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## Monday, May 13, 2019

## Chair

**Mr. Neil Ellis**

# Standing Committee on Veterans Affairs

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● (1530)

[*English*]

**The Chair (Mr. Neil Ellis (Bay of Quinte, Lib.)):** Good afternoon. I call to order this meeting of the Standing Committee on Veterans Affairs, the 42nd Parliament, 1st session, on the effects of mefloquine use among Canadian veterans.

Today we have Dr. Jane Quinn, associate dean, school of animal and veterinary services, Charles Sturt University, by teleconference; and Dr. Edward Sellers, professor emeritus, University of Toronto.

Dr. Quinn, we'll start with you. Thank you.

**Professor Jane Quinn (Associate Dean for Research, Faculty of Science, Charles Sturt University, As an Individual):** Thank you very much for inviting me to speak to the committee.

I have prepared a short statement. Is it okay to read it?

**The Chair:** You have 10 minutes, if you wish.

**Prof. Jane Quinn:** My name is Dr. Jane Quinn. I'm an associate professor and associate dean for research in the faculty of science at Charles Sturt University. I'm also a co-founder of the Australian Quinoline Veterans and Families Association.

My background relevant to this inquiry is 30 years of experience in comparative biomedical research. I'm a Ph.D.-qualified neuroscientist and undertake research on the impact of toxins in whole animal systems and tissues, specifically the brain. Of relevance to this inquiry, I have personal lived experience of the adverse effects of mefloquine, also known as Lariam, as my late husband committed suicide after taking mefloquine for overseas exercises with the British military.

There is no doubt that there are many thousands of veterans globally whose lives have been significantly impacted by taking mefloquine for military service. These are genuine people who have suffered for many years without necessarily understanding their symptoms, why they did not go away with treatment or continued to get worse over time, some to the point of severe cognitive impairment; radical sleep disorders; severe anxiety and mood disturbances, such as bipolar disorder; or in some cases, they succumbed to suicidal ideation and suicidal completion.

Mefloquine causes permanent neurological and neuropsychiatric changes in a significant minority of those who take it. Many of these veterans have been told they have treatment-resistant post-traumatic stress disorder, without it being acknowledged that their symptoms were actually caused by an ongoing neurological brain injury. Some have been subjected to treatment regimes with multiple drugs, including antipsychotics, and in some cases their brain is further exposed to injury through ECT without ever having received a true or complete diagnosis.

As you have heard from other witnesses to this inquiry, the neurological and neuropsychiatric side effects of mefloquine and other quinoline antimalarials have been well-known for many decades. It is a key question as to why it has taken so long for the impact of this drug to be acknowledged in military veterans. Recognition that mefloquine causes long-term brain injury and other systemic medical conditions is a first and necessary step to getting effective and appropriate treatment, and ongoing medical support for those impacted.

You've heard from a number of experts who have suggested this is not the case, that their brain injury does not exist, but their arguments are not supported by a veteran's experience nor that of the emerging literature, when mefloquine exposure is taken into account.

One of the witnesses to this committee commented that the medical condition caused by exposure to mefloquine cannot be diagnosed. This is not the case. The spectrum of symptoms commonly observed in individuals who have suffered a severe or lasting reaction to this family of drugs is quite discrete. It includes insomnia, sleep disturbances, vivid dreams, depression, anxiety, paranoia, cognitive impairment and memory loss, tinnitus, vestibular dysfunction, peripheral neuropathies, gastrointestinal frequency or chronic diarrhea, and can include seizures, suicidal ideation and attempted and completed suicide.

The disease cannot be identified by name in a diagnostic manual under a discrete code in either DSM-5 or ICD-10, but this is not the same as the condition not existing.

There is a syndrome that has a consistent pattern of comorbid symptoms that can be identified in response to mefloquine exposure, very similar to the diagnostic process used to identify lupus or, indeed, post-traumatic stress disorder. Therefore, is this a condition that exists? Absolutely, yes.

Chronic or acute mefloquine toxicity syndrome, which has been shortened by some to the term “quinism”, is the condition we are talking about today.

Can the particular set of symptoms associated with mefloquine toxicity be confirmed by a discrete diagnostic process, creating a differential to other specific neurological or neuropsychiatric conditions? The answer to that is yes.

The science behind the syndrome is complex. Mefloquine is a pan-neuronal drug with broad activity within the brain. It's highly lipophilic and able to cross the blood brain barrier. It can, therefore, have broad reaching impacts across the central nervous system.

Others have questioned the role of a brain stem lesion in mefloquine toxicity syndrome. We must be mindful in making sweeping statements about the area of the brain impacted by mefloquine that both deep brain areas, such as the brainstem, Raphe nuclei and ascending reticular activation system, or subcortical areas impacting emotion and those controlling learning and memory, such as the hippocampus, all are impacted by exposure to mefloquine. Definitive biological studies in humans to confirm this would be simply unethical.

● (1535)

The broad mode of action is reflected in the variety, but consistency, of symptoms that mefloquine toxicity can show, impacting both superficial and deep brain regions. It does not just cause seizures and psychosis, which are indicative of higher cortical to subcortical effects, but also emotional and behavioural changes controlled by the amygdala and other subcortical regions.

Tinnitus and vestibular disorders can be both central and peripheral, and this is where the brain stem can be involved. As such, a description of mefloquine as a brain stem injury and, therefore, simply looking for cellular impacts in the brain stem would be conferring a simplicity to this syndrome that is not reflected in its symptomatology.

You have heard from a number of other witnesses that mefloquine can cause both short-term and long-term neuropsychiatric and neurological side effects, but these are not the only health impacts associated with mefloquine. They can include severe gastrointestinal disease, joint pain and peripheral neuropathies, so there is a spectrum of ill health associated with a reaction to mefloquine, all of which can have a significant life-changing impact on the sufferer and last for many decades post-exposure.

Perhaps some of the most compelling arguments to support this statement that exposure to mefloquine causes long-term health deficits are findings in a recent study commissioned by the Australian Department of Defence and Department of Veterans' Affairs. This study reviewed health surveys undertaken by Australian soldiers who had been given mefloquine or another anti-malarial treatment during active service in Bougainville or East Timor. This was, therefore, a study comparing like with like, apart from their drug exposure, and included exposure to battle conditions. Although it was based an opportunistic retrospective dataset, this analysis identified that the personnel who had been given mefloquine were more likely to have poorer health scores in the long term than those who had received doxycycline or another anti-malarial.

As an analysis, commissioned by Defence, of scientists who were trusted Defence research partners, this evidence could not be overlooked. Perhaps on the basis of this finding, the Australian government accepted in principle all of the recommendations of the recent Senate inquiry into the use of mefloquine and tafenoquine in the Australian Defence Force, and committed $2.1 million Australian dollars to a treatment and rehabilitation program currently being implemented by the Department of Veterans' Affairs in conjunction with its counselling service, Open Arms.

I'm proud to say that I sit on the steering committee for this program, and I hope it will provide significant assistance to the group of veterans who have, to date, been left without assistance by the organizations meant to help and treat them.

Acceptance that mefloquine causes long-term harm is critical to resolving the health issues for those affected, and I believe that this evidence is not in doubt. The question is what the next steps are for those individuals and what strategies can be implemented to help them.

Comprehensive neurocognitive screening should be applied to all veterans to determine their neurocognitive, as well as psychological, health status. A 360-degree health review should be implemented to look holistically at the health and well-being of these veterans and their families, and appropriate support strategies should be applied, including access to occupational therapists, psychologists, psychiatrists or other health care professionals as appropriate.

Pharmacogenomics screening, particularly for metabolic enzymes of the cytochrome oxidase P450 family and for pharmacogenetics markers that have been shown to be required for mefloquine metabolism, should become mandatory for all military personnel prior to their being prescribed any anti-malarial drugs to ensure both efficacy and safety, as well as the efficacy and safety of other treatments that they may be given during their military service or after.

This screening should also be applied to all veterans, particularly those affected by mefloquine, to ensure that any drugs now being prescribed are not going to cause further complications.

I would urge this committee to look to the future to ask the question “What is the best assistance that can be given to the veterans suffering from long-term health impacts from mefloquine for military service?” and to look to programs currently being designed in Australia to go at some of their outcomes.

I very much appreciate being invited to speak to this committee, and I am happy to answer any questions.

● (1540)

**The Chair:** Thank you.

Dr. Sellers, can you hear me, or do we have to go to the screen?

**Dr. Edward Sellers (Professor Emeritus, University of Toronto, As an Individual):** No. I can hear you.

**The Chair:** Do you have a presentation, or do you just want to introduce yourself?

**Dr. Edward Sellers:** I'll make a few brief comments.

I'm a professor emeritus of pharmacology and toxicology, psychiatry and medicine at the University of Toronto. I've been involved in research, teaching, and clinical care, involving psychopharmacology—that is drugs that act on the brain—for over 40 years.

I must say, Mr. Chairman, I was somewhat surprised to be invited to meet with the committee because it wasn't entirely evident to me what you expected. I suspect it may have something to do with my very broad background in basic and clinical neuroscience and my involvement in pharmacal kinetics and risk factors for drugs. One area that I have worked in that might of particular use to the committee is the causality assessment of drug-related events. That is the determination of whether a drug has actually caused a particular adverse event.

One of my papers, for which I was the senior and supervising author, is probably particularly relevant to the work of the committee. This paper was called “A method for estimating the probability of adverse drug reactions”. It is a systematic algorithm for looking at all the factors and rating the likelihood that a drug actually caused a reaction and to take into account the relative contribution that the drug might have had in the face of other factors that may bear on a joint risk between the drug and the particular adverse event.

I agree with Professor Quinn's characterization of the evidence that there are acute and chronic, often serious, adverse events of administering mefloquine. I've used this particular algorithm in many settings, from single patients and groups of patients to literature reviews and so forth. Several years ago, I used this particular way of assessing causality to apply to a non-military individual who in error dispensed mefloquine instead of Malarone and had a profound, acute, and chronic, neurotoxic reaction.

Professor Quinn has outlined some of the issues around diagnosis. Of course, it's very tempting to try and fit what happens after a drug is given into a very tight box. You give penicillin; you get a rash, and it seems fairly straightforward.

In the case of chronic neuropsychiatric toxicity, it's not really that simple because a drug that has such reaction interacts with the individual's past history, their concurrent history, if they have mental disorders or are subject to other stresses. It's not surprising that the manifestations are quite diverse. I have heard people sort of argue, “How could a drug cause such a broad kind of effects?” Anyone who's involved in behavioural science and neuroscience doesn't find it surprising, really, because very many different parts of the brain can be affected by drugs that can bind to different receptors in different parts of the brain. The way the adverse event shows up—it's phenotype, as we call it—is determined by antecedent and concurrent factors.

A problem that frequently comes up is that often the information that's available is incomplete. Many of the studies alleging that the neuropsychiatric consequences of mefloquine are very rare are really done from data sets that are very weak. In those that have been designed properly, prospectively or with matched controls—mefloquine has even been given to healthy, normal volunteers—indicate that it has a very narrow margin of safety. You can raise the dose two-fold or three-fold, and you'll have 40% or 50% of the healthy, normal volunteers having acute effects from the drug.

● (1545)

The acute effects sometimes get passed off as if they're not important, but we're talking about a drug that's used for prophylaxis in people who don't have the disease. When you give the drug to normal volunteers and you see vivid dreams, disassociation, and effects on cognition, this is a warning sign that this drug has potentially serious toxicity.

One issue that comes up with mefloquine is that the toxicity doesn't seem to be entirely predictable. Now, it is true that higher dosages give rise to greater frequency of adverse events, and some of them are very unpleasant. However, it's not so clear with the onset of chronic neurotoxicity. Often, an acute event after taking the drug is a warning that the individual has some risk factor, that the drug is interacting and is going to cause a problem.

What we find is that there are other things that must be afoot. For example, we know that mefloquine gets out of the brain by a particular transport protein. There are individuals who lack this transport protein, so mefloquine can reach very high concentrations in their brains, and that puts them at particular risk. It's really the mefloquine in the brain—amount or concentration—that's important.

The final comment I would make is to endorse the systematic approach that Professor Quinn has urged. It is extremely important that individuals who are to receive any drug that has risk be explicitly warned and that there be careful documentation, and that individuals who have the risk factors don't receive certain drugs.

I know that there's been interest in this particular field in drug labelling, but drug labelling is not a good way to inform patients or even physicians about what the problems are. The surgeon general's review identified a lack of proper documentation among military individuals with respect to having even received this drug, and identified individuals who received the drug who had contra-indications.

There's something clearly not right, and I think Professor Quinn outlines a very reasonable, systematic and probably long overdue approach.

Having said that, I think that the current practice of not prescribing this drug is entirely appropriate. I noticed in some of the material I looked at before today that somehow patients are given an option that they can indicate they would be prepared to take the drug. I think we're past that. I don't think this is a drug—except in situations where there is extremely careful monitoring and very knowledgeable individuals are prescribing the drug—that somebody can say, “Well, yes, I'd like to take mefloquine”. There's an implication here that is outside of the normal medical world that I work in.

My recommendation is that you take this assessment of causality, this strategy, and apply it systematically to cases that are either emergent ones or retrospectively.... This involves two steps: applying the algorithm to assess causality, and then assessing what information is missing that makes it difficult to make the assessment of causality. Just because it looks like it's not likely the drug doesn't mean there isn't a reaction caused by the drug. It's usually because the information is not available to make the assessment. This is the problem in most of the literature that people point to when they're trying to support that this is a very rare kind of thing, or that it doesn't happen at all and so forth. That's not the real situation.

Thank you.

● (1550)

**The Chair:** Thank you.

We'll begin with Ms. Wagantall.

**Mrs. Cathay Wagantall (Yorkton—Melville, CPC):** I really appreciate that both of you, Professor Quinn and Dr. Sellers, are here today. Your testimony has already been very beneficial to us.

Dr. Quinn, I want to express my deep concern and sympathy for what you've been through personally. You have a unique environment, in that you have suffered one of the greatest losses you could in relation to this drug, and you also have such expertise in this field. Thank you so much for being willing to be here with us today.

One of the answers we get here related to veterans seeking care for the effects of mefloquine toxicity, which is not recognized here in Canada as a medical condition, is that if they have a diagnosis consistent with the warnings listed for the drug, then they only need to bring that diagnosis to VAC, and VAC will treat the veteran for the condition but will not recognize that the condition is due to mefloquine. If veterans are reporting nausea, vomiting, diarrhea, abdominal pain, dizziness, vertigo, loss of balance, or neuropsychiatric events such as headaches, lack of sleep, or sleep disorders, they could be treated for these conditions but with no recognition that they might be due to taking mefloquine.

I would really like to know your perspective on whether that is appropriate or whether it should be considered as a major factor in their diagnosis.

**Prof. Jane Quinn:** Yes, I definitely think it should be considered as a major factor. If you have a clear causal relationship—and this is what we've just been discussing—then it is common sense that there needs to be a validation of that causality within the diagnosis.

One of the significant issues that veterans have faced is the fact that the role of the drug in their ongoing medical conditions has not been formally acknowledged and has therefore not been allowed to be taken into account in their treatment and in the consideration of the life circumstances around how their particular medical condition arose.

There has been a significant amount of money, for example, focused on PTSD research, which is a very valid cause, but this is an equally valid cause with an equally well-described and well-contained disease status.

**Mrs. Cathay Wagantall:** Thank you.

**Prof. Jane Quinn:** Those veterans with validation through a PTSD diagnosis gain considerable benefit in their mental well being, and that needs to be applied for—

**Mrs. Cathay Wagantall:** Right. So it's not just a matter of recognizing the conditions. PTSD and mefloquine toxicity should receive the same kind of attention.

I'm curious. I was at the Invictus Games in 2017. CIMVHR held a big seminar on taking care of the families of our armed forces and veterans. Your minister of Veterans Affairs at the time—I'm forgetting his name—was there. We had a good conversation around mefloquine. He said that our new Minister of Veterans Affairs, Mr. Seamus O'Regan, had indicated to him that he would really like to work with him on studying and dealing with this particular issue.

Are you aware of any collaboration at all between Australia and Canada, with the research that you have been doing?

**Prof. Jane Quinn:** I'm not clear that there has been a direct collaboration. Certainly Australia and Canada are both part of the Five Eyes on mental health, a broad initiative around military veterans' mental health, particularly. But the direct collaboration—

● (1555)

**Mrs. Cathay Wagantall:** Specifically on mefloquine?

**Prof. Jane Quinn:** I'm not sure.

**Mrs. Cathay Wagantall:** Okay.

**Prof. Jane Quinn:** I know that there is international oversight of what's occurring globally, but I'm not sure that there's a specific initiative.

**Mrs. Cathay Wagantall:** So they should definitely be aware of it, if nothing else—the research that's been done.

**Prof. Jane Quinn:** Yes.

**Mrs. Cathay Wagantall:** In March of this year, as you mentioned, Australia announced a $2.1 million initiative to support veterans who had taken mefloquine. From what I understood, part of that came from the fact that they had a whole year to come and testify, and that was in itself traumatic. It includes a comprehensive health assessment, and concern for those who took mefloquine.

From what you said, you have a major role to play in Open Arms. Where do you see the value in something like this coming forward for our Canadian veterans? As of today, the surgeon general has changed how mefloquine is distributed. It's no longer used the way it was. Its use has gone way down. But we have many veterans who have suffered under this drug. What is your view on transferring that type of program to other countries, including Canada?

**Prof. Jane Quinn:** First, I'm on the steering committee, so I'm not formally employed by either the Department of Veteran Affairs or Open Arms, but I sit very much as an external adviser on that committee and part of the team that has formulated how that program should look.

It would hardly be applicable. It would be immediately transferable. It's a treatment design program that aims to give an assessment and treatment strategy for personnel who suffer from any kind of neurocognitive, neurological disorder. So it's not necessarily specific only to mefloquine and tafenoquine veterans in Australia, but can take account of more broadly acquired brain injury in mild traumatic brain injury or degenerative brain conditions for all the veterans as well.

It would be easily transferable to any other jurisdiction.

**Mrs. Cathay Wagantall:** Do I have another moment? Am I done?

**The Chair:** Sorry.

Mr. Eyolfson.

**Mr. Doug Eyolfson (Charleswood—St. James—Assiniboia—Headingley, Lib.):** Thank you both for coming.

This is very useful to us, and likewise, Dr. Quinn, thank you for coming forward and for your candour about your struggles. I know this must make things much more difficult for you.

We're talking about the diagnosis of mefloquine toxicity. Right now, we are dealing with a lot of literature that says there are some associations. I haven't been able to pin down anyone for an answer as to how I can look at patient X and say this patient's symptoms are mefloquine toxicity. An Australian committee report tabled in March of 2019 specifically says, “There is no specific way to diagnose chronic mefloquine toxicity effects as many symptoms are shared with other conditions such as PTSD.”

How do we reconcile a statement like that?

**Prof. Jane Quinn:** I think that statement is somewhat simplistic. A set of diagnostic criteria includes both neurological as well as neuropsychiatric symptoms.

**Mr. Doug Eyolfson:** Okay. Sorry to interrupt. I have very limited time.

Where can we find these diagnostic criteria published? Are these generally accepted by the medical profession as diagnostic criteria?

**Prof. Jane Quinn:** I think that's what I said, namely, that it doesn't appear in any of the diagnostic manuals. However, the accumulation of symptoms has been published on numerous occasions, both in case reports and in articles that have taken broader populations into account.

**Mr. Doug Eyolfson:** I understand that, but that doesn't necessarily mean this is defined by diagnostic criteria if part of the literature describes it in a number of case reports. If it's not in any diagnostic manual, how do I as a physician know that a patient who came back and deployed and took mefloquine is suffering from mefloquine toxicity versus PTSD?

**Prof. Jane Quinn:** There are a number of specific differentials, one of which is vestibular disorder and central vestibular disorder. The others are the particularly vivid dreaming states and the decline observed in patients suffering from after-exposure to mefloquine.

The other key diagnostic indicator is whether or not a person had a reaction at the time to taking the drug. In other words, they had a different health status prior to and immediately prior to taking mefloquine and their health status changed at the point at which they took the drug. That's a key critical indicator to identify those who had been directly affected.

I think Professor Sellers will probably have something to add to that as well.

● (1600)

**Mr. Doug Eyolfson:** Dr. Sellers.

**Dr. Edward Sellers:** Yes. I think that Professor Quinn is nudging up to what you have to do. It's really the assessment of whether the drug has caused a reaction. In this case, we know the natural history that an acute reaction is associated with a probability of a longer term reaction. So you need to know, was the drug given? What dose was given? Was it taken? How long was it taken? What are the individual's risk factors? What is the uniqueness of their symptomatology? What's their past history of anxiety, depression and so forth? And if you do that systematically, you can determine whether mefloquine was involved in the evolution of the symptomatology. It's nice to have a diagnostic category, but with neuropsychiatric kinds of issues, you're going to have a mixture of signs and symptoms.

**Mr. Doug Eyolfson:** Okay. Thank you.

I'd like to refer to a paper published in the American Journal of Tropical Medicine and Hygiene in 2018. This was data collected from approximately 19,500 U.S. veterans, many who were deployed and many who were not. It looked at the mental health outcomes between anti-malarials—whether or not people received anti-malarials. Again, this is a very large study in a peer-reviewed scientific journal. The summary says, “once deployment and combat exposure were added to the multivariable models... No significant associations were found between mefloquine and mental health measures.” It goes on to say, “These data suggest that poor physical and mental health outcomes reported in this study population are largely because of combat deployment exposure.”

This is a very large study in a peer-reviewed journal that's fairly recent, which basically says that they cannot find any definitive relationship between this drug and these symptoms.

What do we have to counter that? Are there peer-reviewed scientific journal articles of similar power that will refute this?

**Prof. Jane Quinn:** There have been a number of studies done over time.

Sorry, go ahead.

**Dr. Edward Sellers:** The issue here is that large doesn't make good. That's a particular retrospective kind of study that suffers from failure to document, record and have an accurate estimate, and the kind of symptoms that often get reported never show up in medical records, so—

**Mr. Doug Eyolfson:** If I may, the paper is very detailed. It has a number of symptoms and quite a rigorous medical evaluation of these people who were deployed. Again, I've done some medical research. I practised medicine for 20 years. I have to admit, that's the first time I've ever heard the phrase regarding scientific studies that “large doesn't make good”. One of the problems with scientific studies is that the smaller your studies, the more difficult it is to basically ascribe significance to them.

**The Chair:** Thank you.

Ms. Blaney.

**Ms. Rachel Blaney (North Island—Powell River, NDP):** Dr. Sellers, I would be very happy to hear your response to that question.

**Dr. Edward Sellers:** The basis of my little clip there that “large doesn't make good” is that it really depends on the source of the data. That kind of study is very typical of retrospective epidemiologic studies. The universal weakness of those studies is that one does not have information about all the things you really want to have.

You want to know what the subjective symptoms and behaviours were that were exhibited. What you often end up with is little things in a chart; you have a diagnosis, but you don't know when it started, so you end up basically with an inference that that particular study is at odds with what we know from other studies that have been properly controlled.

Professor Quinn referred to one such study, but there are others. In the literature as a composite, going back as early as the 1970s, it is clear that drugs that have this chemical structure are associated with this again and again and again.

When you see somebody leaving a bank, and the money isn't there, you say “woah”. It happens the next day. There's a robber. Something is going on. This is a repetitive pattern with this drug.

● (1605)

**Ms. Rachel Blaney:** Thank you so much. I really appreciate that.

Dr. Quinn, I will turn to you. Right now in Canada there's no real process for Veterans Affairs or even National Defence to reach out to people who have taken mefloquine. There's no process for them to screen, so one of the concerns that I have as we do this study is how many people are undiagnosed in this country. Are they getting the proper supports and treatment they need?

You also spoke to the reality that sometimes treatment for post-traumatic stress disorder—which may be part of the diagnosis, but not the fulsome diagnosis—can be a problem for them in getting the support they need.

I'm just wondering if you could speak to the parts of the following question. How can we explain to this government that we need to be reaching out to these folks to make sure they get properly diagnosed? What happens if they're undiagnosed and only being treated for post-traumatic stress disorder? What kind of harm could that bring?

Thank you.

**Prof. Jane Quinn:** This was very much the position that we came into when designing the neurocognitive health program for Australia. We knew there was a cohort of veterans out in the community who were suffering from long-term neuropsychiatric and neurological health impacts, as well as other health impacts, that had impacted their family members and their very broad existence. We knew they were very disenfranchised from treatment modalities through the Department of Veterans' Affairs, because those have often been highly unsuccessful.

One key remit was to have an open strategy that allowed them to re-engage with that process without fear of coming into conflict with previous diagnoses, and also to allow a full and open neurocognitive assessment and holistic assessment of their current health status and health needs. One key thing that needs to occur prior to those veterans coming back into those treatment programs is the validation that their condition could be related to the drugs they have taken. An acknowledgement by the Australian government—and now through the findings of the senate inquiry—that it is a tangible and real event that has impacted their lives in a very longitudinal manner is something that is extremely important to re-engage those veterans who have been lost from treatment programs in the past.

I think these are key strategies, and an active outreach program that is very focused on improving overall quality of life, not just making a series of short-term diagnoses and therefore short-term treatment outcomes.

**Ms. Rachel Blaney:** Thank you so much. Definitely what we've heard from many veterans across Canada is that piece about being acknowledged and that their feelings of stress and disenfranchisement are because their having this disorder is not being acknowledged.

Dr. Sellers, is there anything you would like to add to that part about the treatment of post-traumatic stress disorder without the proper diagnosis of mefloquine toxicity? So do you have anything about doing the outreach and actually connecting with people who may have this and do not have the proper diagnosis here in Canada?

**Dr. Edward Sellers:** Of course, this goes far beyond PTSD because the neuropsychiatric consequences of mefloquine can involve depression, psychosis and a whole range of different kinds of symptoms. As a clinical pharmacologist, the kind of thing I would do is look for an index of exposure. I would try to find all individuals who were alleged to have been prescribed. In my opening comments, I made the point that prescribing, dispensing and taking are all quite different. We have examples of mefloquine being taken every day when it's meant...and so forth. All these strange kinds of things happen.

I suspect the military must have really good records of who actually was prescribed this. That would be a starting point to identify what we would call an index case, and to then go and assess that individual with respect to some of the things I outlined in this causality process. That involves establishing that it was taken, that the sequence was right, what dose it was and what concurrent issues were.... It's a systematic way of taking an individual and making an assessment.

It's convenient to talk about how the drug causes it all, but it's always a little more complicated than that when you're dealing with these kinds of disorders. The drug can very well be an important contributor, and that is just as important to determine as those rare cases when it was the only antecedent factor that caused it.

For the case that I mentioned that I assessed, it was clearly just a dose issue. Seven times the proper dose was given to a businessman, and he had a profound acute effect and a very profound neuropsychiatric consequence. You have to have the information and get the data.

● (1610)

**The Chair:** Ms. Ludwig.

**Ms. Karen Ludwig (New Brunswick Southwest, Lib.):** Thank you both for your testimony today.

My first question is for Professor Quinn. Dr. Sellers talked about records of who was prescribed mefloquine. We know from previous witnesses before this committee that we don't have thorough records here in Canada, unfortunately.

In Australia, have records been taken, in terms of who was prescribed and when that was prescribed?

**Prof. Jane Quinn:** Yes, to some extent. We have an interesting situation and it's somewhat comparable to Canada's in that there were a number of veterans who received mefloquine during clinical trials carried out by defence during the late 1990s and early 2000s.

Interestingly, because they were exposed to the drugs during a clinical trial regime, that exposure wasn't documented in their main military records. It was held separately. What became apparent when we were first investigating the situation here in Australia was that those individuals were not aware that they had been exposed to mefloquine or another experimental drug, tafenoquine, because that was not documented in their general medical records. Those medical records had been held separately. So accessing those medical records became extremely important.

What is unique, slightly, about the Australian situation is that those individuals are therefore extremely well documented, and the retrospective study that I talked about in my opening statement actually was cross-referencing between some of those data sets, because there were individuals who could be discretely identified. We know quite precisely the number who were exposed during clinical trials—it's around 4,500—to the two experimental drugs, one of which was mefloquine, and then there has been some detailed documentation kept since about 2010 that allows us to know that there were at least another 500 individuals exposed after that.

There is a paucity of information from the late 1980s through to about 2000, when more detailed electronic medical records were kept, so it's an open book as to who exactly was taking mefloquine and who wasn't. That's a very similar situation to that in the U.K., the U.S. and Canada, where there's been a period of time prior to electronic medical record-keeping when it is actually very difficult to know exactly who took the drug and who didn't. What we do know is who was deployed to regions where it was the drug of first choice, so individuals deployed to those locations could almost be guaranteed to have taken that drug.

However, as Dr. Sellers says, one of the key things that need to be done is to actually interrogate those personnel to find out if that was the case, because recollections of whether a drug was taken daily or weekly can certainly give a very strong indication for those who were exposed during that period of time as to whether they were likely to be taking—

**Ms. Karen Ludwig:** Professor Quinn, I'm just going to jump in to add to that. I'm going to take a turn on this one.

I'm wondering, Dr. Sellers, if you could speak a little bit to that. For example, Professor Quinn is talking about digging deeper into people's pasts in terms of who may or may not have taken it. When you talk about the neuropsychiatric symptoms, how familiar would health care professionals be in Canada on the neuropsychiatric symptoms possibly associated with mefloquine, if veterans went in to see their family doctor?

● (1615)

**Dr. Edward Sellers:** I think the reality is that it wouldn't work out all that well. I think most primary care physicians would not be very familiar with.... We know that the management of mental health is a problem in our health care system anyway. Problems aren't recognized. This is getting very deep into a very specialized kind of problem, so I think that the kind of approach that involves a targeted kind of approach with special capabilities to do the assessments....

I take the point that sometimes the records are just dreadful, so you can't really tell whether something's actually been prescribed, but you probably do have a pretty good record of who was deployed into a zone in which prophylaxis would have been given. Then you can go to the individuals and ask. Many, many individuals will tell you exactly, “Oh yes, they gave me this pill, but I never took it”, or they'll say, “Oh yes, well I thought maybe I should take some extras”. They'll tell you more or less what's going on. You don't go crazy putting weight on it, but it gives you something that you may not find in the record, because they can tell you.

**Ms. Karen Ludwig:** Right.

Do I have more time?

**The Chair:** You have 40 seconds.

**Ms. Karen Ludwig:** My last question is for Dr. Sellers as well. In terms of what you have learned internationally—one of you today talked about the Five Eyes: Australia, Canada, New Zealand, U.K. and the U.S.—are there any medical conferences or training specifically on this, discussing the topic of mefloquine and veterans?

**Dr. Edward Sellers:** Not to my knowledge, although I suspect Professor Quinn may have managed to stimulate this in Australia. She's quite a force.

**Ms. Karen Ludwig:** Professor Quinn.

**Prof. Jane Quinn:** There have been no specific conferences or events outside of those organized in the veterans community.

**Ms. Karen Ludwig:** Okay. Thank you.

**The Chair:** Mr. Samson, you're next.

**Mr. Darrell Samson (Sackville—Preston—Chezzetcook, Lib.):** Thanks very much to both of you for your testimony today as we continue to dig deeper into understanding these effects and to prepare a report that will allow us to know more than we knew before. We may be able to make some recommendations that could make a big difference, so I thank you for that.

Doctor Quinn, I'd like you to comment on a report that came out in August, 2017. The Australian Repatriation Medical Authority, a science body responsible for making recommendations to the Department of Veterans' Affairs, specifically recommended to deny the benefit of the doubt in the link between mefloquine and this syndrome and its effect of brain injury.

Could you give your opinion on that, please?

**Prof. Jane Quinn:** Yes, I can.

I was asked to submit evidence to the Repatriation Medical Authority in order to assist them in the process of defining whether or not they would accept a statement of principles for acquired brain injury in relation to mefloquine, tafenoquine and primaquine specifically.

It was an interesting process in that I thought the remit of the investigation was flawed. It had looked across three drugs, one of which has a very discrete neuropsychiatric profile that's well documented; one that was at that time an experimental drug that had very limited evidence available about it outside of the development process for the pharmaceutical industry; and another that had not been systematically reviewed for some time in terms of its safety in terms of neuropsychiatric side effects.

It was an investigation that was very difficult to provide evidence to; therefore, the outcome, which was that the causality link was not determined, was probably quite predictable. However, what should be noted is that the Repatriation Medical Authority currently accepts 15 separate conditions associated with quinolines, or mefloquine specifically, in terms of poor health outcomes that can be claimed through the system in Australia.

If you put those 15 statements of principles together, you essentially get the syndrome we have described as mefloquine toxicity syndrome.

We were looking to confirm that the neurocognitive component could be identified as a separate condition, and unfortunately that was not upheld. I think the evidence for that is emerging and will need to be confirmed through specific, targeted case series. One of the issues around this area is that the desire to undertake those specific review case series has been extremely poor. The more recent evidence coming out of Australia in that sense will, I think, strongly assist us in the process of defining that statement of principles in the future.

● (1620)

**Mr. Darrell Samson:** You said in your testimony that the Australian government had invested $2.1 million towards support. What was the basis of that determination, the conclusion that allowed that investment?

**Prof. Jane Quinn:** I think that has come from a number of places. The first was the very significant impact of the testimony those veterans who have been affected by the experimental drug tafenoquine, and also mefloquine here in Australia, put forward at the Senate inquiry, where it became clear and evident that their lives had been permanently impacted in a very negative way by being exposed to those two drugs.

**Mr. Darrell Samson:** Excuse me, sorry. What was the conclusion? I know there were all kinds of scenarios, but what was the clarity that determined the causality?

**Prof. Jane Quinn:** I think that final determination came in part from the study carried out by the University of Queensland for the Department of Defence, which showed there had been clear and tangible long-term negative health outcomes specifically related to taking mefloquine during the two deployments in Bougainville and East Timor.

**Mr. Darrell Samson:** Which ones would they have been? What would be the diagnosis, the symptoms, the exact ones—PTSD or?

**Prof. Jane Quinn:** No. They were particularly anxiety, and depression and neuropsychiatric symptoms. This again was based on a retrospective dataset, and thus was an opportunistic study. It was not targeted and defined. This is a piece of research that still needs to be carried out.

But I think that with the weight of that evidence, together with the evidence presented at the Senate inquiry, plus events that are occurring internationally around acceptance and acknowledgement of the impacts of mefloquine on veterans' mental health, and settled cases of litigation, I think there was probably a cumulative effect that suggested to the government this was a necessary process. As well, there were those individuals who are working inside the Department of Veterans' Affairs and Open Arms who were strongly supportive of this group of veterans and, more broadly, those veterans affected by brain injury of many different causes.

**The Chair:** Mr. McColeman.

**Mr. Darrell Samson:** Am I done? Six minutes?

**The Chair:** That was six minutes and 20 seconds.

**Mr. Phil McColeman (Brantford—Brant, CPC):** Thank you to the witnesses for being here today to give your perspectives on this.

I want to put things in context for you. You may or may not know this, but I think it's worth getting on the record that we had the top medical people of the Canadian military here—this would be our Department of National Defence, or DND—and Brigadier Downes, the surgeon general of our DND. He said that he had done extensive research and had read just about everything there was about mefloquine and its effects on military people—this is the top medical officer in our national defence department—but could not agree with anything you would have said today.

In other words, his view was there is not enough evidence and not enough study, just as my colleague across the table, from a medical background, was trying to draw the connection between a study and the fact that it did not show any evidence of the correlation that both of you clearly outlined to us today. Not surprisingly, either, the other witnesses we have had at this committee have all drawn the same connection that you have—except for our military brass, the people making the decisions within our military circles. This was the drug of first choice right up to Afghanistan, in particular the one that stands out in Canadian history in terms of some of the effects and psychological and mental health issues that happened in Somalia and the atrocities that happened through military hands.

One of our more respected generals, I believe, who's now a senator, is Roméo Dallaire. He has said unequivocally that we should not be giving this to people in the military. He forcefully said it, publicly, and yet we are here at committee asking questions of our military leaders who don't find any credibility in what you're saying. They obviously haven't read Professor Quinn's references to what's happened in Australia.

Obviously, you have had study. Interestingly enough, there was never a reference to the fact that Australia had taken action on this and had developed policy within government to compensate and help these individuals who are struggling so much.

I put that in context because it's simply a matter of screening, of asking those who served whether they took this drug. That would be up to and including Afghanistan and including the ones who are still taking it in our military.

So I'm outraged; you might be able to see that across the video screens. I'm outraged by the fact that this government has not taken action on it—or other governments previously, if we had this information. It seems to me that the database is there. That was another question brought up: How do we know who took it? Well, we know who served. We have all their records. We ask them, “Did you take it?” That's all. Then we acknowledge the fact that there is a correlation. Australia has dealt with it, the United States is dealing with it and banning it, and yet we somehow stubbornly within our military want to continue to allow our military people to take it. If we did nothing more than just stop it from being offered, we'd be doing a service to our military people and to future veterans. We're here talking about veterans, the ones who took it and the ones who have claimed the correlation of these symptoms and these problems with their health issues, and we have a defence and a government trying to say that it doesn't exist.

● (1625)

When I give you that context, my question is, what do you think the next steps for Canada should be on this issue of those veterans who consumed this toxic drug and those who are continuing to consume it? Could I have your general thoughts, each of you?

Why don't you go first, Professor Quinn? Then perhaps Dr. Sellers could weigh in as well.

**The Chair:** We're short on time, so could you be to the point, please?

**Prof. Jane Quinn:** Yes, I think it's very clear that mefloquine is fundamentally unsuitable for use in military populations, for many reasons. The immediate discontinuation of oral use of mefloquine across the board should be your first step, acknowledgement of those who have taken the drug and been affected by it should be the second, and implementation of a clear treatment and screening program should be the third.

● (1630)

**Mr. Phil McColeman:** Thank you.

**The Chair:** Dr. Sellers, do you want to add to that quickly?

**Dr. Edward Sellers:** I know that you've characterized this as being a uniquely military problem, but it's actually not uniquely a military problem. This is a problem with a drug that has toxicity, and it has been observed in many populations.

Whatever you decide to do, I would urge that it be a process that involves independent medical assessment and management and clinical pharmacology input, because that's the way we would manage any public health issue with a drug that was causing toxicity of this type.

**The Chair:** Mr. Chen.

**Mr. Shaun Chen (Scarborough North, Lib.):** To continue with Mr. McColeman's line of questioning, we understand from DND that currently the drug mefloquine is prescribed to servicewomen and -men only if they ask for it. For the past two years, they reported that only three people in the armed forces have been prescribed mefloquine.

I'm hearing from you, as our witnesses, that this drug should not be prescribed at all for servicewomen and -men given the conditions under which they work and the risk of potential long-term reactions. When a servicewoman or -man is deployed to an area where malaria is a real risk, and if all other anti-malarial medications are contraindicated, would you consider mefloquine as a drug of last resort for those who might be exposed to malaria?

**Dr. Edward Sellers:** I guess that's probably for me.

First of all, I can't conceive of a real situation where one of the alternatives—Malarone or something of that sort—would not be appropriate. I indicated in my comments that if a military person is asking for this drug, I think they would have to be misinformed about the risks, and that's very, very unusual. I think there are alternatives.

Now, if there were some circumstance that I can't think of, then yes, a careful history of the individual, of their past mental health, their family's mental health, a look for risk factors, and careful documentation and monitoring of them, warning them and telling them what they are to do if they have certain acute effects...because the acute effects are a bit of a warning that things are not going quite the way you want. These drugs quite commonly do have these acute effects—

**Mr. Shaun Chen:** Dr. Sellers, I'm sorry, but I have limited time.

**Dr. Edward Sellers:** I want to make a footnote to this, and that is that there is evidence that women are more susceptible to mefloquine. I think that was given no mention at all in the surgeon general's report, yet the literature is fairly clear that it is an additional risk factor.

**Mr. Shaun Chen:** Dr. Sellers, I just want to clarify. Are you are saying with respect to other anti-malarials that you cannot think of a situation where someone should have to choose mefloquine over those other options?

**Dr. Edward Sellers:** I think it would be very, very rare, and I've given a way that if you had to, you would carefully monitor and be able to intervene. We know how prescribing and dispensing can sometimes go. It's “take the pill,” and that's the end of it. In fact, the surgeon general's report documents the relatively poor attention paid to informing individuals about the risks and documenting what was done, the contraindications and so forth. There's already evidence that..... You know, it's what we would expect in medical practice.

● (1635)

**Mr. Shaun Chen:** With respect to prescribing mefloquine, you've said that drug labelling is not sufficient. Patients need to be explicitly warned. How would that be done, in a general sense, for any doctor prescribing this to a patient?

**Dr. Edward Sellers:** We have other examples of drugs for which we have checklists, patient information and documents you can provide to inform individuals. Actually, I have them sign a contract that they have read it and understand it, and that explicitly tells them what the risks are and what I'm going to do to monitor them, such as bring them back at specified intervals to make sure they're doing okay.

I can think of a way that you could give mefloquine, but I can't think of a situation where you'd really have to. There are a number of alternatives out there, and others coming along—more modern kinds of approaches, vaccines and things of that sort.

**Mr. Shaun Chen:** I'd like to hear Professor Quinn, if she has any comments with respect to my questions.

**Prof. Jane Quinn:** Yes, I agree with Dr. Sellers. I think it would be a very unlikely and unusual situation where the need for deployment was so high that the use of mefloquine as a drug of last resort would be advisable or acceptable. The review process would need to occur at least three weeks to a month prior to deployment, so that any medical review was occurring in-country, not out of country. The likelihood of this situation arising, in light of many other alternatives, and significantly safer alternatives.... I think the suggestion is a moot point.

**The Chair:** Mr. Kitchen.

**Mr. Robert Kitchen (Souris—Moose Mountain, CPC):** Doctors, thank you both for being here today. It's greatly appreciated. You definitely add to our study.

As you've heard from my colleague on the issue of how we know which soldiers have actually been exposed to mefloquine, we don't have those records. They were given a drug, and those records apparently don't exist. That's a big challenge. Ultimately, we do have soldiers who are suffering. They're presenting neurological and neuropsych disorders, and the challenge is whether the problem is mefloquine toxicity or PTSD.

In a perfect world, it would be great to have a protein—for example, the Bence-Jones protein, which makes it evident that a person has multiple myeloma—but we don't have that. What prompted this question, Dr. Sellers, is your earlier comment about a transport protein that gets mefloquine out of the brain. I'm interested to hear a little more about that. Is that new research? Is that purely being theorized? I wonder if you could tell us.

**Dr. Edward Sellers:** It's not very new research. It's been known for a long time that this class of compounds is transported by a particular mechanism that's presumably there to protect the brain. A lot of drugs are pushed out of the brain by this transporter. No, this is just one possible explanation for why some people seem to be particularly susceptible, with their genetic variance of this, which would explain why some people might get very high levels of mefloquine in their brain.

There are other risk factors, too. It's not mefloquine or PTSD. It's perfectly possible that mefloquine and PTSD could occur in an individual, along with other symptomatology. That's the nature of neuropsychiatric problems: depression, anxiety and things of this sort. They rarely travel alone. You have the concept that mefloquine can travel on its own, but also, as a risk factor, contribute to neuropsychiatric problems. That doesn't mean it's unimportant, but that the context of mefloquine use is very important. Obviously, the military are exposed to extremely stressful situations in some cases, and there could well be an interaction between that exposure and the drug. Without the drug, maybe the interaction wouldn't result in a long-term, chronic, neurotoxicity.

● (1640)

**Mr. Robert Kitchen:** Dr. Quinn, do you have anything that you would like to add to that?

**Prof. Jane Quinn:** I'd really just support what Dr. Sellers has said. This is a complex syndrome and there are multiple players coming into that presentation of the clinical symptomology. However, we do know that there are specific liver enzymes that are involved in drug metabolism that would put a person at higher risk of also having those higher levels accumulating in the brain or being able to reduce the levels in the blood stream more effectively over time. The P-glycoprotein family, which is the transporter that Dr. Sellers is talking about, also has genetic variability and will also facilitate higher levels accumulating in the brain in individuals with particular genetic allelotypes.

There is a genetic screening process that patients who take certain types of toxic drugs—particularly for cancer treatments, for example—need to undergo in order to know that those drugs are going to be metabolized appropriately. That screening process can be undertaken in all individuals for all drug types. It can also inform who potentially may or may not be more susceptible to having a potentially more significant reaction under this accumulated set of circumstances.

I think there is science out there that absolutely supports all of that screening that could occur. It's just something that should be implemented.

**The Chair:** You have 15 seconds.

**Mr. Robert Kitchen:** Should we be accepting and following what Australia has done in recognition of this?

**Prof. Jane Quinn:** Absolutely.

**The Chair:** Ms. Blaney.

**Ms. Rachel Blaney:** One of the things that occurs to me as we do this study is the reality of the particular group of people we're talking about here. One question that's come up a couple of times is: Are we making sure that our armed forces have informed decision-making about medication that they're taking?

The other part that I think is really important is that as they may be experiencing some of the impacts of taking mefloquine, what is keeping them from disclosing? When you look at it, career prospects and looking at the future are challenges that provide barriers for people.

When I look at what's happened over the course of time of this medication being in the system, I'm very concerned about people who may be serving our country right now who are having some of these symptoms, but they don't want to talk about it because they don't want to see their careers get shut down.

Are the folks who serve us getting informed information about the medication that they're taking? I'm wondering if you can speak to that in that nuance of this particular group of people we're talking about. We're not talking about people who are going for a vacation. We're talking about people who are serving our country.

Dr. Quinn, if I could start with you.

**Prof. Jane Quinn:** That's absolutely the reality for many. Disclosure, particularly the neuropsychiatric side effects related to mefloquine in serving military members, is a black box subject. Certainly my husband experienced that. I know that many of his colleagues who experienced side effects would never report them for fear of their careers being damaged by that process.

One of the issues compounding that has been that when people have come forward and disclosed their issues associated with quinoline antimalarials, they have had to do that in the broad public domain to gain recognition. They have often been openly attacked or faced very negative career consequences because of that. I think that absolutely has been the experience within military circles to date, so changing the attitude around reporting is something that is critically important.

I know that a lot of military organizations are working to try to get that safe disclosure environment as part of the modern military concept. It is a significant challenge and it certainly is an impediment to many people coming forward to report their side effects, even if they were side effects that occurred a very long time ago and are now related to relatively minor health issues.

● (1645)

**Ms. Rachel Blaney:** Thank you. I think that's my time.

**The Chair:** Thank you. That ends our testimony today.

**Mrs. Cathay Wagantall:** I would like to ask a couple more questions. We certainly have time before the clock goes.

**The Chair:** Do I have the unanimous consent of the committee to do that? If there is anybody else? Show your hands if you want to go at all.

Just Cathay, for five minutes.

**Mrs. Cathay Wagantall:** Okay.

**Ms. Rachel Blaney:** I have just a couple of questions.

**The Chair:** Ms. Wagantall.

**Mrs. Cathay Wagantall:** Thank you.

In trying to determine who has taken mefloquine, I tabled an Order Paper question asking specifically about Canadian Armed Forces members who were required to take mefloquine since 1990. I asked how many were required to take mefloquine by deployment, country of deployment, dates and whatnot.

I got the results of individuals who were required to take it by the Canadian Armed Forces from 2003 up to 2018. They indicated that "we now recommend it as a second line medication."

What I've heard today is that it shouldn't be in a line of medication choices at all. Correct? Just a quick yes or no, please.

**Prof. Jane Quinn:** I agree.

**Dr. Edward Sellers:** Agreed.

**Mrs. Cathay Wagantall:** They said, "The Canadian Armed Forces (CAF) continue to review all relevant scientific literature on mefloquine to ensure our policy remains current."

Clearly they didn't, because as was mentioned in the meeting that we had with our top bureaucrats, they weren't aware of the Australian report.

They added that "Antimalarial medication is recommended when CAF personnel deploy to areas where there is a concern for contracting malaria."

They named some countries. Afghanistan isn't on this list. It's a desert country, and our armed forces were required to take it there. Does that make sense to you? Just a yes or no.

**Prof. Jane Quinn:** No.

**Dr. Edward Sellers:** No.

**Mrs. Cathay Wagantall:** There are shaking heads. No.

They said, "The CAF has recommended mefloquine as an option for malaria prevention since the early 1990s." It was an option and they note that "Other options were available". They indicate further that it was "the patient's choice", but we know that in 1992 tens of thousands of free mefloquine tablets were made available to the Canadian Armed Forces troops deployed in Somalia as part of a clinical trial.

Our surgeon general in his 2017 report said that "The CAF members deploying to Somalia did not participate in the SMS study, since the guidelines of the study were not compatible with the operational requirement to deploy to Somalia". Yet that was the drug they were ordered to take and had to use the entire time they were there.

Is that not in your mind some kind of a moral or legal breach when you are requiring and demanding that they take that drug, and yet it was not followed through with as a study in a way that it was intended to be used?

Are there any comments on that?

**Dr. Edward Sellers:** I'm not familiar with the details of that particular study or the circumstance. I did read that in the report. It did strike me as a bit unusual because of the absence of any detail about why it was incompatible and so forth.

It seems a bit unusual, but I have no knowledge of it.

**Mrs. Cathay Wagantall:** So it wasn't compatible to go ahead with the study regardless?

Dr. Quinn, do you have anything to add?

They were still given a drug that was not licensed and was supposed to be used as a—

**Prof. Jane Quinn:** I think it's an extremely extraordinary situation and obviously has had significant and lasting ramifications for the Canadian military and all those involved at that time.

I think the other point is there is no such thing as informed consent in military populations, and, therefore, the use of military veterans or military members in clinical trials is a significant issue.

**Mrs. Cathay Wagantall:** Whereas we were told that they made it a last line of defence, and in here they say it's a second line of defence, our surgeon general also made it clear in his report that their decisions in regard to the military in no way implicated or impacted the use of mefloquine amongst civilians in Canada in any way.

This deeply disturbs me. You mentioned that drug labelling isn't a good way to inform people. We know that a lot of our medical practitioners are not informed about the dangers of this drug. All kinds of Canadian civilians travel internationally to areas where there is malaria.

What would your perspective be on this drug being used within our civilian population?

**Prof. Jane Quinn:** It's becoming a drug that is less and less prescribed by general travel doctors and other general practitioners. I think the international exposure of mefloquine's impact on individuals has caused a significant downturn in its use, but that should really have been driven by the drug regulators from a safety perspective. I think there has been a significant shortfall in the way the drug's history has played out over time, in that the regulators have not performed their duties appropriately.

● (1650)

**Mrs. Cathay Wagantall:** Do you have a comment, Dr. Sellers?

**Dr. Edward Sellers:** If you go on the Internet or you look at any of the guidelines, the drug of first choice is Malarone. It's a combination drug. It's also quite expensive.

**Mrs. Cathay Wagantall:** That's interesting, because cost seems to have been a factor, at least a partial factor, even with our Armed Forces. The cost of a once-a-week mefloquine pill versus the cost of the others is significantly different, correct? Just a yes or no?

**Dr. Edward Sellers:** Yes, it is.

**Mrs. Cathay Wagantall:** I want to bring attention to Australia again, because I had a friend, a veterans' advocate, on mefloquine. She and her husband took it when they went on a trip as civilians to Thailand. She had trouble before she even left home, and the doctor told her to just keep taking it, that she would get used to it, and Australian backpackers told them to get off this drug. She suffered all of her life, and we lost her last December.

This is why its use among the civilian population concerns me as well, because that education needs to be out there.

**The Chair:** Thank you.

Ms. Blaney.

**Dr. Edward Sellers:** There's ample evidence that the civilian population is affected by this drug. It's just as Professor Quinn said.

**Ms. Rachel Blaney:** I just want to go back to Dr. Quinn to clarify something for the record. In Australia now there's an official diagnosis for mefloquine use. Is that the case?

**Prof. Jane Quinn:** Mefloquine is identified as a causal factor in 15 statements of principles for the Repatriation Medical Authority, which is the basis on which they apply principles through the Department of Veterans' Affairs for treatment and compensation. However, that's not the same as its being recognized as a particular disease, syndrome or having a defined diagnosis.

**Ms. Rachel Blaney:** Thank you so much. I appreciate that.

The last thing I want to come back to is the lack of conferences or work being done on this internationally. What we're often seeing here in Canada, and what it sounds like you're seeing there in Australia as well, is that veterans are coming together and leading these conferences, doing this at that grassroots level—and, of course, probably working towards having that sense of acknowledgement.

I'm just wondering if you could speak to the challenges. How do we support these folks so that their voices are heard? It sounds like you've done a lot in Australia, but I'm wondering about specific recommendations for this country and those veterans who are working so hard to be acknowledged and recognized here.

Thank you.

**Prof. Jane Quinn:** One of the significant steps forward that we've taken here is involving veterans groups in the co-design process that has driven the current neurocognitive health program that's being developed. That absolutely has been done side-by-side with the Department of Veterans' Affairs' Open Arms counselling service and those advocacy groups, including people like me. That would be a major step forward in Canada as well if you brought those individuals, with their lived experience and significant knowledge, into the design process for the treatment and rehabilitation programs. That also partially validates their existence as bona fide patients and experts in their own medical right.

I think it would be a very significant step forward if that could happen in Canada as well.

**Ms. Rachel Blaney:** Thank you.

Dr. Sellers, is there anything you'd like to add?

**Dr. Edward Sellers:** It sounds like the kind of health care model that should be embraced. Veterans are part of the general population and, therefore, a partnership with the military and building the kind of momentum that has been built in Australia seems so obvious that it's almost embarrassing to have to point it out, but it is something that could be done, and I think that Canada is well positioned to take a lead on that kind of initiative.

● (1655)

**Ms. Rachel Blaney:** Thank you so much.

**Dr. Edward Sellers:** Well, actually, that would be a follower role.

**Ms. Rachel Blaney:** Thank you so much. Those are all the questions I have.

**The Chair:** Mr. Kitchen.

**Mr. Robert Kitchen:** My colleague spurred a question in my mind as she spoke to you. I take it that both of you have done research. Is that correct? You've also presented research to projects and to university groups to condone your research. Is that correct?

**Prof. Jane Quinn:** Yes.

**Dr. Edward Sellers:** Many, many papers.

**Mr. Robert Kitchen:** If you had presented a research paper suggesting that you were going to do a certain study—looking for information and collecting your variables and your data—and then you didn't do it or failed to report it, what would happen to your research?

**Prof. Jane Quinn:** Your research career would go downhill fairly fast.

**Mr. Robert Kitchen:** Right.

**Prof. Jane Quinn:** You would certainly not [*Technical difficulty—Editor*] funding if you perform in that way.

**Mr. Robert Kitchen:** Would your committee allow you to continue with that research?

**Dr. Edward Sellers:** I think it depends a bit on what you did.

If you didn't do what you said you were going to do and you tried to publish it and you got caught, you would probably lose your appointments and you wouldn't get funded. I mean, this gets to be close to fraud and things of that sort.

It's not something I would have ever done, so it's hard to answer the question. Of course, you can read on the front page of newspapers from time to time about somebody who has made it all up, and they've never come to a good end.

**Mr. Robert Kitchen:** Thank you very much.

**The Chair:** On behalf of the committee, I'd like to thank both of you for taking time out of your day and for your testimony and all you do for the men and women who have served.

The meeting is adjourned.