

From the ground up: information needs of nurses in a rural public health department in Oregon

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Objectives: The research identified and assessed information needs and resources of public health nurses in a local health department.

Methods: Semi-structured in-depth interviews were conducted with seventeen public health nurses at a local health department in rural Oregon. Interview transcripts were analyzed using a constant comparative method to assess the information nurses sought and used in their work.

Results: Public health nurses performed a wide variety of roles and associated tasks. Major themes that emerged from analyses of interview transcripts included: (1) differences in information needs

depending on position and role; (2) colleagues as the most efficient and trusted source of information; (3) limitations of existing knowledge-based resources; (4) need for up-to-date and pertinent information; and (5) need for personal computers, basic communications software, and expanded Internet access.

Conclusions: Lack of Internet access is a significant barrier to use of information resources, and information tools tailored to meet the needs diverse public health nursing roles and facilitate information sharing among colleagues are needed. Librarians and informaticians can assist by addressing these needs and improving the organization of content and interface design for commonly used websites.

INTRODUCTION

Public health has a wide variety of functions, services, and other roles, most of which are carried out by local public health agencies (including local health departments, jurisdictions, and districts) [1]. The Institute of Medicine (IOM) has outlined the three core functions of public health: *assessment*, such as investigating community health problems or hazards (e.g., infectious disease outbreaks); *policy development*, such as educating the public or developing policies that support community health (e.g., smoke-free laws); and *assurance*, such as enforcing regulations or providing personal health care services to underserved populations (e.g., providing family planning services or immunizations) [1]. In carrying out public health functions, local public health agencies are the foundation of the public health system in the United States, and public health nurses are the largest professional group in the local public health workforce [2].

As a field, public health depends heavily on information acquisition and transfer [3–6]; information is critical, in some fashion, for all of the essential services of local health agencies [7]. One of the major objectives of the field of public health informatics is to discover useful applications of information technology to improve public health practice. Emerging information technologies provide an opportunity to efficiently provide updated knowledge-based resources (i.e., information derived from the professional literature of a field of knowledge [4]) and information management services to public health workers. However, to design effective information systems for the practice of public health, librarians and informaticians must clearly understand the

Highlights

- Because of widely differing positions and roles, the information needs of public health nurses in a local health agency varied greatly, suggesting that a multifaceted approach is likely necessary to address the needs of this population.
- Colleagues (i.e., public health professionals) are the most commonly used, efficient, and reliable source of information. Librarians may have valuable opportunities in facilitating communication among public health colleagues.
- Existing knowledge-based resources are limited, poorly organized, and inadequately indexed.

Implications

- Basic hardware and software for transferring information, scheduling, monitoring patients, and developing client education materials may be needed in local public health.
- Nurses working in local public health have a tremendous need for access to reliable and easy-to-access information.
- Librarians, informaticians, and other experts in knowledge management and information systems could greatly assist in organizing and indexing public health information.

information needs of local public health agencies and understand how staff members use information in their daily work.

Several authors have conducted literature reviews to analyze the information needs of health practitioners [8, 9]. In a literature review of rural health practitioners, Dorsch has found that while the information needs and practices of rural health practitioners are similar to their urban counterparts, the barriers to accessing information differ: rural health professionals are thwarted by isolation, lack of services by local libraries, inadequate information-seeking skills, and lack of Internet access that other health professionals do not experience [8].

Few systematic, qualitative studies have been performed of information needs, patterns of information use, information-seeking behaviors, or relationship between information resources and current work processes among health department employees, particularly at the local level [10, 11]. The 2001 Public Health Outreach Forum brought together librarians and information scientists to share experiences with the US Partners in Information Access for the Public Health Workforce (Partners) collaboration [12]. Participants discussed individual projects focusing on informal assessment of public health information needs but recognized the need for more systematic research into the information needs of the local public health workforce [13]. Several surveys have been conducted to investigate the information technology needs of, and use by, local health department personnel [6, 14]. These surveys, identified, among other needs, a need for training and purchase of basic computer software and improved Internet access.

While quantitative studies provide important information regarding the scope and generalizability of information requirements, they are limited in their ability to provide in-depth answers, such as how and why information resources are chosen, and insights about the complex array of factors involved in information seeking among health department personnel [15]. Because such information is critical to the successful design of information systems for public health professionals, this study addressed this gap by applying qualitative methods to investigate critical information needs and uses at the local health department level.

Qualitative methods have been used successfully by researchers to investigate the information needs of health care providers in clinical care settings [15–23]. Qualitative methods have been used to investigate the practices and strategies of state health department officials, public health physicians, and public health faculty in finding evidence-based clinical information [11–14]. However, to the authors' knowledge, qualitative methods have not been used to comprehensively investigate the information needs and uses of local public health department professionals.

The purpose of this qualitative study was to identify and assess the information needs and resources of public health nurses in a local health department in rural Oregon in relationship to their roles, job positions, and work-related tasks.

METHODS

Study setting

The study was conducted among employees at a local health department one hour east of Portland, Oregon, from January 2003 to July 2005. The health department, 1 of 34 in the state, served approximately 20,500 residents in a primarily rural agricultural county. Services provided by the department included family planning, early childhood development, nutrition for women and children, immunizations, infectious disease surveillance, pediatric sexual abuse evaluations, environmental health and sanitation, and bioterrorism preparedness.

Study design

Semi-structured, in-depth interviews [18] were conducted with all health department nurses and nurses aides (n=17). Institutional review board (IRB) approval was obtained from the Oregon Health & Sciences University (OHSU).

Because nurses represented the largest professional group of the local public health workforce [2], the study was limited to employees with a nursing degree (BSN, RN) or in the process of obtaining their nursing degrees. The local health department employed fifteen nurses and two nursing assistants, all of whom consented to participate in the study. Interviews with the nursing assistants were included because of their direct involvement with assisting nurses and their likely insights into nurses' information needs; these participants were also nursing students. (Note: All interviewees throughout the remainder of the text are referred to as nurses.)

An interview guide outlining issues to be explored was developed by the research team. The team consisted of a university faculty member with expertise in ethnographic methods and public health nursing, a public health informatics fellow with expertise in medicine and information sciences, and a biomedical and health informatics graduate student. In an effort to better understand the relationship between professional training, experience, and information needs, participants were asked to describe their background and training in public health, as well as the circumstances that brought them to the health department. In addition, all participants were asked to respond to the following statements or questions:

1. Describe your professional background, training, and public health experience.
2. Describe your role at the health department and the various tasks associated with your work.
3. What information do you generate, seek, or share in the course of carrying out these tasks?
4. What information resources do you use in carrying out your work?
5. How is information transferred from one person or entity to another?
6. What information resources would you like available to you to assist you in your work?

All interviews were conducted by the same interviewer. Each interview lasted approximately ninety minutes and was conducted in-person, on-site at the health department. After obtaining written consent, interviews were tape-recorded and subsequently transcribed. In addition to the open-ended questions listed above, participants were prompted to provide additional details and examples of the points they raised. Field notes taken during the course of each interview, as well as documents provided by interviewees, were included in the analysis. In addition, at the time of the interview, participants were observed performing their work-related tasks for one to three hours, and field notes included details about observed information-seeking behavior. Information resources and other work-related artifacts (such as forms and protocols) referred to during interviews were also collected.

Analysis

Transcripts from the seventeen nurses' interviews were analyzed using content analysis [24]. Two trained analysts (Turner, Stavri) open-coded (i.e., codes were not established a priori) the transcripts independently to systematically identify and extract themes, topics, and issues. The analysts used the method of constant comparisons to develop a coding system grounded in the data [25]. Words, phrases, and sentences were evaluated for contextual meaning. Coding discrepancies were resolved through discussion. Investigators used the qualitative analytic software Atlas.ti [26] to facilitate data storage, coding, retrieval, and content analysis. Researchers used this software to assist in the organization and systematic comparison of concepts across interview transcripts. Comparisons were made between concepts coded in a single interview, as well as across different interviews [26].

RESULTS

The average time each nurse had worked at the health department was seven years (range: two months to fifteen years), and the average number of years of nursing experience was fourteen (range: five to twenty-two years). Only two nurses had received formal public health nursing training prior to being hired. The primary resource for training and work-related information was provided by nursing peers in an "on-the-job" training context. Many of the longer-serving nurses had worked in a variety of different positions in the department over time. For example, at some time, most of the clinical nurses had held the position of school nurse or home visiting nurse.

Themes

Information needs differed depending on employees' positions and roles. Although the health department nurses shared a common professional background, they were employed in a variety of positions,

including clinical office nurse (4), home visiting nurse (3), school nurse (2), nursing assistant (2), women's health specialist (2), nursing supervisor (1), communicable disease nurse (1), bioterrorism liaison (1), and health department director (1).

Information needs differed greatly depending on the respondent's position and professional role in the department. Table 1 summarizes the various roles, responsibilities, tasks, and associated information sources commonly used. Job positions and their specific roles impacted information needs in different ways. For example, clinic nurses wanted standardized charting forms or charting templates to take with them for home visits, while school nurses desired easy access to health education standards, lesson plans, information on health interventions, and information on better communication with parents and teenagers. The health department director, a nurse by training, expressed the need for community health data and basic, user-friendly statistical tracking software for monitoring health at the county level.

Responses to questions about information resources indicated that the resources used by the nurses were more a function of health department position and role than their professional nursing background, (similar to their responses about information needs). Although the nurses shared common professional training, the activities and tasks involved with their position dictated the information resources they used at work (Table 1).

The most efficient and reliable source of information was other people. In every interview, *colleagues* were identified as the most efficient and reliable source of information used in day-to-day work. People of critical importance identified in the interviews included peers, administrators, program personnel, and state contacts. In particular, experienced peers were revealed as a major information source for clinical information, logistical recommendations, and on-the-job training.

For questions outside their area of expertise, nurses often reported relying on the greater clinical expertise of the nurse practitioner, nursing supervisor, and health officer. Program-specific questions and questions outside their expertise were addressed through telephone calls with state program personnel. State health division personnel were seen as highly knowledgeable and accessible, and they were often contacted first when program-related questions arose (Table 2).

Participants needed easy access to pertinent, up-to-date information resources on a broad range of subjects. Clinic nurses desired better access to primary care nursing information, as well as a wide range of more specific medical topics. In addition to general nursing care resources, home visiting nurses wanted detailed resources for caring for patients with disabilities. Several participants indicated that low literacy and multilingual patient educational materi-

Table 1
Summary of responsibilities, tasks, and information resources for a sample of rural public health nurses in Oregon

Position	Responsibilities and tasks	Information resources
Clinic nurse	<ul style="list-style-type: none"> ■ Provide family planning ■ Administer immunizations ■ Diagnose and treat communicable diseases. ■ Diagnose, treat, and follow-up sexually transmitted diseases (STD) ■ Provide HIV case management ■ Train student nurses 	<ul style="list-style-type: none"> ■ Peers ■ Clinical protocols and program manuals ■ Local health officer/nursing supervisor ■ State department of health experts ■ Centers for Disease Control and Prevention (CDC) and state health department materials ■ Textbooks ■ Professional conferences
Home visiting nurse	<ul style="list-style-type: none"> ■ Evaluate and monitor child development ■ Manage special medical needs cases ■ Provide maternity case management ■ Provide nutrition and breastfeeding education ■ Provide referrals to health care providers and social service agencies 	<ul style="list-style-type: none"> ■ Peers ■ Clinical protocols and program manuals ■ Local health officer/nursing supervisor ■ Textbooks ■ State health department personnel ■ Professional conferences
School nurse	<ul style="list-style-type: none"> ■ Conduct health education classes ■ Provide skills training to school staff ■ Communicate with parents and school staff ■ Create and maintain emergency protocols for students with medical needs ■ Provide limited medical care services 	<ul style="list-style-type: none"> ■ Peers ■ Local health officer/nursing supervisor ■ Educational materials from local, state, and national health agencies ■ Textbooks
Women's health specialist	<ul style="list-style-type: none"> ■ Provide family planning and STD evaluations ■ Provide pediatric sex abuse evaluations ■ Advise other local public health department nurses 	<ul style="list-style-type: none"> ■ Local health officer/nursing supervisor ■ State department of health personnel ■ Professional conferences ■ Professional journals ■ Textbooks
Nursing assistants	<ul style="list-style-type: none"> ■ Prepare patient rooms and collect information (e.g., laboratory results) ■ Serve as liaison for Spanish-speaking clients ■ Identify pertinent patient education materials ■ Facilitate flow of patients through clinic 	<ul style="list-style-type: none"> ■ Peers ■ Clinical nurses ■ Health education materials
Nursing supervisor	<ul style="list-style-type: none"> ■ Manage staff (e.g., scheduling, personnel management) ■ Monitor communicable disease outbreaks ■ Organize staff training ■ Coordinate emergency preparations ■ Provide community outreach 	<ul style="list-style-type: none"> ■ Local health department director ■ Local health officer ■ State health department personnel ■ Textbooks and guidebooks* ■ Professional conferences ■ State health department newsletters ■ CDC printed materials
Communicable disease nurse	<ul style="list-style-type: none"> ■ Conduct community outreach ■ Conduct disease surveillance ■ Investigate suspected disease outbreaks ■ Participate in emergency response activities ■ Investigate and report notifiable conditions (including STDs) ■ Provide outreach to community health care providers and health care facilities ■ Monitor and treat tuberculosis patients 	<ul style="list-style-type: none"> ■ Peers ■ Clinical protocols ■ Local health officer/nursing supervisor ■ State health department personnel ■ State health department newsletters ■ CDC printed materials ■ Professional conferences ■ CDC and state health department websites
Bioterrorism liaison	<ul style="list-style-type: none"> ■ Plan, organize, and participate in emergency response activities ■ Conduct community outreach ■ Conduct disease surveillance ■ Investigate relevant outbreaks 	<ul style="list-style-type: none"> ■ Peers (communicable disease nurse) ■ Local health department director ■ Professional conferences ■ Clinical protocols ■ CDC and state health department websites ■ State health department newsletters
Health department director	<ul style="list-style-type: none"> ■ Prioritize services and programs ■ Manage personnel ■ Communicate with policy makers ■ Monitor community health ■ Provide budget oversight ■ Disseminate information (e.g., to other health agencies and community stakeholders) ■ Serve on state and county committees 	<ul style="list-style-type: none"> ■ Peers (local health agencies directors) ■ State health department personnel ■ Community representatives ■ CDC and state health department websites ■ Professional journals ■ State health department reports/vital statistics

* For example, American Academy of Pediatrics Report of the Committee on Infectious Diseases; CDC Immunization Guidelines Handbook.

als were needed. Most of the patient education resources provided by the Oregon Health Department were written in English, and nurses indicated that they wanted more materials in Spanish. The low-literacy patient education materials available through the state were deemed to be at an inappropriately high reading level for much of the local health department's clientele. Online consumer health websites, such as the National Library of Medicine's MedlinePlus [27] and the New York Online Access to Health (NOAH) [28], that provided information on a number of pertinent topics were also considered by the Spanish-speaking nursing assistants to be written at an inappropriately high reading level for many of their clients.

The nurses expressed concern that most of the state health department's materials were outdated. Easy access to current information on a broad number of subjects was clearly needed. However, relevant subject matter was generally considered more important than currency of information. For example, outdated and even out-of-print textbooks were considered valuable because they contained practical and applicable primary care information. Interviewees reported that this need for pertinent clinical information was felt most acutely during patient visits.

Although access to the Internet was limited, nurses indicated that they occasionally conducted Internet searches, primarily using the Google search engine, to access information about which they had little knowledge. For example, in response to a child moving into the county schools with a diagnosis of encopresis, the school nurse—who knew nothing about the subject—first consulted the department's textbooks. When she was unable to find any information from the resources on hand, she found a general description of encopresis through a Google search on the Internet.

Because of the relative ease of access and the availability of information at the lay person's level, general searches on the Internet using Google were preferred over searching bibliographic databases through the health sciences library. Although most of the nurses had received training in bibliographic databases available through the OHSU Health Sciences Library, they reported rarely using these resources for two reasons: (1) there was a perception that most journal articles available to them were not pertinent to public health nursing and (2) extra steps were required to access the bibliographic databases. For example, one clinic nurse described how frustrated she was with the need for registered access and passwords, so she abandoned her search for journal articles through the Ovid database in favor of using Google (Table 2).

Some nurses expressed concern about the need to filter through the large number of websites returned from an Internet search engine, but they also expressed confidence in their ability to select quality information from credible sources.

Participants needed existing knowledge-based resources to be better organized and indexed. Inter-

viewees noted that existing knowledge-based resources were limited, poorly organized, and inadequately indexed. Many local health department nurses indicated that available knowledge-based materials—such as clinical resources, patient handouts, and community health education materials—could be improved with better indexing and organization. In particular, participants recommended that clinical resources, currently organized by clinical diagnosis, needed to be organized along clinical parameters, such as presenting symptoms or drug side effects. Clinic nurses reported relying heavily on clinical protocols, which were detailed and complex; becoming familiar with and learning to navigate the clinical protocols took a great deal of interviewees' time. Nurses noted that better indexing systems for these protocols were needed to improve the ability to efficiently and accurately follow clinical guidelines.

As discussed below, Internet access was limited. However, when the nurses were able to access the Internet, they frequently found available public health websites difficult to navigate. For example, while the Centers for Disease Control and Prevention (CDC) website was cited as a useful resource because it was trusted to have authoritative information pertinent to public health, the website was considered difficult to navigate (Table 2).

Participants needed computers, software, and Internet access. Improved access to basic computer and Internet technology typified another information need. All participants expressed the need for more computers for email and Internet access. While the health department director, nursing supervisor, and clinical nurse specialist all had desktop computers with Internet access, nine nurses shared three desktop computers, only one of which had Internet access (through a dial-up residential line). Two of the three shared computers were used to enter data for family planning, billing, and laboratory reporting. Nurses reported that the lack of computers and high-speed Internet access dramatically limited their use of email and online resources.

The nurses identified a need for better computerized systems to track and monitor patients. For example, the nurse responsible for tracking tuberculosis medication compliance had no formal system for tracking whether patients picked up their medications or were late for follow-up visits.

Nearly all participants mentioned the need for a more effective scheduling system for clients. Employees wanted to be able to check the day's schedule from their desks at any time, but the scheduling system consisted of a print scheduling book kept at the clinic's reception desk. Home visiting nurses also wanted a way to track patient referrals from health care providers in the community. The bioterrorism nurse needed basic, problem-free communications technology including telephone, voice mail, and email to communicate with community health care providers and emergency personnel. The local health department director wanted easy-to-use statistical

Table 2
Summary of themes with sample quotes

Theme	Quote
Most efficient and reliable source of information: other people Need for easy access to pertinent information	"If I need more information [about sexually transmitted diseases,] I talk to our providers, our nurse clinician or nurse practitioner, or I'll call somebody at the state health department." In reference to accessing the Ovid through the health sciences library: "I forget what the road block was. I'd have to get up, go ask somebody else to get the password... to get into that site (if they knew it) and it just was not user-friendly for me. So what I've found is Google is a really good search engine and it is more in the line of the lay person's vocabulary, and that's usually who I'm dealing with anyway."
Need for better indexing and organization of clinical resources and patient materials	"It would really be nice with family planning, or if someone presents and they're on a certain method and they have a certain complaint, to be able to find out quickly which of the birth control pills is likely to [be the] cause, which side effects are due to which components of the pill, and what combinations work better to address different side effects. I think the computer would be really good for that."
Need for existing knowledge-based resources to be better organized and indexed	"There is a CDC website but it's hard to get a specific question answered. There's a lot of general information and you're constantly going from page to page looking for what you want, and sometimes you can't find it."
Need for basic hardware and software	"I think what would help a lot is to have a computer that works...I have a dinosaur in my computer (laughs). Just word-processing [along with] spreadsheets. That's all I can use it for. It's not really good for anything else."

software to prepare community health assessments and quarterly reports for the county board of commissioners. Though the CDC's EpiInfo software was available online, the director wanted a simplified program designed for county public health professionals.

DISCUSSION

Although information systems and resources are intended to facilitate and expedite tasks, the number one resource for public health information and training is not books, journals, or the Internet, but people. In every interview, other people were identified as the most efficient and reliable source of information. This finding is consistent with studies on the information needs of professionals including clinicians [8, 19], nurses in clinical settings besides public health [29], and the broader public health workforce [3, 30]. As a result, tools designed for public health information transfer should facilitate, not attempt to replace, communication among public health professionals.

Estimates indicate that up to 45% of the public health workforce will be retiring in the next 5 years [31]. Given the expected turnover in the public health workforce, it is critical to preserve institutional knowledge through better ways of indexing and providing access to local protocols and guidelines to support the less experienced, replacement workforce.

The overlap in services and programs offered by local health agencies across the state may provide opportunities for collaborations to meet some of the information challenges noted in the current study. In particular, developing protocol and low-literacy and multilingual education materials is costly, especially for small health departments with limited resources. An organized system of sharing resources would save money and improve uniformity in clinical care across the state.

Training and educating the public health workforce has been identified as a major need in the IOM report

[1]. In particular, the need for informatics competencies on all levels of the public health workforce has been identified as a key issue [31]. Librarians can play a key role in providing up-to-date resources to nurses [32]. Similarly, by improving the organization and access to pertinent up-to-date resources, librarians can play a key role in helping meet the information needs of these local public health professionals.

Given the wide range of information needs, it is not surprising that employees often chose to search the Internet using Google, rather than using bibliographic resources, such as PubMed. Much of the needed public health information is not found in peer-reviewed journals but is found in the gray literature, which currently is perhaps more accessible through general search engines like Google [33, 34]. An improved understanding of how to organize and index the public health gray literature is needed along with an expansion of projects such as the National Library of Medicine-sponsored Partner's website [35] and the New York Academy of Medicine's Grey Literature Report [36].

More research is needed to find ways to improve indexing, organizing, and accessing online public health information. Interviewees used information from the CDC and Oregon Health Department websites because these sites contain pertinent content from trusted sources. This is consistent with prior studies indicating the importance of sponsoring organization in selecting a public health information resource [34, 37]. Efforts to provide evidence-based materials for local public health practitioners will likely be most successful if such materials are made available through these trusted websites. At the same time, these sites will benefit from improved usability and expanded availability of low-literacy and multilingual materials.

One of the most important findings of this study is the need for basic computer and Internet access. This finding is consistent with studies evaluating the information needs of rural health professionals [8] and findings from the 2003 Turning Point survey [14]. Information technology and informatics training are

vital to keeping the public health workforce informed [38]. It is important that, in creating digital resources, librarians are aware of the reality of limited access in many local public health settings. While the Internet is an inexpensive and widely accessible avenue for providing public health materials, the results of this study illustrate that online resources are not sufficient. Pertinent content for public health nurses is needed in a variety of formats.

However, this study also has limitations. As with similar types of research involving qualitative methods, depth is provided at the expense of breadth. The health department was chosen based on its rural location and close proximity to the researchers' institution, OHSU. Given the specific geographic location and the small sample size, the current findings might be highly individualized and might not be generalizable to nurses in other local public health agencies in Oregon or in other states. However, the background and training of the interviewed public health nurses were similar to those found in national surveys [39]. In addition, to help determine if the information needs expressed by the public health nurses were typical of other rural public health agencies in the state, the researchers conducted a limited number of informal, on-site interviews with four additional public health nurses employed at two medium-sized and one large-sized local health department in Oregon. These interviews suggested that many of the information needs, uses, and challenges of the local health department nurses investigated in the current study were similar to nurses working in other health departments in the state. Finally, due to varying needs, job requirements, and educational background, these results might not be applicable to other local health department employees besides nurses, such as environmental health specialists (e.g., sanitarians) and clerical staff.

CONCLUSION

One difficulty in designing information systems and resources for public health is the variety of potential users with varied backgrounds who perform a wide range of tasks at any given time. A critical first step for building information systems that can successfully assist public health professionals in their work is deeper understanding of the intersection of public health professionals' roles with public health information needs. This study indicates that local health department nurses occupy a variety of positions and perform a variety of tasks that require them to be knowledgeable in a wide range of health areas. These positions and tasks determine their information needs.

This study also demonstrates that use of qualitative methods can provide an in-depth understanding of the issues and challenges related to information for nurses working in such settings. This information can be used to inform the design of information resources and information systems for public health practice. In the future, these techniques can be used to expand information needs research to other members of the

public health workforce such as environmental health specialists and policy makers.

Public health professionals and their librarian colleagues are obligated to select information tools and resources that fit a particular user's need in the context of a particular point in time, for a specific topic or issue, in a variable work environment. With an understanding of information needs, librarians can play an important role in locating pertinent resources and improving the organization and access to public health information.

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