The Science of ACEs and Toxic Stress (Part 1) – Transcript

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Jennifer Ryan: Hello, and thank you for joining us today. My name is Jennifer Ryan and I serve as the Executive Vice President at Aurrera Health Group. My team and I are proud to be leading the ACEs Aware initiative on behalf of the Office of the California Surgeon General and the Department of Healthcare Services. ACEs Aware is a first in the nation effort to screen children and adults for ACEs in primary care settings to identify and treat toxic stress and to provide families with trauma informed care.

Jennifer Ryan: The state has set a bold goal for the initiative of reducing the incidents of ACEs and toxic stress by half within one generation. Today, we're joined by Dr. Nadine Burke Harris, California's first Surgeon General, who's going to teach us about the science of ACEs and toxic stress. Now, many of you have seen Dr. Burke Harris's TED Talk on this topic. Consider this the 201 version of that presentation. I know you'll find it as informative, as compelling, as I have.

Jennifer Ryan: As a reminder, this presentation qualifies for continuing medical education and maintenance of certification credits. Visit our website at acesaware.org for more information. And now, it is my pleasure to introduce to you, Dr. Nadine Burke Harris.

Dr. Nadine Burke Harris: Thank you so much, Jen. And thank you to all of you for joining us today for the Science of ACEs and Toxic Stress. The goal of this webinar is really to ground us all in the scientific foundations for ACE screening and assessment for risk of toxic stress in our patients. Just as a reminder, the 10 original criteria from the Kaiser CDC ACE study include these listed here: physical, emotional or sexual abuse, physical or emotional neglect or growing up in a household where parents experience mental illness is incarcerated, where there's parental separation or divorce, where there's intimate partner violence or parental substance dependence.

Dr. Nadine Burke Harris: One of the reasons why ACEs are so important, and why they're an important indicator in healthcare is because the ACE data tells us that the more of these a person has experienced, the greater their risk for serious

health conditions. And we now understand that the way that this happens is through a biological process called the toxic stress response. The toxic stress response, and here we're referencing the definition from the National Academies of Sciences, Engineering and Medicine, in their consensus report that was published in 2019. It refers to the prolonged activation of the biological stress response systems that can disrupt the development of brain architecture and other organ systems, and increase the risk of stress related disease and cognitive impairment well into adult years. When we talk about toxic stress, although colloquially, you'll hear a lot of people use toxic stress to refer to the stressor. What we know is that in the scientific definition of the toxic stress response really refers to the physiologic stress response; what the body does. And I'll talk more about that in a few minutes. We know that ACEs dramatically increase the risk that an individual will develop a toxic stress response. And, at the same time, we understand that ACEs are not the only risk factors for the development of the toxic stress response.

Dr. Nadine Burke Harris: That a circumstance, exposure, or condition with documented associations with increase of likelihood or susceptibility of development of the toxic stress response is how we would define a risk factor for toxic stress. And we recognize that there's strong evidence to show that other risk factors for toxic stress include poverty, exposure to discrimination, and exposure to the atrocities of war.

Dr. Nadine Burke Harris: One of the things that's really important, a key take home that I want to pull out here, is that ACEs are not the only risk factor for toxic stress. But the reason that we call them ACEs is because the data that tells us that an individual with four or more ACEs has double the risk for ischemic heart disease, or a child who has four or more ACEs has double the risk for asthma. That data is calculated using the traditional ACE criteria.

Dr. Nadine Burke Harris: And so, in order for us to be very precise and rigorous in comparing apples to apples, and oranges to oranges, it's important that when we say someone has an ACE score of four, that we're referring to very precisely to the data that gives us that information. And so, when we use the ACE terminology in the ACEs Aware initiative, we're referring specifically to the 10 ACE criteria. Those 10 criteria that were included in the ACE study.

Dr. Nadine Burke Harris: And then, for other risk factors for toxic stress, where we don't have the same odds ratios that have been determined in very, very large

population studies, yet. I know that some of this work is underway, but when we don't have that yet, we're referring, specifically, to what I call big A, big C, big E, the ACEs from which we have the data from the ACE study. And then, we refer to other risk factors, where we know that there's evidence of increased risk of developing the toxic stress response as risk factors for toxic stress.

Dr. Nadine Burke Harris: One of the pieces of data that we have that is incredibly important is some of the population data regarding the number of individuals exposed. And what we see is that almost two-thirds of adults in the US have experienced, at least, one ACE. 15.8%, nationally, have experienced four or more ACEs. This data comes from the most recent CDC data about the prevalence of adverse childhood experiences in the United States. And if you see in this national map here, we see that ACEs occur in every latitude, every longitude, every socio-economic and demographic group. ACEs occur at all income levels, which is way it's important to screen all children and adults for ACEs.

Dr. Nadine Burke Harris: But we also know that, particularly in the United States, individuals who are African American, Hispanic, or Latino, who are American Indian, or Alaskan native, these populations experience increased prevalence of ACEs. And then, we recognize that they may also experience increased risk of other risk factors for toxic stress, such as experiencing discrimination or poverty, because of the history of defacto and dujour segregation and discrimination in the United States.

Dr. Nadine Burke Harris: And so, it's very important for us to recognize that some of our populations we see the data on gay, lesbian, transgender, bisexual, queer communities also have an increased prevalence of ACEs. And then, also, may experience increased risk of toxic stress or reasons of discrimination, as well. But what we know from the original ACE data is that there's a dose response relationship between ACEs and some of the most serious, significant health conditions that are facing our communities today.

Dr. Nadine Burke Harris: In this slide, what we see are the 10 leading causes of death. This data is actually pulled from the 2017 CDC data, so it does not include COVID-19 as a cause of death, but we know that the CDC is in the process of updating their leading causes of death data. But for now, when we look at the 10 leading causes of death, what we see is that ACEs dramatically increases the risk for at least nine out of 10 of the leading causes of

death. With an odds ratio of two, so double the risk for heart disease. 2.3 times the risk of cancer. 2.6 times the risk of accidents or unintentional injury. Triple the risk of chronic lower respiratory disease. Double the risk of stroke. 11 times the risk of Alzheimer's. 1.4 times the risk of diabetes. 1.7 times the risk of kidney disease. And 37.5 times the risk of suicide attempts.

Dr. Nadine Burke Harris: We see for nine out of 10 of the leading cause of death profoundly increased risk of these health conditions. When we look at what that means. We see from that, that there's a profound healthcare cost. But in addition to the toll on people's wellness, and well-being, on their health, we also see a profound economic cost. Here, in California, when we look at the cost to the State of California from just eight associated health conditions, including asthma, arthritis, COPD, depression, smoking, cardiovascular disease, heavy drinking and obesity. We see the annual cost is $112.5 billion per year. That's $1.2 billion over 10... I'm sorry, $1. 2 trillion over 10 years. Huge economic impact.

Dr. Nadine Burke Harris: What we see is that, for child abuse and neglect, which is part of the ACE criteria, not looking at health transitions, but also looking at the impact on education, criminal justice, welfare, lifetime productivity, we see an additional $19.3 billion annually.

Dr. Nadine Burke Harris: What this tells us is that ACEs affect a lot of people. The impacts are profound in terms of health outcomes, mental health outcomes, overall well-being, and healthcare costs. ACEs and toxic stress represent a public health crisis. ACEs are a root cause for some of the most harmful, persistent, and expensive societal and health challenges facing our state and our world today.

Dr. Nadine Burke Harris: When we think about how do we approach tackling this? Well, when there's a healthcare challenge, and I will say for myself, as a complete science nerd, understanding the biology of adversity helps to give us the tools to know how we can support our patients and really take a smart both, healthcare approach, and public health approach, to addressing ACEs and toxic stress. Take a minute to dive into the biology of adversity. What we now understand, and what has emerged in the several decades since the original publication of the ACE study, is that we now understand in much more detail, better than we ever have before, some of the biological mechanisms that undergird this transformation, or this

progression from early adversity to disease and early death. We understand that the care environment mediates the biological stress response, and that pre-natal maternal stress, post-natal caregiver unavailability or absence, or depriving environments, or child abuse or neglect, can activate the biological stress response.

Dr. Nadine Burke Harris: And that activation includes changes to our genetics, our epigenetics. And what we see here is that, depending on someone's genetic endowment, so whatever their initial genetic code, what their epigenetics that they were born with, that influences their susceptibility or resilience to exposer to adversity. But high doses of adversity leads to epigenetic changes. It leads to reprogramming of the stress and immune regulatory systems. And it leads to neurodevelopmental disruption. And all of these, ultimately, lead to increased risk of cognitive deficits, disease, psychopathology, and social problems.

Dr. Nadine Burke Harris: Put another way, we see that early life adversity can be mitigated by protective factors, but it also is influenced by predisposing vulnerability. That can lead to neuroendocrine and immune disruption. And all of that is affected by epigenetic regulation, changes to the way our DNA is read and transcribed, as a result of exposure to high doses of adversity. And this is what leads to clinic implications, including endocrine, metabolic, reproductive, neurologic, psychiatric, behavioral, immune, inflammatory, and cardiovascular consequences.

Dr. Nadine Burke Harris: But one of the things that's very powerful and it's good to be reminded of is that the toxic stress response is actually at one end of the spectrum of what physiologic stress responses can be. We characterize the physiologic stress response in terms of the positive stress response, the tolerable stress response, or the toxic stress response.

Dr. Nadine Burke Harris: The positive stress response involves brief activations of our stress response, brief elevations in heart rate and blood pressure and hormonal levels. Homeostasis, the body's biological balance recovers quickly through our natural coping mechanism.

Dr. Nadine Burke Harris: The tolerable stress response occurs in reaction to a more severe or prolonged stressor. The tolerable stress response is a time limited activation of the stress response and results in short term systemic changes. Here is the key, so if there is a take-home point that I want to

highlight, it's this. Homeostasis recovers through the buffering effects of caring adults or other interventions. I'm going to say that again. Homeostasis recovers through the buffering effect of a caring adult or other intervention. If that care or intervention does not occur, that leads to the development of the toxic stress response, which is a prolonged long-term sustained change in the biological stress response, which increases the risk for stress related disease and cognitive impairment.

Dr. Nadine Burke Harris: When we look at all of the impacts of the toxic stress response, we're talking about dysregulation of our sympathetic nervous system, our fight or flight response, our stress response. Changes to the size and activity of the amygdala, that's our brain's fear response center. Inhibition of the prefrontal cortex, the part of the brain that's responsible for executive functioning. Toxicity in our hippocampus, which is the part of the brain that's responsible for learning and memory. And changes to the ventral tegmental area and the reward processing system, which is the area of the brain that substances of dependence act on. When you see these changes to the structure and function of the VTA and the reward processing center leads to increased risk of risky behaviors, increased risk of addiction. It's interesting that these risky behaviors not only increase the risk of later on health problems, for example, if someone ends up smoking as a result of their exposure to high doses of adversity.

Dr. Nadine Burke Harris: There's not only the impact on their lungs, but what we see is that it's actually the changes in their brain that lead to a greater likelihood of adopting high risk behaviors. What that means is that it's not enough just to tell our patients, just say no, or you should quit, but we actually have to address the fact that there may be changes to the reward center of their brain that increases the risk for adopting these high risk behaviors. Similarly, we see long-term changes to the immune system leading to increased inflammation and inhibition of anti-inflammatory pathways, changes to the gut microbiome. We see changes in our hormonal systems, including growth hormone, thyroid hormone, pubertal hormones. Changes in our metabolic hormones that regulate appetite and weight. We see sustained changes to the way that DNA is read and transcribed, so changes to our epigenetic regulation as well as changes in our telomere, so accelerated telomere erosion. When your telomeres are eroded too fast, they're the bumpers on the ends of our DNA. They protect our cells from wear and tear. If our telomeres erode at a more

accelerated rate, there's increased risk of diseases like diabetes and cancer.

Dr. Nadine Burke Harris: Now that we understand that biology, that gives us an opportunity to interrupt some of these biological processes. We're going to talk a little bit about how we do that.

Dr. Nadine Burke Harris: Now that we see and understand this neuroendocrine, immune, and genetic regulatory disruption that defines the toxic stress response, one of the things that it's important to understand is that these biological changes can actually be handed down directly from parent to offspring. A parent's ACEs leads to a toxic stress response for that parent, and that leads to changes in stress hormones, neuro-endocrine immune metabolic dysregulation in the parent. You can see changes in parent behavior, and it can also impact the social determinants of health by increasing the risk for things like poverty, et cetera.

Dr. Nadine Burke Harris: Then we look at how that biologically impacts parents. Can affect their ability to conceive, it can actually lead to changes in the stress response system, genes that are then handed down to the next generation. Then, of course, it can profoundly impact the parent's health, both physical health and mental health. That is why in the ACEs Aware initiative, our focus is on screening both children and adults for ACEs as a way of assessing their risk for toxic stress. Because if an adult is identified as being at high risk for toxic stress, we want to make sure that we are employing the stress mitigation strategies that have strong evidence for helping to regulate the stress response as a way of not only treating the adult, but also to do prevention for the next generation. This is two generation work. When we're talking about California's approach to addressing Adverse Childhood Experiences and toxic stress, we are taking both a clinical approach, but also a public health approach.

Dr. Nadine Burke Harris: Now that we understand the science of toxic stress, one of the exciting things is that we also have a lot of science about how to interrupt the toxic stress response. This is critical for helping us break the intergenerational cycle of ACEs and toxic stress and promote an intergenerational cycle of health. The number one thing that we know, and this was something that was a strong... A key standout point in the National Academies of Sciences Engineering and Medicine consensus report is that early intervention is key for improving brain immune

hormonal and genetic regulatory control of development. We know that treatment of toxic stress in adults may prevent transmission of the neuro-endocrine immune and metabolic and genetic regulatory disruptions in their offspring.

Dr. Nadine Burke Harris: Taking that two generation approach, we want to do screening, early detection and evidence-based intervention, not only in children, but also in adults, to both improve health outcomes and then also prevent the intergenerational transmission. Just as we would treat HIV in mom, if we have a pregnant patient, we put her on anti-retrovirals so that she does not transmit that HIV to her offspring. We've seen this profound decline in children born HIV positive. Similarly, identifying and treating adults allows us to be able to intervene against that vertical transmission of toxic stress. How do we do that? Well, it starts with screening.

Dr. Nadine Burke Harris: When we look at the screening algorithm, so the ACEs Aware Initiative convened a group of clinical experts, our clinical advisory committee, who really brought together all of the latest science and synthesized it into a clinical algorithm for assessment of ACEs and toxic stress.

Dr. Nadine Burke Harris: I want to start by highlighting that an ACE screen is not just the form that a patient fills out with the number of ACEs that they've experienced. In fact, a complete ACE screen involves a triad of the ACE score, the assessment of ACE-Associated Health Conditions, or clinical signs and symptoms of a toxic stress response, and as well, protective factors. These three factors is what constitutes a complete ACE screen. An ACE screen is not just the score alone.

Dr. Nadine Burke Harris: When we look at the ACE score, the way that the algorithm works and the way that we interpret it, is if the score is zero, we understand the patient is at low risk. Not no risk, because we know there are other risk factors for toxic stress as well, but we say low risk. For those, and this is for pediatrics, with an ACE score of one to three, we then go through that assessment of ACE-Associated Health Conditions. Those without ACE-Associated Health Conditions, in the pediatric patients, are considered to be at intermediate risk. For those patients, we want to provide education and anticipatory guidance on ACEs and toxic stress and buffering factors.

Dr. Nadine Burke Harris: If a patient does have... if a pediatric patient does have ACE-Associated Health Conditions, or if they have an ACE score of four or more, with or

without ACE-Associated Health Conditions, they're considered to be at high risk. The reason for that is that even though a child may have an ACE score of one or two, if they're demonstrating that they have asthma, for example, because we know that a child with four or more ACEs has doubled the risk for asthma, and we know that for every ACE a child has, there is a cumulative increased risk for asthma. We recognize that asthma as an ACE-Associated Health Condition would put that child in the high risk zone. The reason for that is because if a child is showing symptomatology, then it helps us to understand that if they are showing symptomatology, their body may already be experiencing the impacts of a toxic stress response or prolonged activation of the stress response. We have a lower threshold in children for considering a child to be high risk and intervening.

Dr. Nadine Burke Harris: With that intervention, we provide education about toxic stress, its likely role in the patient's health condition, and the importance of buffering. We assess for protective factors. If a child has any ACEs, we assess for protective factors and jointly formulate a treatment plan, including links to supportive services and interventions as appropriate. This is how we use the triad a way of assessing for risk of toxic stress. We categorize patients as being at low risk, intermediate risk or high risk of having a toxic stress physiology.

Dr. Nadine Burke Harris: I've talked about the ACE-Associated Health Conditions on the ACEs Aware website, you can download the list of ACE-Associated Health Conditions. This is for the pediatric health conditions. It also has the odds ratios based on an ACE score for more. For example, we can look and see that for individuals who have an ACE score of two or more, the odds of them having later menarche is 2.3. For an individual with an ACE score of four or more, the odds of them having school absenteeism is 7.2. These are all considered ACE-Associated Health Conditions. For an individual with an ACE score of four or more, the odds of them having a teen pregnancy is 4.2. Again, understanding these ACE-Associated Health Conditions, understanding that our patients who are at high risk for having a toxic stress physiology are at greater risk of having these health conditions.

Dr. Nadine Burke Harris: Then, in assessing for protective factors, we recognize that protective factors can be intrinsic factors, so some of these protective factors can be neurologic, endocrine, metabolic, immune, genetic or epigenetic factors.

What we recognize there is that someone's family history, someone's genetic endowment is going to be a protective factor for them. Other factors that are also protective factors that we can assess for are things like curiosity and learning, ability to pay attention, ability to regulate emotions, as well as extrinsic factors like buffering relationships, supportive environments, and community resources.

Dr. Nadine Burke Harris: Assessing for protective and buffering factors is the third part of the triad of ACE screening. It's really, it's critically important.

Dr. Nadine Burke Harris: I just walked through the pediatric algorithm for assessing risk of toxic stress. Similarly, there is an adult algorithm that you can find on the ACEs Aware website, and you'll notice that for adults, the algorithm is slightly different, which is that for adults if the score is zero to three, and then when we assess for associated health conditions they have no associated health conditions, that's considered low risk. For adults if they have a score of one to three and they do have associated health conditions, that's considered intermediate risk. And for those with a score of four or more, with or without associated health conditions, is considered high risk. And for those patients at intermediate and high risk, we again do the same thing that we do in pediatrics provide education about toxic stress, it's likely role in the patient's health condition and resilience, right? And we assess for those protective factors and we jointly follow up the treatment plan. And one of the key pieces is that we provide links to support services and treatment as appropriate.

Dr. Nadine Burke Harris: And you'll see here, we have the list of the ACE-Associated Health Conditions in adult ranging from cardiovascular disease, tachycardia, stroke, COPD, asthma, diabetes, obesity, cancer, all the way to sleep disturbance, depression, suicidal ideation, anxiety, substance use, alcohol use. So, you can see the odds ratios there for individuals who have an ACE score of four or more.

Dr. Nadine Burke Harris: So, when we think about our clinical response, so how do we take this information and put it together? Well, step one of a clinical response to ACEs and toxic stress, right, to identifying that a patient has experienced ACEs and is that intermediate or high risk of having a toxic stress response is to apply the principles of trauma-informed care, including establishing trust, safety and collaborative decision-making.

Dr. Nadine Burke Harris: Step two, and this was really the key part that primary care providers have an important role in doing and supporting is supplementing usual care for ACE-Associated Health Conditions, right? And whether that's asthma or chronic lung disease. Supplementing that usual care by providing patient education on toxic stress, right, and offering strategies to help regulate the stress response. And I'll walk through some of those evidence-based strategies in just a moment. It also includes, as I mentioned, validating existing strengths and protective factors because you want to build those into your treatment plan. One of the things that I've done in my clinical practice is to say, "Okay, here are the evidence-based strategies that help to regulate the amount of stress hormones that your body makes. How are you doing on these? On a scale of one to 10, how are you doing on exercise? How are you doing on mindfulness? Where are the places do you think should we make a plan to augment or supplement? And then at our next follow-up visit, I'll see how you're doing and see what is the progress against the health condition that we're trying to manage." Right? So, this is fairly simple and straightforward.

Dr. Nadine Burke Harris: Of course, referrals to patient resources and interventions, whether it's education materials, social work, school agencies, care coordination, patient navigation, community health workers, or mental health, if necessary, right? But I want to emphasize that not every patient who is at high risk of having a toxic stress response requires a mental health referral, right? So, that's really based on whether or not they have mental health symptomatology that requires a mental health referral. And then follow up as necessary, again, using that presenting ACE-Associated Health Condition as an indicator of treatment progress.

Dr. Nadine Burke Harris: So, when we look at the evidence for helping to regulate the biological stress response, we see that for example in children, MRI studies have found that institutionalized children who were randomized into high quality nurture and caregiving showed normalization of the developmental trajectory of the white matter structures of their brains, right? So, we know that safe, stable, and nurturing relationships can actually heal some of the neurodevelopmental consequences of toxic stress. Similarly, responsive caregiving improves cortisol reactivity in children, and things like time in nature reduce the activation of the sympathetic nervous system, that fight or flight system, and it increases

parasympathetic activity, right, that's our resting and digesting system that counteracts the fight or flight stress response.

Dr. Nadine Burke Harris: Things like meditation are associated with regulating the immune system with decreasing inflammatory mediators like interferon gamma and natural killer cell production of interleukin 10, as well as increased T-cell production of IL-4, which is an anti-inflammatory interleukin. Healthy sleep helps to reduce the infection risk and improves the vaccination response by improving the function of our immune system. And moderate exercise also helps to regulate our immune system and decreases infection risk. So, some of these evidence-based strategies that we know act directly on regulating the stress response, and we see this evidence by clinical evidence of decreasing stress hormones, decreasing inflammation, enhancing neuro-plasticity and improving neurologic function, right, are some of the strategies that we can use to intervene, to help a patient regulate their stress response and decrease their risk of ACE-Associated Health Conditions and stress-related disease and cognitive impairment.

Dr. Nadine Burke Harris: And so when we boil a lot of this literature down, we looked at tens of thousands, over 20,000 research articles. What we see is that sleep, exercise, nutrition, mindfulness, mental health interventions like psychology or seeing a therapist or a psychiatry, supportive relationships and experiencing nature all help to reduce stress hormones, reduce inflammation, enhance neuroplasticity, and regulate the biological stress response. And so these are the interventions that we can educate our patients and say, "Because of what you've experienced, your body may be releasing more stress hormones than it should. And these interventions can actually help to regulate your stress response."

Dr. Nadine Burke Harris: So, in addition to the X, Y, and Z usual care for the health condition, right? So in addition to the albuterol and the inhaled steroid, I'm going to also recommend these interventions to help to address the toxic stress component of your ACE-Associated Health Condition. And together, we're going to see how you're doing and see whether or not these things are helpful. And we're going to start by praising you for what you're already doing great. So, and helping you to notice what things help and what things make it more challenging.

Dr. Nadine Burke Harris: So, now we understand what this response looks like in clinic, what's the next step? Well, the first next step is taking the ACEs Aware provider training, where we have a lot more information on ACEs and toxic stress, trauma-informed care, best practices in the clinical setting. So, get trained. And if you're a Medicaid provider in California, please complete the attestation so that you can qualify for reimbursement, for screening for ACEs. And please join our ACEs Aware Clinician Directory so that your patients can find you, anyone who is looking to identify an ACEs Aware clinician, we have a clinician directory that's online to allow patients or folks who identify on ACEs Aware provider.

Dr. Nadine Burke Harris: And the next step is to join a trauma-informed network of care. Here in California we are establishing trauma-informed networks of care. We have resources that we've deployed in many counties throughout the state. And what we mean by a trauma-informed network of care, it's really starts with a recognition that when we're talking about addressing ACEs and toxic stress, there's no way, right, we're not going to solve it all in the exam room, that some of the interventions that we do are going to be in the healthcare provider's office and some of them are going to be in the community. And so a trauma-informed network of care is a group of interdisciplinary health, education, human service professionals, community members, and organizations. They support individuals and families by providing access to the evidence-based buffering resources and supports, and they help prevent, treat and heal the harmful consequences of toxic stress.

Dr. Nadine Burke Harris: So, who is in a trauma-informed network of care? Well, they include primary care providers, behavioral health providers, schools and educational professionals, early intervention services, social service programs, local County and government programs, community-based organizations, tribal organizations, our legal and justice system, a digital health and technology platform to connect and coordinate folks, and our provider networks and managed care plans are all essential components of a trauma-informed network of care. And for more information on trauma-informed networks of care, please check out our ACEs Aware website where we have our roadmap for creating and building a trauma-informed network of care that anyone can download and get that information. And one of the things that you'll see in the roadmap is how to work towards network of care milestones, and that include building and committing to cross-sector partnerships to establish a formal

leadership and accountability structure in order for us to make sure that patients have the opportunity to heal.

Dr. Nadine Burke Harris: We have to be clear about who's doing what and how they're accountable, right? And so building those structures as part of a network of care, understanding and documenting available resources, such as healthcare, community-based and social service resources, establishing referral and response workflows across sectors and holding each other accountable for follow-up, leveraging technology, as I mentioned, and evaluating, refining and improve the network of care activities, because we know we're not going to get it perfectly right out the gate, right? But committing to that continual improvement is so important.

Dr. Nadine Burke Harris: And then finally, we understand that while the network of care is essential, right, that no single sector or category of prevention is sufficient alone. And when we're taking a public health approach to addressing ACEs and toxic stress, it requires what we call primary, secondary and tertiary prevention. Primary prevention is preventing ACEs and toxic stress from happening in the first place. Secondary prevention is early detection. So, that is screening to enable early detection so that we can intervene earlier when we have a better opportunity to have better outcomes. And then tertiary prevention, which is evidence-based intervention for treatment, right? We need all three and we need primary, secondary, and tertiary prevention not just in the health care system, but in all of our systems. And that is really what a public health approach is about. And that's healthcare, public health, social services, early childhood, education, justice, all of the above, I would say housing, you name it, it should be part of a public health response to ACEs and toxic stress.

Dr. Nadine Burke Harris: Again, we wouldn't leave you without resources. So, a real roadmap to understand how we do that can be found in the California Surgeon General's report on adverse childhood experiences, toxic stress and health, called Roadmap for Resilience. It's available on the Office of the Surgeon General website and it really walks through, for each of the sectors that I mentioned previously, how we can do primary, secondary, and tertiary prevention of ACEs and toxic stress. And as we look at this public health approach, a key component for a public health approach is public awareness. It's step one. It's critically important. And that's why I'm very pleased to announce the public education campaign resources,

information for the general public to understand what are ACEs, what does an ACE score mean? What is the implication? Why would my provider even ask me about these questions? All of this is available at a new website, a new initiative called numbersstory.org. And that is to help folks understand the story of their number, right? Because we know that no two is the same as another two, no four is the same as another four.

Dr. Nadine Burke Harris: It's not so much about exactly what your number is. It's helpful to understanding your number, can be important to understanding your own story, but the powerful thing about the Number Story initiative is that it makes it clear that each individual has the opportunity to write their own story, to determine how their story is going to turn out and hopefully understanding how ACEs may be playing a role, ACEs and toxic stress may be affecting their story is critically important. And here in California, we have launched an initiative, at the same time these are partnership initiatives called Let's Make Our State of Care ACEs Aware, and that's really targeted at our health care providers, so that our health care providers can really be part of helping patients access information about ACEs and toxic stress, be a resource to their patients and get access to healing interventions. So we're very excited about the state of care initiative, because we want the state of care in California to be ACEs Aware, to be trauma informed and to be toxic stress responsive.

Dr. Nadine Burke Harris: Looking to the future, we are incredibly pleased that this work really serves as a foundation of a much larger effort here in California. Governor Newsom has proposed in the budget, $4 billion for a comprehensive child to young adult behavioral health initiative. That includes everything from public education, trauma informed care training for educators, increased school, mental and behavioral health providers, investments in our behavioral health workforce, investments in crisis and acute beds. So, really the whole spectrum from prevention and public awareness, to increased resources for those who need inpatient services.

Dr. Nadine Burke Harris: All of this is really about taking a public health approach to understanding how early adversity ACEs, toxic stress can ultimately lead to increased risk of health and mental and behavioral health conditions, and really taking a public health approach to prevention, early detection, and evidence-based intervention. So thank you so much for your time and attention, and I look forward to answering any questions.

Jennifer Ryan: Thank you so much, Dr. Burke Harris for that informative presentation. We have just a bit of time for questions before we close. First, not surprisingly, I need to ask you about the COVID-19 pandemic. As we know, the data is starting to reveal the far reaching impact that the pandemic has had on our physical and mental health as a nation. What are your thoughts about how we can best address this together?

Dr. Nadine Burke Harris: That's a great question, and it's something that I talk about quite a bit in the Surgeon General's report, Roadmap for Resilience report. Because one of the things that we recognize is that the pandemic has not only been a huge stressor, but it's also cut us off from those sources of buffering caregiving relationships that we know are the difference between the tolerable stress response and the toxic stress response. So we can anticipate this looking at the biology that there's a likelihood of significantly increased prevalence of that prolonged activation of the physiologic stress response, right?

Dr. Nadine Burke Harris: The toxic stress response. And what that means is that it really requires a public health approach to addressing these challenges and to healing from the pandemic. So, that public health approach ... again, I talk about it a lot in the Roadmap for Resilience report, but it requires self-care for educators, right? One of the things that is critically important in order for any of us to do this work, to be responsive to ACEs and toxic stress and the stress of the pandemic, we have to be practicing the self-care, right? We need these tools for self-care, and that's why training on vicarious trauma, secondary traumatization, and really how to prepare yourself to be able to do this work and to do this healing work is really important.

Dr. Nadine Burke Harris: How we can practice those self-care strategies, I think is critically important. And then we really need to be looking across every sector and thinking about how do we work together to address some of these challenges and really take this public health approach? Because, the scale of the challenge particularly coming out of the pandemic is enormous. And so if we think that we're going to do this in this very fragmented system, I think it's clear that that just doesn't make sense anymore. SO I think we have truly an unprecedented opportunity now. Coming out of the pandemic, I think there's no one who doesn't recognize how important it is for us to address the impact of stress on our physical and mental health.

Dr. Nadine Burke Harris: So I see the pandemic and this moment as we're emerging from the pandemic as a tremendous opportunity for healing and particularly at the policy level. So I will say that, but it's a time for us to really hold our elected officials to account, to implementing some truly healing and restorative policies.

Jennifer Ryan: Last question. Dr. Burke Harris the events of the past year have brought issues around health equity to even sharper focus, some people are saying that exposure to racism and discrimination, should be considered ACEs. What are your thoughts on this?

Dr. Nadine Burke Harris: Yeah, I think that's a great question. When people say that, I typically respond by asking, "What do you mean by that? And why do you think it should be considered an ACE?" Right? Because when we look at the data and we look at, for example, when we look at the global meta-analysis that was published looking at ACEs and health outcomes from more than 17 different countries around the world. One of the things I want to say is that, in order to be able to implement an initiative at a government level, like ACEs Aware, we have to base our information on these very, very large studies that can stand up to very high levels of scientific scrutiny, right?

Dr. Nadine Burke Harris: The strength of the evidence that we have, provides the foundation for us to be able to implement policy and spend public dollars on these initiatives. So for that reason, when we say exposure to racism should be included as an ACE, I think what people are intending is that, it should be identified as a risk factor for toxic stress. Because that's what we're trying to treat, right? Because it wasn't originally included as one of the ACE criteria, then we simply just don't have the information about the relative risk of ischemic heart disease or Alzheimer's or anything else.

Dr. Nadine Burke Harris: And so we can't impute those odds ratios to the impact of racism, because, we simply don't have that same information. But, I think the point is, when I hear that should exposure to racism be treated like an ACE? And my answer to that is yes, because they're the same thing. And this is what I mean by that. ACEs are risk factors for toxic stress, and we already know that exposure to discrimination is also a risk factor for toxic stress. So we can see from the data, that exposure to discrimination, increases the risk for neuro-endocrine immune and genetic regulatory disruption. We see that right?

Dr. Nadine Burke Harris: So, I think typically that when people say, "Oh, well, isn't discrimination and ACE?" I think what they mean is, shouldn't it receive the same treatment? And my answer to that is absolutely, because we know that it a risk factor for toxic stress and toxic stress is what we're trying to treat. We're not treating the ACEs, they happened in the past. We are treating the toxic stress physiology. And this is one of the things that we had a series on this as part of our webinars, as part of ACEs Aware is understanding exposure to racism and discrimination as a risk factor for toxic stress.

Dr. Nadine Burke Harris: Because of the same interventions to regulate the toxic stress response that we apply for individuals who are found to be at high risk for toxic stress based on their ACE screen, right? Their ACE score, their symptomatology and their protective factors, those are the same interventions that we want to apply when addressing racism as a risk factor for toxic stress. So we want to make sure that individuals have safe, stable and nurturing relationships and environments, right? That's key. And addressing racism, is a fundamental part of ensuring that everyone has access to safe, stable, nurturing relationships and environments.

Dr. Nadine Burke Harris: We want to make sure that folks have safe places to play. And so the disinvestments that we have seen in certain communities because of histories of red lining, because of histories of discriminatory practices, right? Addressing those factors to ensure that there's adequate green space, that there's investment in community factors for resilience building, all of these are part of treating and addressing toxic stress, which is key. But it doesn't mean that racism is an ACE, it just means that it's similar to ACEs, it is a risk factor for toxicity,

Jennifer Ryan: That concludes our presentation for today. Thank you so much for taking the time to join us and learn about these important issues. As a reminder, you can download the recording of this session on our website at acesaware.org, and you can also submit certification for MOC and CME credits. Have a good rest of your day. Thank you.