main drivers for technical innovation at the beginning of their diffusion, but if innovations do not fit with the social context in which they are supposed to diffuse, or if innovators are not able to convince social actors that the innovation may serve their interests, diffusion is not likely to occur.

Managerial innovations are thus relatively sensitive to the social context into which they are introduced, especially the power structure among actors. This is all the more true for PCS, which were introduced in health care systems with the aim of changing behavior. We discuss in detail below how social contexts seem to influence PCS diffusion.

Technical features of PCS

The main technical components of PCS consist of statistical methods and analyses that produce classification systems. Several distinctive features of PCS as a technology seem to promote its diffusion.

First, the relevance of DRGs for particular countries can be assessed empirically. Researchers and clinicians in any nation that considered using DRGs could gather data to determine the extent to which the classifications fit their circumstances. Such assessments could be used to counter critics who claimed that their patients and medical care differed from those of the US. Similarly, the ability to assess the fit of DRGs to local conditions empirically could counter a common and natural reaction to a new technology: ''if it wasn't made here, it can't work here.''

Empirical support for this argument seems very strong. Several nations (Australia, Hungary, Italy, Portugal, the UK, Canada) experimented with the US-developed DRGs and made adaptations to them as a result. Sweden, Denmark, and Norway worked together to develop a PCS for their region.

Another important feature of PCS to consider is that both the original technology for producing DRGs, including the computer-based ''grouper,'' and revisions to the original, were available at reasonably low cost (Kimberly 1993). Of course, innovations that require less initial investment, and relatively little additional cost to revise, are more likely to be adopted.

Moreover, the developers provided consultation and technical assistance to potential users. Kimberly (1993) noted that Fetter and Thompson created a group of researchers and analysts at Yale University to provide a variety of services under contract. Under these contracts, potential users could receive help to assess: the feasibility of assigning DRG codes to patient data; hospital readiness to use such codes; and using the DRG-based cost and budgeting model for hospital payment. As one would expect, countries that worked closely with the Yale group were more likely to adopt the DRG approach (Norway, Portugal, France, Sweden, and England).

The ability to assess the fit of DRGs empirically is closely related to another of the system's key characteristics: DRGs are flexible and, provided one can collect and analyze the necessary data, they are easy to modify. Indeed, Fetter and Thompson (1980; 1991) developed the US-DRGs in 1984 and revised them in 1987. The fact that DRGs are relatively easy to modify also contributes to their acceptance, because advocates can use even minor changes strategically to "demonstrate" that a system has local relevance (e.g. as was the case in Japan).

More generally, the ability to adapt and refine DRGs reminds us that, in some important respects, they are as much an idea or set of principles as they are a technology, at least in the traditional sense of the term. They are also malleable enough to serve the interests of a variety of potential users. Indeed, the variation in their use described in the various country chapters makes this point quite clear.

As Kimberly (1993) observed, analysis of the adoption and diffusion of DRGs reveals the limitations of classic diffusion models. These models assume that innovations are relatively static in their form and substance and similar in their use from place to place (e.g. a CAT scanner). In the case of PCS, however, the innovation itself has changed and continues to change over time. The US, for example, continues to witness revisions to its system twenty years after its initial adoption.

Moreover, the use of PCS varies greatly from one nation to another. In particular, PCS has been used for health care planning, hospital management, utilization review, and payment. For example, Canada uses its PCS extensively for a wide variety of patient services (inpatient, acute care, ambulatory, chronic care), to pay providers, and monitor their use of resources. In contrast, in other nations, PCS are used in some locations (e.g. in one state) but not nationwide and they are used only to monitor the use of resources in hospitals. This variability suggests that a hallmark of PCS as a technology is that it can both be refined and used for a variety of purposes. In sum, the flexibility of the tool facilitates its adoption, but also its variability of use.

Finally, as we saw in Chapter 1, DRGs had been adopted as part of the prospective payment system in the US. This fact created interest in other countries and provided evidence that a new approach to controlling the cost of health care was feasible. Combined with the ability to adapt DRGs to local circumstances, their empirical foundation, their relatively low cost, and the availability of technical support for their use, the experience in the US was the principal driver of their spread to other countries.

Characterizing the migration of PCS

To understand why PCS have diffused to many nations, it is useful to characterize the variation in PCS and the processes that mark their adoption both across and within nations. Specifically, we examine a nation's adoption and implementation of PCS along two dimensions: the extent to which a PCS is used for: (1) multiple purposes, including as a payment mechanism and tool for monitoring resource use; and (2) multiple categories of patients and services (acute care, chronic care, ambulatory care).

Variation in PCS purposes and use for patients

As noted above, PCS vary importantly in their goals and purposes. The most ambitious goals are to use a PCS for both planning and paying an entire nationwide system of health care providers. Examples of countries with these goals are the US, Hungary, and Portugal; the UK, France, and Germany intend to join this group. In contrast, other nations have not made efforts to implement their PCS nationally (i.e. PCS use is at a local, regional, and hospital level). Examples of these countries include Australia and Sweden. Further, some nations use PCS for planning and cost containment, but not for paying hospitals or other providers; these nations include Singapore and Belgium.

Nations also vary in the extent to which they use classification systems for patients in various segments of their health care systems. All nations that we examined use their systems to classify patients in acute care hospitals, and almost all nations use PCS for patients in both public and private sector hospitals (exceptions include Portugal and Singapore whose PCS covers only public hospitals). Fewer nations, but still the majority, have extended PCS use to patients in non-acute care settings, including ambulatory care, emergency care, chronic and nursing home care, and psychiatric care.

Duration and difficulty of PCS adoption

Even among nations that now use PCS extensively, there has been variation in the duration and difficulty of PCS adoption and implementation. At one end of this continuum are nations such as Hungary, Singapore, Portugal, Australia, and Japan, where adoption and implementation proceeded relatively smoothly, though in some instances, such as Australia, it is important to note that PCS is not used nationwide to fund the provision of services. At the other end are nations where implementation took years to achieve (e.g. the US, France). Even some relatively small countries, as measured by GDP or population size, such as Belgium and Switzerland, have experienced long trial periods with PCS.

Timing of adoption

The earliest widespread use of PCS occurred, of course, in the US, while the most recent widespread use is in the largest economies of Europe: Germany, France, and the UK. Other early adopters include Belgium, Canada, Portugal, Australia, Denmark, and Sweden, though, as noted above, the use of PCS in the latter three countries remains limited.

Indeed, rather than consider the latter countries early "adopters" of PCS, it might be more accurate and useful to note that they were among the first to consider the use of PCS and analyzed and experimented with different versions of them. Among this group are Denmark, France, Sweden, Switzerland, and the UK (the latter, for example, established a National Casemix Office as early as 1981). In other words, we can identify this group both as early experimenters with the ideas of PCS, but also as late implementers of fully developed patient classification systems: for many years, these nations used PCS on a limited basis in terms of their purpose, geographic coverage, and the types of patients that they classified. We conclude that the fact that some countries (e.g. Switzerland, Australia, Sweden, Italy) have been involved in extensive trial periods both highlights the flexibility of PCS, and helps to explain their attractiveness.

Accounting for variation in the adoption of PCS

Overview

Most analyses of the adoption and diffusion of innovations begin with the now-classic S-curve model (Rogers 2003). In its most basic form, the

S-curve model has two major components: an early stage in which initial users adopt the new product, service, or technique, and a later stage in which potential adopters become converts to an innovation. The form of the S-curve, with time on one axis and the number of adopters on the other, reflects the fact that typically, relatively few members of a social system adopt an innovation when it is first introduced, and that over time, the rate of adoption generally increases until the number of potential adopters decreases and the rate slows down again (Guler *et al.* 2002). The point at which an innovation moves from initial and early adoption to reach larger numbers of potential adopters marks the inflection point in an S-curve. Early adopters are seen as innovators, while later adopters are seen as imitators, influenced by the behavior of their early-adopting counterparts.

Dynamics of the S-curve of diffusion

In the past two decades, researchers using institutional theory have elaborated on the innovation and imitation phases of the S-curve (Scott 2001). Institutional theorists argue that social systems and organizations typically resist changes in their practices, in part because the value of these practices is taken for granted. At the same time, social systems and organizations also resist change for political and material reasons: actors who gain power and resources from status-quo arrangements are reluctant to give them up.

This means that organizational practices that are in place and that are consistent with widely-held views are highly resistant to change. Such practices are, to a large extent, institutionalized. In turn, proposed innovations, such as PCS, might not only disrupt current practices, they are often viewed as inappropriate, illegitimate, and even "unthinkable."

Nonetheless, practical needs drive organizations to seek innovations (Greve 2003). When their current practices prove to be inadequate for the work and resources at hand, pioneering organizations search for and adopt (or invent) new practices (Leblebici *et al.* 1991). Further, there is often a group of later adopters of innovations who, though they initially resist change in practices, face external social pressure to use practices that other organizations in their field are increasingly using (Abrahamson 1991).

In other words, once some organizations adopt new practices, other organizations slowly but surely come to view these innovations as necessary. Indeed, social pressure to adopt new practices often increases with time, and such pressure may result in innovations even in organizations that do not

need them for technical reasons (Fligstein 1991). These social pressures drive the imitation phase of the diffusion of innovations. In addition, pioneers may derive real economic benefits from the new practices they have adopted, benefits that become visible externally and that influence others to adopt as well.

In sum, these arguments suggest that nations' use of PCS/DRG systems was driven, on the one hand, by local concerns about managing resources and health care providers and, on the other hand, by social pressures that were both internal and external to health care systems. We examine these issues in more depth below.

Rogers' model

In addition to analysing PCS diffusion from an institutional perspective, we also draw on the work of Rogers (2003). Based on extensive reviews and analyses of the innovation literature, Rogers developed a simple, yet powerful, framework, which argues that both the innovation stage and imitation stage of the S-curve pattern are driven by characteristics of the innovation itself (e.g. can the innovation be modified to fit local circumstances?), characteristics of the potential adopter or adopting system (e.g. how strong is the technical infrastructure related to the innovation?), and interaction between the two.

Building on our discussion above about important technical and social aspects of PCS as an innovation, we organize the discussion below around two sets of key factors: (1) characteristics of the adopting system (i.e. the national context for PCS adoption and use); (2) interaction between adopting systems and the innovation that is driven by individuals who acted as carriers of ideas and champions for PCS, networks of PCS users, and other key constituents.

National context: The role of economic, political, social and technical forces

Context may matter a great deal in the extent to which innovations, ranging from new consumer goods (e.g. Tellis and Stremersch 2003), to management practices (e.g. Guler, Guillen and MacPherson 2002), and market-oriented political reforms (Henisz, Zelner and Guillen 2005), are adopted and implemented. We argue that key economic, political, and social factors matter specifically in the case of PCS.

Economic and performance pressures

At base, PCS are concerned with accounting for resource allocation and consumption in the health sector. In nations that are not so concerned with the performance of their health systems, including its costs, or the value that such systems are delivering relative to costs, one would expect less emphasis on accounting for resource allocation, cost control, or planning for expenditures, and, hence, less interest in using PCS.

Of course, one could argue that most nations in the world have been highly concerned with controlling costs in the health sector and, as a result, have some motivation to at least consider the use of PCS to achieve fiscal control. Thus, a key question is the extent to which decision makers perceive PCS as useful for cost containment: the more this is the case, the more likely it is that a nation will attempt to implement PCS.

Nonetheless, though most nations are concerned with the performance of their health care systems, we argue that fiscal concerns vary from one nation to another, both in their intensity and timing. England provides an example of this argument, as until quite recently, England spent less on health care than almost any other developed Western nation. In this context, it was difficult to make the case that PCS was an important managerial tool to help control costs, at least on a relative basis. As a result, it is only now that England's PCS will be used in combination with prospective payment as a means to control the use of resources.

Similarly, we expect less pressure to adopt PCS in countries that are experiencing economic stability, growth, or periods of economic well-being. Further, in nations that do adopt PCS in such economic periods, we expect the use of such systems to be relatively limited and driven by social, as opposed to economic, pressures. Sweden and Denmark fit this argument, and though they experimented relatively early with PCS, their implementation has lagged behind other nations.

In contrast, we expect nations that are experiencing a general economic downturn or an increase in health care expenditure, particularly increases that affect general business performance, to be more likely to adopt PCS, and to do so more quickly and extensively. The early development and use of PCS in the US is a good example. The implementation of the DRG system was driven by rising health care costs, which affected employers who pay for employees' health insurance. Employers had to pass on these rising costs to consumers in the form of the prices they charged for goods and services (e.g. the US auto industry) and, in the early 1980s,

the US experienced a financial recession that fuelled the motivation for DRGs.

It is important to note, however, that, in practice, PCS that involve a prospective payment scheme (such as in the US) may improve hospitals' efficiency, but PCS, even combined with prospective payments, do not seem to contain costs, unless other changes are made to limit the volume of services provided (e.g. as in Italy, Hungary, and Denmark). In other words, under PCS with prospective payment, hospitals have a direct incentive to increase the volume of services they provide, and unless the productivity gains due to PCS balance volume increases, total national expenditure increases.

Technical context

Kimberly (1993) noted, and we agree, that PCS require considerable investment in information systems, computing capacity and technical expertise. More generally, a relatively complex managerial innovation, such as PCS, is more likely to be embraced to the extent that there are other managerial systems in place to support it. Perhaps the most important of such systems are computerized – electronic information systems. It appears that the relatively smooth implementation of PCS in Hungary, Japan, and Singapore occurred in part due to the strength of related technical systems, some of which had been in development for many years before PCS was considered. In Hungary, for example, the Ministry of Health had been gathering and evaluating data from samples of inpatient care cases since 1974.

Political agendas

An important aspect of political context concerns national political agendas, as expressed by ruling governments and political parties. The role of political agendas, especially agendas for health care, is obvious, but nonetheless it is important to consider them (Kingdon 1984). When improving the performance of the health system has been a political priority, the adoption and implementation of PCS have moved more quickly and smoothly. Examples include Portugal, whose PCS was implemented fairly easily between 1987 and 1990, and Singapore, which implemented its system between 1997 and 1998.

The structure of national political and health care systems

We focus here on the structure of national political and health care systems, more specifically, on the structure of decision making that governs these

systems. To what extent are decisions that affect the "rules of the game," and the allocation of resources, centralized vs. decentralized, and how many different actors are involved in such decisions (Meyer, Scott and Strang 1987)?

In decentralized and fragmented political systems, many actors have the potential to influence critical decisions, making the resource allocation process contentious and hence both slower and potentially less uniform across political sub-units. In centralized and more unitary systems, the resource allocation process can unfold more quickly; once a decision is made to move ahead in a particular domain, resources can be allocated relatively quickly and uniformly across the entire system. The same arguments are true for the structure of decision making in a nation's health care system. More fragmented health care systems have both a greater number of, and more varied, actors whose interests need to be taken into account (e.g. public and private payers and service providers).

It is important to note that centralization in political systems does not always imply centralization and lack of fragmentation in health care systems. Though it has a relatively centralized political system, France, for example, has a relatively fragmented health care system. The system includes a mix of both public and private health care providers, and sickness funds that are independent from the national state (i.e. a Bismarck system). In contrast, England, which like France has a centralized political system, also has a centralized, relatively unitary health care system (i.e. a Beveridge system). The English health care system is characterized by relatively hierarchical decision making, with services that are paid for primarily by national tax revenues and provided mainly by a large public bureaucracy, the National Health Service.

In general, we argue that nations with more fragmented political and health care systems will have more difficulty in adopting PCS, simply because such systems have more actors and these actors are more heterogeneous. Further, not only will fragmentation slow the process of PCS diffusion, but it should also be related to more variation in the uses for PCS because different actors are more likely to see different uses for PCS.

In Italy, Switzerland, Denmark, Germany, and Sweden, nations with a federalist form of government and relatively decentralized and fragmented decision making, the structure of government decision making slowed the adoption of PCS (Ring, Bigley, Khanna and D'Aunno 2005). Germany, for example, has strong political decentralization, and though it has a universal health insurance system, it also has many sickness (insurance) funds. There is also a mix of public and private service providers, with weak integration

between hospital care and primary care. This combination of characteristics creates a relatively fragmented system for both politics and health care and, as Kimberly and de Pouvourville (1993) argued, the PCS concept failed to diffuse in Germany because there were too many people to convince to promote its diffusion. It was 2005 before the German federal government was able to impose a policy for PCS and health care cost control at a national level.

Similarly, though Switzerland is a smaller country, it mirrors Germany's structure in politics and health care, and although there was early experimentation with PCS, it diffused only in a few areas (Geneva and Lausanne) where hospital managers wanted to use it for utilization review. In contrast, we observe that in Singapore, Portugal, and Japan, countries that have more unitary and centralized systems, once a decision was made to adopt PCS, the result was a national roll-out in a relatively short period of time.

It is important to note, however, that decentralization in national governance may mean strong centralization at regional levels (provinces in Canada are a good example). Thus, there could be rapid diffusion of PCS *within* local centralized governments that support the concept of PCS. In fact, national political agendas for health care are often so overcrowded with reforms (e.g. concerning public health and primary care) that it is quite difficult to maintain an emphasis on one reform versus another. This problem is particularly evident in national governments that are centralized, whereas at the regional level, governments may have more capacity to set agendas that focus on PCS.

Finally, the size of a nation and its health care system may be another structural characteristic that explains differences in the speed of PCS diffusion. To the extent that other contextual factors (i.e. performance pressures; political agendas; centralized decision making) are supportive, PCS diffusion may be more likely to occur more rapidly in smaller countries (e.g. Portugal, Singapore, and Hungary).

Context and innovation interact: The roles of social actors

Though national context and characteristics of the initial innovation (the US-DRG system) influenced PCS adoption and use, individuals and social networks have also played, and continue to play, a central role. As we look across the experience of the fifteen countries included here, we see three sets of actors as being particularly influential: (1) individuals who were carriers

of, and champions for, the innovation; (2) networks of users, including those who developed a PCS research industry; and (3) major stakeholders at the local level in health care systems, especially physicians and regional and local hospital managers.

The roles of carriers and champions

We distinguish here between individuals who play two types of roles: those who carry to their nations the ideas, concepts and principles of patient classification analysis (often researchers linked to universities or public agencies) versus individuals who are champions for change and promote the use of PCS. Carriers of ideas are similar to the so-called "boundary spanners" or "cosmopolitans" identified in prior research on the diffusion of innovation (Kimberly 1981): these individuals are likely to travel across national boundaries and are connected via social networks and communication channels (e.g. professional journals) to varied sources of information.

Champions, on the other hand, are individuals who, for a variety of reasons, are deeply committed to an innovation and who are willing to invest significant amounts of their time and resources to implement it. Their principal challenge is resistance to change, a universal phenomenon found in all social systems. Some individuals such as George Palmer in Australia, Jean de Kervasdoué in France, and Jean Blanpain in Belgium played the roles of both carrier and champion.

Both carriers and champions are important. Carriers focus more on communicating about, and studying various aspects of, PCS; champions are needed because they focus more on action than ideas. To illustrate, consider the case of Switzerland. Here we see that there was an active group of carriers who conducted studies of patient classification systems in the mid to late 1980s. But the absence of real champions for change in the political system has undoubtedly contributed to Switzerland's relatively slow adoption of PCS.

The importance of individuals, or small groups of individuals, playing both these roles should be obvious from the preceding chapters but, at the same time, they should not be overlooked. Some of these carriers and champions were linked directly to Fetter, Thompson, and the Yale group. For example, George Palmer, whom we consider both a carrier and champion, played a pivotal role in DRG development in Australia, and from 1970 to 1987 he periodically travelled to the US and worked with the Yale group. Similarly, Jean de Kervasdoué came into contact with the Yale group in the late 1970s and subsequently used his position as Directeur des

Hopitaux in the Ministry of Health in France to motivate experimentation with a system based on DRGs.

Another observation is that champions who were not closely linked to decision makers within health care systems were not as effective as champions who were somehow part of those systems. In other words, implementation of PCS was facilitated by champions who occupied positions of authority in their health care systems that gave them the power to allocate critical resources. Though decision-making authority is never absolute, individuals who are both champions and decision makers face fewer obstacles to implementing PCS than others. The case of Singapore illustrates this point: the Ministry of Health was both a carrier and a champion, and held decision-making power, and PCS was implemented relatively quickly. In sum, carriers and champions heavily define the path by which an innovation enters a social system. Variation in who plays these roles, and how well they play them, affects PCS adoption and implementation.

Within institutional theory, an important new literature has emerged on carriers and champions for change (e.g. Scott *et al.* 2000). This literature describes and analyzes individuals who lead change in systems that are highly institutionalized, such as national health systems (Battilana 2006). Battilana and her colleagues reviewed forty recent papers that examined the role of what they term "institutional entrepreneurs" (ie. individuals who attempt to change organizations and practices that are so widely accepted that they are taken for granted (see also Fligstein 1997).

One conclusion from this review, and from Battilana's (2006) study of leadership and change in England's NHS, is that institutional entrepreneurs are not necessarily "insiders" who hold formal positions of authority. Rather, challenges to the status quo often come from those individuals and organizations that are outsiders; they are relatively less powerful and occupy positions at the periphery of organizational networks (Leblebici *et al.* 1991).

How well does this conclusion fit our arguments and the data for PCS carriers and champions? Evidence from the chapters here suggests a good fit insofar as, in many cases, the individuals who brought the ideas, concepts and principles of PCS to their nations (carriers) often were not insiders in government or national health systems, but rather researchers and academics. As outsiders, they had the advantage of being able to see the strengths of PCS. At the same time, however, as outsiders they did not necessarily have the authority or power to be effective champions with the ability to implement changes such as PCS. This may help to explain why many nations have experimented with PCS, but not implemented them as fully as possible.

Networks of users

Recent research indicates that networks, such as those we discuss here, have promoted the worldwide diffusion of a wide range of innovations, including economic policies (Henisz, Zelner and Guillen 2005), organizational practices (Guler, Guillen and MacPherson 2002), and educational systems (Schofer and Meyer 2005). We first discuss the development of PCS user networks and then examine their effects on PCS diffusion.

In his analysis of the migration of DRGs to Western Europe, Kimberly (1993) identified a series of programs, conferences, and events that developed networks of PCS users. These initiatives ranged from an annual one-week educational program begun at Yale in 1978 to promote the use of DRGs, to the formation of an association of Patient Classification Systems in Europe in 1985. In addition, Kimberly (1993) noted that a modest, though significant, DRG-focused research industry has developed whose purpose is to evaluate various aspects of DRG use and implementation. As a result, research on DRGs has produced a set of individuals with particular skills and interests in the analysis of PCS.

The networks that grew from these various initiatives and research programs now span national boundaries and involve multiple stakeholders. In fact, the Association of Patient Classification Systems recently held its 22nd annual conference, with 270 individuals attending from thirty-four countries.

These networks appear to have had several beneficial effects on the adoption of PCS. One is that they facilitate information-sharing about technical issues and problems that PCS pose. Perhaps more important than the technical information within the networks, is the sense of community that they generate. In other words, these networks create both social structures (such as the PCS Association) and a shared world view. From this cohesion comes the legitimacy and support that are needed to promote PCS in the face of obstacles to their adoption and implementation. Finally, as these networks have increased in size and prominence, they also have created a sense of momentum, suggesting that PCS are the way of the future and a necessary management tool for modern health care systems.

Major stakeholders

In addition to the role of individuals who influence or make policy decisions within health care systems, three other groups of actors must be

considered: physicians, hospital managers, and to some, though a lesser extent, regional health system managers, who are particularly important in nations that have decentralized public health care systems (such as Italy, Sweden, and Denmark). Of these actors, physicians are typically the most powerful and they hold particular power when it comes to implementing PCS. Though they may not be able to resist policy makers' plans to adopt a PCS, physicians can make it very difficult to implement one smoothly.

In Belgium, for example, physicians expressed strong opposition to PCS on the basis of concerns about losing their autonomy and practising medicine with a focus on money rather than quality of care. Motivated by these concerns, physicians were apparently able to slow down the implementation of the system until recently. This is despite the fact that Fetter spent a sabbatical year in Belgium in the late 1970s and the Ministry of Health supported relatively extensive research on PCS. In general, the evidence supports the view that the more involved physicians are in the development of a PCS from its inception, the more likely they are to accept its use. Japan and Hungary provide good examples of this.

Further, it may be the case that involving physicians adequately means that a PCS must be developed or at least modified to fit, or at least appear to fit, local circumstances. A clear trade-off is that when local physicians are involved in developing or modifying a system, it takes longer to develop or modify. But there also is likely to be a significant decrease in the time that it takes for the system to be used.

Of course, it is inaccurate to consider that PCS pose only threats to physicians' interests and that they will universally see them as such. The Hungarian experience seems to indicate that physicians, like other stakeholders in Hungary, viewed a patient classification system as a better way to allocate scarce resources and, as a result, they supported, and actively participated in PCS development and implementation.

Though physicians typically hold more power than hospital and regional health system managers, these latter two groups matter as well. Their support for PCS seems to be mixed. On the one hand, PCS increases managers' uncertainty in the short run. This is especially true to the extent that hospital payment has been linked to a PCS (as in the US). In these cases, managers have been uncertain about how PCS would affect hospital financial performance and, importantly, their relationships with physicians. To what extent would the implementation of a PCS drive a wedge between hospital managers and physicians?

Further, PCS clearly puts more responsibility on managers to be accountable for hospital performance. In the US, for example, hospital managers did not initially embrace DRGs and their introduction compelled managers to significantly improve their skills in cost accounting, and financial analysis and planning (Gapenski 1999). Duckett's chapter on Australia also emphasizes the changes in managers' skills that were necessary with the introduction of DRGs.

On the other hand, PCS data give local and regional managers a tool to improve planning and monitor resource use. Perhaps more importantly, PCS data also give managers a foundation for efforts to change physician behavior. Physicians often respond well to data-driven arguments about the need for changes to improve their performance. PCS data provide managers with information that they had previously lacked. Thus, despite managers' short-term concerns about the introduction of PCS, managers' interests often align well with their use and in many nations, though managers were not cited as early advocates of PCS, they have rarely been cited as vocal opponents.

When PCS is introduced in nations that have decentralized health care systems, it is important to consider regional managers. Their interests appear to be similar to those of local hospital managers. Italy provides perhaps the best example because it is divided into twenty-one regions and each one is responsible for administering its own PCS. As Tedeschi notes above, regional managers in Italy must balance a global health care budget and DRGs enable them to plan for, and monitor, resource use. It should be clear, however, that in Italy, as elsewhere, the ability to plan and monitor resource use does not necessarily enable managers at any level to control costs. Other examples of nations where regional, county or municipal managers should be considered include Denmark and Sweden. Their experience seems comparable to that of Italy.

Finally, though we have discussed the interests of major stakeholders separately, it should be clear that it is more likely that a PCS will be adopted and implemented (both in a timely manner and more fully) to the extent that these actors share similar values and views about PCS. Hungary probably provides the best example of such alignment; to a lesser extent, this promoted DRG diffusion in Portugal (though in this case, DRGs were not accompanied by a payment plan). It is well-known, however, that stakeholders in health care systems often hold different, rather than similar, interests and this is yet another reason why we do not observe the typical S-curve of innovation adoption for DRGs/PCS.

What does the future hold?

Given the uneven migration of DRGs/PCS around the globe, it is somewhat risky to speculate about future developments. Nonetheless, two trends seem likely. First, we expect to see the continued migration of PCS to nations around the world. As noted above, representatives from thirty-four nations recently attended the 22nd annual meeting of the Association of Patient Classification Systems and this number has increased year on year. At the same time, evidence from the chapters here suggests that this migration will not proceed smoothly or in a simple S-curve fashion either within, or across, nations.

Second, we expect to see continued evolution in DRGs/PCS themselves and, more generally, in the use of classification techniques to analyze and manage health care services. In particular, there have already been efforts to extend the use of classification systems to patients and services that are non-hospital based in several nations (e.g. Canada). These efforts are likely to increase as policy makers and managers seek ways to improve use of scarce resources.

The Netherlands is considering perhaps the most innovative use of classification systems in health care. Rather than classifying medical conditions and treatment, this approach classifies care episodes. For example, an episode of care for an elderly diabetic individual might consist of transportation to and from a primary care clinic for a routine physical exam. That is followed by a nutrition consultation with a dietary specialist. In other words, this approach classifies a bundle of related services, rather than using discrete medical conditions and treatments as the units of analysis. Focusing on such care episodes provides a more comprehensive and accurate picture of resource use and, as a result, this approach holds the potential to be very useful.

There are clearly challenges to such extensions of DRGs and they raise key questions: are there limits to the use of classification systems? How well do these systems deliver on the promises that advocates make for them? Of course, to the extent that patients, services or care episodes vary considerably, it is difficult to develop reliable classifications. In the case of psychiatric care, for example, there is a great deal of variation in patient characteristics, symptoms, etiology of problems, and treatment. Nonetheless, Canada and Sweden are examples of nations that are now using classification systems for psychiatric care and many other nations are working with similar extensions for ambulatory (outpatient) care in general.

Efforts to extend the use of classification approaches to focus on care episodes underscore one of this chapter's most important points: PCS is better thought of as an idea or a set of principles rather than a technology in the traditional sense of the term. Similarly, PCS is a malleable tool that has been modified to fit local circumstances. These characteristics of PCS make its migration difficult to analyze and predict. But, perhaps rather than viewing DRGs narrowly as the innovation of interest, we should focus attention more broadly on empirically-derived classifications of a wide range of units of analysis, including events, activities, processes, patients, medical conditions, and treatments.

Implications for policy makers, managers and researchers

Drawing on prior analyses of the diffusion of innovations in general (Rogers 2003) and DRGs in particular (Kimberly and de Pouvourville 1993), this chapter proposed a three-part model to assess PCS adoption and implementation. We argued that key characteristics of national context, DRGs as an innovation, and social interaction combine to account for patterns of PCS migration and use around the world.

Several themes emerge from the analysis above. First, policy makers and managers need to think carefully about the purpose of using PCS/DRGs. National policy makers and regional and county managers, as well as local hospital managers, are using these systems for a wide variety of purposes. The more ambitious objectives, such as using a system to pay for acute inpatient hospital care or even outpatient, ambulatory care, are difficult and often take several years to achieve. Perhaps the most important distinction is between using PCS to plan for and monitor resource use, versus using PCS to pay for services. Given the difficulties of introducing PCS in a health care system of any size, it appears that policy makers should give strong consideration to using PCS as a planning tool initially, even if their ultimate objective is to design a payment plan around their classification system.

Second, in only a minority of cases have nations adopted a system developed externally without making at least minor changes to it. Using systems developed in other nations is difficult due in part to the power of local-level actors, especially physicians, who are likely to resist changes that originate externally and are externally imposed. The major consideration here is the extent to which a system needs to be developed locally and what role various

stakeholders will play in development efforts. As noted above, one strength of PCS is its malleability, and it may be wiser to draw on this strength rather than focus on the efficiency of importing a system in its entirety.

Third, as in other cases of social and organizational change, implementation of this innovation takes more time and resources than anticipated; politics are common. Many incremental changes are needed to fine-tune systems over time and promote their use. In many nations (though not all) there has been a game of "cat and mouse" played among government agencies, policy makers, and health care providers. The latter want to use PCS/DRG to promote accountability and efficient use of resources, while the former are concerned about the fairness of payment systems and protecting their autonomy to use resources as they see fit for local patients and communities. These conflicts seem inevitable, and should be taken into account by implementation plans.

Fourth, this leads to a related observation: understanding the structure of decision making and the pattern of relationships among actors in a health care system will be critical for selecting approaches to implementation. In nations with fragmented health sectors, the involvement of local actors will be more than in nations that are less complex, and where decision making is more unified or centralized. In such cases, top-down decision making and implementation of PCS/DRGs are more likely to be successful.

Fifth, the availability of good data and effective information systems is critical to the effective use of PCS/DRGs. Effectively innovating in this management area depends at least in part on having relatively sophisticated information systems in a nation's health care sector. In other words, policy makers and managers should take into account the technical conditions that promote success in PCS adoption and use. This includes the technical ability of local hospital and regional managers whose skills in accounting and financial planning and analysis will be taxed by the implementation of PCS, especially if it involves a payment plan.

Sixth, following the above points, successful innovation in this area seems to require small-scale experiments and trial-and-error. There is a need for health care systems to become learning systems. It is important for researchers and policy makers to collaborate on studies that can inform policy and management decisions. Indeed, it would be very difficult to adopt a classification system without strong contributions from researchers conducting empirical studies to support PCS development and implementation. Studies of implementation, as opposed to work that focuses on the development of classification systems per se, are especially needed to support PCS use.

Finally, in many cases we observe that an individual (or small group of individuals) emerged as leaders to promote the adoption of PCS/DRGs. Despite the importance of analysing the social context and structure of nations and health care systems, there is still an important place for understanding the role of institutional entrepreneurs, champions, and social networks in the process of innovation. These are individuals who see the need for changes in current systems and who are motivated to make them. It is important to understand who these individuals are, and how they leverage resources to promote the adoption of PCS/DRGs. Identifying champions for change and linking them to established networks of PCS users is a critical first step. The more that carriers of ideas are isolated from champions for change, the longer it will take to adopt PCS in a country or region, and the less smoothly implementation will proceed.

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