



PTSD 101 Course

Transcript for: Epidemiology of PTSD

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This is a PTSD 101 course on Epidemiology of PTSD. Epidemiology is the study of factors affecting the health and illness of populations. One of the most basic questions to ask by epidemiologists is how often a given disease or condition occurs. For example, "How many people have PTSD?" This seems a simple question and it is, but getting the right answer requires careful science; the science of epidemiology.

My name is Paula Schnurr; I am the Deputy Executive Director of the National Center for PTSD and also a research professor at Dartmouth Medical School. I'm with Jaimie Gradus who is an epidemiologist at the National Center. She also works at the VA Boston healthcare system and is an assistant professor at Boston University in the Schools of Medicine and Public Health.

We have three learning objectives today. At the end of this course, you should be able to understand key epidemiologic concepts, describe factors that influence prevalence estimates in a given sample, and evaluate prevalence estimates for PTSD in civilian and Veteran populations. And now, Jaimie will tell you more about the science of epidemiology.

People may think epidemiology is a dry science; however it is interesting and important. Here's why. By understanding the prevalence of a disorder we, as a society, can change behavior, treatment, and policy with regard to that disorder. For example, knowing about the prevalence and incidence of HIV changed sexual behavior and education. Knowing about the prevalence of PTSD (our topic for today) has changed how DoD and VA offer services.

Increased recognition of disorders as problems in society comes from epidemiological studies. Epidemiology is the science of public health. What that means is that epidemiology focuses on the health of a population as a whole and not on the health of individuals like a clinician would. Given that, it follows that what we get from epidemiology is information about the extent of disease in a population. In other words, how many people have disease and where to best allocate resources based on this information.

The goal of this course is not to teach you epidemiology but to help you understand key concepts so that you can be a critical reader of the literature. So, the first objective of this course is to define key epidemiological concepts, because these concepts are often misunderstood.

First, population and sample. A population is a group of people with a common characteristic such as place of residence, age, gender, or experience. A sample is a subset of a population. In the graphic on

this slide, all of the stick figures represent a given population while the highlighted stick figures represent a sample of the population.

Ideally, a sample would be representative, i.e., the proportion of people with different characteristics in this sample would be the same as the proportions in the underlying population of people the investigator aims to assess. Sometimes, because of practical concerns like budget, this may be impossible. Oftentimes in this case, the investigator will use a convenience sample like a clinic population, but these samples may be biased because they oversample certain people; for example, sicker people in a clinic population. But we will get back to sampling issues in a little bit.

Turning back to definitions, I am now going to describe two terms that are commonly used in epidemiology: incidence and prevalence. First, it is important to note that, while incidence and prevalence are both measures of how often disease occurs in a population, they are not interchangeable. We will talk about their differences in detail in the next few slides.

Incidence is a measure of new cases of disorder that occur among a population at risk over a given period of time. It can either be expressed as a proportion or a rate of disease occurrence over time. The highlighted figure depicts new cases of disease occurring over time in a population at risk. By the end of the period, the highlighted figures show the incidence of disease in this population

Prevalence, on the other hand, is the proportion of people that have a disorder at a specific time, right now, last year, or at any point in their lifetime. The highlighted figures represent the prevalence of disease in this population, i.e., the currently existing cases of disease.

As I mentioned in the last slide, prevalence can be determined with regard to various periods of time. Current prevalence is the proportion of people in a population who have a disorder at the time of or near the time of assessment; for example, the past month or year. Lifetime prevalence is the proportion of people who have ever had the disorder.

Finally, two last important terms to know are risk and protected factors. These are characteristics that have been demonstrated to be associated with, although not necessarily the direct cause of, a particular disorder...where risk factors lead to increases in disorder occurrence and protective factors lead to decreases in disorder occurrence. It is important to note that risk and protective factors may not necessarily be causal and sometimes the term “risk marker” is used to specify that a risk factor is not a cause.

In the next section, I am going to describe factors that influence prevalence estimates that are observed in studies.

Believe it or not, prevalence estimates can vary both as a function of true changes that occur in prevalence over time and as a function of differences in study methodology. Today I am going to talk about four things that can impact prevalence estimates although there can be others. These are: how often a disorder occurs, characteristics of a study sample, how information about the disorder is obtained in the study, and when and where the study sample is obtained.

To illustrate these points, let's walk through an example. Suppose you wanted to know what the prevalence of PTSD was among Veterans who served in Iraq and Afghanistan. You might look to a study by Hoge and colleagues from 2004 to find an answer.

Hoge and colleagues assessed four different samples of soldiers and Marines with one group before deployments and three other groups after deployment to Iraq and Afghanistan. So, in looking at the Hoge article, the first thing you might notice is that the prevalence estimates of PTSD are different before and

after deployment with the prevalence before deployment at five percent and the prevalence after deployment as high as 12.9 percent. One can hypothesize that this change in prevalence estimates reflects true changes in the occurrence of PTSD after deployment experiences. So, the first factor that impacts prevalence estimates is true changes in disorder occurrence frequency.

So, getting back to our question again, “What is the prevalence of PTSD among Veterans who served in Iraq and Afghanistan?” we can already see that the answer is complicated because the prevalence estimates would differ based on whether or not we are talking about the time before or after Veterans were deployed.

Let's say that we continue with the Hoge article to continue to learn more about the prevalence of PTSD in OEF (Operation Enduring Freedom—Afghanistan) and OIF (Operation Iraqi Freedom) Veterans. The second thing we might notice is that the prevalence estimates differ based on other characteristics of the group we were talking about. In the case of the Hoge article, prevalence estimates differ by branch of service and location of deployment as well, with a prevalence estimate of about six percent of Army members who went to Afghanistan versus 12.9 percent among Army members who went to Iraq. Prevalence estimates can also differ by gender, race, and other demographics but we will get to that in a little bit.

So, to get back to our original question, the answer has grown even more complex because we now know that the prevalence of PTSD can differ among Iraq and Afghanistan Veterans based on deployment status, deployment location, branch of service, and potentially other factors.

Next, we are going to use the Hoge article to highlight another important point. Prevalence estimates can differ based on decisions about the study design made by the researchers. An example of this is that prevalence estimates can vary as a function of the way a disorder is assessed, and there are varying methods that can be used to assess whether or not a disorder is present. These are self report, lay interview, or structured diagnostic interview, among others.

The Hoge article presented prevalence estimates based on two ways of defining PTSD. Broadly defined PTSD required that participants met symptom criteria for a diagnosis but did not require functional impairment or a minimum severity of symptoms. Strictly defined PTSD required that participants met symptom criteria for a diagnosis and either reported functional impairment or a large number of symptoms.

As you can see in the table, prevalence estimates were higher when using broadly defined PTSD which captured more symptomatic people. For example, Marines after deployment to Iraq had a prevalence of PTSD of 12 percent according to the strict definition but had a prevalence of 20 percent according to the broad definition.

So again, going back to our initial question and examination of the Hoge article, we see that the answer is further complicated in that prevalence estimates can differ by disorder assessment method. Both questionnaire and interview are appropriate ways to assess disorders. What's really important is that the instrument used to assess the disorder be well validated.

The final issue we will touch on is sampling method which I also mentioned earlier in the course. It's important to remember that the ideal sample represents the underlying population the investigator wishes to study. If it does not, the prevalence estimate obtained may be inaccurate. In that case, sample estimate should be generalized with caution. For example, prevalence estimates for PTSD or any other disorder in treatment seekers will typically be higher, sometimes much higher than prevalence estimates in the general population. So, these estimates are valid with regard to the prevalence of the disorder

within treatment seekers but may greatly overestimate the prevalence of that disorder in the population as a whole.

So, in getting back to our question, we realize that the work by Hoge and colleagues is important but it is also important to keep in mind who is being described and who results are generalizable to when analyzing prevalence estimates presented in this or any study. Further, the war has changed over time with many service members having multiple deployments and a finding from a study in 2004 may not represent the prevalence of PTSD today. It's also important to keep in mind that the Hoge study included Army and Marine Veterans and may not generalize to Navy or Air Force Veterans.

So, back to our original question, "What is the prevalence of PTSD among Veterans who served in Iraq and Afghanistan?" The answer is, it is difficult to answer. Estimates are impacted by many factors and it is really important to consider these factors when interpreting prevalence estimates.

So, how do you know if what you're reading or seeing is quality epidemiological research? You can evaluate the quality of the study by examining a few important factors. Good epidemiological studies will be studies that have large sample sizes, representative samples, standardized validated measures of assessing the disorder, and complete descriptions of the sample from which the prevalence estimates were obtained.

So in summary, prevalence is the proportion of people with a disorder in a population at a specific time. Prevalence estimates are dynamic and can change over time. Also, prevalence estimates are influenced by disorder occurrence, current sample characteristics, sampling method, and how the disorder is assessed, among other factors. Now, Paula will present information about PTSD prevalence.

Now, we'll turn to our third objective: To help you evaluate prevalence estimates for trauma exposure and PTSD in civilian and Veteran populations. We've selected key studies in order to describe the primary findings.

The best estimates of prevalence of PTSD in the general US population come from the National Comorbidity Survey, known as the NCS, and the National Comorbidity Survey Replication, known as the NCS-R. All of the information on the prevalence of PTSD in the US come from one or the other of these two studies. The NCS, which was conducted between 1990 and 1992, included almost 6,000 adults ranging in age from 15 to 54. The NCS-R was conducted between 2001 and 2003 and included almost 6,000 adults age 18 or older. These studies use rigorous scientific method. They're based on large nationally representative samples. Also, the diagnosis of PTSD was based on structured interviews known as the CIDI, which is designed to be used by lay interviewers, that is, non-clinicians. Diagnoses derived from the CIDI correspond well to diagnoses made by clinicians using structured interviews. And, it's important to understand why this is so. Trained clinical interviewers can be too expensive for large scale research like this. Using structured lay interviews enables researchers to ensure the quality of data while managing costs.

Trauma exposure is common. Sixty-one percent of men and Fifty-one percent of women in the US have experienced at least one traumatic event. And, over one third of men and one quarter of women have experienced two or more. The most common types of traumas include: witnessing someone being badly injured or killed, being involved in a fire, flood, or disaster, and being involved in a life-threatening accident. Men are more likely than women to experience these events, as well as physical attacks, combat, and being threatened by a weapon. In contrast, women are more likely than men to experience rape, sexual molestation, childhood neglect, and childhood physical abuse.

So from the NCS, we see that trauma exposure is common. Yet, despite the high prevalence of trauma exposure, most people do not develop PTSD. 6.8 percent of US adults have had PTSD at some point in

their life, and 3.6 percent currently have PTSD. Current year refers to any time in the past 12 months. Women are about twice as likely as men to have PTSD—9.7 percent of women and 3.6 percent of men have had PTSD at some point in their life. 5.2 percent of women and 1.8 percent of men currently have PTSD. This elevated prevalence pattern in women is quite consistent across other studies in the US and around the world. There is a lot of debate and interest about why it occurs. I can say that it's only partially due to differences in the type of trauma experienced by men and women. Research is ongoing. I also should say that the elevated prevalence applies only to civilian samples. Male and female Veterans are more comparable, although some studies indicate that female Veterans are at higher risk relative to men. We'll discuss these findings later in the presentation.

PTSD prevalence differs across countries for a variety of reasons including cultural differences in how people express their distress. Another important factor is the amount of trauma in a population. Prevalence is higher in populations with a greater amount of exposure to trauma. And by amount here, I mean factors such as the number of events and the duration. A study conducted in 2001 of civilians in four settings that had recently experienced war or violent conflict found that the prevalence in PTSD ranged from 16 percent in Ethiopia to 37 percent in Algeria which is far higher than in the US. Amount of trauma is only one of the key factors that explain differences in PTSD between subgroups within a population or between populations. Type of trauma is also important.

The prevalence of PTSD varies as a function of the type of trauma someone experiences, but the differences are not consistent for men and women. For men, physical attack, threat with a weapon, disasters, and accident are not very likely to lead to PTSD. Only two percent of men develop PTSD after being physically attacked or threatened with a weapon. The two types of events most likely to lead to PTSD in men are combat and rape. Almost 40 percent of men develop PTSD after combat and 65 percent after rape. Sexual trauma also has a high likelihood of leading to PTSD in women. They don't differ from men in the response to rape. In fact, it looks like men are higher in this study, but the difference is not statistically significant because so few men in this sample were raped. Women are more likely than men to develop PTSD following sexual assault. They're also more likely than men to develop PTSD following physical attacks and being threatened with a weapon. The prevalence of PTSD following disasters and serious accidents is uniformly low in both men and women.

So, we've just reviewed data showing how the prevalence of PTSD varies as a function of trauma type and gender. PTSD varies as a function of many other risk factors. In addition to female gender, increased risk is associated with other sociodemographic characteristics, such as younger age, minority race, and lower education. Historical factors also increase the risk of PTSD. These include prior trauma exposure, other prior adversity, and history of psychiatric disorder. Characteristics of the trauma itself matter too, such as the type, amount, and age at exposure. Sexual and interpersonal trauma are most likely to lead to PTSD. As I mentioned earlier, amount of trauma increases risk, so does younger age at the time of exposure, although age appears to affect risk only up to early adulthood. And lastly, characteristics of the recovery environment, such as low social support, stressful life events, and new trauma are associated with higher risk of PTSD.

We've just seen that the likelihood someone develops PTSD depends on both personal and situational risk factors. But, risk factors don't tell us why. For example, minority race is associated with increased risk of PTSD. Does this mean that minorities are somehow more vulnerable or less resilient than whites? In fact, the elevated prevalence of PTSD in minorities is largely due to differential exposure. On average, non-white minorities are more likely than whites to have greater trauma exposure, so it makes sense that minorities would have a higher prevalence of PTSD. Care must be taken when interpreting why risk factors affect risk. It's important to remember that risk factors do not necessarily explain why some people are at an increased risk of developing PTSD.

We've just been talking about the prevalence of PTSD in civilians. Now, let's turn to the topic of Veterans. I'm going to focus exclusively on US Military Veterans, although the data I'll present have broad generalizability to Veterans from other countries. There is a great deal of interest in comparing the prevalence of PTSD across Veteran cohorts. When trying to do so, one of the first things to remember is that cohorts differ in many ways that could affect the likelihood of developing PTSD: the nature of the warfare, the people who serve, as well as the social and historical context. For example, war zone exposure differs across cohorts. This slide depicts data from a national survey of Veterans in 2001. This study found that World War II Veterans had the highest prevalence of combat exposure, followed by Vietnam Veterans. The graph you are looking at is showing data for all Veterans of a given era including those who served without being deployed to a war zone. This survey was conducted before the current wars in Iraq and Afghanistan. If this cohort had been included, they probably would be comparable at least to World War II Veterans or even higher, because such a high percentage of the current forces have been deployed to a war zone.

In order to understand PTSD in Veterans, it's important to consider several other key facts. First of all, there are no comprehensive studies like the National Comorbidity Surveys that apply to all cohorts and Veterans. Estimates for different cohorts must be based on the results of various studies. Also, information on some cohorts is limited. For example, there are no studies using validated measures of PTSD in a representative sample of World War II or Korean War Veterans. There are also no recent studies of current PTSD based on a representative sample of Vietnam Veterans. Sometimes, people want to know how the prevalence of PTSD in Veterans returning from the current wars in Iraq and Afghanistan compares with the prevalence of PTSD in Veterans of prior wars when they returned home. The PTSD diagnosis was not formalized until 1980, so it's difficult to know the prevalence before then. Researchers have addressed this problem by obtaining estimates of lifetime PTSD. But, Veterans who died before 1980 can't be included in these estimates. The strategy has given us good information about the Vietnam cohort, but for Veterans of World War II and the Korean War we will never know how many had PTSD when they returned home.

First, let's talk about PTSD in Veterans of the wars in Iraq and Afghanistan. Personnel who served in either location are referred to as OEF/OIF Veterans, and these conflicts are known as Operation Enduring Freedom and Operation Iraqi Freedom. This cohort offers the best opportunity to understand the effects of war zone exposure in Veterans because of the active research efforts to study PTSD before, during, and after deployment.

For example, the Millennium Cohort Study, the longitudinal study of over 150,000 male and female military personnel. The study began in 2001. Participants are being assessed periodically through 2022, using mail and online survey methods. Because data collection began in 2001, the study provides a way to examine the specific effects of deployment on PTSD prevalence. We can know with confidence whether an individual who returns from a war zone with PTSD had PTSD even before being deployed.

In this study, 2.2 percent of men and 3.3 percent of women had PTSD at baseline before the war. One wave of follow up data were collected between 2004 and 2006 after the wars began. Looking specifically at people who did not have PTSD at baseline, the investigators found that being deployed to a war zone elevated the risk of new PTSD onset. Prevalence in personnel who had not deployed or who had deployed without experiencing combat was comparable to the baseline prevalence, roughly two to three percent. In contrast, 8.7 percent of deployed personnel developed PTSD by follow up.

Good estimates of the prevalence of PTSD in OEF/OIF Veterans come from several sources. One of the best is a study by the RAND Corporation in 2008. The study is based on a representative sample of almost 2,000 men and women, from all branches of service, who were surveyed between 2007 and 2008. In this study, the investigators found the prevalence of current PTSD was 13.8 percent. Overall, across studies that have been done to date, it appears that approximately 15 percent of OEF/OIF

Veterans have PTSD. Prevalence is higher in VA users though, almost 25 percent, which means that Veterans with PTSD are especially likely to come to the VA for care.

Previously, I mentioned that the OEF/OIF cohort offers the best opportunity to understand the effects of a war zone exposure in Veterans. The cohort also offers the best opportunity to understand the effects of war zone exposure on women. In prior conflicts, few women had direct combat exposure, but now more women are being exposed to actual combat. What we see from this unique opportunity to compare men and women is that many studies find comparable prevalence between men and women. The question is why.

So, the data suggests that men and women are comparable in their response to war zone trauma. But, caution is needed when interpreting this lack of difference between men and women. For example, in the 2008 RAND study, women and men did not differ in prevalence. They were comparable. But when researchers statistically accounted for differences between men and women in types of war zone exposure, and other risk factors such as education, whether someone was an officer, race, and so on, women were 70 percent more likely than men to have PTSD. We have to remember that, despite exposure to combat in greater numbers than before, women may differ from men in the amount and types of war zone exposure and many other ways that could affect risk. So, research is ongoing to address this important issue and help us conclusively determine whether men and women differ in their response to war zone exposure.

So, as I mentioned previously, the best available data suggest that about 15 percent of OEF/OIF Veterans have PTSD. Now let's turn to looking at PTSD in Gulf War Veterans. The best estimate of PTSD in this cohort comes from the National Health Survey of Gulf War Era Veterans and Their Families. The study is a representative sample of over 20,000 Gulf War Theater Veterans and Gulf War Era Veterans. Initial data collection occurred between 1995 and 1997. And then, follow up was conducted in 2005.

In 1995, the study found that 12.1 percent of Gulf War Veterans had PTSD. By 2005, that number had increased somewhat, to 15.2 percent. By comparison, the prevalence of PTSD among Gulf War era Veterans, that is those who were not deployed, was under five percent at both times.

So, we just reviewed data from OEF/OIF Veterans and Gulf War Veterans, and it appears that the prevalence of PTSD among those who deployed to a war zone is quite comparable, around 15 percent. Now let's turn to looking at PTSD in Vietnam Veterans. The best estimate of PTSD in this cohort comes from the National Vietnam Veterans Readjustment Study, which is known as the NCVRS. The NCVRS is a representative sample of over 3,000 Veterans who served in Vietnam and during the Vietnam Era. It also included civilians. Data were collected in the mid-1980s. This is very important to keep in mind, because current PTSD in this context means current as of about 25 years ago. Another key feature of this study, a real strength, is the estimate of prevalence is based on a rigorous multi-method approach that combined clinical and lay interviews along with questionnaires.

According to the NCVRS, by the mid 1980s, lifetime PTSD prevalence in Vietnam Theater Veterans was 30.9 percent in men and 26.9 percent in women. That is, the lifetime prevalence at that point was comparable in men and women. Current prevalence was 15.2 percent in men and 8.1 percent in women. The prevalence of PTSD in Vietnam Veterans today is unknown, at least according to any data source comparable to the NCVRS. So, these are the best data we have on current PTSD in this cohort. Now, if you contrast the lifetime data and the current data, it appears that women were more likely than men to recover, which may have been due to the fact that the women who served in Vietnam were older than the men. They had more education because most of them served as nurses, so they have post high school education, and they did not serve in combat roles.

So, it appears that the prevalence of current PTSD among cohorts from OEF/OIF, the Gulf War, and Vietnam is roughly comparable. Now, let's turn and look at PTSD in World War II and Korean War Veterans. For these cohorts, estimates of PTSD prevalence must be derived from a variety of studies based on convenient samples. There's no study like the NVVRS or the RAND Study for these cohorts.

From the best available data, it appears that the prevalence of current PTSD is somewhere between one and three percent, which is much lower than the fifteen percent that we see in the younger cohorts. The prevalence of lifetime PTSD in older Veterans is unknown.

Now one possible explanation for the lower prevalence in older Veterans is that there are real differences between the cohorts. The wars differed, the people who fought them differed. And the differences may be real. Another explanation is that older Veterans are reluctant to admit to distress because of stigma. So, when they are studied, they under-report their symptoms. Our society has come a long way since World War II in promoting increased recognition and acceptance of mental health problems. And yet another explanation is mortality. You know, after all, we're studying survivors and research on Vietnam Veterans has shown that PTSD is associated with increased mortality. Prevalence may be low in older Veterans because those who had PTSD are not around now to be counted. It's most likely though that all of these explanations are true to some degree.

Now, I'll sum up the main points of this section of the course. First, the National Comorbidity Survey Replication, the NCS-R, gives the best estimate of PTSD prevalence in the U.S. general population. According to this study, 3.6 percent of US adults currently have PTSD and 6.8 percent have PTSD currently or have had it in the past.

Second, prevalence varies as function of type of trauma exposure; sexual and other interpersonal traumas are especially likely to lead to PTSD. Prevalence also varies as a function of numerous risk factors related to the person, the trauma, and the recovery environment.

And third, no single study provides information about PTSD prevalence in all Veterans. It's especially difficult to compare the prevalence of lifetime PTSD across cohorts. However, we know that current prevalence is lower amongst Veterans of World War II and the Korean War than among younger Veterans. For older Veterans, the prevalence is somewhere between one and three percent. For all other cohorts, the prevalence is around 15 percent. However, it's important to remember that the estimate of current PTSD in Vietnam Veterans is almost 25 years old and that the true current prevalence could be higher or lower.

In conclusion, knowledge about the epidemiology of PTSD is important for researchers to help guide scientific inquiry, and for clinicians to help them gain greater understanding of their patients and use this understanding to enhance treatment outcome. Knowledge about the epidemiology of PTSD is also important for program administrators and policy makers to help guide their decisions about programs and resources.

At the beginning of this course, we asked a simple question. How many people have PTSD? The answer is: it depends. You learned in this course that the best answer for Veterans of Iraq and Afghanistan is 15 percent, while the best answer for the general population is 6.8 percent. When you began this course, you were probably hoping there would be just one answer. Now, we hope you understand why there have to be multiple answers. Who you are asking about matters, as does how well you studied them.