

Case Report ■

Developing IT Infrastructure for Rural Hospitals: A Case Study of Benefits and Challenges of Hospital-to-Hospital Partnerships

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Abstract This article presents a study identifying benefits and challenges of a novel hospital-to-hospital information technology (IT) outsourcing partnership (HHP). The partnership is an innovative response to the problem that many smaller, rural hospitals face: to modernize their IT infrastructure in spite of a severe shortage of resources. The investigators studied three rural hospitals that outsourced their IT infrastructure, through an HHP, to a larger, more technologically advanced hospital in the region. The study design was based on purposive sampling and interviews of senior managers from the four hospitals. The results highlight the HHP's benefits and challenges from both the rural hospitals' and vendor hospital's perspectives. The HHP was considered a success: a key outcome was that it has improved the rural hospitals' IT infrastructure at an affordable cost. The investigators discuss key elements for creating a successful HHP and offer preliminary answers to the question of what it takes for an HHP to be successful.

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Introduction

Information technology (IT) in hospitals has the potential to reduce medical errors, lower costs, and improve patient care. A recent American Hospital Association survey¹ found that IT is playing a larger and more influential role than ever before in hospitals. However, many hospitals cannot afford IT infrastructure. This is particularly true for smaller, rural hospitals that have few resources to develop and maintain a technological infrastructure.^{1,2} At the same time, there is an increasing demand for health services in rural regions.³ This growing need for health services combined with the lack of resources is forcing many rural hospitals to search for alternatives to designing, deploying, and maintaining their own IT infrastructure.

One innovative approach is to outsource rural hospitals' IT infrastructure, not to a traditional IT vendor but rather to another larger, more technologically advanced hospital in their region. To examine the effectiveness of this hospital-to-hospital IT outsourcing partnership (HHP), we conducted an interview-based case study with participants from three rural hospitals plus the larger regional hospital that provides the IT infrastructure to identify the benefits and challenges of hospital-to-hospital IT outsourcing partnership.

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Background

Information technology outsourcing refers to the transfer of responsibility for providing IT services to an external provider. During the 1980s outsourcing became a widely accepted method for managing IT.^{4,5} Until recently, the most common types of IT arrangements included⁶: (1) buy-in contract, (2) fee-for-service, and (3) strategic alliance. However, more recently, a fourth approach, a partnership arrangement, is gaining more interest.^{7,8} A partnership represents shared goals between the client and vendor, not only for risks/rewards, but also for long-term focus and joint activities.⁹ Little empirical research of this approach exists because such arrangements are not yet widespread.¹⁰

In the health care industry, much of the outsourcing has focused on specialized patient services, such as dialysis and diagnostic imaging as part of the growing trend in telemedicine, as well as for more mundane physician tasks such as transcribing doctor notes.¹¹ The key impetus for outsourcing in health care is similar to reasons in other domains: lower cost alternatives and access to a larger talent pool. Although limited, prior research on IT outsourcing in hospitals suggests that geographical location (rural vs. urban), hospital size, and physician involvement in IT functions are factors that have influenced outsourcing behavior.¹² Surveys of hospital IT outsourcing activities reveal that currently fewer than 15% of IT functions are outsourced,¹² but hospitals are increasingly under pressure to build sophisticated IT infrastructures and also to control IT costs. In this environment, IT is becoming the focus for additional outsourcing initiatives in hospitals both in the US^{13,14} and abroad.¹⁵

Research Methods

Research Sites and Participants

The participants in the study were all the senior management personnel, knowledgeable about the outsourcing arrangement at the three rural hospitals (R1, R2, R3) and the

Table 1 ■ Research Sites

| Hospital | Size (Number of Beds) | Participation in HHP (Number of Years) | Number of Interviewees |
|----------|-----------------------|--|------------------------|
| RH | 411 | 10 | 6 |
| R1 | 83 | 10 | 2 |
| R2 | 25 | 6 | 2 |
| R3 | 9 | 5 | 1 |

HHP = hospital-to-hospital IT outsourcing program; RH = regional hospital; R1, R2, R3 = rural hospitals 1, 2, 3.

regional hospital (RH) (Table 1). Each rural hospital had signed a separate IT outsourcing agreement with the regional hospital (RH) for their IT products and services. The study was approved by Penn State University's institutional review board.

Regional Hospital

The regional hospital (RH) is a 411-bed short-term acute care facility. It serves as the main referral hospital for the rural hospitals in the region. RH is also the provider of IT products and services to each of the rural hospitals in the HHP. It operates as the data center, and provides hardware interfaces, software applications, and customer support for its partners. RH's IT department consists of 55 staff members who support RH's internal operations as well as the IT needs of partners that have contracted through the HHP. We interviewed six employees from RH. They included the chief medical information officer and five managing directors from the IT group, including software services, hardware, network, and telecommunication services and customer support services.

Rural Hospitals (R1, R2, R3)

Rural hospital 1 (R1) is an 83-bed short-term acute care hospital located 51 miles northwest of RH. The partnership agreement between RH and R1 has been in place for approximately 10 years. RH provides IT support for the majority of their hardware and software systems. This includes product installation, training, and on-call service. Through the HHP, R1 has received financial applications, clinical applications, radiology, and the laboratory information system. The study participants from R1 included an executive officer and the head of the IT department. Both participants had been involved in the IT outsourcing arrangement from the beginning.

Rural hospital 2 (R2) is a 25-bed critical access hospital that is located 17 miles southwest of RH. R2's HHP agreement has been in place for approximately 6 years. Prior to joining the HHP, R2 had only minimal computerized patient billing. Through the HHP, R2 acquired accounting capabilities and a radiology information system, and is currently in the process of installing clinical software and converting their laboratory information system. The study participants from R2 included a hospital executive and senior manager, both of whom have held their jobs for a number of years and have been involved in the partnership since the beginning.

Rural hospital 3 (R3) is a 9-bed facility that is located 55 miles west of RH. The partnership agreement between RH and R3 has been in place for approximately 5 years. RH provides IT support for all of R3's hardware and systems, including product installation, training, and on-call service.

Prior to joining the HHP, R3 had only one computer in the entire facility. Through the HHP, R3 now has access to patient accounting software and is about to get access to clinical software and a laboratory information system. The study participant from R3 was the hospital administrator.

Data Collection and Analysis

We conducted 11 interviews over a 6-month period in 2006–2007. The interviews were digitally recorded, transcribed, and supplemented by researcher field notes. The interview transcripts were systematically studied using open coding to identify and categorize emerging concepts. This analysis¹⁶ was used throughout the coding process to ensure that the developing concepts and categories were grounded in the data, consistent with the grounded theory approach.¹⁷

Results

Participants expressed a generally positive view of the HHP. However, the interviews also revealed some major challenges to implementing the arrangement.

Benefits

We discuss two benefits that the HHP provided to the participating hospitals (Table 2).

Financial Savings

The most prominent financial benefit for the rural hospitals was the ability to afford a comprehensive IT infrastructure at a relatively low price. For instance, the rural hospitals only pay for the percentage of the hardware dedicated to their needs. Therefore, if RH buys an additional hard drive, the rural hospitals would only be charged based on the percentage of the hard drive that they use. These cost savings extend to software, licenses, and maintenance costs that are all shared with RH. Because RH buys most of its clinical systems from a single national vendor, it is able to pass on to its partners the discounts that it receives from the vendor. The rural hospitals would not have been able to get these discounts on their own because of their small size. The HHP led to economies of scale that made it possible for the rural hospitals to afford technologies that they would not have been able to otherwise afford. It was a major driver in the decision to participate in the HHP.

[R1]: "Financially it made sense for us. Being part of a large purchase group provided us with an opportunity to look at a brand new financial and clinical system, with more applications and mature systems."

[R2]: "[It was the] most technical infrastructure and services we could get for the price. It would be very difficult for us to afford to go out and buy our own software packages on the open market."

The economies of scale provided financial savings to RH as well. In addition to passing along some of their IT costs to

Table 2 ■ Benefits of the HHP

| Benefits | Features |
|---------------------|--|
| Financial savings | Economies of scale Cost basis |
| Shared IT expertise | IT staff experts Access to IT staff of 55 |

Abbreviations as in Table 1.

the rural hospitals, RH was able to offset some of their staff costs by charging the rural hospitals for any staff time devoted to their needs. Therefore, RH was able to increase its IT workforce even though RH's portion of the workload did not increase at the same pace. A second financial benefit was the savings in ongoing operating costs. Because the HHP was established on a cost basis, the rural hospitals did not incur the costs typically found in a client-vendor contract. Instead, the rural hospitals were charged a fee based on the number of hours that RH supported them at a rate equal to the RH employee's salary plus benefits. This resulted in a lower service cost structure compared to a typical vendor's hourly consulting rate.

Shared IT Staff and Expertise

The rural hospitals also benefit from access to RH's IT staff. These personnel are skilled with the IT products because they work with them on a daily basis at RH. Besides installing the systems and providing training, the IT staff also provides technical support to the rural hospitals. Without access to their expertise, it would have been exceedingly difficult for the rural hospitals to deploy and use the IT products. Prior to the partnership, the rural hospitals had minimal or no IT personnel.

[R1]: "A less-than-100 bed hospital can't afford an IT staff. We're not a large enough organization that can justify having a full-time network engineer or a full-time interface analyst."

[R3]: "RH's IT Department has more employees than our whole facility does. That's the perspective."

Although it is tempting to characterize this lack of access to IT expertise as simply a financial concern, the problem is more acute. For these rural hospitals, it was difficult to attract IT professionals to a rural community hospital that lacked an existing IT infrastructure. The HHP provided a human resource benefit that complemented the technological resources. RH also gained a significant benefit: it was able to increase the size of its IT staff. The growth in staffing increased primarily because of the support RH provided to the rural hospitals. The IT staff growth allowed RH to develop and integrate new applications that they would not have been able to under normal circumstances. As the HHP progressed, the existence of skilled IT staff at RH was a significant ancillary benefit to the rural hospitals; they were more confident in the system because the IT staff was already trained in the workings of the hospital system that they would also be using. For RH, the rural hospitals provided additional cases that the IT staff could use to broaden their expertise, and also an impetus to hire additional IT staff.

Table 3 ■ Challenges to HHP

| Challenges | Features |
|-------------------------------|---|
| Customer service expectations | In-sourcing hospital in vendor role Customer satisfaction feedback |
| Complexity of interdependence | Lock-in |

Abbreviations as in Table 1.

Challenges

Although the participants asserted that they benefited from the HHP, they also acknowledged several challenges. We discuss two major challenges (Table 3).

Customer Service Expectations

One challenge was RH's view of its customer service role versus the customer service expectations of the rural hospitals. One of the distinctive characteristics of the HHP in comparison to a more traditional outsourcing arrangement is the dual role played by RH—that of a provider of health care services, and as a vendor for IT products and services. These somewhat contradictory roles created a measure of conflict with the rural hospitals as they struggled with their own role as a hospital and client and their customer service expectations in this partnership.

[R1]: "They have accountability as the vendor. We want to be treated like a customer."

[R2]: "We are a sideline, not a business to them, an afterthought. Their main business is health care."

As a result, the rural hospitals perceived that their customer service requests received a lower priority and customer service attentiveness compared to what may have been provided by a commercial vendor in a traditional outsourcing arrangement. They believed that a traditional vendor would want to meet their needs in order to retain their business, but that this was not always the case in the HHP. They also experienced limited opportunities to provide customer satisfaction feedback, but acknowledged the dual nature of this responsibility. RH was not oblivious to the problem. RH's management recognized that the rural hospitals may not always get the support they deserved from the HHP.

[RH]: "the only problem . . . one of the biggest concerns . . . they don't get the support they deserve. Lack of people, timing isn't right [to be able to provide someone on-site]."

These customer service challenges were most prominent in the early phases of the partnership, when expectations were being crystallized. As the HHP progressed and the relationships matured, the rural hospitals reported an improvement in both the level and quality of customer service as the roles and responsibilities between themselves and RH evolved and became more clearly defined over the course of the time.

Complexity of Interdependence

The second challenge relates to the increasing interdependence between the rural hospitals and RH. Participants from the rural hospitals pointed out that the interconnectivity that resulted from the arrangement resulted in unintentionally constraining their autonomy. In fact, both RH and the rural hospitals observed this growing interdependency through purchases of software packages and systems integration. The rural hospitals expressed concern over this growing reliance on RH.

[RH]: "It's an evolving relationship, the more we do for them, the more intertwined we are, the hole gets deeper and deeper. Each passing year their reliance on us and our involvement with them becomes stronger."

[R2]: "It would be painful to separate. The more packages we get into, like radiology, they're so interlinked."

Although the rural hospitals still had their autonomy to make their own decisions in the selection of any additional products, it was clear that maintaining IT support would be difficult for them if they chose a product different than the one supported by RH. As a result, even though they ostensibly had the authority to sever the relationship at the end of the contract period, the rural hospitals were aware of the negative consequences. For instance, if they were to sever the relationship, they would have to duplicate their existing systems and maintain them on their own. This would not be a financially viable alternative for them. The “lock-in” that resulted from the HHP is a source of concern for the rural hospitals.

Discussion

The challenges and benefits suggest two important lessons: (1) interdependency of relationships is complex and must be carefully managed, and (2) goal congruence is important. These lessons may also have implications for successfully managing health information exchanges.

Interdependence is the extent to which two parties rely on each other to achieve their respective goals. It also suggests that the parties must have complementary assets and skills to help create successful partnership.¹⁰ One major advantage of the HHP is the relationship that a “client” (rural hospitals) has with a “provider” of IT services (the regional hospital) that understands the IT needs of the client within the context of the same community. However, interdependence also leads to a certain degree of loss of autonomy, or lock-in, for the client hospitals. For instance, the smaller rural hospitals are now closely linked with the larger regional hospital, and this link is difficult to break. “Although there certainly are ways of getting out of the relationship, untangling it is very complex” [R1]. “For them to cut the cord and duplicate what they have on their own would be huge, you’d have to have deep pockets” [RH]. The integration limited the freedom of the rural hospitals to purchase and install compatible products from a separate third-party vendor. This interconnectivity grew increasingly complex over time as more products were added to the system, making it difficult to reverse this relationship.¹⁸ Furthermore, the rural hospitals had to relinquish some of their decision-making authority to the regional hospital. For example, the rural hospitals had to abide by network security policies established by RH to protect the entire network, and could not easily make independent changes for their own hospital. Hospitals involved in an HHP must understand the complexities and issues surrounding these partnerships.

The rural hospitals found that having a mutual understanding of their primary mission and philosophy—to offer quality patient care—strengthened the foundation of their partnership with the regional hospital. As one rural hospital stated, “It’s good to have a contract with an organization in the same line of business. We have a very similar mission. How we do what we do is similar. They understand us and we understand them. That’s comfortable when you’re at the table” [R1]. Furthermore, because the hospitals operated in the same regional setting, they shared an additional, cooperative mission—to improve the regional network of health care. For each rural hospital in this study, RH is also their referral hospital. This IT collaboration is therefore beneficial

from the viewpoint of both RH and the rural hospitals’ congruent goals—to provide a stronger continuum of care to patients throughout the region. A related concern is competition for services between hospitals. The rural hospitals, as primarily critical care facilities, do not directly compete with the RH for patient services. The rural hospitals provide minimal care and offer a limited range of services. For example, in the case of a heart attack, after emergency care is administered, the patient is transferred from the rural hospital to RH. There may be some minor, indirect competition for more basic patient services available at all hospitals, such as outpatient laboratory or radiology, but it is considered insignificant because of the distance between hospitals, and has not surfaced as an issue in the HHP. Goal congruence between the regional and rural hospitals played an important role in the success of the HHP.

Conclusion

In this case study, we examined one innovative approach to meeting the IT needs of rural hospitals through the development of an HHP. In this partnership, the rural hospitals outsourced their IT services to a larger, more technologically intensive regional hospital. Unlike a traditional outsourcing arrangement, the HHP was not designed as a profit-making venture; instead, it was conceived, implemented, and matured over time as an approach to improve the IT capabilities of the rural hospitals so that they could provide better patient care. Furthermore, the larger regional hospital also benefited from the HHP. The results from this study show that hospital-to-hospital partnerships can be successful for all the partners if properly managed.

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