

Public Health Systems and Services Research: Building the Evidence Base to Improve Public Health Practice

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ABSTRACT

Public health services and systems research (PHSSR) is the American designation for a field that uses a number of research disciplines and perspectives to examine the organization of public health systems, how they are financed, how they deliver public health services, the quality and costs of services they deliver, and the impact of variations in all these areas on population health; it is closely related to health services research (HSR), and uses many of the same methods as HSR. This article traces the developmental path of PHSSR, identifies organizations that have been critical in its growth, provides examples of PHSSR that demonstrate the potential it has to improve public health practice, and discusses the future of PHSSR and the use of PHSSR to influence public policy. While there have been sporadic attempts to examine the public health system in the United States since the early 20th century, PHSSR has only been a formally recognized area of scientific inquiry since the early 2000s. PHSSR has experienced rapid growth, and evolved from mainly descriptive research to inferential research, and towards yielding results that suggest causation rather than correlation. While PHSSR as a field shows great promise to improve public health practice, in order for it to fulfill that promise it is vital that PHSSR produce results that are of use to the practice and policy making communities.

Key Words: Public health, public health practice, public health systems and services research

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Public health services and systems research (PHSSR) is the American designation for an area of scientific inquiry that uses a number of research disciplines and perspectives to examine the organization of public health systems, how they are financed, how they deliver public health services, the quality and costs of services they deliver, and the impact of variations in all these areas on population health.¹ PHSSR is also referred to by some organizations (perhaps most notably AcademyHealth, the professional organization of health services researchers) as public health systems research (PHSR), the name that was used early in its inception. PHSSR is closely related to health services research (HSR), and uses many of the same methods as HSR. While PHSSR is not a new field of inquiry, it has experienced a rapid expansion in the last decade,^{2,3} and has become firmly established as a recognized body of research.^{1,4,5}

PHSSR in the United States is yielding research results that are increasingly used by the public health practice and policy communities. Recent changes to the US health system, particularly those associated with continued economic difficulties, and the passage of health care reform, suggest that PHSSR will likely acquire a position of even greater importance to public health practice and policy making. Recent events in other countries that are experiencing major changes in their health or public health systems, and the potential for use of PHSSR to build an evidence base to inform these changes, suggest that the discipline can and will likely be adopted by other countries.

THE DEVELOPMENT OF PHSSR

While research on various aspects of the US public health system had been conducted since the early 1900s, the first notable effort to collect comprehensive data on a large scale began in the 1920s as the American Public Health Association (APHA) Committee on Administrative Practice examined the structure of local health departments, made recommendations about their organization and staffing and identified the critical services to be provided by local governmental health departments.⁶⁻⁸ In the mid-1930s, the provision in parts of the social security legislation that provided funding for public health departments necessitated that health departments have benchmarks to judge the nature of services they provided. A high point of these early efforts was the APHA Committee on Administrative Practice's 1945 report *Local Health Units for the Nation*, which listed the organizational structure and resources required to provide what the committee defined as the basic six services that should be provided by every health department

(now known as Emerson's Basic Six): maternal and child health, infectious disease control, vital statistics, environmental health, health education and laboratory services.⁹ Unfortunately, in the decades following Emerson's report, the APHA and other public health organizations turned their attention to other important health issues, including access to medical care, the advent of community health centers, the passage of Medicare and Medicaid legislation, and poverty and civil rights, and they largely abandoned research and reports on areas such as health department structure and organization.

Research interests and efforts related to the public health agency and system were revived as a result of critical events beginning in the late 1980s. In 1988, the Institute of Medicine (IOM) published *The Future of Public Health*.¹⁰ This report described the public health system as being in disarray, largely as the result of neglect and a scarcity of resources. The report also proposed a mission for public health, "fulfilling society's interest in assuring conditions in which people can be healthy", and introduced the concept of the public health system; a system comprised not only of governmental health agencies, but also other public and private entities that share the mission of public health. The report suggested three core functions of public health (assurance, assessment and policy development), and made a series of recommendations for federal, state and local government designed to improve the governmental provision of public health services.¹⁰ The report energized the public health establishment and began a broad movement to restore public health to its appropriate place in the US health care system.

One of the early activities prompted by this revitalization of public health was the creation of *Healthy People 2000*, a document that contained a series of goals designed to implement the concept of management by objectives for health in America and setting measurable health targets for the nation to achieve. One benchmark of *Healthy People 2000* was that 75 percent of the US population would be covered by health departments that provided the three core functions of public health (Objective 8.14).^{11,12} This required two things crucial to the development of PHSSR: tools for measuring the performance of local health departments to ascertain whether they provided those services, and a mechanism to assess the extent to which this objective was achieved.

An additional pivotal event in the public health renaissance was the effort by President Clinton in the early 1990s to implement health systems reform, an action that prompted the public health community to assure that public health was appropriately included in that reform. One of the efforts of the public health community was to further develop the three core functions of public health into a set of ten essential public health services,^{13,14} delineated in Table 1. The development of the ten essential services mirrored

an international trend toward codifying the functions of public health, led by the Pan American Health Organization (PAHO) and the World Health Organization (WHO), which resulted in the development of essential public health functions by those organizations used to guide public health development globally.^{15,16}

Table 1

Ten Essential Public Health Services Developed by the Core Public Health Functions Steering Committee in the US.

Essential Service 1	Monitor health status to identify and solve community health problems.
Essential Service 2	Diagnose and investigate health problems and health hazards in the community.
Essential Service 3	Inform, educate and empower people about health issues.
Essential Service 4	Mobilize community partnerships and action to identify and solve health problems.
Essential Service 5	Develop policies and plans that support individual and community health efforts.
Essential Service 6	Enforce laws and regulations that protect health and ensure safety.
Essential Service 7	Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
Essential Service 8	Assure competent public and personal health care workforce.
Essential Service 9	Evaluate effectiveness, accessibility and quality of personal- and population-based health services.
Essential Service 10	Research for new insights and innovative solutions to health problems.

This development of a list of critical services that should be assured by public health played a significant role in resurrecting research on the public health agency and system in the US, as it spurred renewed interest in examining the performance of public health agencies and systems. In turn, this led to the development of more precise performance measurement tools and interest in the characteristics that predicted high performing public health organizations. The growth of managed care, a new mechanism of paying for medical care services, during this period also prompted individuals to examine the relationship between these new medical care delivery models and public health, and helped spur the application of HSR principles to public health.^{17,18}

The uncertainty surrounding the role of public health in the wider spectrum of health care changes in the US during the early 1990s also led to the recognition of the need for a unified and strong voice for, and a better understanding of the makeup of and activities undertaken by local and state public health agencies as well as local boards of health. As a result, the leading organizations that represent these bodies, the National Association of County and City Health Officials (NACCHO), the Association of State and Territorial Health Officials (ASTHO) and the National Association of Local Boards of Health (NALBOH), began a series of surveys intended to ascertain the character, capacity and activities of their members. While these surveys are of great utility to their parent organizations, they are also of substantial use to those conducting PHSSR — they serve as one of the major sources of information on public health system makeup, particularly governmental public health agency characteristics.

The development of the core functions and essential services spurred, as previously suggested, the exploration of measuring public health performance. In the US, C. Arden Miller at the University of North Carolina, Chapel Hill and Bernard J. Turnock and Arden S. Handler at the University of Illinois at Chicago began to develop metrics that local public health agencies could use to measure their performance in providing the ten essential public health services, and resulted in an early performance measurement instrument, the Miller/Turnock 20, which is still used today.^{13,19-22} The widespread adoption of the essential services in the late 1990s prompted others to explore developing an instrument that used them as a framework for measuring the performance of the public health system, the National Public Health Performance Standards Program (NPHPSP) performance measurement instruments.²³ This was an important event in the development of PHSSR as it expanded the scope of performance measurement beyond the local community; the National Public Health Performance Standards Program also includes instruments to examine system performance at the state level as well as performance of the local board of health. It also expanded the scope of performance measurement beyond the governmental public health entity to include all members of the public health system. Efforts to measure the performance of the public health system and use it to improve performance have also occurred outside the US, most notably the early initiatives by PAHO and later initiatives by WHO to measure system performance in Europe and the Americas, which were prompted in part by the development of the National Public Health Performance Standards Program.^{24,25}

In 2003 the IOM produced a follow-up report to *The Future of Public Health*, entitled *The Future of the Public's Health in the 21st Century*.²⁶ It reemphasized the need to continue the efforts of the 1988 report to reform public health and looked specifically at the role of other members of the public health system, beyond the official governmental agencies, to improve the public's health. The report provided direction and recommendations for a variety of system partners, including the media, health insurance organizations, and the academy. The report also underscored the importance of and need for PHSSR. Specifically, the report concluded that:

“The Committee had hoped to provide specific guidance elaborating on the types and levels of workforce, infrastructure, related resources, and financial investments necessary to ensure the availability of essential public health services to all of the nation's communities. However, such evidence is limited, and there is no agenda or support for this type of research, despite the critical need for such data to promote and protect the nation's health.”²⁶

Based on this finding it made a recommendation that the Centers for Disease Control and Prevention (CDC) develop a research agenda to identify and generate the data needed to make these recommendations. Early efforts to promote and support PHSSR were largely led by the CDC's Public Health Practice Program Office (PHPPO), which served as an advocate for public health practice. The Public Health Practice Program Office viewed PHSSR as a key aspect in efforts to develop better health departments committed to measuring performance and improving it using quality improvement techniques. The Public Health Practice Program Office also focused on strengthening the relationship between health departments and the academic public health community, seeing the academy as having the research potential to assist health departments.

The Public Health Practice Program Office sponsored two early conferences focused on researching the public health system that, in turn, led to efforts to engage AcademyHealth to recognize and lead the effort to make PHSSR a vital part of the broader discipline of HSR. The CDC's efforts resulted in the creation of the Public Health Systems Research Interest Group (PHSR IG) that continues to meet during AcademyHealth's annual research meeting. CDC and AcademyHealth provided (and still provide) important support to the development of research on the public health system, and, through the Public Health Systems Research Interest Group session at the Annual Research Meeting of AcademyHealth, a venue to showcase outstanding research.

CONTEMPORARY PHSSR RESEARCH AND RESEARCH SUPPORT AND DIRECTION

The release of the 2003 IOM report sparked interest in PHSSR in a number of organizations, most notably the Robert Wood Johnson Foundation. In 2004, the Robert Wood Johnson Foundation launched a number of public health initiatives, including an effort to assure that practice and policy innovations were based on research. This effort accelerated the development of PHSSR, particularly the development of the infrastructure needed to conduct research on the public health system. One of their first initiatives was to promote the availability of data sources with utility for PHSSR.²⁷ The Robert Wood Johnson Foundation supported a joint effort between the National Library of Medicine (NLM) and the University of Kentucky College of Public Health to provide a compendium of data sources that might be of use to PHSSR; this effort later expanded to include other elements, for example, a bibliography of PHSSR, which would be helpful to researchers and practitioners.

The Robert Wood Johnson Foundation has also supported a series of initiatives to increase the number of individuals who conduct PHSSR. In 2004, the Robert Wood Johnson Foundation launched a PHSSR grant initiative through the Changes in Health Care Financing and Organization program (now administered through the National Network of Public Health Institutes), which funds larger PHSSR research projects. The foundation and its partners at the University of Kentucky quickly identified the need to create a pipeline to develop junior researchers, and in 2006 created a mechanism to provide modest support for dissertation research and junior faculty research projects. This effort was later complemented by new career development awards, launched in 2012, modeled on the National Institutes of Health Mentored Research Scientist Development Award. These grants have resulted in major research efforts, and have served to help develop new PHSSR researchers.

While the creation of the Public Health Systems Research Interest Group meeting was an important step forward in the development of the field, there is now a second major venue for PHSSR researchers to present their findings and network with their peers. In 2005, the University of Kentucky, with the support of the Robert Wood Johnson Foundation, founded the Keeneland Conference, held annually in Lexington, the home of the University of Kentucky, and the academic home of what later became the National Coordinating Center for PHSSR. The Keeneland Conference now regularly attracts in excess of 350 participants and includes referred presentations,

posters, plenary sessions and organized networking opportunities. Both of these venues are important sources for contact between research and practice, as both actively include practitioners and policy makers as well as researchers.

THE CHANGING NATURE OF PHSSR AND CURRENT EXAMPLES

At its inception, PHSSR was largely descriptive primarily due to the lack of longitudinal data available for more complex analysis, and was intended to build the foundation for later, more complex analyses. Early PHSSR focused mainly on painting a more detailed picture of the makeup of inputs to the public health system, and, to some degree, the impact of variations of inputs to the system (workforce, finances, etc.) on processes and products.^{3,28} The cross-sectional nature of the research made it impossible to imply causality, which has hampered its use in informing evidence-based practice. This should not mean, however, that it was of no use; early PHSSR helped stimulate many of the hypotheses, providing the foundation for later research and adding to the evidence base guiding optimal public health practice. Recent developments suggest that these early efforts were successful, and that PHSSR, as a discipline, is transitioning towards using more complex methods and longitudinal analyses. As a result, it is yielding results that may be of greater use to the practice and policy community.

One example of recent PHSSR that illustrates the growing methodological rigor of the discipline is a study published by Mays and Smith in 2011. It used instrumental variables methods (a complex econometric technique) to determine that, over a 13-year period, there was a strong association between increases in public health spending and decreases in many major causes of preventable deaths. The authors concluded that each ten percent increase in spending was associated with a decrease in mortality between 1.1 and 6.9 percent.²⁹ The use of instrumental variables by Mays is of particular note, as they can be applied in retrospective research to control for confounders, in a fashion similar to a randomized control trial, the gold standard for research. As a result, it provides greater certainty that the variations observed are related to the variables examined, and not confounders.

An example of how PHSSR is being translated immediately to practice is a study published by Brownson, et al. in 2012. They completed a systematic review of the literature related to administrative practice in public health and identified 11 high priority, and 10 moderate priority areas that were associated with a series of evidence-based administrative practices that will promote improved practice by public health departments.³⁰ This

work demonstrates the utility of PHSSR to public health practice and is an important step forward in the development of evidence-based administrative practice in public health. Continued work in the area of evidence-based administrative practices may eventually result in a guide to public health administrative practices, comparable to the *Guide to Clinical Preventive Service* or the *Guide to Community Preventive Services*.^{31,32}

THE FUTURE OF PHSSR

Recent events suggest that PHSSR can and will continue to gain importance in health policymaking in the US, and internationally. The passage of the Patient Protection and Affordable Care Act (PPACA), a major effort to reform the US health care system, and the subsequent decision by the Supreme Court of the United States in support of most of the provisions in the Act, coupled with the reelection of President Obama, suggests that there will be major efforts to overhaul the US health care system. Reform efforts will, in part, be guided by HSR, particularly with regards to how best to array health care resources to achieve the goals of more efficient, effective health care while controlling the rising costs of that care. Given that public health plays a crucial role in PPACA, it should be no surprise that PPACA has a provision that provides support for PHSSR. While a major focus of PPACA is to expand access to medical care in the US, PHSSR can play a role in informing the significant components of the Act designed to improve population health, increasing the quality of health care in the US, and a shift towards patient-centered care. To date, the medical care system as a whole and the HSR community has not appreciated nor done much to examine or consider the public health system as an important component of the health care system and as a potential contributor to many of the goals espoused in PPACA. This may change as a major component of PPACA is a commitment to use public health and prevention to improve population health, reflected in components of the Act that provide reimbursement for clinical preventive services, support for worksite health promotion and a trust fund to fund new public health initiatives that will improve population health status.³³ With those new components of PPACA in place, attention has and must be turned to the same research questions in public health as are being asked about the medical care system. While questions related to PPACA, specifically, issues of efficiency, effectiveness and the best use of resources to protect and improve public health will be important, particularly as they relate to bending the rising curve of medical care costs.

Table 2

Major Topical Areas and Associated Subareas of Revised PHSSR Research Agenda

Topical Area	Associated Subareas
Public Health Workforce	Enumeration
	Demand, supply and shortages
	Diversity and disparities
	Recruitment and retention
	Workforce competencies
	Educational methods/curricula
Public Health System Structure and Performance	System boundaries/size
	Public health agency organization/governance
	Interorganizational relationships/partnerships
	Performance measurement/quality improvement/ accreditation
	Social determinants of health and health disparities
Public Health Financing and Economics	Fiscal Analysis
	Financing Mechanisms
	Costs/performance/outcomes
Public Health Information and Technology	Capabilities to assess and monitor health outcomes
	Translation and dissemination of research tested public health strategies
	Information and communication technologies

One mechanism that will help this development is the recent publication of a revised research agenda for PHSSR, meant to update the research agenda that CDC had proposed in 2003 in response to *The Future of the Public's Health in the 21st Century*.³⁴ From 2011-2012, the Robert Wood Johnson Foundation collaborated with the National Coordinating Center for Public Health Services and Systems Research at the University of Kentucky, CDC and Altarum Institute in developing a revised research

agenda for PHSSR. The project began with a series of systematic reviews covering four major areas of PHSSR, specifically, workforce, structure, quality improvement and financing, and were followed by a series of facilitated small group webinars and open forums and research conferences and practice meetings to obtain specific comments, areas of interest and questions that were identified by experts in the discipline.^{28,35-38} These questions and areas of interest were then assessed at major practice and research meetings. The reviews and comments were further clarified and grouped into a research agenda with four major topics: workforce, systems and performance, finance and economics, and information and technology, as well as 17 subtopics.⁵ Table 2 lists the major topics and the 17 subareas. A complementary review of public health systems and services literature related to finance was published as well.³

A critical area of research that needs closer examination is the impact of various public health system characteristics on population health status.³⁹ While issues such as efficiency may help drive public health activities, in order for them to be deemed effective they must have a positive impact on population health status. To date, little research has examined the relationship between health system performance and activities on health outcomes, outside of a few examples.⁴⁰⁻⁴⁴ Building the evidence base surrounding the effect of public health system inputs on health outcomes would help public health agencies use efficiency to inform, not drive their efforts, and allow them to target their efforts and resources toward improving specific health outcomes that are most relevant to their communities.

Other developments in public health may also help shape the future path of PHSSR. One notable example is the advent of public health accreditation. While a few states in the US had already established state-level accreditation of local health departments, the creation of the Exploring Accreditation Task force in 2004 to examine feasibility of a national public health accreditation effort has resulted in the advent of voluntary accreditation of state, local, territorial and tribal health departments through a non-profit, non-governmental entity, the Public Health Accreditation Board.⁴⁵ Public Health Accreditation Board accreditation is keyed to quality improvement in the provision of public health services. Public Health Accreditation Board accreditation will also necessitate the development of a greater evidence base surrounding administrative practices to support the effectiveness and guide the revision and development of accreditation standards and measures.⁴⁶ The data that are developed regarding performance of health departments by the Public Health Accreditation Board may also provide an important source for examining the capacity, programs, process and outcomes of the public health process.

In order for PHSSR to thrive, it must have the funding sufficient to facilitate the conduct of research with increasing complexity and scope. While the Robert Wood Johnson Foundation has been a generous supporter of PHSSR, in order for PHSSR to thrive as a discipline it must become sustainable, this necessitates a diversity of funding streams. Given the important role the federal government played in the development of HSR, efforts are underway to increase the amount of federal funding for PHSSR. Efforts have been extended to engage federal partners in collaborative funding of PHSSR with the anticipation that it will encourage federal agencies to consider increasing the support for PHSSR as they see the results of this effort. The National Institutes of Health Clinical and Translational Science Awards, the Health Resources and Services Administration's Public Health Training Centers and the Patient-Centered Outcomes Research Institute all offer potential new opportunities for funding collaboration in PHSSR efforts.

PHSSR AS A GLOBAL ENDEAVOR

While this article is primarily focused on the conduct of PHSSR in the US, this does not suggest that it is an endeavor that is exclusive to the US. Research on the public health system has been conducted in many other countries, and there is a notable increase in international interest in PHSSR.

For example, approximately three years ago Canadian colleagues began to examine how practice and the academy in that country could work together to establish a research agenda for PHSSR in Canada. While the effort was initially unsuccessful it demonstrates that there is an interest and likely to be continuing efforts by Canadian colleagues. There are now examples of published work on the Canadian public health system.⁴⁷⁻⁴⁹

In a similar vein, there has been some movement in Israel towards identifying essential public health services, and a dialogue has begun regarding how best to identify public health services to be provided as the Israeli health care system goes through some evolutionary changes.⁵⁰ These national efforts mirror a European initiative, led by the WHO, to conduct research to measure and strengthen the regional public health system, and efforts by the PAHO to assess and improve public health in the Americas.^{24,25}

Recent movements towards health system reorganization also have spurred interest in investigation the public health system, and the role it plays in assuring health. For example, England, through Public Health England, has launched a major reorganization of their local health departments, which offers a unique opportunity to investigate the implications of

this major innovation on public health programs in that country. Further examples exist, but these point to the fact that others have begun to address the problems and issues that face the provision of population-based public health services in other national health care settings.

TRANSLATING PHSSR INTO PRACTICE AND POLICY

While growth is essential to establishing PHSSR as a discipline, so is utility.^{1,5,27} A major, generalized problem in research is the translation of that research into practice, and this is certainly the case with PHSSR as well. The importance of dissemination and adoption of new research findings, and the rapid transmission of those findings are keys to assuring that the research that is done will have impact on the development of new programs and administrative practices. There are new efforts to promote dissemination and adoption of PHSSR. A major problem with disseminating research findings is the delay between publication of a new research study and its adoption into practice. The creation of a new open source, online, peer reviewed journal in the field, *Frontiers in PHSSR*, is one effort to address this publication lag time. The new journal is off to a good start and proposes to turn around brief research pieces in a shortened timeframe, much as the Morbidity and Mortality Weekly Report provides early information about issues that require the immediate attention of state and local health directors. *Frontiers in PHSSR* is distributed to each member of the National Association of County and City Health Officials through their national office, providing immediate information to health directors for use in practice.

One critical effort in assuring that PHSSR is of utility to the practice community is the development of public health practice-based research networks. Previous experience with primary care practice-based research networks led to the creation of public health practice-based research networks that assure that research questions in the current portfolio of PHSSR activities are relevant and research will be quickly translated into practice, as the practice/research team assures that the practitioner is involved in the research from its inception to the completion and application of that research.⁵¹ The public health practice-based research networks have already begun to generate important research findings on contemporary questions in PHSSR, such as the response to the downturn in funding for PHSSR and the use of quality improvement in public health practice.⁵²⁻⁵⁶

In addition to translation to practitioners and to researchers, it is imperative to put PHSSR research results in the hands of policy makers. This serves two purposes, first to assure that policy in public health services is based on

evidence. The provision of the most current information about the issues that policy makers must deal with has been successful in the HSR arena, where many of the current efforts at improving health care and controlling costs are driven by research. Obviously, the decisions about public health, its funding and the nature of public health is of concern to policy makers, and it is imperative that the latest information is in their hands to guide decisions. A partnership between the Robert Wood Johnson Foundation funded National Coordinating Center and AcademyHealth is designed to accomplish this task. The knowledge of how best to accomplish translation of research findings into policy is a principle strength of AcademyHealth, and this bridge between research and policy is likely to be productive.

CONCLUSION

While scattered attempts at PHSSR have been occurring in the US for quite some time, relatively recent events have prompted the development of a new era in PHSSR. The public health renaissance born from the 1988 IOM report on public health accelerated budding efforts to revisit research activities focused on the public health system. The public health community is also operating in an environment characterized by increased focus on efficiency and accountability, generating a demand for evidence that can be used to inform practice and policy. Due in part to these pressures, PHSSR is experiencing a phase of rapid growth, and it is playing a greater role in activities to assist the practice and policy communities in their efforts to improve population health.

PHSSR has made great strides, and it may be poised to play an even larger role in public health. The impact of the PPACA on public health agencies in the US may be substantial, as it may encourage collaboration between the public health and healthcare sectors, and through the expansion of health insurance, may impact the amount of funding that public health agencies receive through the provision of clinical care services. Changes to the public health system may not be restricted to the US — current economic challenges may force many nations to rethink how they deliver health services to the public, and, if changes are made, will require evidence to indicate the most effective way to make changes to service delivery while safeguarding the public's health. In addition, the revised research agenda for PHSSR reflects a fresh perspective on the discipline and provides a host of new areas of inquiry that will help inform public health practice in the US. These challenges provide a great opportunity for those conducting PHSSR to continue to protect public health.

Acronyms List:

APHA = American Public Health Association

CDC = Centers for Disease Control and Prevention

HSR = health services research

IOM = Institute of Medicine

PAHO = Pan American Health Organization

PHSSR = public health services and systems research

PPACA = Patient Protection and Affordable Care Act

Conflicts of Interest: None declared.

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