Final Close-out Progress Report

Title: Exposure to Blood Among Home Health Care Nurses

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Table of Contents.

List of Terms and Abbreviations
RN, registered nurse

Abstract
Background: Home care/hospice nurses are at risk of infection from human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) through exposure to patients' blood. They routinely perform complex medical procedures that formerly were mostly performed in hospitals and that involve potential exposure to blood and bloody body fluids. Furthermore, home health care nurses work under conditions that are often conducive to exposure and unfavorable to preventive actions. Very little is known about the extent to which home health care nurses are exposed to blood, factors contributing to their exposure, or current prevention practices in this population.
Methods: A mail survey (n=1,473) was conducted among home care/hospice nurses in North Carolina in 2006.
Results: The adjusted response rate was 69%. Nine percent of nurses had at least one exposure/year. Overall incidence was 27.4 (95% confidence interval: 20.2, 34.6)/100,000 visits. Nurses who had worked in home care ≤5 years had higher exposure rates than other nurses–seven times higher for needlesticks and 3.5 times higher for non-intact skin exposures. Nurses who worked part time/contract had higher exposure rates than nurses who worked full time–seven times higher for needlesticks and 1.5 times higher for non-intact skin exposures. The rates for part-time/contract nurses with ≤5 years experience were extremely high. Sensitivity analysis showed that it is unlikely that response bias had an important impact on these results.

Safety-engineered medical devices were always provided by the employer to only 45%-80% of the nurses, depending on the type of device. Nurses who were always provided with safety-engineered medical devices by the employer were much more likely to use the safety devices than nurses who were not always provided with the devices. Over 90 percent of nurses who had the devices always provided reported using them, compared to 20 – 50 percent (depending on the device) of nurses who did not have the devices always provided. Moreover, among nurses who did not use the devices, the primary reason given for not using them was that they were not provided.
Conclusions: Approximately 150 North Carolina home care/hospice nurses are exposed to blood annually. If these results are representative of other states, then approximately 12,000 home care/hospice nurses are exposed each year nationwide. Providing nurses who are new to home/hospice care with more training, orientation, and supervision would potentially reduce their occupational blood exposure. OSHA standards requiring employers to provide safety-engineered medical devices to home care/hospice nurses are apparently not being enforced. Bringing employers into compliance with these standards would potentially reduce occupational blood exposure among home care/hospice nurses. Future research should aim to develop interventions to reduce the high exposure rates among part-time/contract home care/hospice nurses.

Highlights/Significant Findings

1. Approximately 150 North Carolina home care and hospice nurses are exposed to blood annually. If these results are representative of other states, then approximately 12,000 home care and hospice nurses are exposed each year nationwide. These numbers can be expected to grow as nursing employment in home care continues to increase.

2. Nurses who were new to home care/hospice (≤5 years experience) had much higher exposure rates than those with more home care/hospice experience.

3. Nurses who worked full time had much higher exposure rates than nurses who worked part-time/contract.

4. Nurses who were always provided with safety-engineered medical devices by the employer were much more likely to use the safety devices than nurses who were provided the devices sometimes or never.

Translation of Findings.

1. Nurses who are new to home/hospice care should be given more training, orientation, and supervision with respect to preventing blood exposure.

2. Future research should investigate the hypothesis that fill-in nurses are at greater risk of blood exposure and the reasons for this.

3. OSHA standards requiring employers to provide safety-engineered medical devices to home care/hospice nurses should be enforced.

Outcomes/Relevance/Impact

Potential outcomes:

1. Nurses with five years or less experience in home care/hospice had much higher exposure rates than nurses with more experience in home care/hospice. Much of the excess was concentrated in nurses with two years or less experience in home care. Examination of age and total years of experience as an RN showed that it was years of home care experience that mattered for blood exposure in this setting, rather than total nursing experience. Although most nurses entering home care have several years of nursing experience in other settings, home care requires different skills and competencies than they would have developed from previous training and experience. Moreover, the literature suggests that nurses entering home care are provided with only minimal orientation and training before being assigned full or even excessive case loads. Taken together, **these findings suggest that providing nurses who are new to home/hospice care with more training, orientation, and supervision would reduce occupational blood exposure in these workers.**

2. Part-time and contract nurses had much higher exposure rates than nurses who worked full time. This may be related to the role of the *fill-in nurse* in home care.

When a patient's regular nurse is unavailable, the home care is provided by a fill-in nurse. Most fill-in care is provided by part-time and contract nurses; full-time nurses are unlikely to do fill-in visits. Thus, a substantial proportion of visits by part-time and contract nurses may be to homes and patients with which they are unfamiliar. This, in combination with the unpredictable nature of the home care environment, may explain the markedly higher exposure rates in part-time/contract nurses. **Future research should investigate this hypothesis and develop interventions to reduce the high exposure rates among part-time/contract nurses in the home care/hospice environment.**

3. Safety-engineered medical devices have been shown to prevent occupational blood exposure. Nurses who reported that specific safety-engineered medical devices were always provided by the employer were much more likely to also report using those safety devices when they last performed the relevant medical procedure. Over 90 percent of nurses who had the devices always provided reported using them, compared to 20 – 50 percent (depending on the device) of nurses who did not have the devices always provided. Moreover, among nurses who did not use the devices, the primary reason given for not using them was that they were not provided. **This suggests that enforcing OSHA standards that require employers to provide safety devices to home care/hospice nurses would reduce occupational blood exposure in this population.**

Scientific Report

Background

Home health care nurses, like other health care workers, are at risk of infection from human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) through exposure to patients' blood. Of these three pathogens, pre-exposure prophylaxis (by vaccination) is available for HBV only. The extent of immunization among home health care nurses is unknown. Post-exposure prophylaxis (with antiretroviral drugs) is available for HIV only, but even under ideal conditions (e.g., when it can be started very soon after exposure), it is not 100 percent effective. There is no vaccine or post-exposure prophylaxis for HCV. Thus, the primary means of preventing occupational HIV and HCV infection, and to a lesser extent HBV infection, is through prevention of blood exposure. Very little is known about the extent to which home health care nurses are exposed to blood, factors contributing to their exposure, or current prevention practices in this population.

Although the risk of exposure among home health care nurses is not known, the nature of their work suggests that it may be high. Home health care nurses routinely perform complex medical procedures that formerly were mostly performed in hospitals and that involve potential exposure to blood and bloody body fluids. Furthermore, home health care nurses work under conditions that are often conducive to exposure and unfavorable to preventive actions. Unlike nurses who work in highly structured hospital environments, home health care nurses provide patient care in homes where working conditions vary widely from one venue to the next and they have little control over the

work environment. They frequently encounter filth, extreme clutter, poor lighting, uncontrolled pets and children, structurally unsafe homes, the arrival of unexpected guests, caregivers under the influence of substances, and combative, mobility-impaired, comatose, or disoriented patients. They perform medical procedures, including using sharps, under these potentially dangerous conditions without supportive assistance from other trained medical personnel such as other nurses or nurse aides. They routinely work alone, and without equipment appropriate for the management of patients with impaired mobility or cognition such as hospital beds, lifting and turning assistive devices, and wheelchairs. They lack adequate barrier supplies, cleaning supplies, or disposal resources in some venues, thus making it difficult or impossible to satisfactorily remove blood and bodily fluid from contaminated household surfaces such as upholstered and padded furniture, drapes and plush items, wood, and other porous surfaces. Moreover, many home health care nurses work under conditions of excessive stress from concern for their personal safety either within the home or in the surrounding neighborhood, the unpredictability of the home environment, and fatigue due to overtime hours worked. These working conditions exacerbate the potential for blood exposure, especially from percutaneous injury from contaminated needles or sharp instruments.

The number of home health care workers is expected to increase by 60 percent from 2000 to 2010, reflecting the existing trend towards increased home care of patients.

Specific aims

1. Estimate incidence rates of occupational blood exposure among home health care nurses in the North Carolina for each of three routes of exposure, i.e., needlesticks; mucous exposures to eyes, nose, and mouth; and blood contact with non-intact skin.
2. Identify risk factors for blood exposure among home health care nurses and quantify their effects.
3. Quantify the availability and use of medical safety devices.

Methods

We conducted a mail survey of registered nurses (RNs) who were listed in the licensing data base of the North Carolina Board of Nursing as working in home care or hospice in non-administrative positions. All nurses who met the eligibility criteria were included in the sample. Nurses who had been selected for the earlier pilot study, who were not currently working in hospice or home care, or who did not make six or more home visits in a typical week were ineligible. The licensing database does not include employment setting (i.e., home care or hospice) for newly licensed (<2 years) nurses; however, it would be rare for nurses in this category to work in home care or hospice. Data collection was conducted during October and November, 2006. Data analysis was conducted using SAS version 9.1 (SAS Institute, Inc., Cary, NC). The questionnaire can be viewed at http://www.constellagroup.com/nchhnquestionnaire. For brevity, *home care* is used in the rest of this report to represent home care and hospice. This study was approved by the Institutional Review Board of Weber State University.

Formative research

During Year 1, project planning and formative research were conducted to determine the best method of data collection; gather information on barriers, incentives, and motivation for participating in the study; and to inform the development of the questionnaire items and response options. Methods utilized in the formative research included one-on-one interviews with project collaborators, shadowing ("tagging" along with) home care nurses as they made their visits, key informant interviews, and focus groups with practicing home health nurses.

Home care and hospice nurses from the four types of home care or hospice agencies that operate in North Carolina (i.e., hospital-based, private freestanding, health department, and hospice) were recruited to participate in the formative research. All participants were given a $25 (key informant interviews and direct observation) or $50 (focus group) gift card.

Focus Groups. Two focus groups were conducted to obtain information on the feasibility of various data collection methods and barriers and incentives to participation in the study. A trained focus group moderator, facilitated all focus group discussions while a co-moderator took notes. Each session lasted approximately sixty minutes. The discussions were audio recorded.

Key Informant Interviews. Seven key informant interviews were conducted to inform development of questionnaire items and response options. At least one key informant was from each of the four types of home care/hospice agencies. All interviews were conducted by the one of the authors. Interviews lasted sixty to ninety minutes.

Direct Observations. Direct observation was conducted to inform development of questionnaire items and response options. One of the authors accompanied three different nurses on their respective shifts (approximately 4-6 hours each) to directly observe their work environment and activities. A total of eight home visits were observed lasting between 20 and 54 minutes each.

Questionnaire development

Based on findings from the formative research, a mail survey was deemed the most appropriate data collection method. Development of the questionnaire included cognitive testing with practicing home health nurses.

Pilot Study

A pilot study with 400 randomly selected home health and hospice nurses from North Carolina was conducted beginning in October 2005. The study design incorporated Dillman's Tailored Design Method (TRM) for mail surveys. The purpose of the pilot study was to test the study design, including the logistics and questionnaire, and to estimate response rates and exposure rates for planning the main survey. Two factors were tested in a 2X2 factorial design to see if they would increase response rates: an

incentive and two different types of survey packet envelopes. The incentives tested were a lapel pin with the study logo and a $1 bill. The envelopes tested did or did not have an image of a nurse giving home care on the front. Results from the pilot study indicated that surveys with the pin received a marginally better response rate than the $1 bill and those with the image envelope received a marginally better response rate than the no-image envelope. The highest response for any group was approximately 65 percent.

We conducted telephone follow-up of non-respondents to the pilot study. The purpose of the follow up was to learn why nurses did not participate in the survey, and techniques for increasing participation. We were able to contact a third of the non-respondents. The main reasons given for not returning the questionnaire were that the nurse was did not meet the eligibility criteria (ineligible subjects were requested to return the survey) , and that they had already returned it (although we did not receive it). The main finding from this follow up activity was a confirmation of our earlier conclusion that a telephone survey of this population was not a feasible approach for the study.

Pilot Study #2. A second pilot study was conducted with 100 home health nurses in August 2006. The purpose of this second pilot study was to determine the fesibility of a revised data collection approach that included pre-notification calls placed to nurses prior to mailing the survey in order to increase response rates. This pilot study resulted in a finalized data collection approach for the main study that included nursing students from a local university placing pre-notification calls to the home health nurses selected for the study, in order to increase interest, support, and participation in the survey.

Incidence rates

Incidence rates were calculated as number of exposure events per 100,000 home visits. The numerator for the rates was derived from questionnaire items that asked how many times during the past 12 months "did you get patients' blood or body fluid containing visible blood in your eyes, nose, or mouth?" i.e., *mucous membrane exposures*; "were you stuck by a needle or lancet after it had been used on a patient?" i.e., *needle/lancet sticks*; and "did you get a patient's blood or body fluid containing visible blood on your non-intact skin (such as skin with dermatitis, hangnails, cuts, abrasions, chafing, or acne?" i.e., *non-intact skin exposures*.

The denominator for the rates, i.e., number of home visits during the past year, was calculated as the number of weeks in which visits were made times the average number of visits per week. The number of weeks was taken from the question, "How many weeks did you see patients/clients last year (52 weeks)?" The average number of visits was derived from items that asked the number of home visits the respondent made in a typical week "currently," "last summer," and "last winter." To account for seasonal variation in number of visits, the average number of visits per week was calculated as the weighted average of the numbers reported in these three items, with the value for "currently" taken as representing spring and autumn and therefore receiving twice the weight of the other two.

Nurses' sex, age, and the year they received their RN license were included in the information received from the Board of Nursing. Other data for the analysis came from items that asked whether the respondent worked full time, part time, or as a contract nurse; whether his/her workplace was a hospital affiliated- or private for-profit or non-profit agency or a health department; and how many years he/she had worked in home care or hospice since becoming a licensed RN.

Provision of safety devices was ascertained by the question, "How often does your agency provide you with the following safety-devices?" Response options were Never, Sometimes, Usually, Always, and Don't Know. The seven items listed were shielded winged steel needle (butterflytype); retracting or shielded lancet/lancet; 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; and puncture-resistant sharps container.

Use of safety devices was ascertained by a series of questions that described a medical procedure in which a safety device should be and asked the respondent if he/she used a safety device the last time he/she performed that procedure.

Statistical analysis

The average exposure rate and within nurse correlation were estimated using the method of moments, based on the assumptions that the incidence of exposure for any single visit is distributed as a Bernoulli random variable and that the probability of two exposures on any two visits by the same nurse is constant. The latter assumption allowed us to model over-dispersion in total number of exposures by incorporating within subject correlation.

We conducted a sensitivity analysis of the observed incidence rates with respect to response bias. We first calculated the hypothetical true incidence rate under various assumptions about nonrespondents. We then compared these results to the observed incidence rates to draw conclusions about the impact of possible response bias on the results.

Simple frequencies were calculated to estimate provision and use of safety devices. Provision was dichotomized as always provided vs. other because of the skewed distribution of the responses.

Results

We received 833 questionnaires from nurses who were eligible for the study, whereas 640 nurses did not return the questionnaire or refused (in preliminary phone calls), for a response rate of 57 percent, i.e., $833/(833+640)$. In addition, we received 317 questionnaires from ineligible respondents, 48 questionnaires were returned because of invalid addresses, and an additional 225 nurses were determined to be ineligible in preliminary phone calls, for a total of 590 known ineligibles/non-contacts. Assuming that

the proportion of eligible nurses among those who did not return the questionnaire or refused was similar to the proportion among those for whom eligibility/contact status was known (i.e., $833/(833+590)$), the adjusted response rate was 69 percent (i.e., $833/(833+374)$).

Participants (n=833) were primarily white (91 percent), female (96 percent), and between the ages of 36 and 55 years (63 percent). Seventy-five percent had been RNs for ten years or more. These proportions were very close to the comparable proportions for the entire sample (n=1,473). Forty percent of participants had five years or less experience in home care, and 77 percent worked full time. (See Table I.)

Table I. Characteristics (%) of the study population of the North Carolina Study of Home Care and Hospice Nurses, 2006

Characteristic	Eligible respondents (n=833)	Sampling frame (n=1,473)
Female	95.8	95.3
White	91.3	89.4
Age 36-55 years	62.7	62.1
10+ years since becoming RN	74.8	82.6
≤5 years as home care/hospice nurse*	39.5	
Worked full time*	77.2	

*Data available for survey participants only

Incidence rates

The proportion of nurses who had at least one blood exposure during the previous year was 8.9 percent (95 percent confidence interval: 7.6, 10.2). The overall incidence rate was 27.4 (20.2, 34.6) exposures per 100,000 home visits (Table II). More than half of the exposures were to non-intact skin.

Nurses who had worked in home care for five years or less had higher rates of needle/lancet sticks, non-intact skin exposures, and total exposures compared to other nurses, although the precision of some of these estimates was low (Table II). The estimated rates were seven times greater for needle/lancet sticks and 3.5 times greater for non-intact skin exposures. The rates were even higher for nurses in their first two years of home care (data not shown). There was little difference in incidence rates by total years of experience as an RN, age, or type of workplace.

Nurses who worked part time/contract had higher rates of needle/lancet sticks, non-intact skin exposures, and total exposures than nurses who worked full time, although the precision of some of these estimates was low (Table II). The estimated rates were seven

times greater for needle/lancet sticks and 1.5 times greater for non-intact skin exposures. The differences were even greater when restricted to nurses who had worked in home care for five years or less (Table III). The rates for part-time/contract nurses with five years or less experience were extremely high.

Table II. Blood exposure incidence rates per 100,000 home visits (95% confidence intervals), b status, and experience as a home care nurse. The North Carolina Study of Home Care and Ho

Route of exposure	Total	Employment status						Experie
		Full time			Part time/contract			≤5
	Incidence rate	Incidence rate	n^a	n^b	Incidence rate	n^a	n^b	Incidence
Needle/lancet stick	7.9 (5.3-10.5)	3.3 (1.2-5.3)	20	19	23.3 (12.5-34)	8	7	16.3 (10.0-22.6)
Mucous membrane	5.7 (1.3-10.2)	7.2 (1.5-12.8)	27	14	1.0 (0-3.3)	2	2	6.3 (0-12.
Non-intact skin	14.0 (9.5-18.4)	12.6 (7.6-17.6)	58	31	18.7 (8.5-28.9)	12	8	24.8 (14.6-34.9)
Total	27.4 (20.2-34.6)	22.8 (14.3-31.3)	105	57	43.0 (28.6-57.3)	22	17	47.1 (32.4-61.8)

n^a = number of exposures; n^b = number of exposed nurses.

Table III. Blood exposure incidence rates per 100,000 home visits (95% confidence intervals), by route of exposure, employment status, and experience as a home care/hospice nurse. The North Carolina Study of Home Care and Hospice Nurses, 2006.

Route of exposure	≤5 years working as home care/hospice nurse		6+ years working as home care/hospice nurse	
	Employment status		Employment status	
	Full time	Part-time/contract	Full time	Part-time/contract
Needle/lancet stick	5.9 (1.2-10.6)	59.2 (26.5-91.9)	1.5 (0.1-2.8)	5.2 (0-11.2)
Mucous membrane	7.8 (0.1-15.5)		6.8 (0-14.9)	1.5 (0-4.6)
Non-intact skin	19.7 (8.9-30.6)	45.5 (15.0-75.9)	7.6 (3.8-11.5)	5.2 (0-11.6)

Total	33.2	(16.9-49.4)	104.6	(63.8-145.5)	15.8	(6.7-24.8)	11.9	(2.7-21.1)

Sensitivity analysis. The sensitivity analysis showed that in order for our observed incidence rate of approximately 30 exposures/100,000 visits to underestimate the true rate by one half (i.e., true rate=60/100,000), the incident rate among nonrespondents would have to be at least three times the rate among respondents *and* nonrespondents would have to make at least twice as many visits per week on average as respondents. Similarly, in order for the observed rate to overestimate the true rate by a factor of two (i.e., true rate=15/100,000), the incidence rate among nonrespondents would have to be one-fourth or less of the incidence rate among respondents and nonrespondents would have to make more than twice as many visits per week on average as respondents. (See figure 1.)

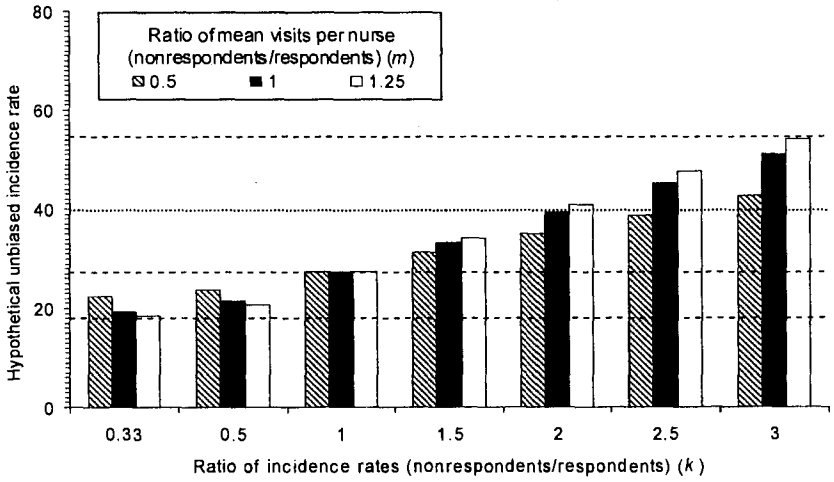

Figure 1. Hypothetical unbiased incidence rates under varying assumptions about nonrespondents in relation to respondents. Occupational blood exposure rates from the North Carolina Study of Home Care and Hospice Nurses, 2006. The lines mark the observed incidence rate (middle dashed line), unbiased rate assuming 50% underestimate (upper dashed line), unbiased rate assuming 50% overestimate (lower dashed line), and the upper limit of likely response bias based on the sensitivity analysis (dotted line).

Provision and use of safety devices

Nurses who reported that specific safety-engineered medical devices were always provided by the employer were much more likely to also report using those safety devices when they last performed the relevant medical procedure. Over 90 percent of nurses who had the devices always provided reported using them, compared to 20 – 50 percent (depending on the device) of nurses who did not have the devices always provided (Table 4). Moreover, among nurses who did not use the devices, the primary reason given for not using them was that they were not provided (Table 5).

Table 4. Provision and use of safety devices

Safety device	Always provided	Used last time the procedure was performed - %		
	%	Total	Not always provided	Always provided
Shielded winged steel needles	82	84	36	94
Syringe with sliding shield	75	81	46	93
Lancet	66	76	48	92
IV catheter with shielded or blunted stylet	65	73	34	92
Hinged cap or shielded straight needle	59	67	30	91
Hinged cap blood tube holder	46	57	18	92

Table 5. Reasons for not using the device the last time the procedure was performed - %

Safety device	Not a risky procedure	Do not like this equipment	Did not have equipment at visit	Device not provided by my agency
Shielded winged steel needles	7	8	11	58
Syringe with sliding shield	5	1	13	47
Lancet	8	6	16	58
IV catheter	3	2	10	30

with shielded or blunted stylet				
Hinged cap or shielded straight needle	4	8	17	52
Hinged cap blood tube holder	1	3	10	70

Discussion

Incidence rates

Our findings suggest that approximately 9 percent of home care nurses are exposed to patients' blood each year. This represents about 150 exposed nurses in North Carolina and, if our population is representative of nurses in other states with respect to blood exposure, about 12,000 nurses nationwide. These numbers can be expected to grow as nursing employment in home care continues to increase.

Exposure rates were much higher among nurses with five years or less experience in home care as compared to nurses with more experience. Much of the excess was concentrated in nurses with two years or less experience in home care. Examination of age and total years of experience as an RN showed that it was years of home care experience that mattered for blood exposure in this setting. Although most nurses entering home care have several years of nursing experience in other settings, home care requires different skills and competencies than they would have developed from previous training and experience. Moreover, the literature suggests that nurses entering home care are provided with only minimal orientation and training before being assigned full, or even excessive case loads. This may produce situations in which the nurse is unable to take preventive measures or chooses behaviors that increase his/her risk of blood exposure. This would explain the markedly higher incidence rates among nurses with less experience in home care.

Exposure rates were much higher among part-time and contract nurses as compared to nurses who worked full time. This may be related to the role of the *fill-in nurse* in home care. When a patient's regular nurse is unavailable, the home care is provided by a fill-in nurse. Anecdotal evidence from two members of the research team, who have worked in home care, suggests that most fill-in care is provided by part-time and contract nurses, and that full-time nurses are unlikely to do fill-in visits. Thus, a substantial proportion of visits by part-time and contract nurses may be to homes and patients with which they are unfamiliar. This, in combination with the unpredictable nature of the home care environment, may explain the markedly higher exposure rates in part-time/contract nurses.

Routes of exposure
Non-intact skin exposures accounted for more than half of all blood exposures. Although transmission rates for this route are thought to be lower than transmission rates for needlesticks and mucocutaneous exposures, the Centers for Disease Control and Prevention's Universal Precautions emphasize prevention of exposure from all routes. Moreover, non-intact skin exposure may be an important pathway for HBV infection among health care workers, and HIV infection and HIV/HCV co-infection by this route have been documented.

The rate of mucocutaneous exposures was close to the needlestick rate, although the precision of the former estimate was low. The transmission rate for HCV by mucocutaneous exposure has been estimated at 0.4% – higher than the HIV needlestick transmission rate of 0.3%. The transmission rate for HBV among unvaccinated health care workers by this route may be high as well. The mucocutaneous transmission rate for HIV has been estimated at 0.09%. Thus, mucocutaneous exposures represent over 40% of all exposures by routes of known or suspected high transmission for two of the three major pathogens of concern. Moreover, there is some evidence that mucocutaneous exposure is in fact an important pathway for HBV infection among health care workers.

Response bias
The results of the sensitivity analysis suggest that response bias, to the extent that it was present, did not cause our observed incidence rates to be substantially different from the true population rates. It is unlikely that nonrespondents made many more visits per week than respondents, given that 77 percent of respondents worked full time. If respondents and nonrespondents made the same number of visits per week, then the true incidence rate would not be substantially less than what we found even if the rate among nonrespondents was only one-fourth of the (true) rate among respondents. Similarly, if respondents and nonrespondents made the same number of visits per week, then the true incidence rate would only be double what we found if the rate among nonrespondents were four times the (true) rate among respondents. A four-fold difference in blood exposure rates between nonrespondents and respondents seems unlikely. Thus, our results provide a reasonable basis for developing policy and prevention programs in relation to occupational blood exposure in home care and hospice nurses.

Provision and use of safety devices
The low rates of provision of some safety devices indicate that some employers are not in compliance with OSHA standards. Our results indicate that the primary reason nurses do not use safety devices is that they are not provided by the employer. Enforcement of the standards could lead to reduced blood exposure in home care and hospice nurses.

Publications

Leiss JK, Lyden JT, Mathews R, Sitzman KL, Vanderpuije A, Mav D, Kendra MA, Klein C, Humphrey, CJ. Blood exposure incidence rates from the North Carolina Study of Home Care and Hospice Nurses. *Am. J. Ind. Med.*, in press.

Inclusion of gender and minority study subjects

Program Director/Principal Investigator (Last, First, Middle): Leiss, Jack K

Inclusion Enrollment Report

This report format should NOT be used for data collection from study participants.

Study Title: Exposure to Blood Among Home Health Care Nurses

Total Enrollment: 833 **Protocol Number:**

Grant Number: OH008241

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race				
	Sex/Gender			
Ethnic Category	**Females**	**Males**	**Unknown or Not Reported**	**Total**
Hispanic or Latino	1	1		2 **
Not Hispanic or Latino				
Unknown (individuals not reporting ethnicity)	795	34	2	831
Ethnic Category: Total of All Subjects*	796	35	2	833 *
Racial Categories				
American Indian/Alaska Native	7			7
Asian	3			3
Native Hawaiian or Other Pacific Islander				
Black or African American	52	3		55
White	716	31		747
More Than One Race				
Unknown or Not Reported	18	1	2	21
Racial Categories: Total of All Subjects*	796	35	2	833 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not Reported	Total
American Indian or Alaska Native				
Asian				
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported	1	1		2
Racial Categories: Total of Hispanics or Latinos**	1	1		2 **

* These totals must agree.
** These totals must agree.

Inclusion of Children
n/a

Materials available for other investigators
The questionnaire is available at http://www.constellagroup.com/nchhnquestionnaire.

Investigators who want to conduct analyses of the data can contact Dr. Leiss at jackl@mcmoss.org or 919-647-4740.