Industrial Health 2012, **50**, 521–528

Original Article

Work Experience, Work Environment, and Blood Exposure among Home Care and Hospice Nurses

Jack K. LEISS[1]

[1]Epidemiology Research Program, Cedar Grove Institute for Sustainable Communities, USA

Received July 11, 2011 and accepted July 25, 2012
Published online in J-STAGE October 8, 2012

Abstract: Blood exposure rates among home care and hospice nurses (RNs) in the United States are markedly lower for nurses with more home care/hospice experience, whether or not they have more total years of nursing experience (i.e., in other work environments). This study examined whether the protective effect of home care/hospice experience was greater for nurses who worked under three types of circumstances that are typical of the home care/hospice work environment and conducive to blood exposure. A mail survey was conducted in 2006 among home care/hospice nurses in North Carolina, a largely rural state in the southeastern U.S. The adjusted response rate was 69% (n=833). Blood exposure rates were higher among nurses with ≤5 years' experience in home care/hospice. Contrary to expectations, the protective effect of more experience was greater among nurses who did not have limited access to safety devices/personal protective equipment, did not have to rush during home visits, and did not often visit homes with unrestrained pets, unruly children, poor lighting, or extreme clutter. These results suggest that characteristics of the home care/hospice work environment limit nurses' ability to use their experience to prevent blood exposure.

Key words: Blood exposure, Epidemiology, Home nursing, Occupational exposure, Surveys

Introduction

Several recent studies have examined factors associated with blood exposure among home care and hospice nurses[1–4]. This issue is important because the population is large (over 130,000 nurses in the U.S. in 2009)[5] and expected to grow as home care/hospice expands[6]. These nurses are at risk of infection with human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) from needlestick, blood contact with eyes, nose, and mouth, and blood contact with non-intact skin[7, 8]. The one-year risk of blood exposure in this population has been estimated at 5%–9%[1, 9].

One of the most striking findings of these studies is the reduced risk associated with experience in home care/hospice nursing. In North Carolina, nurses who had worked in home care/hospice for five yrs or less had rates of blood exposure that were three times higher for total blood exposures and almost seven times higher for needlestick, compared to nurses who had worked in home care/hospice for over five yrs. Furthermore, blood exposure rates were not associated with age or total yrs of nursing experience[1]. In Massachusetts, the rate for blood exposure from sharps injuries was three times higher for nurses with five or less yrs of experience in home care[9].

The association of blood exposure with home care/hospice nursing experience but not total nursing experience suggests that characteristics unique to home care/hospice nursing, rather than nursing practice in general, may be causal risk factors for blood exposure in this population. The procedures performed by home care and hospice

*To whom correspondence should be addressed.
E-mail: jackl@mcmoss.org

nurses are similar to the procedures performed by nurses in other settings (for example, wound care, IV insertion), but the work environment is very different[10]. Unlike hospital and medical office staff, home care and hospice nurses commonly provide care in the midst of clutter and disrepair, dirtiness and poor sanitation, poor lighting, loud noise, distracting or interfering human activity, and unrestrained pets[11]. They usually work alone (i.e., without professional support)[10], often in situations in which they are at risk of physical or emotional injury or loss of property[12–17]. In addition, they are subject to excessive work loads, extensive long distance driving, and heavy paperwork demands[2, 10, 12–14, 18–20]. Finally, home care and hospice nurses may have limited access to appropriate safety-engineered medical devices and personal protective equipment intended to prevent blood exposure[2, 3, 21, 22].

Nurses entering home care/hospice may be receiving little or no training related to providing care in the unique environment described above[10, 19, 23]. Under these circumstances, the lower risk of blood exposure among nurses with more experience in home care/hospice suggests that, during their initial yrs of working in this environment, nurses learn techniques that later serve to reduce their risk of blood exposure.

The objective of the present study was to examine whether the protective effect of home care/hospice work experience (i.e., reduced rates of blood exposure) was greater for nurses who were subject to the above work conditions than for nurses who were not. If the protective effect was greater for nurses who were subject to these conditions, this finding would suggest that improved training for nurses entering home care/hospice could prevent blood exposure by giving nurses the skills at the beginning of their careers that they would subsequently develop through on-the-job experience. More specifically, if, through experience, nurses learn techniques for preventing blood exposure under the unique work conditions of home care/hospice, then a greater reduction in blood exposure rates should be observed among more-experienced nurses who encountered these conditions at work compared to those who did not. This, in turn, would suggest that early training in the techniques currently learned on-the-job could reduce excess blood exposure among less-experienced home care/hospice nurses.

Subjectsand Methods

The North Carolina Study of Home Care and Hospice Nurses was a mail survey conducted in North Carolina, a largely rural state in the southeastern United States, in 2006. Registered nurses who were listed in the licensing database of the North Carolina Board of Nursing as working in home care or hospice in non-administrative positions were eligible for the survey. Additional eligibility criteria included on the questionnaire were: currently working in home care or hospice in North Carolina and making six or more home visits in a typical week. Data analysis was conducted using SAS version 9.2 (SAS Institute, Inc., Cary, NC). The questionnaire can be viewed at http://www.sra.com/nchhnquestionnaire/. Additional details of the study design as well as descriptive blood exposure incidence rates have been published previously[1]. This study was approved by the Institutional Review Board of Weber State University.

Work environment

Three factors were used to characterize the home care/hospice work environment, i.e, level of access to safety devices and personal protective equipment, time pressure during home visits and, adverse conditions in the homes visited.

Safety devices and personal protective equipment (PPE)

Nurses were asked how often their agencies provided them with six specific types of safety devices (shielded winged steel needle; retracting or shielded lancet/lancet holder; syringe with sliding shield, hinged cap, or retracting needle; IV catheter with shielded or blunted stylet; hinged cap or shielded straight needle; and hinged cap blood tube holder). Response options were never, sometimes, usually, always, and don't know. Nurses were categorized as having 0–3 (i.e., limited access) or 4–6 (access) types of safety devices always provided. A detailed analysis of this data was presented previously[21].

Provision of PPE was measured by a similar question. Among the types of equipment listed, safety goggles, surgical mask with eye protection, and mask for CPR (cardiopulmonary resuscitation) were relevant for protecting against blood exposure to the eyes, nose, and mouth. Accordingly, nurses were categorized as having all three (i.e., access) or less than all three (limited access) of these items always provided. Similarly, among the types of equipment listed, fluid-impermeable gown/apron was relevant for protecting against blood contact with non-intact skin. Nurses were categorized as having this item always provided (access) or not always provided (limited access). A detailed analysis of this data was presented previously[22].

Time pressure

One item asked nurses whether they agree with the statement, "I always have enough time during a home visit so that I don't have to rush." Responses were indicated on a five point scale ranging from strongly disagree to strongly agree. Nurses were categorized as not having to rush (responses of 4 or 5) or having to rush (responses of 1, 2, or 3). Additional analysis of this data was presented previously[11].

Conditions in the home

Characteristics of homes visited were measured by four items asking how often the nurse visited homes with unrestrained pets; unsupervised, unruly children; poor lighting; and "cluttered homes where I have to clear a space around the patient to place my medical supplies," (i.e., adverse conditions). Response options were never, sometimes, usually, and always. Nurses were categorized as usually/always (often) or sometimes/never (seldom) visiting homes with at least one of these characteristics. A detailed analysis of this data was presented previously[11].

Blood exposure rates

The rate of blood exposure was defined as the number of blood exposures per 100,000 home visits. To determine the number of blood exposures, nurses were asked how many times during the previous 12 mon they had been stuck by a needle or lancet after it had been used on a patient; how many times they had gotten patients' blood or body fluid containing visible blood in their eyes, nose, or mouth; and how many times they had gotten patients' blood or body fluid containing visible blood on their non-intact skin.

To determine the number of visits, nurses were asked how many home visits they made in a typical week and in how many weeks they had made visits during the previous yr (out of 52 weeks). The product of these two values was the number of visits for that nurse.

Blood exposure rates were calculated for each of the three routes of blood exposure (needlestick, blood in eyes, nose, or mouth, and blood on non-intact skin) as well as for total blood exposure. In calculating these rates, the same variable was used for all three routes of exposure to measure time pressure, and similarly for conditions in the home and for work experience. However, as described above, different types of safety devices/PPE are relevant for different routes of blood exposure, depending on the type of protection offered. Therefore, for each route, the rates associated with access to safety devices/PPE were calculated based on the types of safety devices/PPE that are relevant for that route. Thus, access to safety devices was used for calculating rates of needlestick; access to safety goggles, surgical masks with eye protection, and masks for CPR was used for calculating rates of blood exposure to the eyes, nose, or mouth; and access to fluid-impermeable gowns/aprons was used for calculating rates of blood exposure to non-intact skin. Access to all three groups of safety devices/PPE was used for calculating rates of total blood exposure; that is, nurses who were always provided with all three groups of safety devices/PPE were categorized as having access to safety devices/PPE, whereas nurses who were not always provided with all three groups of safety devices/PPE were categorized as having limited access.

Work experience and behaviors

The number of yrs of having worked as a home care or hospice nurse was self-reported. Experience was defined as ≤5 yrs (i.e., less experience) or >5 yrs (i.e., 6+ or more experience).

Three items asked nurses whether they agreed with statements about their behavior in circumstances characteristic of home care/hospice. The statements were, "When entering a cluttered home, I always take time to clear a space around the patient to set up my medical supplies", "When entering a home with an unrestrained pet, I require that the pet is removed from the patient's room prior to the delivery of care," and "For procedures requiring sharps, I always make sure that a sharps container is within arm's reach".

Results

Questionnaires were received from 833 eligible nurses. Based on the assumption that the proportion of eligible nurses among those who did not return the questionnaire or could not be contacted was similar to the proportion among those who did return the questionnaire, the adjusted response rate was 69%. Participants were primarily white (91%), female (96%), and between the ages of 35 and 54 yrs (63%).

Approximately 40% of the nurses had worked in home care/hospice for five yrs or less (Table 1). Fifteen to 40 percent were not always provided with the various types of safety devices/PPE. Nearly half reported having to rush during home visits, and two-thirds usually or always visited homes with adverse conditions.

As expected, the rate of blood exposure was higher

Table 1. Distribution of years of experience in home care/hospice nursing and working conditions, the North Carolina Study of Home Care and Hospice Nurses, 2006 (n=833)

	n	%	95% CI
≤5 years of experience in home care/hospice nursing	325	39	(35–44)
Not always provided with 4 or more safety devices[a]	248	33	(28–37)
Not always provided with safety goggles, surgical mask with eye protection, and mask for CPR	354	42	(39–46)
Not always provided with fluid-impermeable gown/apron	136	17	(12–21)
Has to rush during home visits	375	45	(42–49)
Usually/always visits homes with adverse conditions[b]	521	63	(60–66)

CI, confidence interval; *CPR*, cardiopulmonary resuscitation; *n*, number of nurses. [a]Devices counted were shielded winged steel needle; retracting or shielded lancet/lancet holder; syringe with sliding shield, hinged cap, or retracting needle; IV catheter with shielded or blunted stylet; hinged cap or shielded straight needle; hinged cap blood tube holder. [b]Conditions counted were unrestrained pets, unruly children, poor lighting, and clutter.

among nurses with ≤5 yrs of home care/hospice experience compared to nurses with 6+ yrs of experience (Table 2; rates for blood in the eyes, nose, or mouth are not shown separately because of the small number of blood exposures). However, contrary to expectations, the protective effect of more experience was greater among nurses who had access to safety devices/PPE compared to those whose access was limited, who did not have to rush during home visits compared to those who did have to rush, and who seldom visited homes with adverse conditions compared to those who often visited such homes.

For example, among nurses who had limited access to safety devices/PPE, less experience was associated with twice the rate of total blood exposure compared to more experience (Table 2). However, among nurses who had access to safety devices/PPE, less experience was associated with eight times the rate of total blood exposure. Similarly, among nurses who had to rush during home visits, less experience was associated with three times the rate of total blood exposure, compared to six times among nurses who did not have to rush. Among nurses who often visited homes with adverse conditions, less experience was associated with nearly three times the rate of total blood exposure, compared to more than four times among nurses who seldom visited such homes. Comparable results were found for needlestick and non-intact skin exposure (excepting adverse conditions in the home for non-intact skin exposure).

There was no difference between those with less or more experience in the percent of nurses who engaged in the three behaviors specified above (data not shown).

Discussion

This is the first study to investigate factors related to the marked and consistent excess of blood exposure among nurses with less experience in home care/hospice compared to nurses with more experience in home care/hospice[1, 9]. The results suggest that experience providing care in the home care/hospice environment enables nurses to reduce their risk of blood exposure—the rate of blood exposure was three to seven times lower among nurses with more experience (Table 2). This general pattern was found for nurses who did and did not have limited access to safety devices/PPE; did and did not have to rush during home visits; and did and did not often visit homes with unrestrained pets, unruly children, poor lighting, and clutter.

However, this study also suggests that characteristics of the home care/hospice work environment limit nurses' ability to use their experience to prevent blood exposure. More experience was associated with greater protection for nurses who were not subject to the three factors examined. That is, the reduction in blood exposure associated with more experience was greater for nurses who had access to safety devices/PPE than for nurses whose access was limited; greater for nurses who did not have to rush during home visits than for nurses who did have to rush; and greater for nurses who seldom visited homes with adverse conditions than for nurses who often visited such homes.

Thus, this study does not support the conclusion that, through experience, nurses learn to compensate for the increased blood exposure risk posed by their work environment. Rather, these results suggest that conditions in the work environment must be addressed directly in order to reduce blood exposure among home care/hospice nurses. This latter conclusion is strengthened by the finding that there was no difference in the percentage of less- and more-experienced nurses who engaged in three behaviors

Table 2. Blood exposure rates (per 100,000 home visits) among home care and hospice nurses, by years of experience in home care/hospice nursing, working conditions, and route of exposure, North Carolina, 2006 (n=833)

Years of home care/hospice nursing experience and working conditions	Total[a]					Needlestick					Blood on non-intact skin				
	n	Rate	95% CI	Rate ratio[b]		n	Rate	95% CI	Rate ratio[b]		n	Rate	95% CI	Rate ratio[b]	
				Ratio	95% CI				Ratio	95% CI				Ratio	95% CI
≤5 y	68	47	(32–62)			16	17	(10–23)			33	24	(14–35)		
6+ y	59	15	(7.6–22)	3.2	(1.3–5)	13	2.4	(0.7–4.1)	6.8	(1.4–12)	36	7	(3.7–10)	3.5	(1.3–5.7)
≤5 y - Limited access to SD/PPE	53	42	(21–62)			7	12	(2.9–20)			7	17	(0–37)		
6+ y - Limited access to SD/PPE	37	21	(8.5–34)	2.0	(0.4–3.5)	5	2.6	(0–5.7)	4.5	(0–11)	7	13	(2.0–24)	1.3	(0–3.2)
≤5 y - Access to SD/PPE	15	57	(40–73)			6	18	(11–25)			24	26	(14–37)		
6+ y - Access to SD/PPE	22	7.2	(2.2–12)	7.9	(2.0–14)	8	2.6	(0.5–4.8)	6.9	(0.7–13)	29	6	(2.5–9.5)	4.3	(1.1–7.5)
≤5 y - Has to rush during home visits	48	41	(17–66)			8	7.3	(0.4–14)			23	23	(7.3–39)		
6+ y - Has to rush during home visits	39	14	(7.2–21)	2.9	(0.7–5.2)	6	1.9	(0–4.2)	3.8	(0–9.7)	27	10	(3.9–16)	2.3	(0.2–4.4)
≤5 y - Does not have to rush during visits	20	53	(37–70)			8	26	(14–37)			10	26	(13–39)		
6+ y - Does not have to rush during visits	18	8.5	(3.7–13)	6.2	(2.2–10)	7	2.8	(0.4–5.2)	9.2	(0.3–18)	9	5	(1.3–8.6)	5.2	(0.6–9.9)
≤5 y - Adverse conditions usually/always	57	44	(23–65)			11	10	(3.6–17)			30	26	(12–40)		
6+ y - Adverse conditions usually/always	39	16	(5.9–27)	2.7	(0.5–4.8)	7	1.8	(0–3.7)	5.6	(0–13)	24	7	(2.8–11)	3.7	(0.7–6.7)
≤5 y - Adverse conditions seldom/never	11	53	(34–72)			5	28	(14–42)			3	22	(8.6–36)		
6+ y - Adverse conditions seldom/never	20	12	(4.8–19)	4.4	(1.3–7.5)	6	3.5	(0.2–6.8)	7.9	(0–16)	12	7.2	(1.4–13)	3.1	(0–6.2)

CI, confidence interval; *n*, number of blood exposures; *PPE*, personal protective equipment; *SD*, safety devices; *y*, years. [a]Includes blood exposure to the eyes, nose, and mouth. This route is not shown separately because of small n's. [b]Comparing ≤5 yrs to 6+ yrs within strata.

that may have been expected to reduce the risk of blood exposure when conditions in the home conducive to such exposure were encountered. (The three behaviors were: in the midst of clutter, clearing a space around the patient to set up medical supplies; requiring that unrestrained pets be removed from the patient's room prior to the delivery of care; and for procedures requiring sharps, making sure that a sharps container is within arm's reach.) If more-experienced nurses had engaged in these behaviors more often than less-experienced nurses, such a finding may have indicated that more-experienced nurses practice techniques learned through experience, and therefore unavailable to less-experienced nurses, to reduce their risk of blood exposure. However, as the data indicate, this was not the case.

Each of the three types of characteristics of the home care/hospice work environment requires a different kind of intervention. Access to safety devices/PPE is mandated for all health care workers in the U.S. under the Occupational Safety and Health Administration's Bloodborne Pathogens Standard[24]. However, not only are many home care/hospice nurses not provided with safety devices/PPE by their employers[21, 22], but many home care/hospice agencies have not implemented a comprehensive blood exposure prevention program, also required under the Bloodborne Pathogens Standard, which is needed to realize the full protective potential of safety devices/PPE[3]. Of particular relevance for home care and hospice nurses is inconsistency in the safety devices provided[2]. These results, along with previous analyses from this survey that found that the primary reason for home care/hospice nurses not using safety devices/PPE was limited access to the devices and equipment[21, 22], highlight the need to develop interventions aimed at increasing home care and hospice nurses' access to safety devices/PPE and home care/hospice agencies' implementation of comprehensive blood exposure prevention programs[3].

Having to rush during home visits has been attributed to heavy patient loads, excessive paperwork demands, and threats to personal safety[2, 16]. Interventions have been developed to address threats to personal safety[16, 25], but the literature suggests that these interventions are not widely implemented[2, 26]. The problems of heavy patient loads and excessive paperwork demands need to be addressed at the policy level[20].

Conditions in the home that increase the risk of nurses' blood exposure are not subject to the authority of occupational health officials or home care/hospice agencies[27]. Furthermore, as this study indicates, nurses do not learn and implement, through experience, techniques that effectively counteract the increased risk of blood exposure posed by these conditions. The lack of attention to this issue in the literature suggests that the requisite techniques have not been developed. Future efforts to reduce blood exposure in this population should include development of techniques to prevent blood exposure under these conditions and training in their use by home care and hospice nurses.

The rate ratio estimates in this report have low precision (wide confidence intervals). These estimates should be verified in other studies. Bias from differential response or differential recall could have influenced these results. However, in order for the rate ratio comparisons to be biased, one particular group of nurses—for example, nurses with less experience who often visit homes with adverse conditions and have a lower rate of blood exposure—would have to have differential response (or differential recall) compared to the other seven groups of nurses[28]. This pattern of differential response (or recall) seems improbable. If nurses who were more at risk of blood exposure tended to leave home care/hospice sooner than other nurses, this differential selection could have produced a spurious association of more experience with reduced blood exposure rates. This question should be investigated through longitudinal studies. However, this pattern of selection would not have biased the comparisons made in the present study. Similarly, it is possible that more-experienced nurses, through seniority or chance, received patient assignments that carried less risk of blood exposure (although we found no association between procedures performed during home visits and risk of blood exposure; data not shown). Again, however, this possible source of bias in the experience–blood exposure association would not have biased the comparisons made in the present study.

Conclusions

In the context of the literature, the results of this study suggest the following conclusions:

- All home care and hospice nurses need training, in techniques that perhaps have yet to be developed, in preventing blood exposure when providing care in homes with adverse conditions characteristic of home care/hospice (i.e., unrestrained pets, unsupervised children, poor lighting, and excessive clutter).
- Reduction of threats to personal safety and of the excessive work loads typical of home care/hospice nursing

are needed to prevent blood exposure in this population.
- Full implementation of the Bloodborne Pathogens Standard[24] among home care/hospice agencies is needed to prevent blood exposure among home care/hospice nurses.

Acknowledgements

This study was funded by grant number OH008241 from the Centers for Disease Control and Prevention/ National Institute for Occupational Safety and Health. The findings and conclusions in this report are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health. The author thanks Linda Lacey of the North Carolina Center for Nursing for help with the Board of Nursing data; Kathy Culliton, MS, APRN and Cynthia Gecik, MSN, RN for help in understanding the PPE data; and members of the study team: Jennifer T. Lyden, Rahel Mathews, Dr. Kathleen L. Sitzman, RN, Abenah Vanderpuije, and Dr. Mary Agnes Kendra, RN.

References

1) Leiss JK, Lyden JT, Mathews R, Sitzman KL, Vanderpuije A, Mav D, Kendra MA, Klein C, Humphrey CJ (2009) Blood exposure incidence rates from the North Carolina Study of Home Care and Hospice Nurses. Am J Ind Med **52**, 99–104.
2) Markkanen P, Quinn M, Galligan C, Chalupka S, Davis L, Laramie A (2007) There's no place like home: a qualitative study of the working conditions of home health care providers. J Occup Environ Med **49**, 327–37.
3) Scharf BB, McPhaul KM, Trinkoff A, Lipscomb J (2009) Evaluation of home health care nurses' practice and their employers' policies related to bloodborne pathogens. AAOHN J **57**, 275–80.
4) Gershon RR, Pogorzelska M, Qureshi KA, Sherman M (2008) Home health care registered nurses and the risk of percutaneous injuries: a pilot study. Am J Infect Control **36**, 165–72.
5) Bureau of Labor Statistics Occupational employment statistics. May 2009 national industry-specific occupational employment and wage estimates. NAICS 621600 − home health care services. Last updated May 4, 2009. http://www.bls.gov/oes/current/naics4_621600.htm#b00-0000. Accessed July 8, 2010.
6) Bureau of Labor Statistics (Occupational Outlook Handbook, 2010–11 edition. Last updated December 17, 2009. http://stats.bls.gov/oco/ocos083.htm. Accessed January 21, 2011.
7) Haiduven D, Ferrol S (2004) Sharps injuries in the home health care setting: risks for home health care workers. AAOHN J **52**, 102–8.
8) National Institute for Occupational Safety and Health (2010) NIOSH Hazard review. Occupational Hazards in home healthcare, DHHS (NIOSH) publication no. 2010–125, Cincinnati, OH.
9) Quinn MM, Markkanen PK, Galligan CJ, Kriebel D, Chalupka SM, Kim H, Gore RJ, Sama SR, Laramie AK, Davis L (2009) Sharps injuries and other blood and body fluid exposures among home health care nurses and aides. Am J Public Health **99**, S710–7.
10) Benefield LE (1996) Making the transition to home care nursing. Am J Nurs **96**, 47–9.
11) Sitzman KL, Leiss JK (2009) Documentation of incidental factors affecting the home healthcare work environment. Home Healthc Nurse **27**, 516–21.
12) Fitzwater E, Gates D (2000) Violence and home care. A focus group study. Home Healthc Nurse **18**, 596–605.
13) Kendra MA (1996) Perception of risk by home health care administrators and field workers. Public Health Nurs **13**, 386–93.
14) Kendra MA, Weiker A, Simon S, Grant A, Shullick D (1996) Safety concerns affecting delivery of home health care. Public Health Nurs **13**, 83–9.
15) Gershon RRM, Pearson JM, Sherman MF, Samar SM, Canton AN, Stone PW (2009) The prevalence and risk factors for percutaneous injuries in registered nurses in the home health care sector. Am J Infect Control **37**, 525–33.
16) Fazzone PA, Barloon LF, McConnell SJ, Chitty JA (2000) Personal safety, violence, and home health. Public Health Nurs **17**, 43–52.
17) Canton AN, Sherman MF, Magda LA, Westra LJ, Pearson JM, Raveis VH, Gershon RR (2009) Violence, job satisfaction, and employment intentions among home healthcare registered nurses. Home Healthc Nurse **27**, 364–73.
18) Sitzman KL, Pett MA, Bloswick DS (2002) An exploratory study of motor vehicle use in home visiting nurses. Home Healthc Nurse **20**, 784–92.
19) Murray TA (1998) From outside the walls: a qualitative study of nurses who recently changed from hospital-based practice to home health care nursing. J Contin Educ Nurs **29**, 55–60.
20) Stoker J (2001) Have politics and regulations contributed to the nursing shortage? Home Healthc Nurse **19**, 611.
21) Leiss JK (2010) Provision and use of safety-engineered medical devices among home care and hospice nurses in North Carolina. Am J Infect Control **38**, 636–9.
22) Leiss JK, Sitzman KL, Kendra MA (2011) Provision and use of personal protective equipment among home care and hospice nurses in North Carolina. Am J Infect Control **39**, 123–8.
23) Hartung SQ (2005) Choosing home health as a specialty and successfully transitioning into home health nursing practice. Home Health Care Manage Pract **17**, 370–87.

24) Occupational Safety and Health Administration (Bloodborne Pathogens Standard (29 CFR 1910.1030). Last updated May 10, 2007. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051. Accessed April 8, 2008.
25) Sylvester BJR, Reisener LRN (2002) Scared to go to work: a home care performance improvement initiative. J Nurs Care Qual **17**, 71–82.
26) McPhaul K, Lipscomb J, Johnson J (2010) Assessing risk for violence on home health visits. Home Healthc Nurse **28**, 278–89.
27) Occupational Safety and Health Administration. Enforcement procedures for the occupational exposure to bloodborne pathogens. Directive no. CPL 02–02-069. Last updated http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=2570#XI. Accessed May 31, 2009.
28) Kleinbaum DG, Kupper LL, Morgenstern H (1982) Epidemiologic research: principles and quantitative methods, Van Nostrand Reinhold, New York.