KNOWLEDGE MANAGEMENT in PUBLIC HEALTH

Edited by
Jay Liebowitz • Richard A. Schieber • Joanne D. Andreadis

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Dedication

Dedicated to all people striving to make a difference in the world.

To those public health professionals, educators, and students who tirelessly serve for the greater good.

To Janet, Jason, and Kenny—I'm so lucky!

To my mother, my husband Oliver, and my children, Alexandra and Christopher.

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Foreword

According to Wikipedia, knowledge management (KM) comprises a range of practices used in an organization to identify, create, represent, distribute, and enable adoption of insights and experiences. What's different about this when compared with business as usual? For one thing, I am citing Wikipedia, rather than an international authority, book, or published manuscript. Wikipedia is a form of knowledge convergence put into an electronic document with the full expectation that it will mutate to contain more and better information by any number of experts and thinkers as the topic matures. It is an electronic expression of Darwinian forces, an open book whose last page will never be written. And as such, wikis are a manifestation of KM processes. Wikipedia lies within and is accessed through the Internet, an electronic entity that is itself a manifestation of communal knowledge.

The concept of a wiki is not new, but its electronic format is enormously more efficient. In the spring of 1900, archaeological tablets written in Linear B, an ancient script form of the Mycenaean language, were excavated at Knossos in Crete. Scholars of classical Greece were unable to decipher the language, so the thinking at that time was that these tablets were not written in Greek. For years the tablets remained undeciphered. After World War II, a British architect and classical scholar, Michael Ventris, became interested in the mystery. Perhaps most importantly, he shared the information with a group of people he thought would be most likely to shed light on the mystery. He asked for their insights and shared their responses, repeating the process often. It was similar to Wikipedia before the electronic possibility. This example of KM led Ventris to solve the mystery. He managed to combine the knowledge and hunches of a group. More recently, Dr. Jeffery Koplan at Emory University has used the Internet to get many people to consider the definition of the term "global health." What was extraordinary a half-century ago has become a daily occurrence in problem solving today, in part due to the enormous increase in efficiency rendered by computers and information technology, and in part because of the need to better understand our increasingly complex world.

KM has the goal of synthesizing old and new information to create sensible solutions. It attempts to do so by compiling written, spoken, and thought knowledge

into electronic document formats so that it is available, readable, searchable, and helpful to others. Such information is either explicit (written) or tacit (thought, and therefore accessible only to that individual). Unwritten, or tacit, knowledge often is difficult to obtain and incorporate into other knowledge already written. In recent years, it became clear that the archives on smallpox eradication are deficient to tell the story of that effort. In an attempt to make tacit knowledge explicit, Dr. David Sencer has headed up a project to extract oral histories from the participants of the eradication program.

In addition to the translation of pertinent tacit knowledge into writing, KM activities include a perpetual effort to compile explicit knowledge germane to a problem so that it may come to bear on that problem. While its definition is conceptual, KM is best known by the tools it creates to join experts together to create new knowledge. These tools include expertise locators such as institutional white pages; collaborative technologies such as Lotus Notes, blogs, wikis, and social networks such as Facebook or MySpace; communities of practice where experts and those interested in a particular area can meet virtually to discuss aspects and applications of the field; the underlying aspects of information technology needed to create and maintain these functions; and other mechanisms. Some aspects, such as the Linear B example, predate the early development of modern KM systems (circa 1995), but had a similar purpose. Some tools may already be in place in a public health organization. For example, e-mail has consistently provided a solid way to communicate policy decisions, and the information and data that led to their creation. Where KM differs is the expectation that many people at many levels will participate in the development of a new policy, and a place will be made available for a healthy discussion and record of its pros and cons. The capacity of such systems to allow the search for prior experience cannot be overstated. This search capability quite often obviates the need for one-to-one telephone communication, and makes use of archival information that may have preceded the current decision maker. The smallpox example suggests that organizations should establish a better way of capturing and recording implicit and tacit historical and current events, along with the opinions and beliefs, policies, programs, and their outcomes, in real time whenever possible.

How can KM improve public health actions? One of the principal assets of public health departments, perhaps the chief one, is the development and distribution of usable knowledge. The most important medical advance in the twentieth century may be that ordinary people were able to use science, even if they were not scientists themselves. The improvement of health over the past century resulted from millions of daily decisions on exercising, food choices, smoking, and use of seat belts, helmets, insulin, vitamins, blood pressure medication, anticoagulants, vaccines, sun screens, etc. It involved making scientific knowledge available for individuals in a usable way and sometimes through laws imposed on everyone. Therefore, public health units, whether federal, state, or local in scope, need to ensure that the knowledge they provide is current, user-friendly, engaging, accurate, and representative

of both the majority and less popular opinions. The tools of KM—especially blogs, wikis, and document-sharing management and control—can be of benefit in ensuring that these requirements are met with the least difficulty and accessible by all. KM is not truth, but it is a system for seeking truth.

KM can help public health maximize the efficiency of staff. It provides a technological solution with a profound database. Practitioners can develop sound policies in less time in response to a new problem when they have something akin to Google for Public Health that provides the information he or she needs, and a blog whose discussion threads can help determine what such information means. This could lead to a rapidly developed but well-considered policy that is data-driven and benefits from, in a sense, the wisdom of the crowd.

What would be the chief barriers to engaging in such activities? The usual responses would be the lack of resources—personnel or funds—to begin developing such a system. The fault in logic here is the same logic error made when people say they do not have resources for prevention, which, if in place, could likely reduce the need for such resources. The KM system is exactly what is needed to save resources, and will likely reduce dependence on a large number of personnel to research and understand a problem.

Another barrier to engagement is unfamiliarity with such systems. Although there is a substantial amount of information already available electronically on the Web, much of it is unsorted, in various formats, and speaks to different audiences. A value of this book is to help the reader become familiar with the many elements of KM while understanding how to start such a system in his or her own work environment. I emphasize "start" because with the relatively few resources likely to be made available to develop it, a full-blown KM program will take time and energy. The first few chapters of this book describe why and how to build such a system, while the other chapters give specific examples describing the development and value added of such a system in a variety of public health environments.

Tough or quick decision making has always benefitted enormously from well-considered knowledge based on the maximum amount of pertinent information available at the time—this has not changed. What is new in our present public health environment is the need to do this more often and with fewer personnel available relative to the services expected by the public. Better use of information under a KM system is well-suited to serve that master.

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Preface

Reversing the Knowledge Paradigm

Starting Early

A paradox exists as many knowledge-centered students move into their public health and medical school studies where mentoring and apprenticeship programs are the rule, not the exception. Whether shadowing physicians or working in clinical care or applied public health teams, collaboration is a fundamental critical success factor for today's health care professional.[1,2,3,8] A knowledge-sharing culture becomes the norm rather than the isolated case. Thus, a paradox exists when these students whose "knowledge is power" attitudes have thrived must now adapt and assimilate to a "*sharing* knowledge is power" philosophy. We must start early in the undergraduate careers of future public health and health care professionals. How can this transformation easily take place in order to better prepare future doctors and public health professionals?

The simple answer is through the field of knowledge management. Knowledge management focuses on improving collaboration, knowledge flows, and communication.[4,6,7] It looks at how best to leverage knowledge internally and externally, and is a process for creating value from the intellectual assets. Knowledge management typically involves the iterative cycle of knowledge identification and capture, knowledge sharing, knowledge application, and knowledge creation. Knowledge management can serve as the integrative mechanism to form bridges across the isolated islands of knowledge. Those pursuing knowledge management have found that innovation and creativity are often increased, a sense of community and belonging is enhanced, and the institutional memory is further preserved.

How can these concepts then apply to preparing our students for their forthcoming public health and medical school educations? This can be done from both a codification, systems-oriented "collection" approach and a personalization "connection" approach. Orientation programs and team-building exercises can help foster

greater connections for public health and premedical students. Creating online communities, people locator systems, and group pages for teamwork and discussion forums also will encourage collaboration to take place. Today's student is already used to social networking sites, such as Facebook, YouTube, MySpace, and others, so the Generation Yers are already very adept at "building bridges."[5] Also, integrating various issues into the classroom that span across a discipline's boundaries will help students to analyze problems from a multidisciplinary, synergistic perspective versus through a myopic lens.

Mentoring also can be used effectively to facilitate knowledge exchange and knowledge retention. Of course, the Pre-Health Professional Advising Office and the Pre-Health Honor Society in most universities provide wonderful guidance in a mentoring-type role. The Student Doctor Network (http://www.studentdoctor.net) also provides a mechanism for exchanging ideas and experiences in preparing for a medical profession.

Separate from a frequently asked questions list, it may be helpful to have a lessons learned and best practice system in order to formally document dos and don'ts relating to premedical and public health studies, medical-related research, physician shadowing, interviewing, volunteering, medical school selection, and other related premed and public health areas. Different from online communities, a lessons learned and best practice system has the success and failure tips formally vetted before acceptance into the lessons learned system. The Pre-Health Professional Advising Office, for example, may serve as the committee that would include selected students, faculty, alumni, and staff to meet every month to review the submitted lessons learned for possible inclusion in the lessons learned system. The lessons learned system would allow users to learn from others' experiences, as well as serve as a formal repository for building this institutional memory. This system should also include a user profiling feature, through which users can indicate which areas they are interested in receiving lessons. As a new lesson is entered into the system that fits the user's profile, the user will automatically be sent an e-mail with the URL to access that new lesson. In this manner, the "push" approach (versus the "pull" approach) will provide a more active method for people to receive appropriate lessons.

Another interesting approach borrowed from the knowledge management community for educating our premedical and public health students could be to have team-taught courses with professors from different backgrounds. For example, it may be beneficial to have an instructor-led team of business, bioethics, technology, science, history, and public health professors to integrate and infuse these various topics within the traditional premed curriculum. Instead of covering them in separate modules, various issues that touch on these areas may be posed, which would then have to be discussed, researched, and solved by the students. In this case, the professor may serve as the facilitator, adviser, or coach versus the usual knowledge provider role. This approach has worked quite well in integrated science and technology programs such as at James Madison University, for example.

As medical errors could result from miscommunication and poor handoffs between health care individuals and teams, knowledge management principles can be applied early on in the future doctor and public health professional's educational experience to assuage these possible risks. By capitalizing on the talents and social networking skills of our undergraduates, collaboration and communication can be further enhanced by incorporating knowledge management concepts and applications in the classroom. Those approaches, as discussed in this Preface, may provoke others to explore integrative mechanisms for building synergy among the public health and premedical student communities. By doing so, our future health care professionals will be better prepared to handle the complexities of both their professional and personal lives.

The Way Ahead

The impetus for this book was to expose public health and health care practitioners, students, and educators to the idea of applying knowledge management in their professional and everyday lives. This book is one of the first volumes, if not *the* first, on knowledge management in public health. The chapters are written by some of the leading individuals and organizations involved in applying knowledge management in public health worldwide. We thank them for their valuable contributions to the book. We are grateful for the encouraging words written by Dr. Foege in the Foreword. We also owe our appreciation to John Wyzalek, Tara Nieuwesteeg, and the entire Taylor & Francis staff for their help in publishing this book. We hope that you have as much fun reading the book as we did in putting it together. Enjoy!

Dr. Jay Liebowitz
Dr. Richard A. Schieber
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Editors

Dr. Jay Liebowitz is a professor in the Carey Business School at Johns Hopkins University. He was recently ranked as one of the top ten knowledge management researchers/practitioners out of 11,000 worldwide. He is the program director of the Graduate Certificate in Competitive Intelligence at Johns Hopkins University and the MS-ITS Capstone Director. He is founder and editor-in-chief of *Expert Systems with Applications: An International Journal*, published by Elsevier. Previously, Dr. Liebowitz was the first knowledge management officer at the NASA Goddard Space Flight Center; the Robert W. Deutsch Distinguished Professor of Information Systems at the University of Maryland, Baltimore County; chair of Artificial Intelligence at the U.S. Army War College; and professor of management science at George Washington University. Dr. Liebowitz was a Fulbright Scholar, is an IEEE-USA Federal Communications Commission Executive Fellow, and was the Computer Educator of the Year of the International Association for Computer Information Systems. He has consulted and lectured worldwide and can be reached at jliebow1@jhu.edu.

Dr. Richard A. Schieber is a pediatrician and a medical epidemiologist at the Centers for Disease Control and Prevention in Atlanta. Dr. Schieber is board certified in general pediatrics, pediatric cardiology, and pediatric critical care medicine. He has experience working in university practice, private practice, federal government, county public health department, and injury advocacy groups. In the 1980s he began the Pediatric Critical Care Medicine Division at Emory University and served as its first division director and medical director of the pediatric intensive care unit. In 1992, he left full-time clinical practice and moved to the CDC, where he has served public health as an epidemiologist in many capacities—childhood injury prevention, adverse cardiac events following smallpox vaccination, immunizations—and also as the first senior advisor for Pandemic Influenza in 2005–2006. Since October 2007 he has been the senior medical adviser for a new program that blends situation awareness and knowledge management at the CDC.

Dr. Joanne D. Andreadis leads the CDC's Innovation Team in the Office of Strategy and Innovation, office of the director, at the Centers for Disease Control

and Prevention in Atlanta, Georgia. Dr. Andreadis's focus is to encourage entrepreneurial research and systems-based solutions to public health challenges by fostering a culture of innovation, promoting exploration of new approaches that translate science into action, and fostering open innovation to accelerate public health impact. Dr. Andreadis has more than twenty-six years of experience as a bench scientist and with numerous publications. Prior to her current position, Dr. Andreadis was the chief of the Botulism Public Health Research and Preparedness Unit in the National Center for Zoonotic, Vector-Borne, and Enteric Diseases. The focus of her group was to identify gaps in public health laboratory response capability, to work with cross-sector partners to develop innovative solutions, and to transition novel capabilities to national and international public health laboratories. Before starting at the CDC, Joanne was a principal investigator at the Center for Bio/Molecular Science and Engineering at the U.S. Naval Research Laboratory, a corporate research laboratory for the Navy and Marine Corps in Washington, D.C. Her work there involved developing methods to support the production of artificial biological polymers, developing tissue-based biological sensors for biothreat detection, and developing high throughput multivariate tests for identification, subtyping, and profiling of target organisms. Dr. Andreadis was a National Research Council Postdoctoral Fellow and received her doctorate in biochemistry and molecular biology at the University of Maryland.

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