

The Role of Research in Integrated Healthcare Systems: The HMO Research Network

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Science is the basis of medicine. Good science leads to better decisions and more effective systems to support those decisions. Most individuals associate science primarily with academic institutions. However, top-quality research relevant to managing the health of populations and the care of specific clinical conditions is increasingly being carried out by investigators working in integrated healthcare systems. This introduction outlines the activities of the HMO Research Network, whose researchers have made and continue to make important contributions to the field of health research. Its objective is to inform readers of the activities and value of systems-based health research. We describe the importance and extent of the research conducted by HMO Research Network members, as well as the advantages of conducting research in such settings.

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Integrated care health maintenance organizations (HMOs) provide an ideal mix of population base, electronic medical and financial databases, and longitudinal observation for much health research. They are especially well situated for research addressing issues such as the costs and effectiveness of prevention and treatment practices, organization of care, secular trends in diseases, and relative priorities on how to apportion scarce resources. The HMO Research Network (HMORN) is carrying out research that is crucial to improving the quality, availability, and effectiveness of healthcare. The 13 HMORN research centers perform 90% of all research conducted by HMOs with formal research centers.¹

The first integrated care system research center was founded in 1961, and the advantages of conducting research in such environments led to the formation of additional centers. In 1994, these centers established a professional organization, the HMORN, to encourage high-quality, public domain research within HMOs. The 13 geographically dispersed HMORN centers represent integrated care systems with approximately 13 million members. Collectively, they study a broad range of health issues. Research conducted by member organizations is in the public domain, and results of their studies are published in approximately 1200 peer-reviewed publications annually.

Members of the HMORN include several exclusively prepaid group practices, several mixed-model HMOs,

and 1 independent practice association HMO. These centers vary in structure and organization, as do their parent health plans. However, they have common access to a defined population of members and data regarding these members, much of it electronically available, which permits longitudinal evaluation of health practices. Their placement within large health systems makes rigorous evaluation of alternative approaches to care feasible. The members of the HMORN have electronic medical records systems or are in the process of installing them. As they come online, these systems will provide unprecedented opportunities to evaluate alternative approaches to treatment, long-term outcomes of care, cost-effectiveness and cost-benefits, rare disease epidemiology and treatment, and many other critical healthcare issues.

Table 1 lists the members of the HMORN and selected characteristics of their research centers. Each center is funded primarily through competitive grants and contracts from federal, foundation, and proprietary funding organizations. The annual HMORN scientific meeting combines presentations of scientific papers with seminars on how to develop collaborative research studies that permit the member organizations to address research questions that cannot be carried out within single healthcare organizations.

Research from the HMORN centers has affected the organization, quality of care, federal and state health policies and regulations, plan benefits, and many other aspects of healthcare delivery. The studies summarized in **Table 2** are some examples of HMORN projects that have influenced healthcare, health law, and health policy. At any given point in time, the members of the HMORN are conducting more than 2000 research studies.

The HMORN research centers have also been key participants in some of the nation's most important

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Table 1. HMO Research Network (HMORN) Members and Their Characteristics

HMORN Member	Year Research Center Began	2002 Members, No.	2002 Research Budget, \$ Million	2002 Publications, No.*
Division of Research, Kaiser Permanente (KP), Oakland, Calif	1961	3 500 000	28.1	188
Center for Health Research, KP, Portland, Ore	1964	452 000	26.2	102
KP, Southern California, Pasadena	1978	3 000 000	9.7	127
Henry Ford Health System	1979	571 000	62.0	Approximately 300 [†]
Group Health Cooperative	1983	588 000	19.8	143
Health Partners Research Foundation, Minneapolis, Minn	1989	657 000	7.3	80
Lovelace Clinic Foundation, Albuquerque, NM	1990	240 000	2.3	6
KP, Colorado, Denver	1990	370 000	5.7	17 [‡]
Harvard Pilgrim, Boston, Mass	1992	770 000	15.0	80
Meyers Primary Care Institute (Fallon Healthcare), Worcester, Mass	1996	207 000	2.2	66
United Healthcare, Minnetonka, Minn	1997	3 000 000 [§]	Not Available	11 [‡]
KP, Georgia	1998	281 000	1.1	7
KP, Hawaii	1999	227 000	2.5	16

*Some publication counts include publications by clinicians and non-peer-reviewed publications (e.g., book chapters); others do not.

[†]Henry Ford Health System has a large clinical science research program; 10% to 15% of publications are in health services, epidemiology, and related fields similar to those of other HMORN members.

[‡]2001 publications.

[§]Number of members accessible for research purposes.

multisite National Institutes of Health studies, including the Multiple Risk Factor Intervention Trial,²⁴ Systolic Hypertension in the Elderly Program,²⁵ Study of Osteoporotic Fractures,²⁶ Trials of Hypertension Prevention,²⁷ Beta-Blocker Heart Attack Trial,²⁸ Women's Health Initiative,²⁹ Dietary Approaches to Stop Hypertension,¹⁰ and others. The HMORN participates in 5 federally funded, national, multisite research networks (Table 3): Cancer Research Network, Center for Education and Research in Therapeutics, Cancer Care Outcomes Research and Surveillance, Integrated Delivery System Research Network, and Vaccine Safety Datalink. The HMORN also has formal partnerships with the American Association of Health Plans and the

Alliance of Community Health Plans for the conduct of public health research.

BENEFITS OF RESEARCH IN INTEGRATED CARE SYSTEMS

Integrated care research has unique access to entire populations, comprehensive data systems, and real-world delivery issues.

Study Populations

Defined Population Base. Defined populations of plan members permit long-term observation, with numerators (the sick) and denominators (the popula-

Table 2. Some Managed Care Research Projects With Significant Influence on Policy and Practice

Project and Selected References	Description	Influence	HMO Research Network Members
Poverty project and Medicare Plus Project ²⁻⁴	Enrolled Medicaid and Medicare recipients in integrated care and examined use	Changed federal law to permit capitated enrollment of Medicaid and Medicare recipients	Kaiser Permanente (KP), Northwest, Portland
Influenza vaccine studies ^{5,6}	Evaluated cost-effectiveness of influenza, and <i>Haemophilus influenzae</i> immunizations	Determined that immunization is effective and cost-saving and established national standards	KP, Northwest, and KP, Northern California, Oakland
Colorectal (CR) cancer screening ⁷	Evaluated effect of CR cancer screening on outcomes	Showed benefits of CR screening on survival and long-term benefit of colonoscopy	KP, Northern California
Office-based tobacco intervention ^{8,9}	Evaluated effect of nurse-directed tobacco intervention with smokers	Adopted in multiple health systems and contributed to Agency for Healthcare Policy and Research standards	KP, Northwest
Dietary Approaches to Stop Hypertension ^{10,11}	Tested efficacy of a diet integrating 2 decades of research findings in reducing blood pressure	Resulted in best-selling book that demonstrated that diet reduces blood pressure, is good for other conditions, and is acceptable to consumers	KP, Northwest
Multiphasic physical examination (MPE) studies ¹²	Evaluated data from years of health maintenance organization (HMO) MPEs and subsequent morbidities	Identified broad new epidemiological insights and many new risk factors for illness and demonstrated lack of efficacy of MPE in reducing illness	KP, Northern California
Adverse drug events in older persons ¹³	Identified factors associated with adverse drug events in cohort study of older persons	Identified factors related to serious adverse drug events and recommended preventive strategies	Meyers Primary Care Institute (Fallon Healthcare)
Childhood allergy study ¹⁴	Examined environmental risk for allergy or asthma in HMO cohort	Demonstrated that pets in the household are protective against allergy and changed recommendations on allergy and pets	Henry Ford Health System
Vaginal birth after cesarean section ¹⁵	Conducted observational study of 57 553 HMO births	Showed safety and monitored frequency of vaginal birth after cesarean section, resulting in changing of standard practice	KP, Southern California
Chronic disease management model ¹⁶	Developed model and strategies for changing chronic disease management	Resulted in adoption of the model by many health systems and the World Health Organization	Group Health Cooperative
Bicycle safety helmets ¹⁷	Conducted large HMO case-control study on bicycle injuries and safety helmets	Found that wearing helmets reduces head and brain injury by 70% and led to national helmet campaigns	Group Health Cooperative
Chlamydia screening and pelvic inflammatory disease (PID) ¹⁸	Determined whether chlamydia screening reduced subsequent PID	Led to national standards and programs	Group Health Cooperative
Prevention priorities ¹⁹⁻²¹	Developed consensus on relative costs of preventive services to save a quality-adjusted year of life	Established priority standards for preventive care which are used to measure system quality	Health Partners Research Foundation and KP, Hawaii
Minority health ²²	Collected and used minority health data from HMO to assess disparities	Identified disparities and resulted in remedial programs that are widely referenced and used by government and organizations	Henry Ford Health System; KP, Hawaii; KP, Colorado; and Lovelace Clinic Foundation
Group visits for chronically ill ²³	Assessed effect of group visits on care of older chronically ill persons in randomized trial	Resulted in adoption of group visit model by primary and specialty care in KP, Colorado, and elsewhere	KP, Colorado

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Table 3. HMO Research Network (HMORN) Studies

Study	No. of Sites	Description	Funding Agency
Cancer Research Network	11	Multisystem cancer research studies addressing prevention, control, cost, and outcomes	National Cancer Institute (NCI)
Center for Education and Research in Therapeutics	11	Research on safety, effectiveness, and appropriateness of drugs, biologics, and devices	Agency for Healthcare Research and Quality (AHRQ)
Cancer Care Outcomes Research and Surveillance	5 (acting as 1 study site)	Multisite study that relates care and outcomes for lung and colorectal cancer to demographics and other factors	NCI
Integrated Delivery System Research Network	13	Task order responses to multiple health services research issues	AHRQ
Vaccine Safety Datalink	5	Investigations evaluating vaccine effectiveness and outcomes	Centers for Disease Control and Prevention

tion). This permits the estimation of rates that are essential to understanding changes over time, cause-and-effect relationships, and factors associated with disease incidence and treatment outcome.

Stable Population Base. In integrated care systems, many cohorts exist naturally, and data on those cohorts are present in electronic form. This permits long-term cohort studies to be conducted retrospectively and at reasonable cost. The experiences of health plan members can identify secular trends, outcomes of system interventions, and risk factors and their interactions.

High Volunteer Rates. Health plan members are more likely to respond to an appeal for research volunteers when that appeal is from their own health plan. Recruitment and retention rates from integrated care system research cohorts are substantially higher than those from community recruitment and, therefore, afford high external validity.

Representativeness. Large, often nonprofit, integrated care systems are usually demographically representative of their geographic populations, enabling findings that are generalizable to other defined populations.

Diverse Ethnicity. The members of the HMORN are diverse ethnically, culturally, and geographically, facilitating studies that address racial and other disparities and are generalizable to other populations.

Data Systems and Sources

Comprehensive Medical Records. Integrated care systems maintain medical records that may include

information across inpatient and outpatient settings and different clinical providers, thus enabling comprehensive pictures of a population's health and health-care use.

Electronic Data Facilitating Preliminary and Rare Disease Studies. Successful research requires preliminary data, often collected at considerable expense, time, and energy. Comprehensive data information systems in integrated care can serve much of this need. Many research ideas can be developed without pilot funds beyond those required for retrieving and analyzing data from existing databases.

Electronic data permit identification of less common diseases and treatments. Accessing 5 of 11 Cancer Research Network sites identified 132 580 cancer cases for one study,³⁰ including 2680 pancreatic cancers, 2788 ovarian cancers, 2986 bladder cancers, and 5147 non-Hodgkin lymphomas.

Automated Medical Records. Perhaps the greatest innovation in medical care in the 21st century will grow out of the shift to electronic medical records. Electronic medical records systems have the capacity to facilitate use of consensus guidelines, minimize drug interactions and reactions, design prevention and care plans that are individually tailored, and provide extraordinary epidemiologic opportunities to observe disease trends, disease outcomes, and disease or risk factor associations. They will provide health economists the opportunity to study the relative costs and effectiveness of different approaches to care and will

assist in designing and evaluating alternative structures for delivering care.

Translation Into Practice

Ability To Test Efficacy of Care Alternatives. Large integrated delivery systems often experiment with innovations in delivery. These innovations can be rigorously evaluated when trained researchers are involved.

Location Inside Healthcare Systems. The presence of the HMORN centers within healthcare systems encourages interactions and critical partnerships among researchers, clinicians, and managers early in the research process. This promotes implementation and testing in real-world settings. The perspectives of managers, clinicians, and staff often lead researchers to modify initial assumptions about what will or will not work within their systems, nurturing the development of functional innovations that can be successfully translated into practice. Facilitating research serves the clinicians, the patients, and, ultimately, the entire system. These partnerships create an environment that translates research findings into practice.

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COMMENT

The US healthcare system faces serious challenges in the years ahead.^{31,32} Meeting clinical and economic goals is difficult because of complex reimbursement processes, perverse incentives that encourage excessive services, a preoccupation with expensive technologies, the inability to stop doing what does not work, a legal system that encourages faultfinding instead of remedial action, and the lack of a systematic means for learning from mistakes. Research within integrated care systems can develop new concepts and methods that define basic goals, produce practical tools that document the nature and magnitude of problems and outcomes, evaluate strategies and interventions for improving care, and assess new models, programs, and systems.³³ These systems are also ideal venues for studies that examine the relative benefits and priorities for using healthcare resources.

In integrated care systems, key factors intersect. Economics pushes those systems to avoid unnecessary services; quality assurance processes such as the Healthplan Employer Data Information Set direct them toward quality improvement; and the clinical setting requires them to take into account the real-world realities of delivering care. These settings are ideal for testing and evaluating preventive and treatment services.

The HMORN recognizes that access to these extraordinary resources is a public trust. The HMORN vision is to “transform US health care through research on the diverse populations served by integrated health systems.” It strives to achieve this goal through public domain research that serves the public interest. The work of the research centers of the HMORN supports good decision making by clinicians, managers, policy makers, and members of their respective health plans.

Because integrated care systems are such an ideal setting in which to conduct many types of applied medical research, the larger integrated care delivery systems have a social obligation to support and participate in such research. High-quality medical care requires high-quality research and evaluation. Clinicians, managers, and the public must come to view research as an integral part of what health systems do. The design of data systems in large healthcare organizations needs to include considerations relating to research and evaluation. University researchers should develop closer partnerships with their health system research colleagues to improve the quality and quantity of research in these settings,³⁴ and we welcome such collaborations.

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