Session date: 3/01//2016
Series: Spotlight on Women’s Health: Women’s Health Initiative
Session title: Mortality
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Molly: We are at the top of the hour now. At this time I would like to introduce our panel of speakers in the order that they will be presenting for us. Presenting first we have Dr. Donna Washington. She is part of the VA Health Services Research and Development Center for the study of Healthcare Innovation Implementation and Policy in VA Greater Los Angeles Healthcare System, and also the Geffen at University of California in Los Angeles. Joining us briefly will also be Dr. Julie Weitlauf. She is at VA Palo Alto Healthcare System Sierra Pacific MIRECC and Center for Innovation to Implementation. She is also at Stanford University in the Department of Psychiatry and Behavioral Sciences. Next will be Dr. Tracy Simpson from the Center of Excellence in Substance Abuse Treatment and Education at the VA Puget Sound Healthcare System, and also from the Department of Psychiatry and Behavioral Sciences at University of Washington. Next we will have Dr. Karen Lehavot. She is also in Teleservices Research and Development at VA Puget Sound Healthcare System, and in the Department of Psychiatry and Behavioral Sciences at the University of Washington. At this time I would like to turn it over to Dr. Donna Washington.

Dr. Donna Washington: Okay Molly, thanks very much. Can you see my screen?

Molly: I can. Thank you.

Dr. Donna Washington: Great, thank you everybody for joining us. My co-presenters and I are delighted to be with you today to tell you about three papers in our supplement that pertain to mortality among women veterans and the Women’s Health Initiative. Before we delve into the talk, I am going to give you a brief background about women veterans in the Women’s Health Initiative, or you will hear me say WHI, and what motivated this research in older women veterans. Today, two million of the nation’s 22 million veterans are women. And 800,000 of these women veterans are aged 65 or older. They served in the military during World War II, the Korean Conflict, and during the Vietnam Era. Very little is known about the aging issues in these older women veterans and the potential impact of the military service on the aging process.

A 2015 manuscript by Julie Weitlauf and colleagues, myself included, compared women veterans to non-veterans using the very robust Women’s Health Initiative data resource. In that paper, we reported on the very notable finding of higher mortality in women veterans compared to non-veterans. That finding stimulated our group of over 60 VA and non-VA researchers to address 13 different gaps in our knowledge about older women veterans by preparing manuscripts on those topics. These manuscripts appeared in the February 2016 *Gerontologist Supplement* and the February *Gerontologist Special Issue on Veterans*. You will see URLs at the bottom of the slide. You can follow them to access all papers through Open Access. In many instances, these papers were the very first reports on healthy aging, high priority diseases and conditions, menopause related conditions, and mortality comparing older women veterans to non-veterans.

This research was motivated by several factors. It was motivated to examine both positive and negative associations in military exposure, to quantify the health behaviors and other factors associated with helping aging, disease onset, and mortality. That is again comparing veterans to non-veterans. Finally, we wanted to begin clinical and research preparation for the projected increase in older women veterans. You will see a bar graph on this slide which shows the age distribution of the 2014 US women veteran population compared with the projected age distribution of women veterans in 2025. It is a little under ten years from now. Just looking over to the far right set of bars which represents veterans in the 65 or older age group, you can see that there is a projected 83% increase in women veterans in that oldest group anticipated in the next ten years.

Let me give you a little bit of background on the Women’s Health Initiative. The WHI is a very large program in the US that was begun in the early 1990s. The goal was to answer major questions about post-menopausal women’s health. Our focus was on the diseases that occur in the post-menopause with greater frequency – specifically cancer, heart disease, and osteoporotic bone fractures. This was a vast undertaking that included almost 162,000 post-menopausal women recruited from 40 US centers around the country. Recruitment occurred between 1993 and 1998. The women that were enrolled in the study were first followed for up to 12 years through 2005. In 2005, participants were consented to enroll in a five-year extension through 2010. Over 115,000 participants agreed to that. Then participants were consented a third time in 2010 to enroll in an additional extension; and 93,500 participants were enrolled in that extension study. This is an amazing resource and probably the largest data resource of its type of older women veterans.

The WHI eligibility criteria are listed here. Just briefly what you can see is that all of the women were aged 50 to 79 at baseline. They were all post-menopausal. The other eligibility criterion is summarized here.

This slide gives you a brief flow diagram for the overall study. It shows that the nearly 162,000 women enrolled in the WHI were enrolled into either a large observational study with nearly 94,000 women or a clinical trial program with just over 68,000 women. If they were enrolled in the clinical trial program, they were participating in one, two, or three trials. You can see the numbers that participated in each of these. They were allowed to participate in more than one trial, so all of these numbers are overlapping. At baseline, all participants were asked about prior service in the US military. Of the over 145,000 women who answered that question, 3719 answered affirmatively. Those were the veterans in our study. The remaining 141,000 plus women had not served in the US military and are the non-veterans in our analysis.

This plot is of the age distribution of the women in the WHI comparing veterans and non-veterans. These age distributions were quite different with 50% of the women veterans enrolled at age 70 or older. That is in contrast to only 22% of the non-veterans being in that oldest age group. Keep in mind these different age distributions as we discuss the studies later. I am going to turn over the mic at this point to Julie Weitlauf who will discuss this slide.

Dr. Julie Weitlauf: Thanks Donna, hi. As mentioned the WHI was a huge research resource for looking at older women’s health. It was started in the nineties. It is still ongoing. There is to date more than 1000 papers that have been published. Those papers really provide the empirical foundation for what we know about post-menopausal health in US women today. What was striking to me when I started this project several years ago was that despite the fact that there were so many papers, there has not been one to date that had looked at the almost 4000 women veterans that were in WHI. As I mentioned, Donna, I and some others published the first paper on this topic which came out in November in *Women’s Health Issues*. We really sought to characterize the veteran cohort. As we mentioned there are nearly 4000 women veterans who participate in WHI. That represented about 3% of the total WHI recruits. This is the good news because WHI recruited volunteers. It did not sample people. That 3% is about what you would expect in the population for that age demographic of women veterans to non-veterans. WHI looked like it got a pretty good sample or a pretty good group of veteran recruits.

When we started to characterize what was different and what was not different between the veterans and non-veterans, we noticed that at WHI baseline there were many more similarities in terms of health and health behaviors among the veterans and non-veterans. There were many more similarities than differences. What was different was that the veterans were very demographically distinct from the non-veterans. As Donna mentioned, they were older disproportionally. Almost 50% of the women veterans recruited into WHI were aged 70 or older at baseline compared to only 22% of the non-veterans. This is meaning that while we do not know where they served, most likely the majority of those women would have been eligible to serve during World War II. The women veterans were more educated than the non-veterans, and much more likely to have received a college education. They were disproportionally Caucasian relative to the non-veteran participants in WHI. They were less likely to be married at baseline and less likely to have ever been married relative to the non-veterans. To the extent that all of these factors may be associated with longevity and health risks, we wanted to set the stage with looking at what was distinctive about this population before we got started. I am turning it back over to you, Donna.

Dr. Donna Washington: Great, this is Donna Washington again. The first paper that we will discuss in this session is “Military Generation and Its Relationship to Mortality in Women Veterans and the Women’s Health Initiative”. I would like to acknowledge my co-authors and thank Gayle Reiber, Andrea LaCroix, and Erica Ma for organizing and supporting the Gerontologist Supplement. From that initial 2015 analysis of women veterans in the WHI, we learned about the elevated risk of all-cause mortality that women veterans had relative to non-veteran women. This was even after adjusting for differences between the two groups in age and common health risk. This elevated mortality in women veterans was in stark contrast to findings from studies of Vietnam women veterans that found a mortality advantage for women veterans relative to US women. That mortality advantage that others found has been referred to as the Healthy Soldier Effect referring to a health selection bias for individuals entering the military.

Thinking about these very different findings in mortality, one possible explanation is that there could be generational differences in veterans’ mortality risk such that the Healthy Soldier Effect diminishes over time. The WHI with its wide age range of participants included more than one generation of women. We know from a variety of prior women veteran studies that sociodemographic characteristics, military roles and exposures, and associated health risks have changed for women veterans over time. Identifying causes of mortality, particularly if they differ by generation, is essential for informing prevention activities, clinical practices, and health policies.

Our study objective was to evaluate older women’s mortality rates and causes across veteran status and generation. Specifically we sought to determine if veteran status is associated with higher rates of all-cause mortality within each of two military generations of older women. We sought to compare cause specific mortality by veteran status within each generation.

Participants were women veterans and non-veterans from the clinical trials and observational studies who had baseline data on veteran status. We categorized both veterans and non-veterans into a military generation based on their birth cohort. We defined the pre-Vietnam generation as women who were born from 1913 to 1931. That is because based on the typical age of entry into military service, which is age 22, women in those birth years were age consistent with military service during World War II and the Korean War. We defined the Vietnam and after generation as women born from 1932 to 1948. That group was age consistent with service during the Vietnam War or in the early post-Vietnam era. Participants were followed prospectively for a mean of 15.2 years. Mortality assortment was primarily through the National Death Index and/or through physician adjudication. Causes of death were coded using ICD-9 codes. For a statistical analysis we conducted Cox proportional hazard models for each generation to estimate the association between veteran status and all-cause as well as cause specific mortality. Then we sequentially adjusted the models for baseline sociodemographic characteristics in the WHI study arm, and then additionally for health behaviors and health risk. In the fully adjusted model we added in hypertension and number of comorbidities.

These bar graphs plot selected baseline characteristics for each of the military generation by veteran status cohorts. The first set of bars show the mean age of each of the groups. What you can see is that veterans in the pre-Vietnam generation are a little older than non-veterans. As expected, there is a 12 to 15 year age difference between the generations. What is not apparent from this first set of bars is that higher proportion of women veterans compared to non-veterans in the older pre-Vietnam generation.

The second set of bars shows the big difference across groups and race ethnicity. In the pre-Vietnam generation a much lower proportion of women veterans compared with non-veterans were racial ethnic minority members. The Vietnam and after generation had much greater racial and ethnic diversity among both veterans and non-veterans. With respect to education, veterans were more likely to be college graduates compared to non-veterans, but this gap was smaller for the younger Vietnam and after generation. Then veterans of both generations were much more likely to smoke cigarettes. The highest proportion of smokers was in the Vietnam and after veteran group, in which almost 60% were current or former smokers.

All-cause mortality rates by generation and veteran status are shown in this table. Over a mean follow-up period of 15.2 years there were 29,589 deaths. The age adjusted all-cause mortality rate per 1000 person years was 21.7 for pre-Vietnam generation veterans, 18.9 for pre-Vietnam generation non-veterans, and 9.2 and 7.9 respectively for Vietnam and after generation veterans and non-veterans. Among pre-Vietnam generation women adjusting for age, demographics, and WHI study membership the mortality rate was 16% higher for veterans compared to non-veterans. That is this model one under the veteran column. This robust was robust to additional adjustments for health behaviors and health risk in model two. However, further adjustment for hypertension and comorbidity in model three eliminated veterans’ excess mortality difference. By contrast, in the Vietnam and after generation veterans did not differ statistically from non-veterans in all-cause mortality.

Cause specific mortality rates by veteran status are displayed on this slide with the pre-Vietnam generation. They will be displayed on the following slide for the Vietnam and after generation. Collectively cancer, cardiovascular disease, and trauma accounted for two-thirds of the observed deaths in the sample. The age adjusted mortality rate is higher for veterans compared with non-veterans for each of these three major causes of death. Women veterans’ higher education level and other demographic characteristics were not protective. Looking across model one for each of these causes of death, what we see is that adjusting for age, demographics, and study arm we see a statistically significant 13% higher rate of cancer death, 12% higher has ratio for cardiovascular disease, and 45% higher has ratio for trauma.

Moving down to model two which adjusted for the highest smoking rates and other health risk behaviors in women veterans, we see that the cancer mortality differences are attenuated. But the excess cardiovascular and trauma mortality persists. Then following looking across model three, which adjusts further -- the mortality risk differences are attenuated across all models.

Moving onto cause specific mortality rates for the Vietnam and after generation for both cancer related mortality and cardiovascular disease mortality, these are the two middle columns. Then what we see is that veterans and non-veterans did not differ in their cause specific mortality rates. By contrast looking over at this last column, we see that trauma related mortality was much greater in Vietnam after generation veterans than in non-veterans. In models one and two, women veterans had an almost threefold greater hazard ratio in the fully adjusted model. Controlling for the medical comorbidities and other facts unmask an even greater excess mortality among women veterans with the hazard ratio of four.

Our main finding for that within each military generation we found distinct associations between veteran status and mortality rates. The excess all-cause mortality for women veterans in the older pre-Vietnam generation which was not present in the younger Vietnam and after generation supports the hypothesis that there is a decrease in the healthy soldier effect over time. Women veterans outlive the health advantage that has been noted historically and instead the health behavior, health risk, comorbidities, and other factors we controlled for influence their outcomes. How should we use these findings? First of all, healthcare providers should be aware of the health risk and healthcare needs of women veterans. In addition, efforts to identify and modify the salient health risk behaviors that are specific to each military generation should be incorporated into the care of women veterans. For example, addressing risk behaviors for trauma may have a much greater importance in the Vietnam and after generation.

There was something about veteran status that accounted for greater morbidity, which went beyond the demographic characteristics, health behaviors, and risks that we included in our models. Thinking about future research, we believe research should be directed toward identifying these predictors of premature mortality. We did not have military exposures in our models, and these would definitely be important factors to include in such an analysis.

Since health behavior and health risks change over time with women veterans having more adverse health behavior trajectories compared to non-veterans. Then the association of trajectories or changes in health behaviors with veteran mortality rates should also be examined. Finally, though trauma was not a common cause of death there was a strikingly higher trauma-related mortality rate among Vietnam and after generation veterans. This is similar to what others have found in studies of Vietnam era women veterans. Mechanisms underlying this trauma-related mortality should be elucidated. Understanding how to reduce this increased trauma-related mortality risk could be very important in the care of this and future cohorts of older women veterans.

I will stop now and turn the mic over to Dr. Simpson.

Dr. Tracy Simpson: Thank you Donna. That was really interesting. I typed in some questions for you. What I would like to talk about is a paper that my co-authors and I pulled together. It is entitled “Alcohol Consumption Levels and All-Cause Mortality among Women Veterans and Non-Veterans Enrolled in the Women’s Health Initiative”. Next slide please.

The idea for this particular paper was focusing on Julie Weitlauf’s initial finding that the mortality rates were higher for the women vets in the WHI. It is wondering whether perhaps alcohol consumption might play a role in that. Before we get to the exact questions that we were asking at the WHI data, I want to give you a little bit of background about what we know about women veterans and their alcohol consumption.

Just to start off, most of the information that is available to us about women vets is from VA patients. As you are probably aware, VA patients represent a relatively small proportion of the overall number of veterans in the country. There is a little bit. There was already a little bit of research out there that was comparing women veterans and women non-veterans on some very specific drinking variables including binge drinking, heavy drinking, and positive screens for alcohol misuse. There were four studies when we started. Actually none of them had found discernible differences between veterans and non-veterans. This is interesting. We were very aware that this was a fairly limited number of potential drinking outcomes. Next slide please. Thank you.

The other thing that we learned and learned a lot about in preparing this paper was the general mortality literature linking drinking and what alcohol consumption is or is not a protective factor for women. There have been lots of very large scale epidemiological studies in the general population both in the US and in other parts of the world. They have found that there are three groups of drinkers who are at increased mortality risk relative to moderate drinkers. Actually calling them groups of drinkers is a little bit misleading because one of those groups is actually lifelong abstainers. Another group is people who used to drink but no longer drink. Then there are current heavy drinkers. All three of those groups have higher risk of early mortality relative to moderate drinkers. Before we did our study there was no previous research on whether women veterans and non-veterans differed in terms of their relationships between alcohol consumption patterns and mortality. We were curious whether this might be a factor in that larger finding of increased mortality risk for women vets. Next slide please. Next slide, thanks.

Okay, that is great. The study questions that we asked – the first was just to get the lay of the land. We wondered whether the rates of membership in the various alcohol consumption groups were the same for women veterans and non-veterans. Then within those alcohol consumption groups, were the mortality rates different across women veterans and non-veterans? Then third we wondered whether veteran status modifies the relationship between alcohol consumption and mortality rates. You can see the little question mark reads we are wondering whether being a veteran interacts basically with drinking status to increase mortality risk. Next slide please.

Donna has already gone over the main study methods for the WHI, so I will just point out a couple of things that are important to this particular study. We were able to use the food frequency questionnaire that was embedded in the WHI baseline assessment. That captured a great deal of information about foods that people ate as well as beverages they consumed, including alcohol. From that we formed six consumption categories. The first was lifelong abstainers. Second were former drinkers. The third was women who drank less than one drink per week, then went to seven drinks per week, eight to 14 drinks per week, and 15 or more drinks per week. We formed those categories based on the national guidelines for safe drinking, which are for women drinking seven or fewer drinks per week. It is also important to note that very heavy drinkers as well as illicit drug users were excluded from the WHI. If a woman reported that she had been a heavy drinker or had used illicit drugs in the last five years, she was not allowed to participate in the WHI. That did not happen very often, but it is something to note.

Then the mortality data – we used the same mortality data that Donna did obviously. We accounted for co-variants that we know are associated with mortality including age, race and ethnicity, marital status, whether someone was living alone, family income, educational attainment, past years of tobacco use, BMI, and physical activity. Next slide please.

With regard to alcohol consumption, what we found is in our age adjusted model that only the lifelong abstainer category gets across veterans. You can see that the darker bars are the veterans. For the lifelong abstainers, the women veterans were less likely to have been lifelong abstainers at only about 7% versus 12% of the non-veterans. Next slide please.

Then in terms of mortality rates by drinking behavior and veteran status, what we found is that across all of the different drinking categories in our age adjusted models that the veterans had higher mortality rates. But they were only significantly greater for the former drinkers and for those consuming one to seven drinks per week, or the women we would consider moderate drinkers. Okay, I will go into why that might be in a few minutes. Next slide please.

Our main analyses I just want to let you know that in the larger epidemiologic literature most of the time two different reference groups are used. Generally the lifelong abstainers are used as an initial reference group. Then moderate drinkers are used as a second reference group. That is the way that we did our analyses as well. This slide is about the lifelong abstainers having them as the reference group. What we found was that among the women veterans there were no statistically significant differences between the lifelong abstainer reference group and the other groups of drinkers. Then among the non-veterans, although the hazard ratios are very similar across the two groups, we did find that compared to the lifelong abstainers those who were drinking less than one to seven a week and eight to 14 had significantly lower mortality risk than the lifelong abstainers. I think it is important to note that the pattern of hazard ratios is very similar across the veterans and non-veterans. We think that it was likely a power issue because the number of women veterans is so much smaller. Okay, next slide please. Thank you.

This slide is showing how the ratio is with the moderate drinkers of the reference group. Things shift around a fair bit from the lifelong abstainer previous models to this one. Here for women veterans we found that only the former drinkers had significantly higher mortality rates than the moderate drinking reference group. That is shown in darker shading on the table. For the non-veterans we found that the lifelong abstainers, the former drinkers, those who drink less than one drink a week, and those who drink 15 or more a week all had higher mortality rates than the moderate drinkers. Again the pattern of hazard ratios is very similar across the vets and non-vets. It is likely signifying a power issue. Okay, next slide.

In terms of summary and observation, what we found is that women veterans were less likely to be lifelong abstainers, which means they were more likely to be in one of the other drinker categories. Across the other drinker categories there were no statistically significant differences. Then within each group of drinkers, the women veterans had consistently higher mortality rates in our age adjusted models than the women non-veterans. We think that probably clearly other factors are accounting for this. We think that probably smoking is a very important variable factor here that needs to be followed up. I will tell you more about that in a minute. We also found in our fully adjusted models that veteran status does not appear to modify the relationships between drinker group and all-cause mortality. I was showing you the results in those two models stratified by veteran status that we did test the interactions, and there were no significant interactions there. Okay, next slide.

I think there are some important practical implications or clinical implications to take from this. One is that for both veterans and non-veterans, early mortality risk is quite elevated for former drinkers. This is of concern for a number of reasons. One is that typically when we screen for alcohol use we are asking about current use. If someone says that they are not drinking, we do not necessarily follow up and ask them whether they have ever consumed alcohol and whether they perhaps have ever had problems with alcohol. As clinicians I think we do need to be following up with folks to check to see whether they are former drinkers and we might need to follow them more closely or monitor for other risk factors that could be putting them at risk. This actually could also be true for the lifelong abstainers. They may be carrying other risk factors that need to be tracked.

Also we found for the non-veterans and parallel hazard ratios for the veterans that those who are heavy drinkers have elevated risk for early mortality. One of the things that we would do as a matter of course with heavy drinkers anyway is to suggest that they abstain or reduce drinking to mitigate all sorts of health issues. In particular early mortality risk is a big issue for these women.

We also found something that is an interesting kind of challenge for clinicians and for some patients. We did not find that those who are moderately heavy drinkers were at early risk for mortality. Those women who were drinking eight to 14 drinks per week, for the upper end of that, that is well outside what the NIAAA guidelines are for safe drinking. Their mortality risk is not greater. But those women in other studies have been found to be at elevated risk for some forms of skin and breast cancer. They may need to be counseled about other health risk behaviors aside from mortality. Okay, next slide please.

In terms of future research and health risk behaviors in women veterans, I think a really important place to go is smoking. I think we have all been controlling for smoking in our models or accounting for it, but it may be the ticket. It may be a very important thing for us to follow up on. You will see here that in terms of being non-smokers, the veterans had a much lower rate of death than the non-veterans. There are too many nons in there. The veterans’ past years of smoking are quite a lot higher on average than for the non-veterans. It is also possible that smoking and heavy alcohol consumption could be interacting to put women at risk for early mortality. Next slide.

In conclusion, our findings are in line with the larger literature that indicates that it is really the amount of alcohol that a woman drinks or a man drinks actually is key to whether it is protective or risky. No alcohol seems to be associated with risk. I am not going to use causal language. It is associated with risk. Very heavy drinking and certainly being a former drinker puts people at risk. Moderate drinking in a fairly wide range appears to be protective. Our findings suggest that providers can counsel veterans and non-veteran women in very similar ways regarding what safe and unsafe levels of alcohol consumption, and strongly encourage providers to be paying particular attention to risk factors that could be especially relevant for former drinkers and moderately heavy drinkers. That is it. I will turn this over to Karen Lehavot.

Dr. Karen Lehavot: Thanks Tracy. In this third and final presentation on mortality, I will be talking about mortality in post-menopausal women by sexual orientation and veteran status. Next slide.

Lesbian and bisexual women, or LB women as I will be referring to them in this talk, have been identified as at risk for health disparities by the Institute of Medicine. Health disparities refer to adverse health outcomes for communities of individuals who, as a result of social, economic, or environmental disadvantage systematically experience greater obstacles to health. For LB women compared to heterosexual women, these disparities include poor mental health, things such as poor psychological distress, depression, suicidal ideation, and also higher rates of health risk behaviors. These are things like alcohol misuse and smoking. There has been less research on older LB women compared to LB women in the general population, but several studies have shown similar patterns with respect to health disparities when focusing on this group. In fact, about 15 years ago there was a study using WHI data that compared the older LB women in WHI to the older heterosexual women and found that the LB women reported poorer mental health, greater rates of alcohol use, they were more likely to smoke, have a chronic disability or other health conditions, and to report lower social support. Next slide.

These poor mental and physical health outcomes are important because they have been consistently associated with increased mortality risk in the larger population. When it comes to mortality among sexual minorities we have really limited research. The research that has been done has shown various results. First, the reason for the limited research is because we have very few data sets that have information on both mortality and sexual orientation. There have been two recent studies out of the US that found no differences in all-cause mortality comparing sexual minorities to heterosexual people. Other studies have shown increased mortality for women from breast cancer and suicide. Next slide.

What about LB veterans specifically? LB veterans are an important subgroup to consider when we talk about health disparities. First it is notable that they are a sizable subgroup. There was a recent population based study that showed that 25% of LB women stated that they had previously served in the military compared to 6% of heterosexual women. Next slide.

Tracy Simpson and I actually published a literature review in the *Journal of General Internal Medicine*. We found that LB veterans compared to heterosexual women veterans were more likely to report victimization experiences both in and outside of the military, prior physical and sexual assaults, depression, and poor physical health. In the last couple of years there have been many, many more studies coming out comparing LB veterans to their heterosexual veteran counterparts that have found similar patterns with respect to disparities. Next slide.

Leading up to the current study, we have had no research to date that had specifically examined the health of older LB veterans. WHI provided us with a really unique opportunity to examine sexual orientation, veteran status, and mortality. As both of the previous two presents mentioned, there was a study led by Julie Weitlauf and colleagues using the WHI that showed that women veterans overall had elevated risk of all-cause mortality compared to non-veterans. What we wanted to do in this study was to examine the risk of all-cause mortality and cancer specific mortality for LB veterans, and compare it to these three other groups – LB non-veterans, heterosexual veterans, and non-veterans. Because LB veterans belong to at least two minority groups by virtue of their veteran status and sexual orientation, we thought that it might be possible that they experience even worse health or mortality than LB non-veterans or heterosexual veterans. Hence we were really interested in looking at mortality across these four groups. Next slide.

For the method, it is similar to the previous presentations. Our participants were women in the WHI who were either in observational study or in the clinical trials. Sexual orientation was assessed at baseline in the WHI by asking women about their previous lifetime sexual behavior. If someone had stated that they had previously had sex with either women or men and women both, we categorize them as LB for purposes of this study. We excluded women who reported that they had never had sex, preferred not to answer the question, or whose data was missing. This was about 5% of the sample. Overall, about 1.4% of the sample or about 2000 women were categorized as LB. Of these, 133 women were LB veterans. Mortality was assessed similar to the other studies using the National Death Index from baseline all the way through 2014. In all the mortality models that I will be presenting to you, we adjusted for a variety of covariates both demographic and psychosocial variables. These included things like depression, social support and strain, and past year verbal and physical abuse. We also adjusted for health factors – things like smoking, alcohol use, disability, and cardiovascular disease. Next slide.

These are some demographic differences across our four groups at the bivariate level that I wanted to share with you. The two bar graphs to the left are the ones that correspond to the LB veterans and non-veterans. You will see really that across the board here the LB groups reported higher levels of income. They tended to have higher levels of education and were more likely to be in professional occupations. This mirrors what we see in the general LGB literature. Next slide.

With respect to health behaviors, you will see that with respect to alcohol misuse LB non-veterans were more likely than the heterosexual groups to report that. LB women in general both veteran and non-veteran were more likely than heterosexual women to be current smokers. LB veterans were more likely than the LB non-veterans to have arthritis. Next slide.

These were our main adjusted models for all-cause mortality. I will remind you that these models adjusted for several covariates as I described before – demographic, psychosocial, and health behaviors. We saw here. You will see on the second line a main effect for veteran status, which was expected given Julie Weitlauf’s previous findings. That is women veterans had higher all-cause mortality than non-veterans. We also found a main effect for sexual orientation such that LB women compared to heterosexual women also had higher all-cause mortality. It was a 20% higher rate as you can see by the hazard ratio. We did not see here an interaction between sexual orientation and veteran status for all-cause mortality. In other words, if you were an LB woman it does not matter if you are a veteran or non-veteran in terms of your risk for mortality. Next slide.

In terms of cancer specific mortality, here also we found a main effect for sexual orientation. That is the LB women were more likely than the heterosexual women to be at higher risk for cancer specific mortality. However we also found an interaction here between sexual orientation and veteran status indicating the risk for cancer mortality does vary by these two variables. Next slide.

These stratified models for cancer mortality specifically help us interpret that significant interaction. Essentially what we see here is that if you compare the LB women to the heterosexual women among veterans, we absolutely see a much higher hazard ratio of 2.09 for cancer mortality. Similarly when we compare the LB to the heterosexual women among the non-veterans, we also see a higher hazard ratio. But it is not as strong. That is being an LB veteran specifically seems to put you at a unique risk and a higher risk for cancer specific mortality. Next slide.

In terms of clinical implications for our study, as I mentioned our main takeaway finding was the increased rates of mortality we found for LB women across the board regardless of their veteran status. Although we did not examine mechanisms underlying this disparity, the data we looked at did offer us some clues. We looked at the association between all of our covariates and all-cause mortality. What we found across the board for all four of the groups that we looked at was that smoking history and cardiovascular disease were most strongly associated with mortality. This is especially telling because you might remember I earlier showed you that the LB women were much more likely than the heterosexual women overall to be current smokers. I think for clinicians and providers, this highlights the need to focus on chronic disease and health behaviors, especially smoking. Next slide.

In terms of research implications, I think it was really interesting that we found this higher all-cause mortality for LB women relative to heterosexual women despite the fact that they had all of these protective factors in place for premature death. This is such as higher income, education, and professional occupation even after we accounted for a variety of psychosocial and health behavior variables. This means that in order for us to really understand the mechanisms of what is driving this, we might need to consider some other factors. I think that stigma and things like stress related to one’s sexual orientation and discrimination offer a really important place to examine. We unfortunately did not have those types of variables in the WHI. There was an interesting recent study that found that sexual minorities living in communities with high levels of anti-gay prejudice experienced a higher risk of mortality than those living in low prejudice communities. This kind of further highlights the need to explore this area for future research. Next slide.

In closing today, I just want to remind everyone that we had five cyber seminars focused on women veterans in the WHI. If you missed any of them, you should be able to find slides and recordings of them online on the HSRND website. The first cyber seminar focused on an overview of the WHI. Next slide. The second cyber seminar focused specifically on health aging. The third focused on various diseases and conditions. Next slide. The fourth focused on menopause related findings. Finally today’s cyber seminar focused on mortality. Next slide.

In closing, we want to acknowledge our NIH funding and NHLBI as well, in addition to VA funding which included the VA Office of Women’s Health and VA Health Services Research and Development. You can see on this slide all of our emails if you would like to contact any one of the panelists directly. We would also like to acknowledge our incredible analysts and Erica Ma for her administrative support. Finally we would like to thank the women veterans and the WHI both for their service to our country and their participation in this very important research study. Next slide.

I will now hand it over for Molly to talk about questions.

Molly: Excellent, thank you very much. We do have some great pending questions for you all. For anybody that joined us after the top of the hour and is looking how to submit a question or a comment, just use the question section down at the bottom of your control panel. Click the plus sign next to the word questions. That will open the dialogue box and then you can submit your question or comment. This first one came in, Dr. Washington while you were presenting. How was trauma operationalized in your study?

Dr. Donna Washington: Trauma related deaths were operationalized based on ICD-9 codes for accidents, suicide, homicide, and other injury.

Molly: Thank you. What was the most common trauma related cause of death?

Dr. Donna Washington: That is a great question. We actually did not look within the trauma category, but for the coded up and collapse them into the larger category. Unfortunately I do not have an answer to that.

Molly: Do you by chance know the proportion that was due to suicide?

Dr. Donna Washington: I do not have that information. I am sure that that data is likely available. In this analysis we were trying to collapse it up into sort of the broader trauma category, so I do not have that specific information. It is an excellent question though and certainly one that is highly relevant.

Julie Weitlauf: This is Julie. I do not have the actual number, but it was extremely low. Suicide in general in the WHI was extremely low, including among the veterans. It was a fraction of a percent I believe. We can confirm that though, Molly, if people want to back channel us by email we can get the actual proportion.

Molly: Great, thank you. Donna, can you back up one slide so that we have you ladies’ contact information up there. The next question came in, I believe Dr. Simpson while you were speaking. It says would this be related to drug use also in regards to the mortality rate to drug use compared to alcohol consumption?

Dr. Tracy Simpson: That is a very good question, and I honestly do not know. My understanding is that we do not have comprehensive drug use information for the WHI. Most of the large epidemiologic morality literature has been on alcohol. I will be happy to do a quick lit search and see what I can come up with. I am quite confident that there is nothing out there yet about women veterans and drug use in mortality.

Molly: Thank you. This next question came in, Dr. Lehavot, when you were speaking. What do you make of the fact that two previous studies did not find sexual orientation differences in all-cause mortality, but your study did?

Dr. Karen Lehavot: That is also a great question. Both of those prior studies were population based by Susan Cochran and Vicky Mays [PH]. Neither of them focused on middle aged or older women. Both of them also had substantially smaller numbers of LB women than we had in our study. We had about 1000 more LB women than either of those prior studies had. I imagine that the differences between the study samples are at least partly responsible for the different pattern of results.

Molly: Thank you for that reply. Dr. Simpson, this one is back to you. This is a very interesting study. Thanks so much for sharing. I was wondering what the data source is for educational attainment and tobacco use.

Dr. Tracy Simpson: Okay, Julie may be able to answer this better than me. My understanding is that at baseline in the WHI women were asked how far they had gone in school. That was recorded. Also they were asked about how many years they smoked and how many cigarettes per day they consumed. The pack years was calculated from that information.

Molly: Thank you. The person also writes do you know who I can contact to obtain NDI data through 2014? I currently have it through 2011.

Dr. Tracy Simpson: I do not. Julie, do you know?

Julie Weitlauf: Is it WHI NDI data?

Molly: Presumably.

Julie Weitlauf: I mean that is all centrally managed through the WHI. You would need to go back to your statistical coordinating center, whichever regional center you are using, or back to the Fred Hutch coordinating center. Whatever is available to them is made available to the investigators, so they can update files if it is ready.

Molly: Thank you. Regarding all 33 studies, did you stratify for suicide and depression?

Dr. Tracy Simpson: Are you referring to the 13?

Molly: Oh sorry, he said I meant all three studies. Did you stratify for suicide and depression?

Dr. Karen Lehavot: This is Karen. I can speak for in my study we adjusted for depression. We actually did look at suicide as another specific cause of mortality in our paper, but we were only able to look at it descriptively. As Julie said, the numbers were very, very low. In our study it was 0.2% which did not allow for any additional analyses to be done on that particular variable.

Julie Weitlauf: This is Julie. Go ahead.

Dr. Donna Washington: This is Donna. Depression was one of the covariates that were included in the condition count. Then suicide of course was included as part of the trauma related deaths. Rather than stratifying that, we measured that as part of the overall cause specific trauma mortality.

Dr. Tracy Simpson: This is Tracy Simpson. We did not account for either suicide or depression in our models.

Molly: Thank you all. We do have one final pending question, and Dr. Lehavot this one is also for you. You mentioned some demographic and health behavior differences across groups. Did you see any differences by psychosocial variables? I believe you may be on mute.

Dr. Karen Lehavot: Yes I was on mute. Thank you for pointing that out. We did not find statistically significant differences on psychosocial variables between the LB veterans and the other three groups likely due to low power. For the LB non-veterans, we did find higher reports of social strain, more frequent physical and verbal abuse, and greater depressive symptoms than the heterosexual groups. This is consistent with what we see in the broader literature on LGB health. We did account for those variables in our adjusted mortality models.

Molly: Thank you. That was our final pending question, but I would like to give each of you the opportunity to make any concluding comments if you would like. We will just go in speaking order. Donna, did you have anything you wanted to wrap up with?

Dr. Donna Washington: No, other than to encourage everybody on the line to go to the URLs that were on that early slide. Download these papers. They really do, as a collection, advance the field in older women veterans’ aging research.

Molly: Thank you. Tracy?

Dr. Tracy Simpson: No, I just appreciate the opportunity to share this work with folks. I appreciate the interest. Thank you.

Molly: Thank you. Karen, did you want to wrap up with anything?

Dr. Karen Lehavot: I will just reiterate what Donna and Tracy said. I want to thank the audience for their very astute questions and also the other panelists and presenters for doing this really important work. Thank you.

Molly: Wonderful. We also have Dr. Weitlauf and Gayle Reiber on the call that helped organize this miniseries. Did either of you two want to wrap up with anything?

Unidentified Female: My comment is we appreciate the magnitude of what we have learned here. One of the most important takeaway questions is for all clinicians to ask a military history. If they are seeing women patients, asking about their prior military history will give them some ideas about things that they ought to be screening for and looking for in the future.

Molly: Excellent. I want to thank you all very much for coming on and lending your expertise to the field, and for all this great work you did. Of course it is to the veterans and women who participated in the initiative. Thank you to our attendees for joining us. As I mentioned, this has been recorded and you will receive a follow up email with a link leading to the recording. This does conclude today’s cyber seminar. I am going to close out the meeting. Please wait just a second while the feedback survey populates on your screen. Take just a moment to fill out those few questions. We do look very closely at your responses and it helps guide and improve the program. Once again, thank you to everyone. Have a great rest of the day.