

# The Potential of HIEs as Infomediaries

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## A B S T R A C T

*For more than 40 years, various health services researchers have noted the many distortions in the American healthcare economy that produce massive information asymmetries and almost near opacity in the medical services delivery market. This paper comments on the potential of health information exchanges (HIE) to address many of these deeply embedded structural issues. Although hundreds of HIEs are emerging across the nation and the value of moving to a fully interoperable digital healthcare system has been widely recognized, the economic sustainability of HIEs remains a vexing matter. While most of these organizations rely on a transaction- or production efficiency-based model, the authors conclude this model has economic limits and their future viability may rest upon HIEs becoming public utility infomediaries. As infomediaries that create value—not just in new exchange efficiencies but by establishing new system-wide feedback loops—HIEs may yield entirely new levels of value to many types of markets interested in better managing their portfolios of risk.*

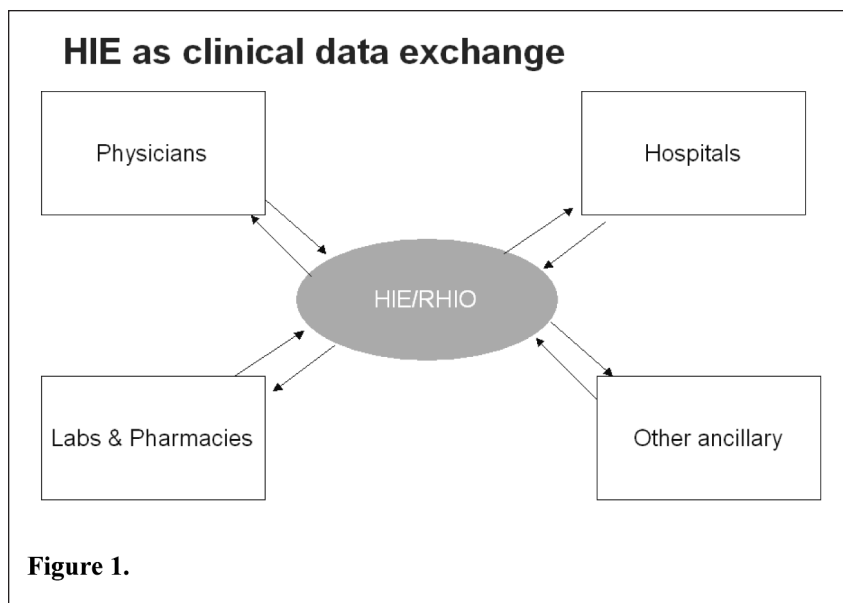
## K E Y W O R D S

- Infomediary
- Information asymmetries
- Feedback loops
- Episode of care
- Health information exchange/Regional health information organization
- HIE sustainability
- Electronic medical record
- Risk

Ever since the publication of Kenneth Arrow's landmark article,<sup>1</sup> economists, healthcare services researchers and healthcare policy experts have wrestled with the ongoing implications of the extreme information asymmetries that Arrow described in healthcare. Simply put, different parties interacting in the healthcare system have bodies of information not possessed uniformly throughout the marketplace; therefore, each has a remarkable incentive to institutionally keep information within its own walls and leverage the

asymmetry to extract rents beyond what a fully transparent market would bear. The lack of uniform and transparent information and its use to reduce risks in market interactions between these parties has continued to encourage massive resource misallocations.

"The Ecology of Medicare Care," published by Kerr White et al in 1961 was perhaps as important as Arrow's paper, but far less recognized.<sup>2</sup> In the paper, White and his colleagues argued that while vast sums of money have been invested in



the science of studying disease and in the science of creating techniques to treat disease, very little had been invested in creating a science for studying the interactions of disease and treatment at the level of the patient. They proposed creating a new unit of analysis to capture this information, “the natural history of the patient,” analogously drawn from epidemiology, which has “the natural history of disease.”

Picking up on this idea, Jerry Solon et al published back-to-back papers in 1967 and 1969 creating the concept of an “episode of care,” not only as a higher order unit of analysis for health services research, but as a health services management tool, outcomes measurement standard and even as a basic unit of reimbursement.<sup>3</sup> The point was to penetrate the wall of opacity suffusing healthcare by instituting new adaptive feedback loops based on patient-generated information.

The common string tying these perceptive authors together is that very little light radiates from the healthcare system. It is a dark, lumpy archipelago composed of tens of thousands of isolated corporate islands that, at least in terms of information, chop up patients into cloistered parcels and then zealously leverage the resulting fragments for economic advantage. The logical extension of their collective insight is that unless new feedback loops are established to better understand and manage clinical, population health and insurance risks, opacity will continue to coalesce around competing institutional interests as market asymmetries. And it is truly startling that, despite the passage of nearly a half a century, their insights are as cogent today as they were in the 1960s.

### Exchanging Data

Health information exchanges or regional health information organizations (HIEs or RHIOs) have emerged as

vehicles to facilitate the flow of clinical information between providers in the community; they are building on the foundation laid by the pioneers in the field, the Indiana Health Information Exchange, the Inland Northwest Health System, HealthBridge and a few others.<sup>4</sup> The primary business focus of these networks has sought to create value for the provider community by creating productive efficiencies. In doing so, they have been able to generate modest revenue, and therefore have achieved a modest but sustainable business model.

An analysis of the micro and macro environments in which HIEs are emerging suggests there are other data intermediary roles that could be embraced by HIEs and the communities

they serve, and that would provide much higher incremental value to society by significantly reducing information asymmetries, linking the lumpy archipelago through an electronic information network.

HIEs are currently responding to a simple but important need in the market—helping providers with disparate clinical information systems and siloed clinical databases to find information on a patient that resides in that community, and perhaps in other communities as well after community-based HIEs are integrated into a national health information network. This need has been spurred by countless observations and studies that patient care is simply not coordinated between the providers caring for that patient; that tests and studies on that patient are unnecessarily duplicated; and that patients are constantly at risk of being harmed by the healthcare system because critical information on their health status is not easily accessible.<sup>5</sup>

However, because the macroeconomic environment does not necessarily create a financial stimulus for this information to be shared (if it did, health information would be widely shared today), HIEs have devised microeconomic stimuli for providers to participate in data sharing and exchange activities. These stimuli can best be described as productive efficiencies<sup>6</sup>, and HIEs such as HealthBridge in Cincinnati and the Indiana Health Information Exchange are good examples of how that model has been built and sustained. These exchanges reduce some administrative burden in data gathering for hospitals, labs, physicians and other providers in the community by creating a hub through which these data can be gathered and disseminated, as depicted in Figure 1.

As a result of these administrative simplifications, providers that have access to the exchange and participate in it, either by paying a transaction fee or a subscription fee, have realized internal cost efficiencies that more than

offset the costs associated with participation. For example, from its inception to today, the New England Healthcare EDI Network has reduced the costs of administrative data transactions from \$5 to 25 cents for participating organizations, bringing total transaction costs down from \$12.5 million a month to \$625,000.<sup>7</sup> The value created is undeniable, but may have reached a point of diminishing returns, much like productive efficiency in all other industries. Unless the scope of the transactions is expanded or the total number of participants is increased, the value created follows a step function with a ceiling, not a constant incremental one.

While important, the net margin realized on these transactions may not be enough to pay for the significant capital cost needed to fully participate in and contribute to an exchange, namely the acquisition and use of an electronic medical record system. For small- and medium-sized practices, which typically have fewer than five physicians and constitute the majority of physician practices in the United States, the acquisition of a fully functional EMR can cost as much as \$15,000 to \$20,000 per physician for the initial investment and an additional \$5,000 to \$10,000 per year in incremental investment.<sup>8</sup>

Adoption rates of EMRs in markets with functional HIEs have not been demonstrably higher than in other markets, which suggests the production-based efficiencies delivered by the HIE have failed by themselves to motivate significant adoption of HIT in physician offices.

Using the experience of the Indiana Health Information Exchange as an example, the net reduction of transaction costs for participating providers is equal to about 50 cents per transaction. To fully amortize the capital investment in an EMR, each physician in a practice would need to realize these savings on at least 20,000 transactions a year. That is why providers that are currently participating in HIEs are mainly hospital systems and large provider groups, both of which typically have invested in clinical information systems that include some level of EMR functionality and do not need a significant incremental capital investment to benefit from HIE-derived productive efficiencies.

However, the continued inability to encourage widespread adoption of EMRs in all provider settings, including small physician practices, will hamper the true potential that data exchange holds in reducing waste and inefficiencies by, for example, eliminating redundant testing, and increasing care coordination and information sharing to create a higher quality healthcare system. It also will inherently limit the role of the HIEs to clinical data exchange facilitators.

### Getting the Most of IT

To realize the full potential of IT adoption in healthcare, healthcare organizations should follow two important strategies.

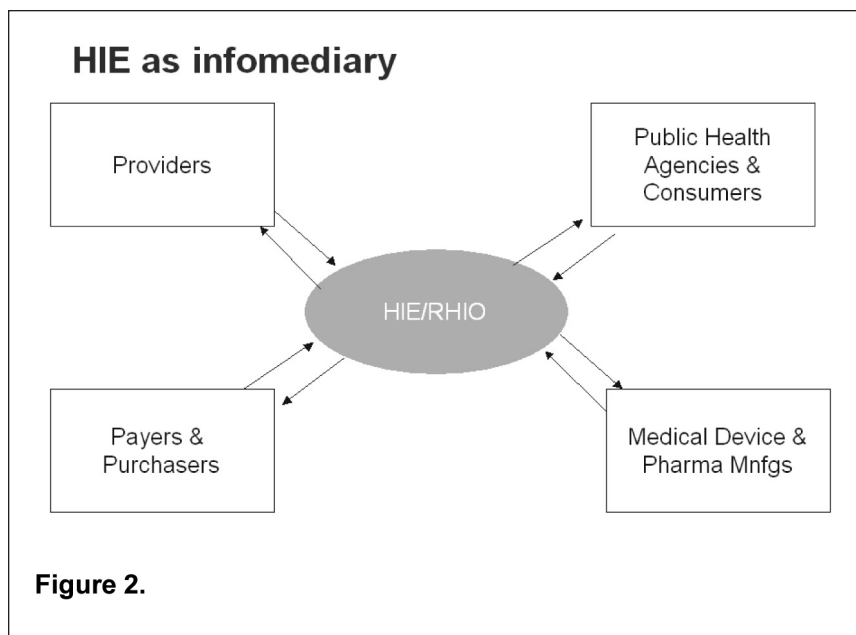
**Provide incentives that reduce or eliminate the negative financial consequences of adopting and using HIT.** In industries other than healthcare, economic agents are constantly encouraged to improve the value of the services and products they deliver because the market will reward them with incremental revenue, either in the form of more volume or higher prices. If payors provided financial rewards for providers that delivered higher value healthcare services, they could motivate them to improve their processes and outcomes of care to compete for these rewards. In effect, that has been the lesson learned through market experiments conducted by Bridges To Excellence. In its implementation markets, Bridges To Excellence has observed physicians and practices that are eligible for financial rewards engage in certain practice transformation efforts that are commensurate to the financial benefits they deem achievable under the program.<sup>9</sup>

Payors could base their reward programs on performance reported and achieved by physicians. Special rewards would be given to those who are using EMRs that have been certified by the newly created Certification Commission for Health Information Technology, are compliant with Health Information Technology (CCHIT) Standards Panel (HITSP) and actively participating in an HIE. For example, those with electronic medical records (EMRs) plugged into HIEs could receive their rewards much faster than those using manual processes because of their ability to report their data continuously. And those without EMRs may find it increasingly difficult to achieve the same level of performance as those with EMRs.

Furthermore, focusing the reward programs on clinical outcome and process measures that are indicative of the type of quality advocated by the Institute of Medicine in its Crossing the Quality Chasm report would further benefit the adoption and use of EMRs as a means to connect to the HIE and participate in the coordination of care with other providers in the community. For many patients with congestive heart failure, the successful reduction of blood pressure and lipid levels requires the coordination of care between primary and specialty caregivers, which may be greatly facilitated through the HIE.

If payors designed community-wide programs that tied 5 percent to 10 percent of a physician's income to the quality of care delivered, there would be significant incentives for that physician to adopt the systems of care necessary to achieve stated goals.

**Redefine the role of HIEs.** Imagine the window of opportunity for HIEs were extended from productive efficiencies to risk portfolio management. The awful truth of the American healthcare system is while institutions find economic comfort in hoarding data, doing so exposes all too unmanageable long-term risks. HIEs can operate as valued healthcare information intermediaries—so-called infomediaries—in the communities they serve.



While their primary customers now are providers, they could have additional customers for whom they could develop the information feedback loops suggested by White, which would reduce the asymmetries analyzed by Arrow. These additional customers are payors, both public and private; third-party application vendors; public health agencies; and pharmaceutical, medical device and other medical technology manufacturers.

Each of these customers has a specific interest in accessing clinical data-based feedback loops to better manage their risks.

- Payors would benefit from comparative performance reports on the quality of care delivered by providers in the community, especially at the individual provider level and for measures that have significant actuarial importance and are difficult to gather without going through medical records, for example, blood pressure for patients with hypertension.
- Application vendors that provide consumers with information tools to help them manage their health would benefit from accessing personal health record data for an individual consumer, on that consumer's behalf.
- Public health agencies would benefit from the reporting of aggregated reports on population health in their community as well as early indicators of public health emergencies.
- Medical device and pharmaceutical manufacturers would benefit from comparative analyses of the relative impact of an innovation they have introduced or are planning to introduce.

While many of these self-interest parties are in potential conflict with one another in the healthcare "marketplace," they can be united by their common interest. The HIE can provide information and create feedback loops to all these

customers, not in an attempt to reconcile the varied self-interests, but rather in the simple attempt to create value for each, and thus for society as a whole. Figure 2 depicts the central role an HIE could have.

### Creating Market Demand

This expanded role for an HIE can be further validated by examining specific instances in which information feedback loops and public availability of de-identified and aggregated clinical data can significantly reduce many of the market's current risks.

Figure 3 displays a model derived from a paper by Robert Blum entitled, *Causal Relationships from a Large Time-Oriented Clinical Data Base: The Rx Project*,<sup>10</sup> published in 1982. It has been

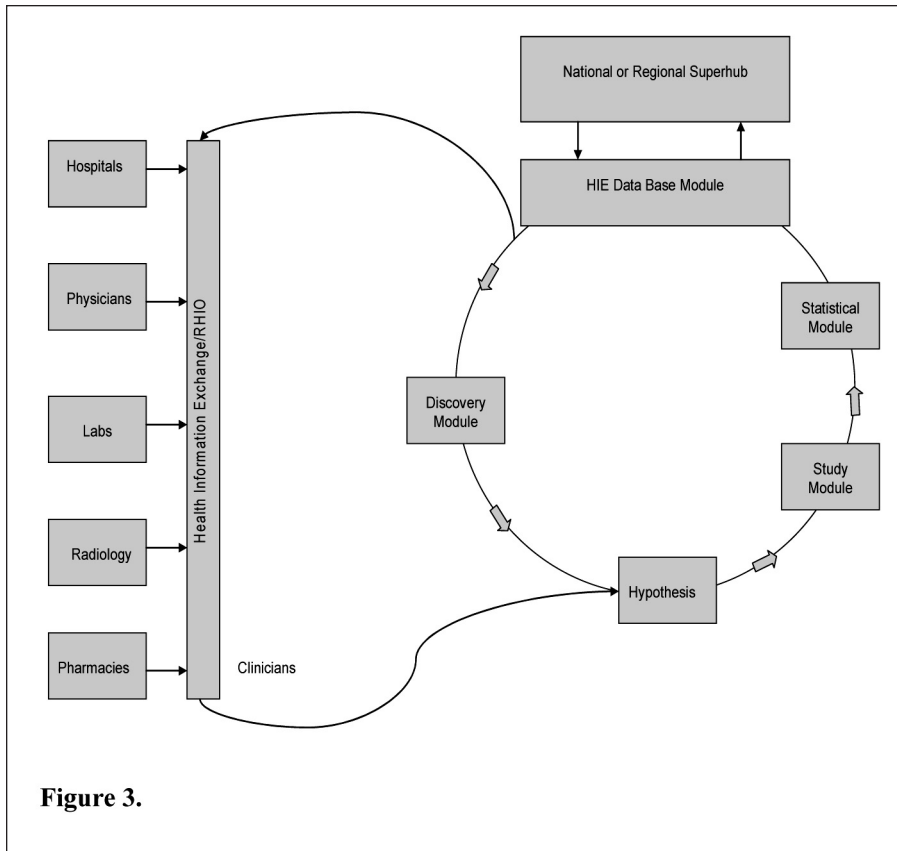
modified to fit into the newly emerging capabilities of a HIE, although the iterative analytic process remains unchanged. Each cycle of discovery and change sets the stage for a new set of hypotheses and consists of a continuous feedback loop running through a series of four modules—a discovery module in which new hypotheses are formulated; a study module in which these hypotheses are tested; a statistical analysis module in which conclusions are drawn; and an HIE database module in which current evidence and conclusions are stored and referenced.

The power of the concept rests in the fact that falsifiable hypotheses can be formulated and tested in the real world of patient care because fully mobilized data running longitudinally across patient cohorts and fragmented provider settings are available via HIEs. Thus, two new highly potent data bridges would be structurally laced throughout the delivery system.

All four quadrants outlined in Figure 2 would be customers of this data, which could open up a whole new frontier in health services information and finally address the insights posed by Arrow, White, Solon and others so many decades ago. By lifting "the veil of insurance," entrenched institutional interests that perpetuate suboptimal asymmetries would naturally gravitate toward more rational and efficient equilibria, revealing abundant opportunities to mitigate institutional risk.

This new process could have a variety of effects on each of these groups of customers.

**Providers.** In certain regions of the United States, medical malpractice premiums are chasing highly qualified providers out of markets; this is particularly acute in areas with underserved populations where reimbursements are well below average or nil. Because there are no interoperable feedback loops, physicians and hospitals are exposed



**Figure 3.**

improve care of their patients to become recognized by the NCQA and potentially qualify for P4P incentives. HIEs could provide the same service to all physicians in their service area.

**Public health agencies.** These agencies have the grave responsibility of surveilling the natural history of diseases working their destructive courses through human populations, to rapidly detect bioengineered agents introduced by external enemies and to formulate adequate responses. In spite of that heavy responsibility, they are denied the robust means to do so. Because clinical data cannot be mobilized at the two most important ends of the scale—the whole patient and the whole population—the onset and journey of pathogenic agents are difficult to detect and react to.

While they are not exposed to economic risk, public health agencies are exposed to mission

to onerous tort settlements that would have been avoided in many cases if the error-prone, paper-based system had been replaced by electronic data exchange.

But avoidable errors and the vagaries of torts aside, the excellent quality of care that all responsible providers seek to render is hopelessly degraded by the fact they do not have access to the patient's full medical history at the point of care, nor can they construct a living global view of their patients replete with the latest disease management technology—the pertinent data lays irretrievably scattered across the fragmented delivery landscape.

As pay-for-performance permeates the market, all providers need continuous feedback on the impact of their interventions to better manage their technical risk and achieve a high level of performance. Most pay-for-performance incentives are calibrated to affect more than 5 percent of a physician's income, so the potential to achieve that gain is a powerful motivator to access the information needed to qualify for the rewards.

In November 2005, the National Committee for Quality Assurance (NCQA) announced a partnership with GE Healthcare Information Technology<sup>11</sup> that would enable physicians that use GE's EMR product and participate in its quality improvement data sharing agreement to become recognized by the NCQA for excellence in diabetes and cardiac care. Participating physicians have their data scored by GE and get feedback to understand how they need to

risk, and they are hampered by the availability of already stretched public funds to help invest in health information exchange. However, they could clearly benefit from biosurveillance reports that would stem from aggregated and de-identified patient data collected by the HIE.

*“...unless new feedback loops are established to better understand and manage clinical, population health and insurance risks, opacity will continue to coalesce around competing institutional interests as market asymmetries.”*

**Consumers.** Similarly, consumers—the ostensible primary beneficiaries of the healthcare system—are unable to access information, not only on the relative quality of alternative providers and care pathways, but about their own health. Because of this, they are prone to the most risk. Not only are they exposed to morbidity and mortality risks because of systemic asymmetries, but they bear unpredictable out-of-pocket costs in the wildly confusing delivery interface. To make matters worse, they carry the long-term

burden of non-value added inflation in the form of foregone wages and benefits. It is a mistake to believe governments and corporations pay for these costs; ultimately, consumers pay for all costs, yet they are powerless to make decisions to change this eventuality.

While there are many initiatives under way to create portable personal health records for consumers, HIEs could play a central role in a community by providing patients with data imported from the various providers into their personal health records (PHRs). PHR vendors like WebMD/Emdeon would be able to better serve their consumer customers if they could get a patient's information from the HIE into the PHR.

**Payors and purchasers.** Every year, hundreds of billions of dollars of the total amount spent on healthcare are destroyed because of dead weight loss.<sup>12</sup> In layman's terms, something on the order of one out of every three or four healthcare dollars not only fails to produce value, but actually contributes to harm.

*“...the continued inability to encourage widespread adoption of EMRs in all provider settings, including small physician practices, will hamper the true potential that data exchange holds in reducing waste and inefficiencies...”*

Every organization on the hook for reimbursing healthcare that has used third- and fourth-generation versions of Jerry Solon's original episode of care concept can show there is little correspondence when analyzing disease/patient categories to dollars reimbursed. This means governments; employers, health plans and self-pay patients are exposed to unjustifiable swings in payout volatility, as are the gigantic reinsurance companies that protect employers and plans from the most volatile swings.

Being able to better understand the trends in population health risk and to manage that risk by creating and measuring the impact of targeted interventions could have a very significant positive impact on medical cost inflation. HIEs could provide a valuable service to payors, not only by providing them with performance data on physicians that could be included in scorecards as part of pay-for-performance and transparency efforts, but also by providing them with feedback on population health trends that would help the payor better target the management of patients with chronic diseases.

In addition, HIEs could create feedback loops on specific payor interventions around population health management.

For example, if a payor were to deploy a “healthy lifestyle” program to encourage reduction in risk factors, the HIE could provide the payor with updated aggregate average lab values for the payor's members to determine if the intervention has had any impact.

**Medical device manufacturers and pharmaceutical companies.** At first blush, these parties appear to be the greatest beneficiaries of asymmetrical warps in the system. For decades, the signal they received from the dysfunctional healthcare market was that, no matter how costly the introduction of your new device or molecule is, as long as it shows the least amount of marginal improvement in patient care, we will buy it. And their profit margins show it; they are the most profitable of all healthcare sectors, well above health plans and hospitals.

That said, they are also in the riskiest of healthcare businesses by facing two types of risk exposure. First, particularly for pharmaceutical companies, creating pipelines for future products is enormously expensive, with no guarantee of a successful release. Second, after new products get past the regulatory gatekeepers, it is nearly impossible to get accurate information on wide-scale product interaction in the delivery system. It is for this reason, of necessity; regulators like the Food & Drug Administration (FDA) erect the trial bars so high and the recall thresholds so low. Regulatory approval is society's last resort to ensuring quality before a potentially dangerous product is unleashed.

The ability to collect highly granular clinical data on an episode-of-care basis through an HIE across millions of de-identified patients would radically alter these risks. HIEs could monitor and report to pharmaceutical companies the impact of a specific therapy on a specific population cohort at a fraction of the cost of doing the same thing today. Similarly, a medical device manufacturer could work with a HIE to design a study on the impact of its device on patient care, at a fraction of the cost to perform the same study in a non-HIE environment.

### Conclusion

HIEs that can create these information feedback loops for customers in their community could easily increase their revenue base to a level where the majority of the fixed and variable costs of managing the exchange are covered. As a result, the transaction (or subscription) costs paid by the participating providers could be significantly reduced and perhaps completely eliminated.

However, to accomplish this critical function, HIEs should constitute themselves as truly not-for-profit organizations that function much like a public good utility. The infomediary functions should not be deployed as a means to profit from that information, but mainly to free information for those who can use it best.

If it wants to, the HIE can become an important infome-

diary in the healthcare industry, linking this archipelago and creating the mechanism for a real market to emerge—an environment in which value is created by the appropriate interactions of competitors and other stakeholders with their customers, and risk is managed instead of ignored or, worse yet, thrown onto someone else's island.

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#### References

1. Arrow, Kenneth J. Uncertainty and the Welfare Economics of Medical Care. *The American Economic Review*. December 1963; Vol.LIII, No.5:941 - 973.
2. White KL, Williams TF and Greenberg BG. The Ecology of Medical Care. *New England Journal of Medicine*. 1961;265(18):885-892.
3. Solon JA, Shepps CG, Lee SS. Delineating Patterns of Medical Care. *New England Journal of Medicine*. 1967; 50(9): 1104 - 1113; Solon JA, et al Episodes of Medical Care: Nursing Students' Use of Medical Services, *American Journal of Public Health*. 1969;59(5):401-408.
4. Rosenfeld, et al Evolution of State Health Information Exchange: A Study of Vision, Strategy and Progress. Agency for Healthcare Research and Quality. January 2006; eHealth Initiative Foundation, Emerging Trends and Issues in Health Information Exchange. FeHI. August 2005.
5. See the Institute of Medicine's series of reports on the Quality of Care in America at [www.iom.edu](http://www.iom.edu).
6. In work conducted for the Agency for Health Care Research and Quality, RAND is creating a typology of efficiency in healthcare in which they describe the differences between productive, technical and allocative efficiency.
7. eHealth Initiative HRSA Funded Communities MA-SHARE Business Plan at <http://ehr.medigent.com/assets/collaborate/2006/03/02/eHI%20HRSA%20Funded%20Communities%202005-1220%20MA-SHARE%20Business%20Plan%202005.pdf>.
8. Center for information Technology Leadership, [www.citl.org](http://www.citl.org); and RAND Research Brief, Can HIT Lower Costs and Improve Quality, [www.rand.org](http://www.rand.org).
9. de Brantes, F. Report to the IOM Subcommittee on Pay for Performance. May 2005. Available at <http://www.iom.edu/CMS/3809/25241/25255/26860.aspx>.
10. Blum, R. Causal Relationships from a Large Time-Oriented Clinical Data Base: The Rx Project. *Computers and Biomedical Research*. 1982.
11. See [http://www.ncqa.org/communications/news/PRSC\\_GE.htm](http://www.ncqa.org/communications/news/PRSC_GE.htm).
12. In economics, a deadweight loss (also known as excess burden) is a permanent loss of well-being to society that can occur when equilibrium for a good or service is not Pareto optimal, (that at least one individual could be made better off without others being made worse off). Deadweight loss can be thought of destroying a given quantity of a good or service in question, and in many cases, natural waste in a system (like leakage from water pipes) is equivalent to and is called deadweight loss.