Rejoinder to Taxonomy of Health Networks and Systems: A Reassessment

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In his commentary on the taxonomy of health systems and networks that we originally developed in Bazzoli et al. (1999) and updated through Dubbs et al. (2004), Luke raises various concerns about the underlying concepts, measures, and approaches we used to develop our classification scheme. His primary concerns are: (1) a bias in system assignment occurs because the taxonomy categories capture multimarket configurations of systems rather than centralization per se; (2) hospital service configuration data do not provide relevant information about the locus of health system/network decision making; (3) the conceptual framework used may not be relevant for health networks; and (4) measurement error exists in certain variables. We address each of these issues in this rejoinder.

Before commenting on these points, we note that our primary purpose for developing the taxonomy in the late 1990s was to examine the structure and strategy of health networks and systems as the American Hospital Association (AHA) and others defined them. The AHA had a long history of tracking these organizations, collecting information on multihospital systems starting in the mid-1970s and on health networks beginning in 1993. Over time, the objectives and structure of these organizations changed in response to changing market imperatives. Most notable was the movement in the mid-1990s to develop organized delivery systems in anticipation of the Clinton administration's Health Security Act of 1994 and in response to the growing belief that capitated contracting between providers and health plans would become common. There was widespread acknowledgement among researchers and the industry that the organizations tracked by the AHA were growing more heterogeneous, and this led to concern that health services research that attempted to measure a system or network effect on hospital behavior would provide misleading information given the diversity of these organizations.

This sparked our interest, and that of the Agency for Healthcare Research and Quality, which funded our research, in developing tools for researchers, the hospital industry, and policy makers so they could identify and examine more finely grained, homogenous groups of health networks and systems.

CONCEPTUAL FRAMEWORK, METHODS, AND FINDINGS

The conceptual framework for both our original taxonomy research and the updated analysis drew heavily on industrial organization economics and organization theory to identify three key characteristics that distinguished hospital organizations: differentiation and integration (Lawrence and Lorsch 1967); and centralization (McKelvey 1975; Miller and Friesen 1984). In our particular context, hospitals developing organized delivery systems in the 1990s were making critical decisions that affected all three of these dimensions. They were deciding about: (1) the type and scope of services to offer so that a broad continuum of primary, preventive, acute, and chronic health services would be present (i.e., *differentiation*); (2) the extent to which specific services were delivered by one or a few network/system affiliates versus being dispersed throughout the system (i.e., the degree of *centralization*); and (3) the use of network/system affiliates to deliver specific health services versus arranging service delivery through outside vendors (i.e., mechanisms to *integrate* activity). Our empirical measures for these concepts focused on the three building blocks of organized delivery systems, namely the array of hospital services provided, physician organizations developed to facilitate health plan contracting (e.g., physician hospital organizations and management service organizations), and provider-sponsored insurance products (Shortell et al. 1993; Dowling 1995; Robinson and Casalino 1996).

Using cluster analysis and other related empirical approaches typically applied in taxonomic research (Lewis and Alexander 1986; Weiner and Alexander 1993; Alexander et al. 1996; Ketchen and Shook 1996), we identified a four category scheme for classifying health networks and a five category scheme for health systems. We used a variety of statistical methods to assess

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the reliability, stability, and validity of these classifications. Table 1 provides descriptions of the 1994 system and network clusters drawn from our original article. Our updated analysis of 1998 revealed similarities but also some important differences in the system and network clusters. In particular, we found growing prevalence and diversity among decentralized organizational forms.

MAJOR POINTS RAISED IN COMMENTARY

Luke makes four main comments on our taxonomy that we address in turn.

Bias in Taxonomy Because of Multimarket versus Single-Market Systems

The central issue raised by Luke relates to the distinction between systems with hospitals in multiple markets, which he calls hospital companies, and local clusters of system hospitals. He defines local clusters in a manner consistent with Cuellar and Gertler (2003), namely cases in which two or more hospitals from the same system are present in a given market. Luke acknowledges that these concepts are not mutually exclusive, namely that some health systems will have local clusters of hospitals in more than one market.¹ In fact, a careful examination of the 2000 data reported in Cuellar and Gertler (2003) indicates that most system hospitals (75 percent) belong to local clusters in that they are in a market where at least one other system partner is present.² Thus, many health systems, even if they have geographically dispersed hospital holdings, have ample opportunities to implement the sharing of services and physician/insurance arrangements among affiliated hospitals located in the same market.

Certainly, a number of system hospitals lack local partners. From the statistics above, about 25 percent of system hospitals fall into this group. If the dominant strategy of a system is to acquire hospitals in distinct markets so that these hospitals lack local partners, our taxonomy most likely classifies that system as “decentralized.” But to us, this classification is appropriate. The system is selecting hospitals in such a manner that the sharing of services and physician/insurance arrangements is not possible. Thus, its acquisitions are an expression of its implementation of a decentralized service strategy.

Another concern of Luke is that the taxonomy classifications simply capture spatial dispersion of hospitals in that systems that are predominantly multimarket will be identified as decentralized and systems with hospitals that are geographically near each other will be centralized. We agree with this general observation. In fact, the cluster descriptions we originally developed,

Table 1: Original Taxonomy of Health Systems and Health Networks*

Health system types

1. *Centralized health systems:* These systems have high degree of centralization in hospital services, physician arrangements, and insurance products. They have moderate differentiation in hospital services and physician arrangements and low differentiation in insurance products. They tend to be located in urban locations and have hospitals in close proximity of one another. In addition, they have relatively more teaching hospitals than other system types
2. *Centralized physician/insurance health systems:* These systems have relatively high levels of centralization for physician arrangements and insurance products at the system level. In contrast, hospital services are only moderately centralized. Differentiation on all products and services is moderate. They have a relatively small number of hospitals that tend to be in close geographic proximity
3. *Moderately centralized health systems:* These systems tend to have moderate levels of centralization and differentiation for all services/products. With the exception of having higher prevalence of church-sponsored institutions, they are indistinguishable with regard to other contextual factors
4. *Decentralized health systems:* These systems are noted by their high levels of decentralization. Their hospital services, physician arrangements, and insurance products are more predominant at the affiliate level. They have high levels of differentiation in services/products and a large number of hospitals that are spread over a broad geographic area
5. *Independent hospital systems:* These systems are characterized by hospitals with little differentiation of hospital services, few physician arrangements, and little insurance product development. Centralization on all service/product dimensions is low to moderate. They tend to be small, rural systems, and to have proportionately more investor-owned hospitals

Health network types

1. *Centralized health networks:* The key distinguishing feature of these networks is their high degree of centralization in the hospital, physician, and insurance domains. Differentiation is moderate on all service and product dimensions. These networks tend to be located in urban areas and to have hospitals in close proximity of one another, which likely facilitates the centralization of their activity
2. *Moderately centralized health networks:* Moderate centralization implies the presence of service/product activity at both the network and affiliate levels. These networks are also moderately differentiated in insurance products and physician arrangements, and are highly differentiated in hospital services. They are of moderate size in the number of hospitals and these institutions are geographically dispersed
3. *Decentralized health networks:* These networks are distinguished by their higher degree of decentralization. These networks have high differentiation in all service and product dimensions. They tend to have a relatively large number of hospital affiliates that are spread over a broad geographic area
4. *Independent hospital networks:* These networks are characterized by hospitals with narrow differentiation of hospital services and few physician arrangements and insurance products. Centralization on all these dimensions is generally low to moderate. These networks tend to have small numbers of affiliated hospitals that are often located in rural areas

*Drawn from Bazzoli et al. (1999, pp. 1698–1705).

which are summarized in Table 1, make similar statements to Luke about the tendency of centralized systems and networks to have hospitals that are in close geographic proximity. However, it is not a foregone conclusion that a

system with all its hospitals in one geographic area will be classified as centralized. Our continuing research has found that systems and networks have been moving away from centralized forms (Bazzoli et al. 2001), and this trend occurred over the period in which other research has shown that health systems have become increasingly localized (Cuellar and Gertler 2003; Bazzoli 2004). Furthermore, our update of the taxonomy showed that much of the structural innovations being developed by systems focused on decentralization of hospital services and physician/insurance arrangements. In particular, we found that 11.5 percent of systems had a decentralized form in 1994, but by 1998 percent, 51.2 percent of systems had a decentralized form. Many researchers have provided explanations for the decentralization trend, including the pull-back from capitated contracting arrangements, the backlash against managed care, and increased interest in developing local, horizontally linked hospital organizations to gain market clout with payers (Alexander et al. 2001; Bazzoli et al. 2001; Abraham et al. 2005; Lesser and Ginsburg 2000).

Relevance of Service Centralization to Locus of Network/System Decision Making

Luke also raises concern about our centralization measures that assess the degree to which particular services and arrangements are delivered by one or a few network/system members versus being dispersed throughout the network/system. He argues that these measures do not accurately reflect the degree to which centralized decision making is present for a system, noting that for-profit hospital systems likely exert substantial centralized control but are frequently categorized as decentralized by our taxonomy. We acknowledge that our centralization measures are proxies and not direct measures of the locus of decision making, and ideally, we would like to know the latter.

However, recent empirical evidence suggests that our centralization measures are in fact valid proxies for assessing the locus of decision making control. Specifically, Alexander et al. (2003) directly examined 1999 data on the division of decision making responsibility between health networks, systems, and their affiliated hospitals. The types of decisions examined in the analysis were extensive, including: hiring and performance review of system/network hospital CEOs, development of system/network hospital strategic plans, approval of system/network hospital budgets and capital outlays, approval of system/network hospital mergers and affiliations, approval of system/network hospital service changes, approval of system/network hospital managed care contracting, approval of system/network hospital bylaw changes, and approval of system/network hospital appointments of members to

governing boards. The study grouped health networks and systems by their taxonomy category and found that greater concentration of decision making authority at the system/network level was present for the domains noted above in centralized versus decentralized organizations. In other words, although centralization in the taxonomy was measured based on how hospital services and physician/insurance arrangements were configured, empirical evidence suggests that centralization on these dimensions is indeed strongly correlated with the degree of system-level centralized decision making authority.

Relevance of Conceptual Framework to Health Networks versus Health Systems

As Luke notes, we used the same conceptual framework of centralization, integration, and differentiation to develop measures and distinguish clusters of health networks as we did for health systems. He states that "... networks have been adopted for a number of limited reasons, including to accomplish information exchange, provide education, share quality improvement efforts, collaborate in recruiting, engage in group purchasing, and engage in joint contracting with payors." We agree with Luke that health networks have evolved over time in these ways, but it is important to remember the context in which the taxonomy was developed. During the mid-1990s, health networks were engaged in efforts to develop organized delivery systems and they represented an alternative to tight ownership-based models (Dowling 1995; Robinson and Casalino 1996; Shortell et al. 1996).

In fact, it is worthwhile to consider the specific definition of health network used by the AHA in their Annual Survey, because it clearly indicates the expectation that health networks were developing organized delivery systems. In 1993, the AHA defined a health network as "a group of hospitals, physicians, other providers, insurers and/or community agencies that work together to coordinate and deliver a broad spectrum of services to their community." The only change over time has been to indicate that these organizations work voluntarily to this aim so that health networks are more clearly distinguished from ownership-based systems. This definition certainly reflects the underlying themes of our conceptual framework in that differentiation is reflected in the delivery of a broad spectrum of services and centralization represents an approach to achieve coordination among network members. Thus, at the time of its development and refinement, it made sense to use a consolidated framework to assess health networks and systems.

Issues of Measurement Error

Finally, in his discussion of bias in system assignment, Luke raises concern about potential measurement errors associated with the set of AHA questions asking hospitals to indicate for each of about 80 different facilities and services whether it is: owned or provided by a given hospital or its subsidiary; provided by the hospital's health system in the hospital's local community; provided by the hospital's health network in its local community; or provided through formal contractual arrangements or joint ventures with other providers in its local community. Luke indicates that some system hospitals report that they do not provide a particular hospital service but that the service is provided in their local community through their system. However, what if that hospital lacks a local system partner? In this case, there is no system hospital present locally to provide the service in question.

We agree that measurement error is an issue for us, as it is for any type of empirical study no matter how carefully survey questions are crafted and data are collected. But it is not clear how extensive this measurement error is. It is important to recognize that the AHA Annual Survey does not provide a strict definition for a hospital's "local community." Although researchers may rely on convenience measures such as a county, metropolitan statistical area, or mileage indicators to delineate a market, individual hospitals may view this very differently given their particular context. As a result, it is unclear if a system or network hospital that researchers deem as "isolated" views itself in that way.

For example, consider a small community hospital that happens to be in the same system as a major tertiary hospital that is widely recognized for its cardiac care. Even if the tertiary hospital partner is 30 or more miles away, it may be reasonable for the small community hospital to view its system partner as providing open heart surgery for members of its local community, especially if the tertiary facility routinely draws cardiac patients from a broad regional or national market. The opposite also could be true, namely two seemingly nearby system or network hospitals view themselves as not being in the same community. This could occur if travel between the two facilities is difficult or if the hospitals serve very different patient populations (e.g., a safety net hospital and a nearby system affiliate serving a largely insured population). The mismatch here comes from the researcher imposing a definition for "local community" that does not correspond with an individual hospital's view of its world.

We do acknowledge, though, that some degree of measurement error exists in the data especially when hospital responses are reflected by simple

checked boxes for a list of approximately 80 different items. If measurement error was substantial, this would imply that the assignment of systems to particular clusters would be plagued with substantial noise. In turn, this would mean that research using the taxonomy as a basis for examining relationships would likely find insignificant results because the signal-to-noise ratio in the cluster assignments would be swamped by noise.

However, our taxonomy has stood the test of usefulness in that existing research using it has made contributions to our understanding and the resulting findings have face validity given the match between observed phenomena and relationships expected based on theory. For example, Lesser and Ginsburg (2000) in their 12-market studies for the Community Tracking Study found that vertical disintegration was occurring in that health systems and networks were shedding physician arrangements and provider-developed insurance products. Bazzoli et al. (2001) tracked taxonomy classifications of system and networks over the same time period and confirmed that the observations of Lesser and Ginsburg were present nationally. A number of studies have also looked at hospital financial performance and hospital efficiency, hypothesizing that centralization would yield some benefit for system and network hospitals by lowering costs and improving profitability. Using the taxonomy or its underlying measures, Bazzoli et al. (2000), Carey (2003), and Rosko and Proenca (2005) found empirical evidence that supports this theoretical prediction.

FUTURE DIRECTIONS FOR RESEARCH

Research is a process of discovery and innovation, in which future work builds on the past, and Luke has provided thoughts and ideas for future research that will expand beyond our foundational research on health systems and networks. Given the issues he raised regarding health networks, there is also a great need to examine how the organizational motivations and objectives of these organizations have changed over time. Also, much has been learned about systems and networks over the last decade, including a trend toward decentralization (Shortell et al. 2000; Alexander et al. 2001; Bazzoli et al. 2001; Dubbs et al. 2004) and growing evidence that systems that link delivery with financing may be associated with higher quality of care on selected process measures (Rittenhouse et al. 2004; Shortell and Schmittdiel 2004; Gillies et al. 2005). Continuing research needs to assess how this new knowledge affects our conceptual thinking and empirical measurement of key features of

hospitals and other health organizations. Future research is also needed to assess the capabilities of systems and networks in responding to important current issues including quality reporting and improvement activities, patient safety, pay-for-performance programs, and the impact of increasing consolidation on competition in local and national markets. We acknowledge that our taxonomy of health systems and networks has limitations, especially its reliance on secondary data and proxies to measure critical concepts. However, we believe that the foundation we built in theoretical underpinnings and empirical methods will help advance needed research in this area.

NOTES

1. For example, the AHA data for 2003 indicate that HCA, which is certainly a large national hospital company, owns a cluster of nine hospitals in the Tampa–St. Petersburg, FL metropolitan areas and a cluster of seven hospitals in the Nashville, TN area.
2. Specifically, in Exhibit 2, Cuellar and Gertler (2003) report that 43 percent of system hospitals are in markets with at least one local partner from the same system, 15 percent of system hospitals are in markets with no local system partners, and the remaining 42 percent of hospitals were not in systems in 2000. Thus, if one were to look strictly at system hospitals, hospitals with local partners outnumbered hospitals lacking such partners by about three to one.

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