

Environment, Health, & Nursing Practice

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Received January 25th, 2011; revised March 11th, 2011; accepted March 30th, 2011.

The purpose of this study was to explore the connection nurses see between the environment and health concerns of their patients. The study surveyed registered nurses (RNs) in a western state to determine whether they evaluated themselves as knowledgeable about environmental health (EH) hazards and if they felt prepared by their nursing curriculum to share this information with their patients. The study replicates a survey of Wisconsin nurses concerning issues related to EH knowledge among RNs in Idaho. Data from 170 respondents to a mailed survey indicated that although nurses agreed that they should be knowledgeable about EH hazards, few were adequately prepared. Overall, many nurses felt unprepared from their nursing curricula to address EH issues in the field. Corrective measures are discussed.

Keywords: Community Nursing, Environmental Health, Environmental Health Education, Environmental Health Nursing

Nursing Curriculum and the Environment

Environmental health (EH) hazards present formidable challenges to human health (Hunter & McCurry, 2010; Koplan & Fleming, 2000; Meadows, 2009; Polk & Green, 2007; Salazar, 2000; Tarcher, 1992; US Department of Health & Human Services, 2000). Recent studies have suggested that environmental factors may be the single most important predictor of health outcomes in the near future. They further suggest that the degradation of our natural resources and other environmental issues may represent the “ultimate threat” to our health (Tarcher, 1992; Van Dongen, 2002; CDC, 2005). In a 2002 survey of nurses in Wisconsin, Van Dongen noted that nurses see a clear connection between the environment and health concerns of their patients. Nurses also reported that addressing these concerns should be part of the role of nurses in the United States today.

But has anything changed in the 10 years since these study results came out? Given the call for changes in nursing curriculum coming from national agencies (e.g., National League for Nursing, 2007), one would hope that nursing curriculum had finally responded to these calls for change and included EH, among other key issues, as a part of its course offerings. As such, nurses should feel better prepared to address EH issues today than they did 10 years ago. This study investigated just this. Do nurses feel any better prepared to address EH issues than they did in 2001 when Van Dongen sent out her survey? We hypothesized that in the ten years since the Van Dongen study, nurses would feel better prepared from nursing curricula to address EH issues.

Though nurses are increasingly confronted with EH issues (Philibin, Griffiths, Byrne, Horan, Brady, & Begley, 2010), little EH knowledge has been incorporated into nursing education with the result that nurses are not adequately prepared to address EH concerns, despite their advantageous position as frontline EH advocates (Ballard, 2008; Barnes, Fisher, Postma, Harnish, Butterfield, & Hill, 2010; Chalupka, 1998; McCurdy

et al., 2004; Melamed & Jackson, 2003; Olmstead, 2009; Pope, Snyder, & Mood, 1995; Watterson, Thomson, Malcolm, Shepherd, & McIntosh, 2005). It is important for nurses to educate themselves about EH issues because when the public is concerned about such issues, they frequently turn to the nursing profession to learn how this will impact their health. Nursing therefore plays a key role in educating the public about EH issues. As early as the mid-1990s, the Agency for Toxic Substances and Disease Registry (ATSDR) began educating members of the health care community on concerns about the health effects of EH and exposure. The Institute of Medicine (IOM) also worked to advance the EH agenda in nursing education (Pope, Snyder, & Mood, 1995). Despite these efforts, EH has received minimal attention in nursing curricula over the past decade (Hewitt, Candek, & Engel, 2006).

Perhaps even more alarming, nurses contend with exposures to mixtures of chemicals and hazardous agents of which many have never been tested for safety (Environmental Working Group (EWG), 2007). The nurses that participated in the EWG survey indicated they had been exposed to a variety of hazardous substances such as sterilizing chemicals, residue from drug preparation, radiation, housekeeping cleaners, etc. These nurses also reported an increased rate of asthma, miscarriage, and certain cancers and gave birth to children with birth defects (EWG).

Building on the work done by the Centers for Disease Control and Prevention (CDC) to educate public health professionals, the Quad Council of Public Health Nursing Organizations began drafting a set of public health nursing competencies. The core competencies represented a set of skills, knowledge, and attitudes necessary for the broad practice of public health (Quad Council: Core Competencies for Public Health Professionals, 2003). The Quad Council believed that the competencies would provide a guide for public health agencies that employ nurses and the academic settings to facilitate education.

Based on an Institute of Medicine (IOM) report, Pope, Snyder and Mood recommended that nurses should develop basic

competencies that include: basic understanding of the relationship between the environment and health; the ability to assess for environmental hazards; advocate for the reduction of environmental risks; and awareness of EH laws and regulations. Van Dongen (2002) believed that in order to develop effective EH programs, educators need to know what nurses believe about EH and their nursing practice and what factors might impinge on their ability to integrate EH into their practice. To answer these questions, Van Dongen developed and implemented a survey instrument to answer the following research questions:

- 1) What do Registered Nurses (RNs) believe regarding the relationship between EH and nursing practice?
- 2) How prepared and competent do RNs feel to address EH issues in nursing practice?
- 3) What do RNs identify as barriers to addressing EH concerns in nursing practice?
- 4) What do RNs identify as resources to facilitate addressing EH in nursing practice?
- 5) What is the relationship between selected demographic variables and responses of RNs on the survey instrument?

Analogous to previous research by Van Dongen (2002), this study examines issues related to EH knowledge among registered nurses in a western state. As the state ranks as one of the worst states in Facilities Releasing Toxic Release Inventory (TRI) Chemicals to Land (Green Media Toolshed, 2005), the state may have more than its fair share of EH issues in the population. In addition, radioactive fallout from nuclear weapons testing during the 1950s and 1960s harmed the health of thousands of people (Snake River Alliance, 2010). Finally, much of the state is at high risk for flooding or wildfire damage (State of Idaho, 2007). Thus, it is crucial that the state's nursing population be aware of and be able to handle EH issues.

Method

Participants

A mailing list of registered nurses (RNs) registered in the state was obtained through the State Board of Nursing (SBON). Based on a power analysis for analysis of variance (ANOVA) with five groups, a medium effect size of 0.25, an alpha of 0.05, and a power of 0.80, a minimum sample size of 195 was needed (Cohen, 1988). However, a sample of 484 was selected in recognition of the low (often <40% to 50%) response rate associated with mailed surveys (Kerlinger, 1986). The participants ($n = 484$) were selected from a list of 13,094 registered nurses that were currently practicing in the state of Idaho through a stratified random sampling based on zip codes (50% urban, 50% rural).

Measures

Permission was granted from Van Dongen (2002) to replicate her survey instrument in Idaho. The first part of this questionnaire asked for demographic information, including: current employment status, educational level, size of their home town, current workplace setting, education related to Environmental Health, whether they had attended any EH programs, and whether they or a close family member had been affected by EH factors. The questionnaire was then broken into four parts.

Nurses were asked about their beliefs regarding EH issues and their nursing practice, their preparation and competency related to Environmental Health, the barriers they faced to addressing EH issues in their nursing practice, and the factors that facilitated their ability to address EH issues. Each item was rated on a 5-point Likert scale. Endpoints for each scale varied based on the question asked.

Procedure

A cover letter explaining the purpose of the study and a postage-prepaid return envelope were included with the survey mailing. As no identifying information was asked on the survey, participants were assured complete anonymity. One month after the initial surveys were mailed, the complete packet was re-sent as a reminder to nurses who might not have already completed the survey or lost it. Unfortunately, some of the mailing addresses provided by SBON were incorrect, which resulted in 170 useable surveys returned to researchers.

Data Analysis

Not all respondents answered all questions; thus data analyses may not always be based on 170 surveys. Descriptive statistics were used to analyze demographic and scale data. Four items were negatively worded on the "Beliefs" subscale, and were thus reverse-scored before analysis. All questions were analyzed using SPSS 17.0.

Results

Demographics of Participants

See Table 1 for key sample demographics. The number of years practicing ranged from 1 to 50, with a mean of 20.75 ($SD = 12.83$). The majority of respondents worked in rural or agriculture settings (42%), with 27% working in towns/suburbs of fewer than 50,000 inhabitants, and 23% working in cities/suburbs with 50,000 to 100,000 residents. Thirty-six percent of respondents had not attended any EH education beyond their formal nursing program.

Quantitative Data Analysis Results

Total scores for all 39 Likert items ranged from 100 to 176 (the possible range was 39 - 95), with an average of 135.50 ($SD = 15.09$). See Table 2 for summary analyses for each of the four subscales.

Beliefs about EH and Nursing Practice

Respondents tended to agree that the environment affects health and that nurses play a pivotal role in EH (overall item $M = 4.11$, $SD = .52$). However, the results of the present study were slightly lower (i.e., slightly less agreement) than those of the original Van Dongen (2002) study (see Table 2). The item with the highest mean on the "Beliefs" subscale was "Every nurse should be aware of specific environmental hazards in his/her community" ($M = 4.39$, $SD = .63$). This differed from the Van Dongen study, in which the item with the highest mean on the "Beliefs" subscale was "The environment is an important determinant of health". Similar to the Van Dongen study, the item with the lowest mean was "Environmental health con-

Table 1.
Demographics of participants.

<i>Employment</i>	53% Full Time	21% Part Time	15% Retired	11% Not Employed in Nursing
<i>Practice Setting</i>	24% Community Hospital	20% Not Working in Nursing	18% Regional Medical Center	38% Other
<i>Education Level</i>	9% Diploma	37% Associate Degree	31% Baccalaureate	22% Other
<i>EH Illness</i>	35% Family or Close Friend	57% No Illness	9% Uncertain	
<i>EH Education</i>	18% Adequate	62% Minimal Coverage	11% No Coverage	

Table 2.
Descriptive statistics for the Four Subscales (Van Dongen's (2002) original results from Wisconsin RNs are presented in italics below each subscale).

Subscale	Subscale Range	Total M (SD)	Individual Item Mean Range	Individual Item M(SD)
Beliefs (9 items)	22 - 45 19 - 45	36.87 (4.61) 38.08 (4.30)	2.44 - 5.00 3.94 - 4.55	4.11 (.52) 4.24 (.47)
Preparation (12 items)	12 - 57 12 - 57	34.08 (10.08) 32.10 (10.54)	1.00 - 4.75 2.38 - 3.08	2.84 (.84) 2.69 (.88)
Barriers (9 items)	12 - 45 9 - 45	29.45 (6.79) 28.81 (6.90)	1.33 - 5.00 3.02 - 3.45	3.27 (.75) 3.21 (.76)
Facilitators (9 items)	18 - 45 9 - 45	35.10 (5.77) 35.67 (7.01)	2.00 - 5.00 3.58 - 4.25	3.90 (.64) 3.99 (.75)

Note: Items were rated on a 5-point Likert scale.

cerns should be addressed by other disciplines, not nursing" ($M = 3.75$, $SD = .95$). Similar to the Van Dongen study, these results suggest that although RNs believe that every nurse should be up-to-date on the specific environmental hazards in his/her community, nurses realize that other disciplines must also get involved.

Preparation and Competency Related to EH

The overall item mean on the "Preparation" subscale ($M = 2.84$, $SD = 0.84$) indicates that RNs were uncertain as to whether they were prepared to address issues of environmental health. This mean was slightly higher than the mean in the Van Dongen (2002) study. Thus, although nurses in both studies were uncertain about their preparation and competency to address EH issues, the nurses in the present study felt slightly more prepared or more competent than did the nurses in the Van Dongen study (see Table 2). In fact, the highest mean on the subscale ($M = 3.18$, $SD = 1.03$) was for the item "Understand the relationship between major environmental hazards and human health", indicating that nurses were uncertain if they even understood the relationship between environment and health. This was true for the Van Dongen study as well. RNs reported feeling least knowledgeable ($M = 2.54$, $SD = 1.13$) about major environmental legislation, such as the Clean Air and Clean Water Acts, similar to nurses in the Van Dongen study.

Barriers to Addressing EH Issues in Nursing Practice

Participants also seemed uncertain about what the greatest barriers to addressing environmental health concerns in their nursing practice actually were ($M = 3.27$, $SD = .75$). These results were slightly higher than those of the Van Dongen (2002) study. Thus, although nurses in both studies were un-

certain about the barriers to addressing EH issues in nursing practice, the nurses in the present study were slightly more certain about these barriers than were nurses in the Wisconsin study (see Table 2). The two items with the highest means (meaning they were perceived as great barriers tied at $M = 3.45$, $SD = 1.09$) were "Little or no time to consider environmental health concerns in my clinical practice" and "Few or no resource people with expertise related to environmental health". The latter item had the highest mean in the Van Dongen study. The item with the lowest mean (least likely to be a barrier) was "Addressing environmental health concerns is not seen as a part of my nursing role" ($M = 2.96$, $SD = 1.19$). This differs from the Van Dongen study, in which the item with the lowest mean was "Personal lack of knowledge about how the environment can affect human health and what to do about it". However, similar to the Van Dongen study, it should be noted that there was merely a slight difference the means of the highest and lowest rated items; regardless, nurses seem uncertain about which items constitute barriers.

Participants were also asked to indicate the three most important barriers from the list of barriers queried on the "Barriers" subscale. The following three statements were listed most often: "Personal lack of knowledge about how the environment can affect human health and what to do about it", "Clients/families have little interest in understanding how the environment can affect their health", and "Few or no resource people with expertise related to environmental health". These results indicate that nurses feel unprepared to answer questions about environmental health, that they do not feel they have the resources required to learn, and that their clients do not seem interested in this knowledge. While nurses in the Van Dongen study rated "Personal lack of knowledge about how the environment can affect human health and what to do about it", as one of the most important barriers, the last two barriers differed.

Nurses in the Van Dongen study felt that “Little or no time to consider environmental concerns in my clinical practice”, and “Lack of recognition by health professional regarding how the environment can affect human health”, as the most important barriers.

Facilitators to Addressing EH

Scores on the facilitator items were relatively high ($M = 3.90$, $SD = .64$), indicating that nurses had a good idea about what they would need to help them address environmental health issues in their nursing practices. These means were slightly lower than those reported in the Van Dongen (2002) study, indicating that nurses in the Van Dongen study were slightly more sure about the factors that facilitated addressing EH issues (see Table 2). Similar to the Van Dongen study, respondents placed the greatest interest ($M = 4.24$, $SD = .99$) in free or inexpensive continuing education programs on environmental health via the Internet, and placed the least interest ($M = 3.43$, $SD = 1.32$) in an expectation from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) or any other accreditation body that environmental health be addressed. Thus, the availability of low-cost continuing education programs seemed more important to the RNs than did expectations of accrediting bodies such as JCAHO.

Similar to the “Barriers” subscale, we asked respondents to list the top three items that would facilitate their education about environmental health issues. The top three items listed were “Free or inexpensive education programs”, “A staff resource person”, and “Health education programs at my workplace”. These were the same facilitators ranked as most important by nurses in the Van Dongen (2002) study.

Additional Statistical Analysis and Results

As one might expect, RNs who had a family member and/or close friend with an environmental illness scored significantly higher ($M = 38.53$, $SD = 4.68$) than those who did not ($M = 36.06$, $SD = 4.32$) on the “Beliefs” subscale, $t(148) = 3.28$, $p \leq .001$. Likewise, they scored higher ($M = 37.49$, $SD = 7.63$) than those who did not ($M = 32.08$, $SD = 11.23$) on the “Preparation” subscale, $t(134) = 3.00$, $p < .01$.

Respondents who had a masters degree in a field other than nursing had higher “Preparation” subscale scores ($M = 44.40$, $SD = 8.23$) than those who had an associates degree ($M = 32.33$, $SD = 9.29$) on the “Preparation” subscale, $F(5, 147) = 2.32$, $p < .05$ (Note: due to missing values, respondents with doctoral degrees were excluded from the previous analysis). As one might expect, RNs who reported receiving adequate or excellent coverage of environmental health issues in their nursing curriculum scored significantly higher ($M = 40.29$, $SD = 7.23$) than those who reported minimal coverage ($M = 33.33$, $SD = 9.61$) or than those who could not recall ($M = 27.14$, $SD = 10.83$) on the “Preparation” subscale, $F(3, 149) = 6.60$, $p < .001$. However, no significant difference was found in “Beliefs” subscale scores based on EH curriculum coverage. Excluding individuals who could not recall whether they had coverage of EH issues in their nursing curriculum, there was a low but significant difference ($r = 0.22$, $p < .05$) between “Preparation” subscale scores and the extent of Environmental Health coverage in one’s curriculum.

Stepwise regressions were conducted to predict each of the

four subscale scores based on education, EH coverage in nursing curriculum (excluding those who did not remember), years in nursing, and community population size. Only EH coverage in nursing curriculum significantly predicted “Preparation” subscale scores, but accounted for only 4% of the variance, $F(1, 134) = 6.68$, $p < .05$. In addition, education accounted for 3% of the variance in the “Barriers” subscale scores, $F(1, 131) = 5.03$, $p < .05$. Finally, community size accounted for 2% of the variance in the “Facilitator” subscale scores, $F(1, 141) = 4.18$, $p < .05$.

Results from Qualitative Data Analysis

Twenty-three (13.5%) RNs reported other barriers, including the following: lack of time, businesses not providing employees with proper safety equipment, lack of patient compliance, lack of respect for nurses, uninformed nurses spreading false information, lack of cultural sensitivity by health care workers, lack of resources or reports linking increased incidences of certain health problems in particular areas, lack of interest in environmental health concerns, patients are unaware of the potential environmental hazards in their area, cost of educating health care professionals, cost of implementing changes, lack of nursing education, lack of assessment skills, and being unable to convince physicians that patient’s conditions relate to environmental health issues (even if the patient claims this).

In addition, 7 (4.1%) respondents listed other facilitators: expectations from the state school board that environmental health concerns be taught to children, reference materials available as handouts for personnel, quick simple explanations of environmental health issues, encouragement from administration, having mandatory Continuing Education Units (CEUs) for Idaho, nursing education programs, services from experts in the workplace, public awareness of how health is affected by environmental factors, and having a specific manual about environmental health issues.

Finally, 20 (11.8%) participants made additional comments at the end of the survey. The major themes included the following: concerns about poor air quality, unsafe food additives, a lack of public environmental responsibility, legislative constituencies not funding long-term threats or scientific evidence, JCAHO’s excessive focus upon documentation, healthcare’s focus upon crisis management and life extension rather than prevention and evaluation, physicians not communicating with one another about patient wellbeing and prescriptions, and RN’s general lack of assertiveness when it comes to EH issues.

Discussion

The primary purpose of this study was to explore the connection nurses see between the environment and health concerns of their patients. The study surveyed Idaho nurses to determine if they evaluated themselves as knowledgeable about EH hazards and if they felt prepared by their nursing curriculum to share this information with their patients. The study replicates Van Dongen’s (2002) study of Wisconsin nurses with a sample of nurses from a western state. In the ten years between studies, nursing curriculum seems not to have advanced in its coverage of EH issues. Nurses reported similar barriers and facilitators, they also reported feeling less prepared and had stronger beliefs about the importance of EH. This is not surprising given the

environmental conditions in this western state. The results indicated that although the RNs believed that nurses should know about EH hazards, few were actually knowledgeable. Furthermore, subscale item means indicated that RNs felt unprepared to answer questions about EH and were uncertain if they understood the relationship between environment and health. Time restraints and a lack of access to people with EH expertise were the greatest perceived barriers. This finding suggested that nursing curricula that included more EH classroom, field experience, and/or consultation time, as well as access to individuals with EH expertise, might improve RNs knowledge of environmental health hazards (Tillett, 2006; Wu, Jacobs, Mitchell, Miller, & Karol, 2007). It is interesting that the item "Addressing EH concerns is not a part of my nursing role" had the lowest subscale mean, indicating that most nurses felt it was their responsibility to be informed about EH issues. Data reflected the RNs' belief that the greatest facilitator of EH education was an inexpensive online EH continuing education program available in the workplace for current RNs, rather than accreditations; thus, this type of training for current RNs should be examined in future research (Shendell & Paris, 2007; Sirkin, Cali, & Keough, 2007; Sweeney & De Peyster, 2005).

RNs who reported that their nursing curriculum covered EH scored significantly higher on the "Preparation" subscale, indicating increased EH preparation. In addition, only EH coverage in nursing curriculum significantly predicted "Preparation" subscale scores. However, no significant differences were found in the "Beliefs" subscale scores, indicating that RNs felt that EH awareness among nurses was imperative, regardless of their level of formal EH instruction (Postma, 2006; Salazar, 2000). This finding highlights the need for nursing curricula to better prepare nurses to discuss EH issues.

A limitation of the study was that some of the mailing addresses provided by the State Board of Nursing were incorrect which resulted in only 170 useable surveys returned to researchers. In addition, we surveyed RNs, not students currently enrolled in nursing programs. Thus, if any new changes have been instituted in nursing curricula, our respondents may not have been aware of them, having already graduated. Third, although we clearly demonstrated the need for nursing curricula changes in EH education, we did not implement any such curricular changes. Future studies should investigate innovative ways to educate nursing students as well as registered RNs about EH issues. For example, a recent study (Beale & Lane, 2010) found that educational games and videos were a good way to educate practicing nurses about new issues in oncology. Perhaps similar games and videos could be developed to educate nursing students and RNs about EH issues.

Although the response rate was low, making it unclear how generalizable the results are to nurses in this western state, the survey findings do suggest a problem. Overall, many nurses felt unprepared from their nursing curricula to address EH issues in the field. Thus, different types of EH curricula need to be developed and tested for efficacy. Based on an Institute of Medicine (IOM) report, Pope, Snyder and Mood (1995) recommended that nurses should develop basic competencies that include: basic understanding of the relationship between the environment and health; the ability to assess for environmental hazards; advocate for the reduction of environmental risks; and awareness of EH laws and regulations. With increased aware-

ness of EH hazards among healthcare professionals, current EH challenges may be reduced in the future (Koplan & Fleming, 2000; Tarcher, 1992).

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