

The Diffusion & Adoption of Innovations

**Testimony before Subcommittee on Quality Improvement & Environment
President's Advisory Commission on Consumer Protection and Quality in Health Care Industry
September 9, 1997**

**Andrew H. Van de Ven & Shawn M. Lofstrom
Carlson School of Management, University of Minnesota**

With Advice from Minnesota Health Care Participants:

- Catherine Borbas, Executive Director
Healthcare Education & Research Foundation
- Dr. Jeffrey Chell, Chief Medical Officer,
Allina Health System
- Andrew P. Czajkowski, CEO,
Blue Cross/Blue Shield of MN
- Bruce Erickson, Professor, Carlson School
Univ. of Minnesota
- George Halvorson, CEO, HealthPartners, Inc.
Chair, Group Health Assoc. of America
- Dr. K. James Ehlen, President, Allina
- Cindy Goff, Public Policy,
Blue Cross/Blue Shield of MN
- Timothy Hansen, CEO, HealthEast
- Dr. John Kleinman, VP Clinical Affairs, Allina
- Jan Malcolm, VP, Public Relations,
Allina Health System
- Dr. Gordon Mosser, Executive Director,
Institute for Clinical Systems Integration
- Richard Norling, CEO, Fairview Health System
- Dr. James Reinertsen, CEO,
HealthSystem Minnesota
- Dr. William Spinelli, Medical Director,
Allina Medical Group
- Gordon Sprenger, Allina Executive Officer,
Former Chair, American Hospital Assoc.
- Mary Ann Stump, Sr. VP, Quality Outcomes
BlueCross/Blue Shield of MN
- Stephen Wetzell, Executive Director,
Buyers Health Care Action Group

Thank you for the opportunity to comment on questions raised by the Subcommittee.

I am a professor of organizational innovation and change at the Carlson School of the Univ. of Minnesota. I invited Shawn Lofstrom, a 3rd-year doctoral student and a Ph.D. research fellow in healthcare organization, to assist me in preparing responses to your questions. With several other doctoral fellows, we have been studying changes in Minnesota healthcare organizations and industry for 4 years. During the 1980's I directed a research program in which 30 U. of M. faculty and doctoral students tracked the development of a variety of technological and process innovations in public and private organizations from their initial concept stage to their commercial implementation or termination.

To prepare for this presentation, we spoke with members of the Minnesota health care community to obtain their views on your questions.

We also reviewed several reports. We found that members of your Subcommittee of the President's Advisory Commission have made significant contributions and accomplishments in addressing the questions you posed to me. So I look forward to sharing and learning with you what we know about the diffusion and adoption of health care innovations.

Questions On Subcommittee's Agenda

- What should be done by health organizations or policy makers to improve the dissemination and adoption of clinical health care scientific knowledge and technologies?
- What types of technical assistance can help the adoption of effective health care innovations?
- What can the health care industry learn from other models and industries?
- How can innovations in health care be encouraged to be public, rather than proprietary goods?

Here are the questions that you asked me to address.

In my opening remarks, I will summarize:

- Some of our social science knowledge on these questions;
- Factors that influence innovation diffusion & adoption at the industry and organization levels; and
- Draw some inferences that may enable innovation diffusion in the health care industry and facilitate innovation adoption by health care organizations.

Innovation Diffusion & Adoption - Basic Concepts

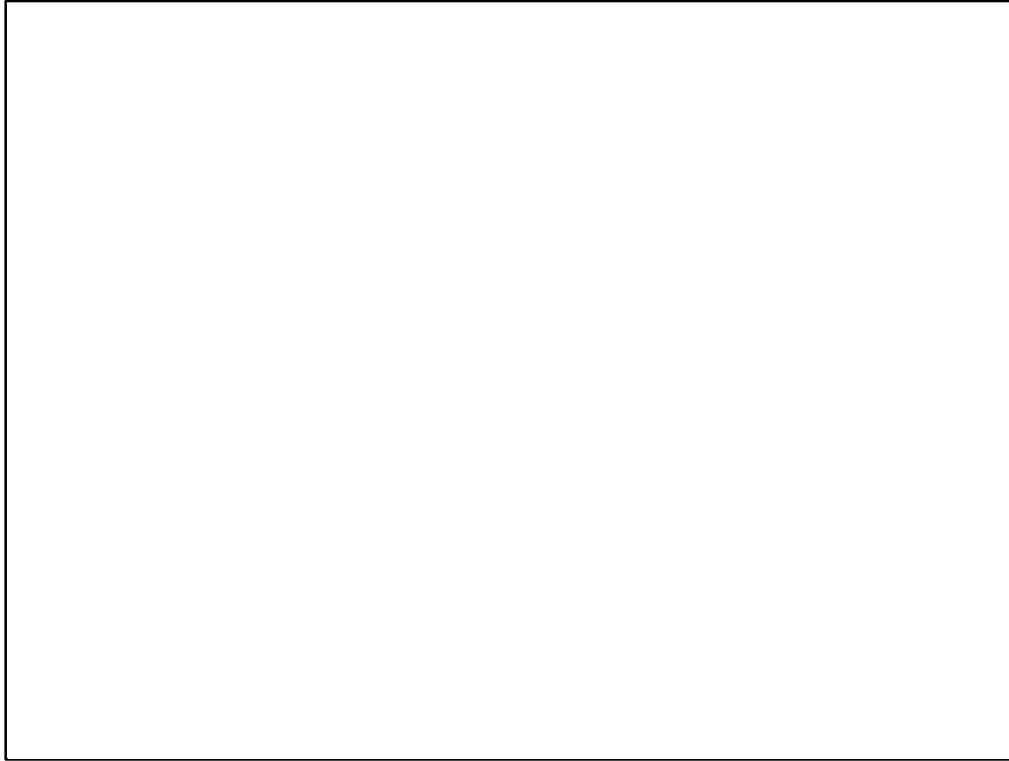
- **Diffusion - Spread & use of new practices in a population**
 - Awareness & use of science-based practices in the public domain
 - Many public & private sector actors influence diffusion
 - Need for a larger systems view of health care industry
- **Adoption - Implementing new practices by organizations**
 - Healthcare organizations compete in implementing new practices
 - Factors that facilitate innovation adoption
 - Adoption is more complex for organizations than for individuals

As used here, **diffusion** is the dissemination and spread of a new health care guideline or technology in the population of health care providers.

- Adopters of an innovation are but the tip of an iceberg; many other public and private actors play key roles. We will suggest a systems framework of the health care industry to discuss the different roles of public and private sector actors in the diffusion of innovations.

Adoption focuses on the selection and implementation of an innovation.

- The central problem in adoption is managing behavioral change in organizations that attempt to implement an innovation.
- Based on social science studies, we will present some principles for managing change, and discuss how the adoption process varies by organizations.



Diffusion is often represented as an S-shaped curve of the % of members in a population who use an innovation over time.

- Like the case of an agricultural weed spray shown here, the diffusion process involves a time lag when different kinds of adopters become aware of and use an innovation. Innovators begin the process, and they represent 2.5% of all adopters. They are followed by another 13% who are often called opinion leaders; then an early majority, a late majority, and concluding with 13% adopting laggards. Similar proportions of different adopters in the S-shaped diffusion curve have been found for other innovations studied, and are summarized in Everett Roger's book, Communication of Innovations (4th edition, 1995).

The S-shaped curve raises several practical policy issues:

- The steepness of the curve: The flatter the curve the longer it takes to diffuse an innovation into a population. What can be done to induce a steeper and more vertical pitch to the S-shaped diffusion curve for health care innovations?
- The fatness of the curve: The wider the curve the longer the time lag between awareness and adoption of an innovation for any group of decision makers. What can be done to induce a narrower curve?

In a recent paper, Commissioner Donald Berwick captured these policy issues by stating, "We need to learn how to diffuse innovations "not too slowly, not too fast, but just right."

Factors Influencing Innovation Diffusion

- **Adoption rate increases when the innovation is perceived:**
 - to have a relative advantage based on objective evidence,
 - be compatible with existing practices,
 - be easy to understand - not complex,
 - to be observable to see how it works in demonstration sites,
 - it can be tried out and revised to fit local needs.
- **Factors at health care industry level:**
 - communications: mass media plus interpersonal
 - interconnectedness of health care network
 - availability of resources & change agents
 - Time, cost, & risk for private firms to adopt innovations decrease with an enabling industry infrastructure.

Source: Everett Rogers Communication of Innovations 4th Ed. NY: Free Press, 1995

In his book, Everett Rogers distilled the findings of over 4,000 social science studies of innovation diffusion and adoption. These studies provide strong scientific evidence that the factors listed here facilitate innovation diffusion. They deal with:

- characteristics of the innovation, itself
- system enabling conditions, which all deal with an industry infrastructure,
- characteristics of adopters (which I will discuss later).

Minnesota Healthcare participants told us that:

While it may appear that the health care industry is effective at disseminating medical practices, central issues remain to be addressed:

- CQI advances should be based on scientific evidence, not politics, legislation or regulation. In addition, there is a need to reaffirm the legitimacy of scientific knowledge, which no longer can be taken for granted. Dr. James Reinertsen called for a national debate on the nature of the scientific process and evidence in influencing the promulgation of health care standards and guidelines.
- Scientific CQI advances should be kept in the public domain; healthcare organizations compete by implementing these publicly available advances. As Gordon Sprenger stated, “withholding such advances is neither the culture of the medical profession, nor what the public deserves.”
- In addition to disseminating new proven practices, an important concern is how to eliminate bad practices, such as Fen Phen. Because of organizational inertia and commitments, eliminating an existing practice tends to take more time and effort than adopting a new practice, other things held the same.

Health Care Industry Infrastructure

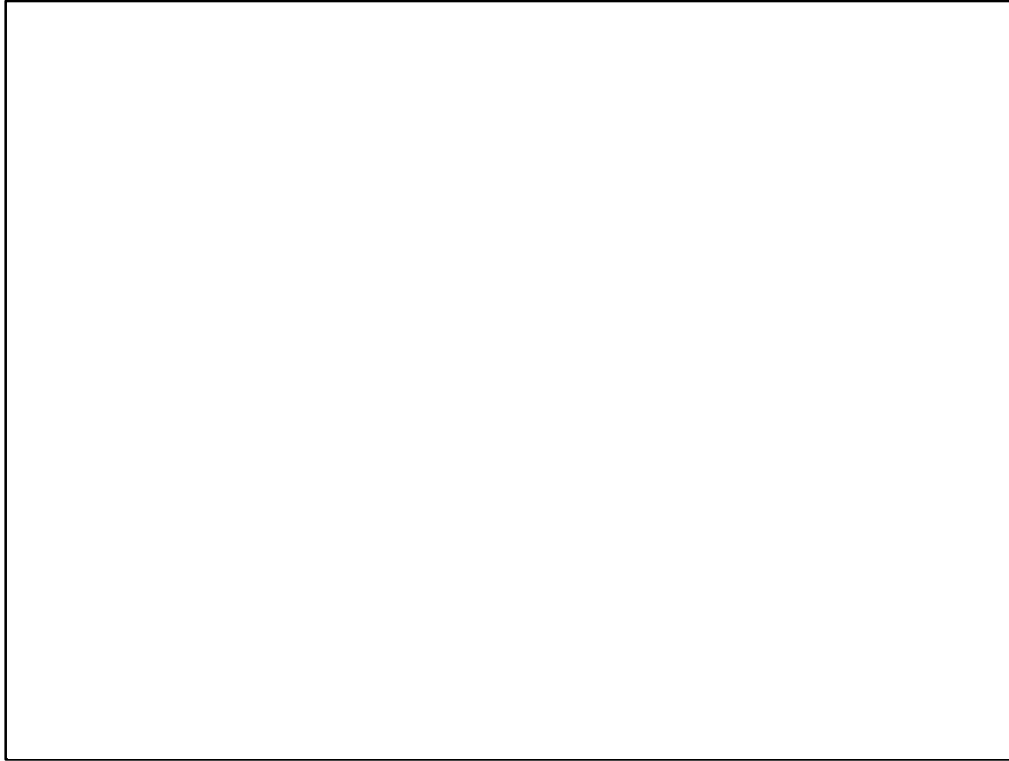
- **Institutional arrangements**
 - Societal norms, laws & regulations
 - Standards & legitimation
- **Supply of public goods & resources**
 - Advances in basic scientific knowledge & technologies
 - Education & training of competent work force
 - Financing & insurance for these public goods
- **Consumer demand for health care**
 - Consumer information and education
 - Market competition & payer organization
- **Health care delivery by private organizations**
 - Organization & incentives of health care organizations
 - Applied R&D and implementation of CQI guidelines

Source: Adapted from A. H. Van de Ven, "The Emergence of an Industrial Infrastructure for Technological Innovation," Journal of Comparative Economics, vol. 17, 1993, pp. 338-365.

The health care system is a complex interdependent web of many public and private actors and institutions. One way to appreciate this is to think about all the core institutions and functions that need to be in place for the health care industry to operate and evolve over time. In particular, think about the four major subsystems shown here.

- Institutional arrangements: The ultimate authorities that legitimate, regulate, and standardize an industry are governmental agencies, professional trade associations, and scientific/technical communities that society recognizes as its delegated agencies.
- The supply of three kinds of public resources are critical to all health care industry participants: advancements in basic scientific and technological knowledge, financing and insurance arrangements, and a pool of competent professionals.
- Consumer demand is essential to a market economy, and in health care the development of informed, competent, and responsible consumers may be the most neglected component of the industry system.
- Private health care organizations transform the available supply of public resources (scientific knowledge and work force competence) into proprietary products and services to meet customer demand.

Discussions of innovation diffusion and adoption tend to over-emphasize private health care providers. Much more attention is needed in diffusing innovations into the other three components of the health care system, for they represent the infrastructure of the health care industry.



The evolution of this infrastructure for health care is a collective achievement. It is built and modified over the years by the accretion of numerous contributions of government agencies, universities, research institutes, professional associations, consumers, buyers, financiers, and providers. No single actor has the resources or competence to control it all, but each plays a key role.

The system components are interdependent: initiatives can help and hinder each other.

- For example, building informed consumers is jeopardized when legislated guidelines are at odds with basic scientific advances.

Organizations that “run in packs” will be more successful than those that “go it alone.”

- Running in packs is analogous to a bicycle race, where participants cue their pace to one another and take turns breaking wind resistance until the ending sprint. Doing so *enables* (but does not assure) each a chance to race faster and perhaps break a record.

Public and private health care organizations need to learn to “run in packs”: i.e., simultaneously cooperate, complement, and compete with one another to build various components of the health care infrastructure, for it is essential to their collective survival and success.

Research supports the proposition of “running in packs” in industries where products and services are difficult to keep proprietary and relatively easy to imitate -- as is true for most of the health care delivery industry. In our studies we have seen it distinguish the winners from losers in the commercialization of several innovations.

- For example, development of GAAs integrated circuits in the US. and Japan.

Innovation Adoption Process by Organizations

People are more likely to implement their own innovations than someone else's.

- **People Resist Change when the Change:**
 - is not understood => provide trial demonstrations
 - costs outweigh benefits => make evidence-based case
 - is imposed or threatening => encourage local reinvention
 - incompatible with arrangements => align structures & incentives
 - bogs down => need process facilitators & leadership support
 - process wanders => collect & feedback data on process to stimulate learning
- **Adoption processes vary when:**
 - Decision unit is an individual or complex organization,
 - Change is externally mandated or locally chosen to fit situations,
 - System is pluralistic with different mental models for organizing.
 - Participants respect different views & negotiate constructively.

Source: A. Van de Ven, H. Angle, & M. Poole. *Research on the Management of Innovation* NY: Harper&Row, 1989.

Health care participants told us that innovation adoption is a much greater problem than the dissemination of innovations in the health care system.

Innovation adoption is a challenge for all system actors-- government agencies, universities, research institutes, professional associations, consumers, buyers, financiers, and providers.

Basic principles of innovation adoption that have wide research support :

People are more likely to implement their own innovations than someone else's.

- the “not invented here” syndrome is not pathological behavior, once we understand the rational reasons why people resist change.

People are not likely to change until they recognize a need for change.

- Provide direct personal exposure to conditions of patients, buyers, and scientific advances

In the case of externally mandated innovation, watch out for those who follow the letter of the law (mandate), for they may be complying in bad faith.

- Compliance (without internalization) abdicates responsibility for behavior;
You see it when you hear people say, “I’m just following orders.”
- Voluntary adoption implies a responsible commitment to changed behaviors.

Innovation adoption is easier for individuals than for complex organizations

- There are more social and political “hassles” to overcome in implementing innovations in complex organizations. But these organizations have a greater potential for innovation because they have more diverse resources to draw upon. Thus, implementation may be easier for individuals, but complex organizations can undertake more significant innovations if they can constructively accommodate divergent viewpoints.

Alternative Models of Organizing Health Care

	Bureaucracy	Market	Profession	Community
Model	A hierarchical structure designed to achieve system goals in most efficient manner.	Commercial enterprise designed to compete for material gain in the market.	An exclusive association that advances knowledge & practice of a specialty.	A benevolent group that serves the greater good of society because its the right thing to do.
Key Elements	Division of labor Specialization Impersonal procedures Hierarchical authority Standardization	Customer-driven Competition Strategic advantage Material self interests Instrumentalism	Professional standards Collegial decisions Expert authority Community of practice Self-direction	Social mission/cause Professionalism Role identity Social obligation Norm of appropriateness
Levers for change	Top-down mandates & enforcement of regulations	Diffuse best practices through free-market competition	Professionals prescribe practices with strongest scientific evidence & peer judgments	Provide knowledge & support for local determination & adaptation to needs

Source: J. S. Bunderson, S. M. Lofstrom, & A. H. Van de Ven, "Administrative and Occupational Models of Organizing," Univ. of Minnesota, Strategic Management Research Center Discussion Paper, July, 1997

The health care industry is undergoing massive transformation as private physician practices, independent hospitals, and health insurance plans are merging to form vertical or virtual integrated health care systems. These changes juxtapose individuals with different professional and administrative values, and collide organizations with historically different cultural identities and practices.

One participant stated, "Today's organizational brothers and sisters were yesterday's enemies and market competitors. It will take some time to align our identities." System managers are struggling to understand how to accommodate and leverage these different orientations to achieve a new vision of health care.

In particular, we are finding people with four distinct mental models in these new "hybrid" organizations: bureaucracy, market, profession, and community. (review each model)

Each model is an internally consistent and equally legitimate basis for organizing key parts of the health care system. A strong case can be made that each model is necessary for the long-run survival of a health care system. Squelching any one of these models may hamper the adaptive capabilities of a health care system.

The trick is to find ways to respect and heedfully accommodate these pluralistic values, preferences, and ideologies that are simultaneously present in many new health care organizations. Accomplishing this trick represents a significant challenge for management theory and practice.

Suggestions for Innovation Diffusion & Adoption

What can we do to increase the diffusion & adoption of innovations?

“Run in Packs” to Develop Infrastructure for Innovation

- Support development of science-based evidence of knowledge advances - e.g., AHCPR
- Provide access & assistance to basic knowledge/standards for local adoption - IS is critical
- Review curricula of medical education and training - see 1995 Pew Commission report
- Conduct professional forums for sharing/diffusing knowledge - e.g., consensus conferences
- Develop informed, competent & responsible consumers - may be the biggest challenge

Encourage Public and Private Health Care Organizations to:

- Provide technical assistance for innovation adoption - consider Ag. Extension Service model
- Engage in peer-group treatment and review of health care
- Realign organization structures & incentives for innovation adoption
- Open information channels & conflict resolution mechanisms
- Support the July 1997 report of Progressive Policy Institute Advisory Group

“Normal people can and will innovate of their own initiatives if enabling conditions are present”

In conclusion, we offer the following suggestions for addressing your questions.

Encourage health care organizations to run in packs (simultaneously cooperating, complementing, and competing) in building the infrastructure for health care innovation.

In particular, pay more attention to the supply and demand components of the system.

-- review specific suggestions

Encourage all organizations to adopt innovations befitting their roles in the system.

-- The suggestions for innovation adoption are not only for private organizations, but also for government, professions, research, education, financial, & consumer groups.

The strongest message from Minnesota health care participants is to insist on scientifically-based evidence for CQI. Regulation of clinical standards and guidelines has the negative consequences of:

-- politicizing and thwarting scientific knowledge

-- reducing necessary (as well as unnecessary) variations in the system

-- squelching experimentation, learning and improvements

Ending quote. Thank you for your attention and considerations.