MEASURING AND EVALUATING THE PERFORMANCE OF VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

Ira Moscovice, Ph.D.
Jon B. Christianson, Ph.D.
Anthony Wellever, M.P.A.

Rural Health Research Center
Institute for Health Services Research
School of Public Health
University of Minnesota

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EXECUTIVE SUMMARY

In recent years, providers and policy makers have increasingly chosen vertical integration of health services as a preferred strategy for responding to environmental forces that threaten institutional stability and survival. The wide and growing interest in health care networking is extraordinary in view of the paucity of evidence that supports the contention that networks achieve what they set out to do or that they serve the public interest. In the absence of empirical studies that suggest a relationship between health care networking strategies and provider performance or improvements in the health of the public, acceptance of networking as an organizational innovation worthy of greater diffusion is largely an act of faith.

The purpose of this paper is to develop a conceptual approach to the study of vertically integrated rural health networks. The paper is composed of three parts. In the first part we offer a typology of vertically integrated rural health networks. A typology is necessary to differentiate networks according to key dimensions that may affect performance. In part two we propose a framework for assessing the performance of networks from several perspectives. In part three we identify measurable indicators of performance and discuss ongoing efforts to implement some of these measures.

DIMENSIONS OF VERTICAL INTEGRATION AMONG RURAL HEALTH CARE ORGANIZATIONS

Vertically integrated rural health networks are extremely diverse. They feature a variety of participants, funding sources, and governance and management structures. Despite their diversity, the temptation to claim that each network is unique should be avoided. While each network may have individual characteristics that set it apart from other networks, each network will also have features in common with some other networks, and other features in common with all vertically integrated rural health networks.

The dimensions we propose to use in distinguishing among vertically integrated rural health networks are: 1) level of integration, 2) complexity, and 3) assumption of risk. "Level of integration" refers to the discretion of a network to make choices in allocating the resources of its members. "Complexity" refers to variation in the characteristics of participants and the types of health care services offered. And "assumption of risk" refers to whether or not a network shares the financial risk for the services it provides.

A FRAMEWORK FOR EVALUATING THE IMPACT OF VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

There are three components to our framework for assessing the potential impacts of vertically integrated rural health networks: efficiency effects, distributional effects, and inter-organizational effects. By efficiency effects, we mean the value placed by consumers on network outputs per dollar expended to produce those outputs. A network arrangement would be considered efficient relative to some alternative arrangement for the financing and delivery of rural health care if it produced greater value per dollar expended. By distributional effects,

we mean the distribution across affected parties of the costs and benefits associated with the provision of rural health care services by vertically integrated networks. Different parties receive the benefits and bear the costs of different health services delivery configurations to varying degrees. The development of a vertically integrated rural health network is likely to alter the existing distribution of benefits and costs in a rural area. By inter-organizational effects, we mean the relationships among providers of health services in rural areas. It is expected that vertically integrated rural health networks will reorganize the way in which services are provided in rural areas, primarily by reorganizing relationships among providers. These re-organized relationships will presumably change the way in which services are delivered and, possibly, the types of services that are available to rural residents. Understanding these effects is of interest in itself, and also can contribute to a better understanding of observed efficiency and distributional effects.

OPERATIONALIZING MEASURES OF PERFORMANCE FOR VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

Despite claims that networks that are able to measure and improve their performance will be better able to compete in the market and network survival depends on quantifying the value of the network for its members, there is very little evidence that vertically integrated networks have the ability to improve the quality of life for their constituents. However, the dynamic environment currently supporting health care reform initiatives has created substantial incentives for the formation of vertically integrated networks and the development of information systems that link the elements necessary to manage patient care.

Measures of Efficiency Effects

In measuring the efficiency effects of vertically integrated networks, we need to focus on assessing the benefits and costs associated with the provision of health services to a defined population served by the network. On the benefit side of the ledger, there has been substantial progress in recent years in clarifying and operationalizing population-based measures of health outcomes, health status, and consumer satisfaction. The challenge to vertically integrated rural health networks is figuring out how they will be able to support the substantial financial and personnel requirements necessary to develop information systems that will provide systematically collected information on an ongoing basis on populations large enough to permit valid comparisons across networks.

The measurement of costs is more straightforward than benefit measurement when considering efficiency effects. Standard measures of costs that have been suggested include:

- Monthly per capita cost
- Annual increase in monthly per capita cost relative to changes in the consumer price index
- Administrative costs as a percent of total costs

- Costs per episode of care by condition (of particular interest for high-cost conditions)

While these data are relatively straightforward to collect, they may need to be adjusted to correct for subsidies or a failure to fully account for non-market costs associated with service provision, such as the value of the time of the patient and the patient's family.

Measures of Distributional Effects

The distributional effects of vertically integrated health networks serving rural populations are one of the key issues that may determine the success of these organizations. Some of the benefits of vertically integrated networks may be realized outside of the rural communities served by the network. Our previous research suggested this was the case for some horizontally integrated rural hospital networks that contained non-local organizational members. It could also occur with vertically integrated networks that are responsible for providing the full range of health services to rural communities, because there frequently will be non-local members of these networks. Therefore, it will be important to measure the benefits received by local community residents and health care organizations and professionals as compared to those received by individuals and organizations outside rural communities. It is also likely that all local rural constituencies will not benefit equally from the development of vertically integrated rural health networks.

Examples of measures that can be used to assess the distributional effects of vertically integrated network development include:

- Financial performance of network members as measured by profitability (total net income, operating income, return on assets), liquidity ratios, and leverage ratios (debt ratio, debt-service coverage ratio)

- Outmigration of patients and services (proportion of services provided by non-local providers that could have been provided locally, by service type) from rural communities served by vertically integrated rural health networks.

- Geographic dispersion of providers and services (as indicated by the availability and accessibility of primary care in the local community and secondary and tertiary care within reasonable travel times)

Collection of data on these types of measures will allow rural communities and policy makers to better understand the implications of network development on economic transfers and the spatial dispersion of services and enable local constituents to assess which groups benefit or lose from participation in vertically integrated networks.

It is our belief that network research can be carried out most effectively in the context of an overall theory of the relationship between the environment that sustains network operations, the structure and governance that influences the selection of network activities, and network performance. However, it may be particularly difficult to address the salient research questions across the complete range of vertically integrated networks because of

their heterogeneous membership, diversity of missions, and variety of functions. The data requirements for network research are also quite extensive. The ongoing efforts of JCAHO, AHA, and private health care plans and organizations to measure the performance of vertically integrated networks may eventually generate the longitudinal network data, collected in a similar way across networks, that is needed for comparative assessments of network impacts.

INTRODUCTION

In recent years, providers and policy makers have increasingly chosen vertical integration of health services as a preferred strategy for responding to environmental forces that threaten institutional stability and survival. The following examples are representative of the acceptance of integration strategies by both private providers and public policy makers:

- In June 1993, the American Hospital Association changed the name of its biweekly journal, after 67 years, from *Hospitals* to *Hospitals & Health Networks* and began to feature prominently articles promoting cooperation and collaboration among different types of providers and insurers.

- National health care reform proposals rely on networks of providers and insurers to provide a range of covered services and to control the costs of service delivery.

- Vertically integrated networks form the cornerstone of various state health care reform efforts. For example, health care reform in Minnesota features Integrated Service Networks of providers and health plans and the reform initiative of West Virginia proposed the development of primary-care-centered Community Care Networks.

- In 1983, 30.7 percent of rural hospitals reported no strategic activity, as defined by a list of 13 horizontal and vertical linkage strategies. By 1988, only 0.6 percent of rural hospitals reported no strategic linkage activities (Mick, Morlock, Salkever, de Lossovoy, et al., 1993).

The wide and growing interest in health care networking is extraordinary in view of the paucity of evidence that supports the contention that networks achieve what they set out to do or that they serve the public interest. The literature on health care networks tends to concentrate on why and how networks form rather than the consequences of their actions for participants and the public at large. In the absence of empirical studies that suggest a relationship between health care networking strategies and provider performance or improvements in the health of the public, acceptance of networking as an organizational innovation worthy of greater diffusion is largely an act of faith.

The purpose of this paper is to develop a conceptual approach to the study of vertically integrated rural health networks. The paper is composed of three parts. In the first part we offer a typology of vertically integrated rural health networks. A typology is necessary to differentiate networks according to key dimensions that may affect performance. In part two we propose a framework for assessing the performance of networks from several perspectives. In part three we identify measurable indicators of performance and discuss ongoing efforts to implement some of these measures.

A TYPOLOGY OF VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

Each provider of health services has a set of interorganizational relations. For example, a rural hospital interacts with its organized medical staff, individual medical practices, referral hospitals, long-term care providers, suppliers, insurers, state and national regulators, hospital associations, and so on. This set of interorganizational linkages is one kind of network (Mulford, 1984; Galaskiewicz, 1979). For the purposes of this discussion, however, a more exclusive definition of the word "network" is needed. Our focus is on "cooperative networks," a term which implies that participants voluntarily agree to collaborate to achieve some stated objective. A vertically integrated rural health network may be viewed as a self-governing organization composed of participants that are themselves autonomous organizations or autonomous individuals. In contrast, the participants in vertically integrated firms are not linked together voluntarily. They are bound together by ownership. This concept will be explored more fully in the following section where we define vertical integration in the context of the health care industry.

Vertical Integration in Health Care

Vertical integration is an organizational strategy employed by industries to protect and secure resources and markets for a "focal" organization. "Upstream" or "backward" vertical integration means securing control over resources on which the focal business depends, and "downstream" or "forward" vertical integration means securing control over the channels of distribution of "finished" products (Thompson, 1967; Fox, 1989; Arndt and Bigelow, 1992). An economic definition of vertical integration is:

> ... the organization of production under which a single business unit carries on successive stages in the processing or distribution of a product which is sold by other firms without further processing (Blois, 1972).

Although the term is frequently used in health care, the meaning of "vertical integration" differs somewhat from its economic definition. For example, the adaptation of vertical integration strategies to health care from other industries is complicated by the difficulty of defining the output and production process of health care systems. Unlike manufacturing industries, health care does not produce a tangible product. The concepts of upstream and downstream integration are also only marginally applicable to health care, because the production process is not linearly sequential. Patients may be admitted to the hospital from a physician's office (conventionally viewed as an upstream provider from the perspective of a hospital) or a skilled nursing facility (conventionally viewed as a downstream provider). Primary, secondary, and tertiary acute care, nursing home care, and home care services may be viewed as either end products or intermediate steps in the production process of services consumed during a spell of illness (Clement, 1988).

Control of resources and distribution in vertically integrated firms is typically exercised through ownership. Although ownership is a method of achieving vertical integration of health services, contracting and joint venturing are also common forms of integration. In its health

care applications, vertical integration does not require ownership. It only requires interorganizational relationships and it is a term that has been used synonymously with networking.

When organizations and individuals agree to form a vertically integrated network to promote their own interests or to benefit the public they serve, the concept of a single focal organization diminishes. While one organization may initiate the effort to integrate services within a geographical area, the purpose of the network is not simply to serve that organization. Individual organizations agree to cooperate in a network because they expect to benefit from participation. Each member attempts to secure resources or markets from other members of the network.

Definitions of vertical integration that emerge from the health services literature therefore generally downplay the importance of the stages of production and highlight the cooperative efforts of different types of health service providers to jointly provide a broad range of services. Conrad and Dowling (1990) define a vertically integrated health care system as:

> ... an arrangement whereby a health care organization (or closely related group of organizations) offers, either directly or through others, a broad range of patient care and support services operated in a functionally unified manner (pp. 9-10).

Vertical linkages in the health care industry are differentiated from horizontal linkages primarily by the heterogeneity of the participants. Vertical networks are composed of different kinds of health service providers and horizontal networks are composed of similar types of health service providers. Vertical integration and horizontal integration, however, are not mutually exclusive: rural providers can belong to any number of both vertical and horizontal networks.

This discussion of vertical integration in the context of rural health care services delivery has implied that vertically integrated rural health care networks are a distinct organizational form. Although they display many of the characteristics of a single organization, vertically integrated rural health care networks are not recognized by governments and accreditation agencies as distinct entities and are instead subject to a variety of licensure, certification, and regulatory provisions that govern their constituent parts. The Joint Commission on Accreditation of Health Care Organizations is developing evaluation criteria for "provider networks," and the state of Wisconsin is developing a coordinated survey process for the component parts of vertically integrated rural health networks called "Rural Medical Centers." However, currently there are no external organizations that license, certify, or review the performance of vertically integrated networks. This lack of external legitimacy for the form and the performance of vertically integrated rural health networks is due in part to the relative newness of the organizational form and to the wide variety of participants, linkages, and functions that are encompassed by the term "vertically integrated rural health network."

Before vertically integrated rural health networks can be recognized as organizations that are more than the sum of their parts, it is necessary to know more about their structure and performance. The first step in broadening this understanding of vertically integrated rural health networks is to identify key features that allow us to distinguish them from other organizations and that allow us to differentiate one kind of vertically integrated rural health network from another. In the next section of this paper, we hypothesize that, although they are alike in some ways, vertically integrated rural health networks can be distinguished according to certain underlying characteristics.

Dimensions of Vertical Integration Among Rural Health Care Organizations

Vertically integrated rural health networks are extremely diverse. They feature a variety of participants, funding sources, and governance and management structures. Despite their diversity, the temptation to claim that each network is unique should be avoided. While each network may have individual characteristics that set it apart from other networks, each network will also have features in common with some other networks, and other features in common with all vertically integrated rural health networks. The dimensions we propose to use in distinguishing among vertically integrated rural health networks are: 1) level of integration, 2) complexity, and 3) assumption of risk. "Level of integration" refers to the discretion of a network to make choices in allocating the resources of its members. "Complexity" refers to variation in the characteristics of participants and the types of health care services offered. And "assumption of risk" refers to whether or not a network shares the financial risk for the services it provides.

Level of Integration Integration is a measure of the "systemness" of the network (Shortell, 1988; Shortell, Morrison, and Friedman, 1992). It is an estimate of the degree to which the independent organizations function as a single unit through shared decision making, the contribution of resources, and the sacrifice of individual autonomy.

This dimension, level of integration, characterizes networks according to the nature of their interorganizational linkages. It distinguishes networks that rely primarily on coordination to achieve the goals of vertical integration from those that employ a strategy of functional and structural coalescence. Networks with higher degrees of integration behave more like a single organization than networks with lower degrees of integration. Level of integration may be suggested by the type of interorganizational linkage that binds the participants together. Hoare, Katz, and Baldwin (1991) suggested a scale of six types of rural health care linkages

ranging from lower levels of integration to higher levels of integration: informal affiliation, coalition/alliance, cooperation, contract, joint venture, and merger.

Complexity The dimension of "complexity" relates to variations in network participants and the technology or the type of work carried out by participants and how these are combined in a network. Extending interorganizational linkages beyond simple dyadic relationships alters the nature of a vertically integrated rural health network. Multiple partners increase the need for network coordination and control. Increasing the number of partners or the scope of services and products may expand the number of system outputs, change the system's productive capacity, and alter its market position. Complexity can thus be described in terms of the breadth and stages of integration (Harrigan, 1984, 1985). "Breadth" refers to the variation of services offered by or through the network (e.g., a range of diagnostic related groups), and "stages of integration" refers to the number of different organizational types (e.g., hospital, clinic, long-term care) that participate in the network.

Assumption of Risk Although the sharing of financial risk under a vertically integrated network arrangement might be considered a stage of integration and, therefore, already accounted for in our description of "complexity," we believe that networks that combine the delivery *and* financing of services exhibit a unique kind of complexity. Rural health services delivery networks are composed of various types of providers who offer a range of services. Although the characteristics of the providers and the services they offer may differ, they are functionally similar in that they provide health care services to individual patients or populations. Delivery and financing networks combine the frameworks of two functionally different industries: health care and insurance. In addition to providing health care services, delivery and financing networks are at financial risk for the health services they offer. The

methods employed to coordinate these two types of activities add a new dimension to vertically integrated health care networks.

The dimensions of vertically integrated rural health networks may vary over time according to environmental and intraorganizational stimuli. Consequently, a network may move from one form to another as its governance, activities, or membership changes. Less formal and complex types of networks may provide a foundation for the eventual development of more permanent and intricate network forms. The typology we have proposed is a device for characterizing a vertically integrated rural health network at a point in time.

On one end of the spectrum, some vertically integrated networks feature a high degree of integration, a high degree of complexity, and shared assumption of risk. The Marshfield Clinic/St. Joseph's Hospital network in Marshfield, Wisconsin, is an example of this type of network. The Marshfield Clinic, which "works closely" with Ministry Corporation, the owner of St. Joseph's Hospital, employs 392 physicians at its main clinic and 21 other practice locations in north central Wisconsin. The network serves a population of 300,000 persons, 65,000 of which are covered by the Clinic's health maintenance organization, Security Health Plan. The Marshfield Clinic/St. Joseph Hospital network does not have a formal governance structure, yet the activities of its primary institutional members are highly integrated and their relationship is symbiotic. Managers from the hospital and clinic form a joint conference committee that meets weekly to coordinate activities and to make shared resource allocation decisions. Monthly meetings take place between the top management of the Clinic and the Ministry Corporation to coordinate strategic planning. Examples of their networking projects include a common electronic patient record, a regional ambulance and air transport system, and an integrated data base of immunization services with public health departments and private practitioners.

On the other end of the spectrum, less formal, cohesive, and complex networks feature a low level of integration, low complexity, and no shared financial risk for service provision. Although these networks may be end-points in the development of vertical linkages, they also may mature over time to more formal, integrated, or complex network types. Participants in networks of this type may also eventually abandon vertical integration strategies altogether, or seek out other vertical integration partners.

An example of this type of network is the Mercy Family Care Network and its relationship to North Iowa Mercy Health Center. The Mercy Family Care Network[1] is composed of thirty-eight physician and eight non-physician providers in seventeen different primary care practices. The network is self-governed and offers services to members ranging from office management, employee benefits, group purchasing, locum tenens services, and so on. Some of these services are provided through contractual relations with North Iowa Mercy Health Center, a 303-bed hospital in Mason City, Iowa. The hospital provides contract management and support services to nine hospitals in the thirteen counties covered by the Mercy Family Care Network. A goal of the Mercy Family Care Network is to develop physician/hospital organizations (PHOs) in each of its practice communities to "reduce duplication of services, increase efficiency, improve coordination of services, and create a truly seamless continuum of care for patients served by the organization." The president of the hospital is a member of the governing body of the Mercy Family Care Network. Participant autonomy is still relatively high in this network, which may indicate a lack of "systemness". There is yet no formal linkage between the hospital network and the primary care network.

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[1] The Mercy Family Care Network is an example of a successful horizontal network that is in the process of changing to a vertically integrated network. Although an evolutionary relationship between horizontal networks and vertical networks has not been clearly established, it appears that a broadening of scope of services and membership is a strategy being employed by some horizontal networks.

As PHOs are developed in the service area, participants are likely to function in ways that are more characteristic of a single organization. Complexity of the Mercy Family Care Network at this time is relatively low; it is composed exclusively of physicians and non-physician providers. The network as a whole is linked to the North Iowa Mercy Health Center.

In summary, the development of a typology of vertically integrated rural health networks can assist providers, policy makers and researchers in identifying, in a systematic way, possible differences and similarities among networks. The dimensions underlying a typology can be useful in understanding differences in how networks function, how they affect different groups of actors, and, ultimately, how they influence the quality of life for rural residents in the communities where they exist.

A FRAMEWORK FOR EVALUATING THE IMPACT OF VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

In this section we present a framework for assessing the potential impacts of vertically integrated rural health networks. We view this framework as a useful tool in thinking about the potential impacts of networks, and how those impacts might vary across types of network, as well as in suggesting areas for research.

There are three components to our framework: efficiency effects, distributional effects, and inter-organizational effects. By efficiency effects, we mean the value placed by consumers on network outputs per dollar expended to produce those outputs. A network arrangement would be considered efficient relative to some alternative arrangement for the financing and delivery of rural health care if it produced greater value per dollar expended. By distributional effects, we mean the distribution across affected parties of the costs and benefits associated with the provision of rural health care services by vertically integrated networks. Different parties receive the benefits and bear the costs of different health services

delivery configurations to varying degrees. The development of a vertically integrated rural health network is likely to alter the existing distribution of benefits and costs in a rural area. By inter-organizational effects, we mean the relationships among providers of health services in rural areas. It is expected that vertically integrated rural health networks will reorganize the way in which services are provided in rural areas, primarily by reorganizing relationships among providers. These re-organized relationships will presumably change the way in which services are delivered and, possibly, the types of services that are available to rural residents. Understanding these effects is of interest in itself, and also can contribute to a better understanding of observed efficiency and distributional effects.

Efficiency Effects

The literature on "benefit-cost" analysis provides a useful structure for discussion of the possible efficiency effects associated with health care delivery system changes such as the development of vertically integrated rural health networks (Christianson and Bender, 1982). As a simple example, suppose that there are two rural communities that are identical in every respect except that residents in one community (A) receive their health care from a vertically integrated health network while residents of the second (B) receive care through some other configuration of health care providers. Is community A "better off" than community B by virtue of being served by a network? Put another way, would community B be better off if it were served by a vertically integrated rural health network than its present delivery system? To answer this question, a benefit-cost approach would compare the "net benefits" associated with the consumption of health care by community A residents to the net benefits enjoyed by community B residents. If the net benefits in community A were greater, then the network would be considered "economically efficient" relative to the delivery approach in community B.

Assessing the desirability of a particular reconfiguration of health care resources, such as the development of a vertically integrated rural health network, by determining if it generates more "bang for the buck" than some designated alternative certainly has intuitive appeal and has been the basis for much past research on the evaluation of health care delivery options. However, while straightforward in concept, the assessment of efficiency effects can be quite difficult in practice. There are several complicating factors that will be pertinent in assessing the efficiency of any particular vertically integrated network model relative to the status quo, or relative to a competing network model. In the remainder of this discussion of "efficiency effects", we identify and describe some of the more important of these complicating factors.

What constitutes the community? In assessing the benefits and costs to the community of a vertically integrated rural health network, the first issue that arises is defining the community. In research on rural health care systems, it is common to define the community by the service area of local providers. While this definition of community is always somewhat ambiguous, since service area boundaries are always somewhat amorphous, it does have the virtue of being widely accepted and understood. Unfortunately, this is more likely to capture the individuals who benefit from the consumption of health care in a particular rural area than those who bear its costs. It is standard practice in the benefit-cost analysis literature to define the "community," for the assessment of economic efficiency, as consisting of all those who receive the benefits and bear the costs of the activity in question. Insurance systems spread the costs of care in rural areas well beyond geographically-defined service areas. For instance, the costs of care provided to Medicare beneficiaries in a rural community are distributed nationwide through the use of federal tax funding. If the development of a vertically integrated rural network reduces costs, the impact is therefore

distributed nationwide. At least conceptually, the "community" which includes all relevant benefits and costs in assessing vertically integrated rural health networks should be nationwide. As a practical matter, however, benefits are likely to accrue to a substantial extent at the local level.

How should benefits be assessed? In theory, benefits are defined as the value that consumers place on the good or service they consume. The benefits that consumers receive from a vertically integrated rural network are therefore equal to the value they place on the services that the network provides. Where markets are competitive and consumers have complete information about the likely outcomes associated with the services they purchase, the prices paid for these services can be used to infer value. However, market prices paid by consumers for health care in rural areas are not likely to be accurate or reliable measures of the value they place on those services, because of incomplete information or imperfect markets. How, then, should the benefits associated with a vertically integrated rural health network be measured? One alternative is to survey consumers, asking them directly to reveal the value they place on health services of different types. The effect of networks on the amounts of different types of services consumed could then be estimated, and converted to a total value, expressed in dollar terms, using the survey responses. Past research has found, however, that it is very difficult to construct these surveys so that accurate and consistent assessments of values are obtained (Berwick and Weinstein, 1985). Therefore, it may be necessary to assess the benefits from vertically integrated rural networks in other than dollar terms, focusing instead on measures of health outcomes and of consumer satisfaction with various dimensions of health services. For instance, the effect of networks on specific population-based health outcomes could be compared to that of alternative delivery system arrangements, under the assumption that consumers would place a higher value on better

health outcomes. This approach also has its limitations. Foremost among these is the difficulty one is likely to encounter in reconciling conflicting findings. For instance, how does one assess the overall benefits from a vertically integrated health network if it is associated with an improvement in some health outcomes, but a deterioration in others without a common metric for aggregation? Thus, while benefits may be easier (but not easy!) to measure using this approach, the results may still be quite difficult to interpret.

How should costs be assessed? In theory, costs should be measured by the dollar value that consumers place on the use of resources in their next best alternative (the "opportunity cost" of the resources used to deliver health services). As in assessing benefits, if the markets for these resources are reasonably competitive, it is usually assumed that the price paid for personnel or capital is a reasonable measure of opportunity cost. However, particularly in rural areas, the prices paid for medical care personnel and facilities may differ from opportunity costs for a variety of reasons. Therefore, simply adding up the accounting costs associated with the services provided by vertically integrated rural health networks may not be sufficient in assessing efficiency effects . This is an important issue since the short-run efficiency effects of networks may well be observed, if they exist, in reductions in duplication of services and better coordination of service delivery, both of which could reduce costs. Effects relating to the improvement of health outcomes may well take a longer period of time to develop.

What is the appropriate time frame for measuring efficiency effects? The timing of benefits and costs can be an important consideration in the measurement of efficiency effects (Weinstein and Stason, 1977). For instance, suppose that the development of a vertically integrated rural health network requires an investment of resources "up front" to develop new administrative structures and management information systems, recruit new personnel, and/or

facilitate the consolidation of service delivery. The effects of this expenditure of resources, in terms of improved community health outcomes or patient satisfaction, may not be observed until some years later. This raises two distinct issues for the assessment of efficiency effects. First, how long a period should be covered in assessing efficiency? Obviously, in this example, a period that is "too short" would run the risk of concluding that networks were inefficient (e.g., cost more than other methods of health care organization and delivery while generating no new benefits), when that would not necessarily be the case. Yet, given the importance of providing "timely" information to policy makers about the desirability of encouraging or supporting network formation, it is likely that conclusions will be drawn primarily on the basis of short-run efficiency effects. A second issue that arises relating to the timing of benefits and costs is more technical in nature: should benefits and costs that occur in the future be treated the same as current benefits and costs (Robinson, 1990). In practice, future benefits and costs usually receive a smaller weight in assessing economic efficiency, but there is little agreement about the amount that they should be discounted or whether the same discount rate should be applied to health benefits as to dollar costs. The use of relatively low weights for benefits and costs that occur primarily in the future would lead to a less favorable assessment of the efficiency benefits of networks, if networks entail high initial costs and generate benefits that accrue gradually over time. On the other hand, if operational cost savings occur from networks immediately, but negative impacts on community residents are not observed until some future period, lower weights would result in a more favorable assessment of network efficiency.

Distributional Effects

In assessing the relative efficiency of vertically integrated rural health networks, it is appropriate to ignore distributional impacts — that is, who receives the benefits and who

bears the costs — in order to focus on the magnitude of the benefits generated by networks relative to their costs. However, this does not mean that the distribution of benefits and costs is not a critical issue in the development of vertically integrated rural health networks. It is important for two reasons. First, society as a whole may place greater weight on benefits that accrue to one group in comparison to another. For example, suppose that two vertically integrated rural health networks generated exactly the same net benefits to their communities but that community A was located in a previously underserved area and had a relatively large population of low income individuals. In determining how to allocate scarce dollars to support network start-up activities, a government agency might choose community A over community B, implicitly attaching a greater weight to benefits received by low-income, underserved populations. Thus, knowing the distribution of benefits and costs associated with rural networks could be useful to policy makers in making decisions about the allocation of scarce public dollars.

Second, knowing the distribution of benefits and costs can be important in understanding why certain types of vertically integrated rural networks develop and survive while others do not. As well as generating different distributions of benefits and costs for consumers, different types of networks will have different implications for the distribution of provider incomes and profits. Some networks may be formed and may survive only if they increase the incomes of dominant groups of providers in a community or, at the least, do not reduce their incomes. For instance, a network is more likely to survive if it generates increases in incomes for some community providers, while income losses for others are highly diffuse and difficult to attribute to network activities. Under these circumstances, at least some providers are likely to be highly supportive of the network, and there is unlikely to be any important organized resistance to its development. On the other hand, if a network results in

improvements in provider incomes that are diffused over a large number of providers and are relatively small for any individual provider, but generates income losses that are highly visible and concentrated in a small number of providers of a service highly valued in the community, it is less likely to be implemented, or survive if implemented. The providers who are hurt by the network will have a strong incentive to oppose its development, while those who benefit from the network will have a much weaker incentive to support it. Thus, the distribution of network gains and losses across different groups of consumers and providers along with their relative visibility, is likely to be a powerful factor in understanding why some networks survive and others, even though potentially "economically efficient", fail.

Interorganizational Effects

To fully understand the impacts of vertically integrated rural health networks it will not be sufficient to assess their economic efficiency and the distribution of the gains and losses associated with their development and operations. When differences in efficiency are observed across network types, or different distributions of gains and losses are documented, it will be important to determine why these differences exist. We believe that the key to understanding how networks function, and to explaining differences in performance across different types of networks, lies in how these networks are structured and governed. Network structure and governance influences the types of activities the network undertakes and the ultimate impact of those activities on rural communities. Vertically integrated rural health networks are not hierarchical organizations; they essentially consist of a web of contractual relationships that bind organizations to each other for a specific purpose or purposes. To understand the structure and operations of these networks, it will be important to uncover the changes in inter-organizational relationships that occur as a result of network formation and to trace how these changes affect the way in which health care services are delivered. The typology

developed in the first part of this paper provides a useful beginning for this effort, as it focusses attention on key dimensions of inter-organizational relationships in vertically integrated rural health networks. The next important steps are 1) to place more flesh on the bones of this typology by describing, in much greater detail, the characteristics of different types of vertically integrated rural health networks and 2) to document connections between network structure and governance and network performance.

OPERATIONALIZING MEASURES OF PERFORMANCE FOR VERTICALLY INTEGRATED RURAL HEALTH NETWORKS

The morning headlines in a west coast newspaper recently announced the formation of a new vertically integrated network through the alliance of a major HMO and a medical center with a large multi-specialty group practice and hospital. The bylines of the newspaper article had the following statements from administrators of the organizations involved in the network:

> "We haven't got the package totally defined yet."
>
> "How it will ultimately work out, nobody knows."
>
> "This is not a merger. At this point, we intend to maintain the separate identities of the institutions."

These statements are reflective of the current state of measuring the performance of vertically integrated networks. Despite claims that networks that are able to measure and improve their performance will be better able to compete in the market and network survival depends on quantifying the value of the network for its members, there is very little evidence that vertically integrated networks have the ability to improve the quality of life for their constituents (Nerenz and Zajac, 1991; Dowling, 1993). A recent study of integrated health care systems was not able to find good examples of outcomes measurement systems that were operational and producing useful results for health administrators, practitioners,

consumers, or policy makers despite the interest in and recognition of the importance of such measurement systems (Coddington, Moore, and Fischer, 1993).

The dynamic environment currently supporting health care reform initiatives has created substantial incentives for the formation of vertically integrated networks and the development of information systems that link the elements necessary to manage patient care. Interest in the measurement of the performance of vertically integrated networks is coming from several directions.

- The Joint Commission on the Accreditation of Healthcare Organizations is currently developing the capability for evaluating and accrediting provider networks. Draft standards are under external review and acknowledge the importance of network accountability for cost and quality (JCAHO, 1993). Accountability for quality will primarily be measured by patient health outcomes and patient satisfaction and network compliance with relevant performance standards. The JCAHO efforts are designed to assist individuals in their enrollment choices and inform purchaser/payer contracting decisions and state oversight of networks.

- Health care plans are developing "report cards" designed to give purchasers and consumers understandable information that can be used to evaluate and compare plans. In the Twin Cities area, Medica's Report Card on Health Care (1993) measures four categories of performance: consumer satisfaction, quality of care, administrative efficiencies, and cost reduction.

- Health care organizations that have vertically integrated are developing indicators that can be used to support system management and to compare the results of vertical integration with other forms of health care delivery for purchasers and patients. The Henry Ford Health System has been a leader in identifying the need for a broader set of performance measures than those traditionally used to examine the financial and quality implications of health care delivery options. The following statement clearly reflects their viewpoint (Nerenz and Zajac, 1991, p. 11):

  > Vertically integrated systems are more likely to be responsible for the total health care of their members, not just for the provision of specific services. A system's interest in quality of care, therefore, extends beyond the quality of the specific services provided, to the quality of the integration and coordination of those services. The combinations of services provided, their interactions, and temporal relationships are of fundamental concern. Patients' health status is an important source of information, because a change in health status becomes an indicator of health system performance.

Thus, despite the lack of good examples of operational systems that measure the performance of vertically integrated health networks, there is clearly the expressed intent to move from rhetoric to measurement in the near future. In the remainder of this section, we will highlight ongoing efforts to operationalize performance measures for vertically integrated networks using the framework described in the previous section.

Measures of Efficiency Effects

In measuring the efficiency effects of vertically integrated networks, we need to focus on assessing the benefits and costs associated with the provision of health services to a defined population served by the network. On the benefit side of the ledger, there has been substantial progress in recent years in clarifying and operationalizing population-based measures of health outcomes and health status. A recent Institute of Medicine (1993) report identified indicators in five areas — promoting successful birth outcomes, reducing the incidence of vaccine-preventable childhood diseases, early detection and diagnosis of treatable diseases, reducing the effects of chronic diseases and prolonging life, and reducing morbidity and pain through timely and appropriate treatment (see Table 1). In addition to measures of birth outcomes and community-wide immunization and screening rates, the IOM Committee expressed substantial interest in the concept of reducing the effects of chronic diseases through avoidable hospitalizations for chronic conditions sensitive to the receipt of effective, timely, and continuous outpatient medical care. Hospital admission rates are viewed here as a proxy measure for health conditions that have worsened enough to require a hospitalization.

The researchers at Henry Ford Health System have defined a comprehensive list of population health indicators including a general health index (based on the SF-36 Health Survey used in the Medical Outcomes Study), a mental health index (based on the Diagnostic Interview Schedule used as a screening tool for psychiatric conditions), a prevention index

Table 1

Examples of Health Outcome Indicators

Indicator	Measure
1. Promoting successful birth outcomes	
Infant mortality	Children who die before first birthday (per 1,000 live births)
Low birthweight	Percentage of infants born weighing less than 2,500 grams
Congenital syphilis	Cases per 100,000 population
2. Reducing the incidence of vaccine-preventable childhood diseases	
Immunization rates	Percentage of preschool children vaccinated
Incidence of preventable childhood communicable diseases (diphtheria, measles, mumps, pertussis, polio, rubella, and tetanus)	Cases per 100,000 population
3. Early detection and diagnosis of treatable diseases	
Breast and cervical cancer screening	Percentage of women undergoing procedure in given period • Clinical breast exam • Mammogram • Pap test
Incidence of late-stage breast and cervical cancers	Percentage of tumors diagnosed at late states • Breast cancer • Cervical cancer
4. Reducing the effects of chronic diseases and prolonging life	
Chronic disease follow-up care	Average number of physician contacts annually by those in fair to poor health; proportion with no physician contacts in previous year
Avoidable hospitalization for chronic diseases	Admissions for ambulatory-care-sensitive chronic conditions
Access-related excess mortality	Number of deaths per 100,000 population estimated to be due to access problems
5. Reducing morbidity and pain through timely and appropriate treatment	
Acute medical care	Percentage of individuals with acute illness who have no physician contact
Avoidable hospitalization for acute conditions	Admissions for ambulatory-care-sensitive conditions

Source: Institute of Medicine, Access to Health Care in America, Washington, DC: National Academy Press, 1993 (Adapted from Table 3.1)

(which sums "healthy behaviors, weighted by their association with important morbidity/mortality outcomes), disease specific incidence and prevalence rates of the population, and disease specific outcomes of care (that measure health/functional status following treatment for a specific diagnosed condition, via the SF-36 Health Survey or other relevant sources) (Nerenz and Zajac, 1991). Their work takes advantage of the efforts of Ware and his Medical Outcomes Study colleagues to develop practical and valid measures of health status and outcomes from the patient's point of view (Ware and Sherbourne, 1992). The SF-36 measures limitations in physical activities, social activities, and usual role activities because of health problems; bodily pain, mental health; vitality (energy and fatigue); and general health perceptions. In the past, collection of these types of data was not generally completed as part of routine medical care; however, as described earlier, more organizations have the capability and are beginning to routinely collect this type of information.

In the same light, consumer satisfaction is now being viewed as an important performance indicator for health care delivery systems competing in the marketplace. Medica's Report Card includes consumers' perceptions of how well their health needs are met. Medica enrollees are routinely surveyed on their satisfaction levels regarding perceived quality of physician care, customer service, access under managed care arrangements, and overall satisfaction. The specific survey questions being answered by consumers include:

<u>Quality of Physician Care</u>

- How satisfied are you with the amount of time your personal doctor spends with you?
- Would you recommend your doctor to a friend?

<u>Customer Service</u>

- How satisfied are you with how quickly the phone was answered?

- How satisfied are you with the courteousness of plan staff?
- Did you get the information you needed?

Access to Providers

- How satisfied are you with the selection of doctors you have to choose from?

Overall Satisfaction

- Would you recommend this health plan to a friend?

These types of questions could be adapted for use by consumers served by vertically integrated networks. Specific interest would focus on the use of non-physician services as well as medical services and the interaction of physicians with non-physician providers in the network.

Nerenz and Zajec (1991) have also summarized patient satisfaction measures used as part of their health system performance indicator inventory. They recommend that patient satisfaction should be measured through member survey results which summarize satisfaction with factors such as care, quality, access, plan benefits, and amenities; complaints and problem-related inquiries per member year; and voluntary disenrollment as a percent of total enrollment which recognizes that consumers "vote with their feet".

In summary, substantial efforts are currently being made to measure the community benefits of vertically integrated networks through the collection of detailed information on health outcomes, health status, and consumer satisfaction. The challenge to vertically integrated rural health networks is figuring out how they will be able to support the substantial financial and personnel requirements necessary to develop information systems that will provide systematically collected information on an ongoing basis on populations large enough to permit valid comparisons across networks.

The measurement of costs is more straightforward than benefit measurement when considering efficiency effects. Standard measures of costs that have been suggested include:

- Monthly per capita cost
- Annual increase in monthly per capita cost relative to changes in the consumer price index
- Administrative costs as a percent of total costs
- Costs per episode of care by condition (of particular interest for high-cost conditions)

While these data are relatively straightforward to collect, they may need to be adjusted to correct for subsidies or a failure to fully account for non-market costs associated with service provision, such as the value of the time of the patient and the patient's family.

It is often more difficult to uncover the underlying reasons for changes that may occur in the above measures. For example, costs may decrease for a variety of reasons, including the direct effects of lower prices for inputs to the production process, new technologies that alter the number and types of services required in the diagnosis and treatment of specific conditions, reduction in the use of unnecessary services, elimination of duplicate services or facilities used by a population, and/or sharing and better coordination of services and support systems such as EMS, transportation, and information systems. The latter three categories of savings may be difficult to measure directly without the use of special studies, but may be particularly relevant in the calculation of short-term and intermediate savings due to network development.

Measures of Distributional Effects

The distributional effects of vertically integrated health networks serving rural populations are one of the key issues that may determine the success of these organizations.

Some of the benefits of vertically integrated networks may be realized outside of the rural communities served by the network. Our previous research suggested this was the case for some horizontally integrated rural hospital networks that contained non-local organizational members (Moscovice, Christianson, Johnson, et al., 1993). It could also occur with vertically integrated networks that are responsible for providing the full range of health services to rural communities, because there frequently will be non-local members of these networks. Therefore, it will be important to measure the benefits received by local community residents and health care organizations and professionals as compared to those received by individuals and organizations outside rural communities.

It is also likely that all local rural constituencies will not benefit equally from the development of vertically integrated rural health networks. As policy makers have discussed the implications of current health care reform efforts for rural areas, there has been considerable discussion of how capacity building programs (e.g., community health centers, migrant health centers, rural health clinics) could be integrated into developing provider networks (Christianson and Moscovice, 1993). These types of programs might not receive similar benefits from network development as more traditional types of providers such as hospitals or physician group practices.

Examples of measures that can be used to assess the distributional effects of vertically integrated network development include:

- Financial performance of network members as measured by profitability (total net income, operating income, return on assets), liquidity ratios, and leverage ratios (debt ratio, debt-service coverage ratio)
- Outmigration of patients and services (proportion of services provided by non-local providers that could have been provided locally, by service type) from rural communities served by vertically integrated rural health networks.

- Geographic dispersion of providers and services (as indicated by the availability and accessibility of primary care in the local community and secondary and tertiary care within reasonable travel times)

Collection of data on these types of measures will allow rural communities and policy makers to better understand the implications of network development on economic transfers and the spatial dispersion of services and enable local constituents to assess which groups benefit or lose from participation in vertically integrated networks.

CONCLUSIONS

This paper has described the key characteristics that differentiate vertically integrated rural health networks, presented a framework for evaluating their impact, and discussed recent efforts to operationalize network performance measures. In so doing, it has provided a basis for describing the salient research questions that need to be addressed concerning the relationships between the environment, structure, and performance of vertically integrated rural health networks. Examples of these research questions include:

- Do networks improve the health and well-being of rural residents?
- If they do generate benefits for rural residents, what types of networks accomplish this for the smallest expenditure of resources?
- How does the environment in which network members function influence the structure and performance of vertically integrated rural health networks?
- How does network structure affect the types of activities undertaken by networks?
- How does network structure effect network performance?
- What are the organizational and environmental characteristics that predict successful network performance?
- What groups receive the greatest benefit from network development?
- Are benefits realized in the local rural communities served by networks?

- Do networks change their organizational structures and activities over time? Is so, how? How does this effect their economic efficiency?

- What are the stages of network development? Is there a natural life cycle for networks?

Although clearly not an exhaustive list, these questions are suggestive of important areas for future network research. It is our belief that this research can be carried out most effectively in the context of an overall theory of the relationship between the environment that sustains network operations, the structure and governance that influences the selection of network activities, and network performance. However, it may be particularly difficult to address the above set of questions across the complete range of vertically integrated networks because of their heterogeneous membership, diversity of missions, and variety of functions. Finally, the data requirements for network research are quite extensive. The ongoing efforts of JCAHO, AHA, and private health care plans and organizations to measure the performance of vertically integrated networks may eventually generate the longitudinal network data, collected in a similar way across networks, that is needed for comparative assessments of network impacts.

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