

Overview of Accomplishments 2023



Childhood Cancer & *the* Environment

A project to educate and activate health professionals to address environmental influences on childhood cancer



wspehsu.ucsf.edu

Dear Colleagues

There may be nothing more traumatic for a parent than to be told that his or her child has cancer. As a pediatrician for more than 40 years, I know that this heartbreaking diagnosis is only the beginning of a multi-year struggle for survival that can lead to many questions including, “Why did this happen to my child?”

As health care providers, we need to be able to hear and respond to family’s concerns about the potential causes of children’s cancers, including risks from environmental exposures. As brain cancer survivor and the inspiration for “Trevor’s Law,” Trevor Schaefer, so eloquently says, “We strive to envision a world in which children no longer suffer from preventable childhood cancers that are related to the air they breathe, the food they eat, the water they drink and the dirt they play in.” As scientists, we know it isn’t that simple, but we’re proud to say that this project is a start.

The following is a very brief overview of how much we’ve been able to accomplish in just one year on our project **Childhood Cancer & the Environment**. We look forward to our next year’s work.

Mark Miller, MD MPH, Project lead

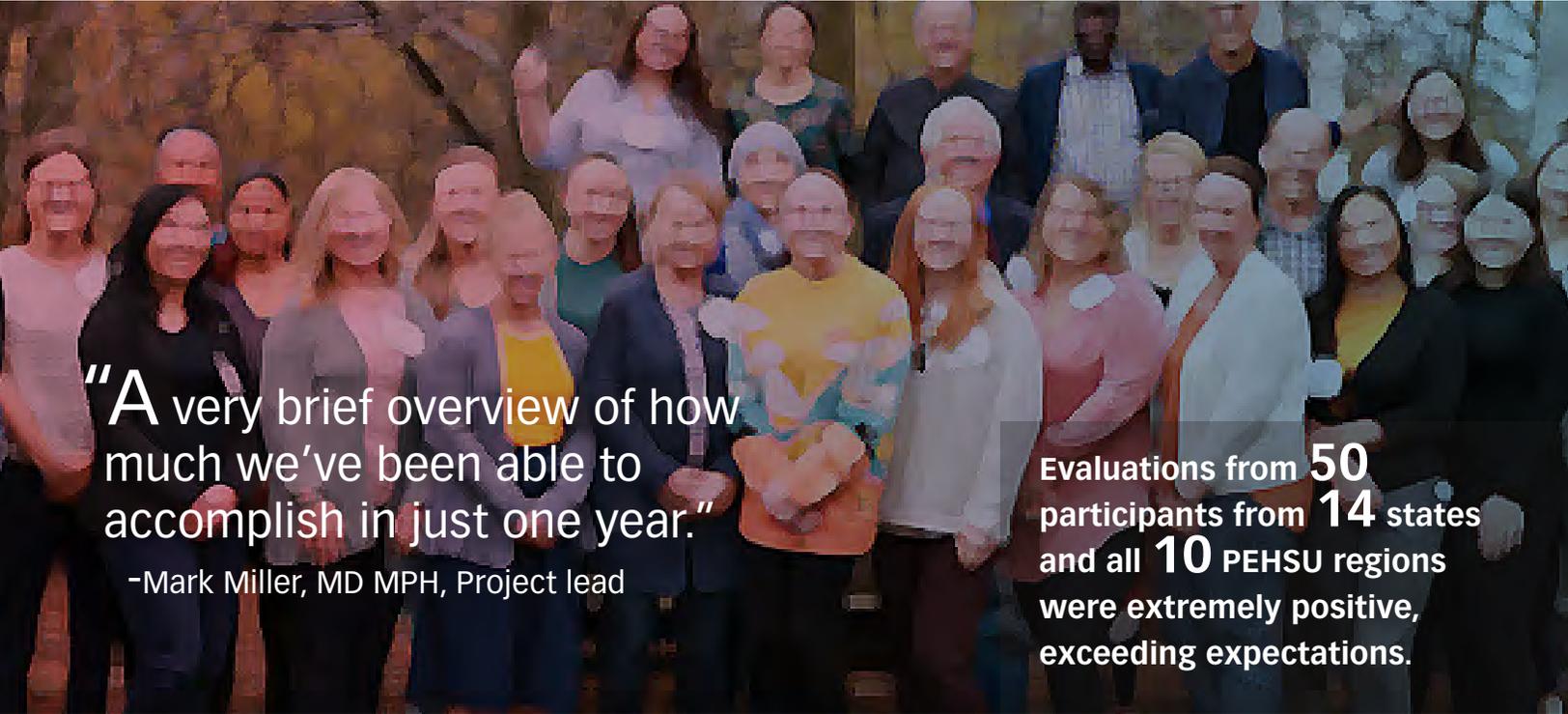


“I’m thrilled to know this project is happening. I know exactly how much it will help many families... Exhausted patients and caregivers rely on our doctors, nurses, child life specialists – and more – to guide us through this unique hell.”

“**W**hen our daughter was diagnosed with Wilms’ Tumor, a kidney cancer, I wanted to know why,” said journalist Alexandra Zissou. “Could there be an environmental link? Our beloved oncologist’s work is to cure, not to sleuth. But, as an environmental health journalist, it didn’t sit well with me there was no one on staff at our hospital – one of the top cancer facilities in the country – who asked questions about home environment at intake, or gave us any specific environmental advice during or after active treatment. I was left to do my own research.”

– Alexandra Zissou, Writer, Editor,
Environmental Health Advocate.

On the cover: Illustration from *A Story of Health, Childhood Cancer: Stephen’s Story* by Dan Higgins, Visual Information Specialist, Centers for Disease’ Control and Prevention



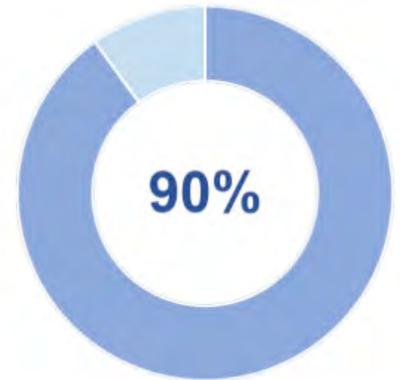
"A very brief overview of how much we've been able to accomplish in just one year."

-Mark Miller, MD MPH, Project lead

Evaluations from **50** participants from **14** states and all **10** PEHSU regions were extremely positive, exceeding expectations.

A short review of the project

The PEHSU Network, led by the Western States PEHSU (WSPEHSU) and in collaboration with the American Academy of Pediatrics (AAP) conducted a groundbreaking education and training project "Childhood Cancer & the Environment" in 2022-2023. Evaluations from 50 participants from 14 states and all ten PEHSU regions were extremely positive, exceeding expectations. Over 90% of in-person workshop participants of pediatric oncology clinicians reporting they were successful for them, with over 70% saying they will use the information they learned to counsel patients and their families. The project was so effective that a second year of work is already beginning to take shape. The project was designed to increase environmental health literacy among two groups: 1) regional PEHSU staff to develop "champions" on this issue, and; 2) pediatric oncology fellows and nurse practitioners, most of whom have had little training in environmental health and children's cancers.



Over 90% of in-person workshop participants of pediatric oncology clinicians reported workshops were successful for them.

Western States Pediatric Environmental Health Specialty Unit (WSPEHSU)

Five virtual trainings for champions led by experts were conducted during the year. 100% of the ten attending said the quality was good to excellent with 90% agreeing the trainings improved their skills to provide support to pediatricians and the public on environmental influences on childhood cancer and provide risk reduction guidance to families, a major goal of the project. Champions have already given presentations at major clinical conferences expanding the project reach.

Ninety percent of the 40 participants at the two in-person workshops for pediatric oncology clinicians said the trainings were a valuable use of their time, increased their professional abilities, and were successful in many other ways. They reported a near doubling of confidence in their skills to educate others about environmental exposures and childhood cancer, increased knowledge in the role of PEHSUs in children's environmental health, and a greater understanding of CDC guidelines to investigate unusual patterns of cancer and environmental exposures.

More details

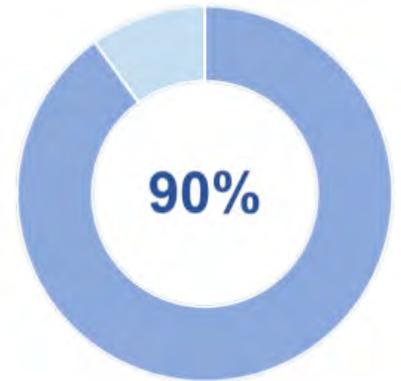
Expanded goals for the regional PEHSUs were to:

- ▶ Increase capacity at each PEHSU to provide support to pediatricians and the public nationwide on environmental and other influences on childhood cancer and provide appropriate risk reduction guidance to families concerned about potential exposures.
- ▶ Understand the approaches taken to identify cancer clusters and respond thoughtfully to community concerns about a potential cluster.

Expanded goals for the pediatric oncology providers:

- ▶ Create a vanguard group of pediatric oncology providers (primarily fellows and nurse practitioners) with an improved awareness and understanding about environmental health contributors to children's cancer.
- ▶ Increase efficacy amongst providers to provide information to families about environmental concerns, to respond adequately to their questions, and have a ready set of identified resources to aid them in this process.

100%
POSITIVE
review



90% of PEHSU
champions attending
the virtual trainings
agreed the trainings
improved their skills.

Why do we need to educate about environmental influences on childhood cancer?

There is a growing body of literature that has implicated the role of several environmental hazards in childhood leukemia (the most common childhood cancers), including exposures to solvents, traffic air pollution, pesticides, and tobacco smoke. There are emerging connections to other cancers as well, including childhood brain cancer. **Despite the strength of these findings, clinician knowledge about this is limited.**

- ▶ A survey of pediatric oncology providers found that **while 88%** reported getting questions from families about environmental exposures, few were comfortable discussing these in relationship to disease.
- ▶ **Over 90%** said that more information on this topic would be helpful in addressing these issues with patients.

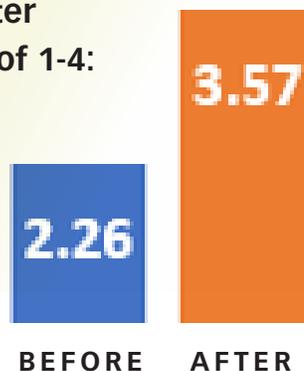


With additional knowledge, pediatric healthcare providers could make a positive impact on patients’ health by providing counseling to them on protective personal actions. For example:

- ▶ Recommending they avoid some common household toxicants, such as pesticides, to lower a child’s risk for leukemia.
- ▶ Advising they take vitamins containing folic acid and eat a diet high in folate in the period before or during pregnancy to protect against development of childhood leukemia.
- ▶ Informing families in survivorship clinics about the increased risk for respiratory illness from air pollution exposure in children who have undergone chemotherapy so that they can make protective choices when air quality is poor.

EXAMPLE: Knowledge before and after the in-person workshops. On a scale of 1-4:

Potential contribution of air pollution to childhood brain tumors and leukemia



“The most useful information was the eye opening scientific data supporting how huge this topic should be in our communities, cities, nationally and unfortunately how little is being done to make it be recognized. This really hit home for me, having a young child of my own and now wanting to make sure I try to do everything in my power to minimize these risks. More importantly not just for my family but for the families I take care of professionally.”

– Workshop participant

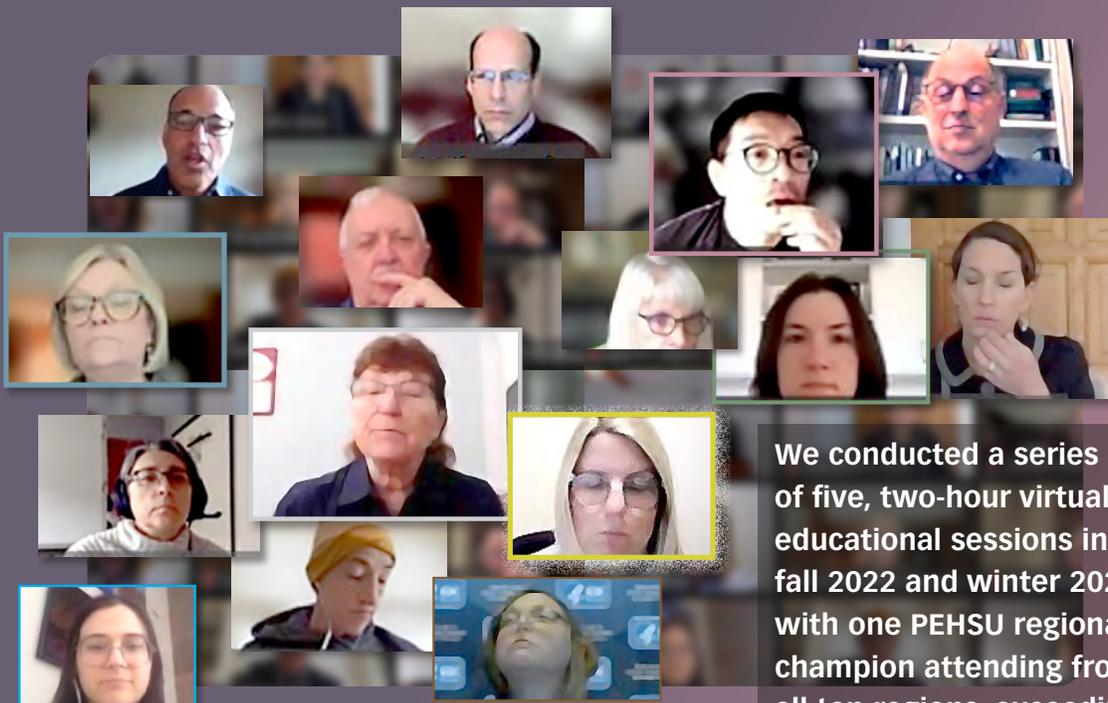
Specific activities

We conducted three main activities during this project:

1 One orientation and five virtual education sessions with PEHSU “Champions” in Fall, 2022 and Spring, 2023

We conducted a series of five, two-hour virtual, educational sessions in fall 2022 and winter 2023 with one PEHSU regional champion attending from all ten regions, exceeding our expectations (we expected five regions to be represented). Key researchers and experts in the field addressed potential environmental influences on childhood leukemia, brain, testicular, and other cancers, and unusual patterns of cancer. They also covered risk communication related to childhood cancer and the environment. PEHSU faculty Champions included nurse practitioners (including one who works in pediatric oncology), pediatricians (including one pediatric oncologist), and a physician’s assistant.

The sessions solicited ideas from participants, who responded enthusiastically, on activities and materials that could help them guide clinicians to provide anticipatory guidance to patients as well as how they might act as advocates for prevention.



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PEHSU Champions (by Region)



Experts included Drs. Catherine Metayer and Joe Wiemels from the University of California, Berkeley Center for Integrative Research on Childhood Leukemia and the Environment (CIRCLE) and Drs. Mark Miller and Victoria Leonard from CIRCLE and the WSPEHSU. Dr. Brian Linde, a practicing pediatric hospitalist and communications mentor, provided communications strategies, and patient advocate, Alexandra Zissu, talked about her experience as the mother of a child with cancer. Suzanne Condon from the Agency for Toxic Substances and Disease Registry (ATSDR) and Stephanie Foster from the National Center for Environmental Health (NCEH) addressed investigating unusual patterns of cancer.

Case studies were brought forward by PEHSU champions and discussed by the group in most sessions. At the conclusion of the five sessions, champions were asked to participate in developing a set of enduring materials that could also be used at in-person workshops for pediatric oncology providers that would follow.

PEHSU Champions by Region

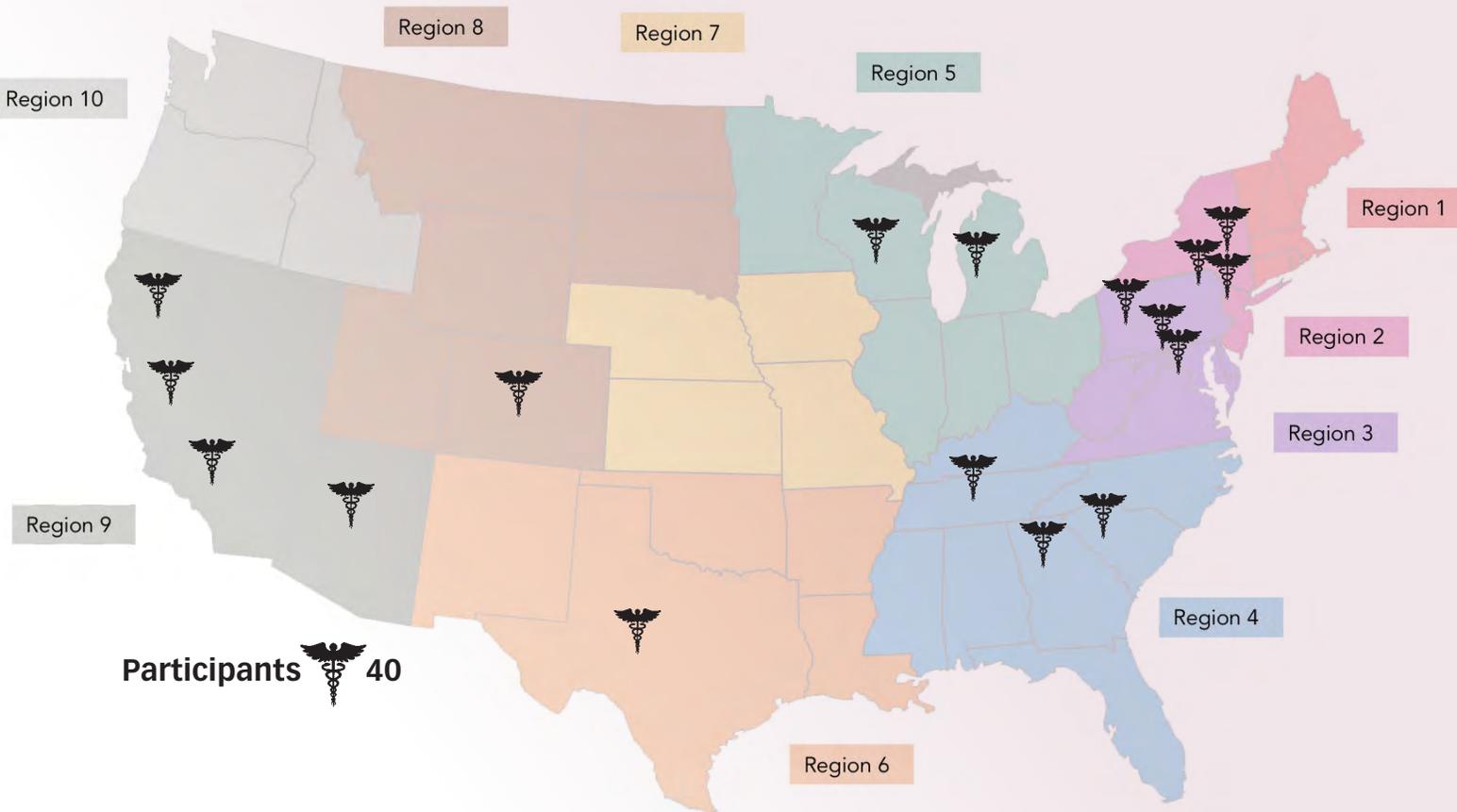
- 1) Alan Woolf, MD, MPH, FAAP
Boston Children's Hospital, MA
- 2) Perry Sheffield, MD, MPH, FAAP
Icahn School of Medicine at Mount Sinai, NY
- 3) Laura Anderko, PhD, RN
Villanova University, PA
- 4) Jinbing Bai, PhD, RN, FAAN
Emory University, Atlanta, GA
- 5) Emily Moody, MD, FAAP
Fairview M Health, Eagan, MN
- 6) Erica Guerrero, MS, MPAS, PA-C
Texas Tech Health Sciences Center
El Paso, TX
- 7) Nikki Wood, DO, FAAP
Children's Mercy, Kansas City, KS
- 8) Laurie Halmo, MD
Children's Hospital of Colorado, CO
- 9) Vickie Leonard, NP
Western States PEHSU,
San Francisco, CA
- 10) Mary Kate Cardon, DNP, APRN, CPNP-PC
University of Washington/Northwest
PEHSU, Seattle, WA

2 In person workshops with pediatric oncology fellows and nurse practitioners

We recruited participants nationwide through a variety of outreach techniques including social media. We required those interested to complete a survey to help us select the best candidates. The responses again exceeded our expectations considering that pediatric oncology is a very small fraction of health care providers.

We selected 40 participants from 14 states in all regions of the country from major cancer institutions including Memorial Sloan Kettering Cancer Center, St. Jude's Children's Research Hospital, Stanford University, MD Anderson Cancer Center, Childrens Hospital of Michigan, Children's Hospital Los Angeles, Children's Healthcare of Atlanta and others.

Workshop participants



“My experience in the trainings has made me feel far more prepared to answer consults received related to childhood cancer, particularly the communication aspect of our learning. I also gained really valuable information about all of the organizations doing related work that I can tap into in future work.”

PEHSU Champion

—Alan Woolf, MD, MPH, Director



We then conducted two day-long, in-person workshops in the spring of 2023 on April 14-16 and May 15-17 on environmental influences on childhood cancers for pediatric oncology fellows and nurse practitioners. Total participation was 40 not including speakers and PEHSU Champions, several of whom attended each session.

They were both held at the Wingspread Retreat and Executive Conference Center, Racine, Wisconsin, an award-winning conference center located along the western shores of Lake Michigan. The secluded and serene location provided a safe, inviting, and sustainably designed meeting environment for the free and open exchange of ideas during the one-and-a-half days of the training.

The workshops agendas and content were informed by PEHSU champion virtual meetings as well as expert consultants.

“Such an inspirational weekend with dynamic young health care providers in a lovely setting! All of us are aware of how much time and effort it takes to organize such events, and the hiccups that can occur. None of these happened here, and the agenda, the faculty and oncology trainees and Wingspread performed flawlessly!”

– Alan Woolf, MD, MPH
Director, Region 1
New England PEHSU



Topics covered included a general introduction to environmental health, an extensive review of the science on potential environmental influences on childhood cancer, information on investigating unusual patterns of cancer (cancer clusters), cancer and environmental equity, and communications strategies. Also included were sessions on taking an environmental history and review of various exposures associated with childhood cancer risk and ways to reduce exposure.

Additional faculty at the in-person workshops included Victoria Leonard of the WSPEHSU and Nse Witherspoon, executive director of the Children’s Environmental Health Network, who provided insights about environmental equity and children’s cancer.

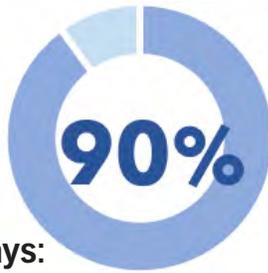


Evaluations

Feedback from participants was extremely positive. Evaluations conducted just after the workshop included the following:

Highlights

90% of workshop attendees (n =40) agreed that the workshop was successful in the following ways:



- ▶ The workshop was a valuable use of my time.
- ▶ The information gained from the meeting will increase my ability to function in my professional role.
- ▶ Workshop materials were thoughtfully developed, effectively delivered and scientifically sound.
- ▶ The workshop provided time to discuss topics in breakout sessions.
- ▶ The environment fostered reflection on how to integrate the material into practice.



“This was a wonderful workshop. I learned a great deal in just a short amount of time, and I am looking forward to sharing my experiences with my team and families at my hospital. I hope to pass along this information and be a stronger advocate for patients, their families, and humanity in general.”

– Workshop Attendee

The average knowledge about each topic area significantly increased from before the workshop to after. (on a scale of 1-4).

before after

1.62 3.60

“I understand the role of PEHSUs in children’s environmental health.”



1.69 3.26

“I know about windows of susceptibility to environmental influences in childhood.”



2.05 3.62

“I know about the role of timing in genetic and epigenetic mutations in childhood leukemia.”

Highlights, continued:



OVER
70%

of attendees said they will use the information to counsel patients and their families.

OVER
60%

said this information should be included in training for medical professionals/ continuing education

95%

said they think there is a need for future collaboration among attendees of the workshop regarding environmental exposures and childhood leukemia.

Workshop attendees' comments

“I will start taking better environmental histories of families when they come in for consult and begin discussing environmental exposure risk with families and ways that they can mitigate future risk.”

“I think because this topic was already foreign to me, the workshop did a great job of covering multiple areas of deficiencies in my clinical practice with regards to knowledge gap in environmental risk factors and childhood cancer.”

“Thank you for the opportunity to attend. It was a wonderfully organized conference with relevant material and the setting was perfect for these types of discussions.”

Get the facts about childhood cancer

Exposure to environmental hazards like these has been associated with an increased risk of developing certain childhood cancers.



Radiation
Decrease unnecessary radiation exposure.

- Ask your child's healthcare provider about the risks and benefits of recommended medical imaging (X-ray, CT scan).
- Radon is an odorless, invisible radioactive gas naturally released from rocks, soil and water. It can get into homes and buildings through small cracks or holes in the foundation and collect indoors. Radon is the second leading cause of lung cancer in the U.S.

Air pollution
Decrease outdoor air pollutant exposure.

- Check the [Air Quality Index \(AQI\)](#) and limit outdoor activity when air quality is poor.
- Avoid contributing to poor air quality by limiting wood fires and backyard burning.
- Reduce pollution from vehicles by carpooling, using public transport, biking, or walking when possible.

Decrease indoor air pollutant exposure.

- Limit sources of indoor air pollution (i.e., smoke, cleaning products, air fresheners, candles, dust).
- Ventilate open windows, turn on exhaust fans when cooking and filter (HEPA filters, air purifiers) indoor air.
- Check the EPA [Care for Your Air](#) website for tips on improving indoor air quality.

Childhood cancer factsheet



Childhood Cancer & the Environment

A project to educate and activate health professionals to address environmental influences on childhood cancer

References from *A Story of Health: Childhood Cancer eBook and CE course**
Update due for release August 2023

References and Resources for Childhood Cancer by Topic
Note: there are many topic overlaps.

Birth Characteristics as Risk Factor for Childhood Cancer
Milne F, et al. Fetal growth and childhood acute lymphoblastic leukemia: findings from the Childhood Leukemia International Consortium (CLIC). *Int J Cancer*. 2013 Dec 15;133(12):2968-79.

Brain Tumors
Fisher PG, Reynolds B, Van Behren J, Carmichael SL, Rasmussen SA, Skow CM. Cancer in children with monochromosomal birth defects. *Pediatr*. 2012 Jun;129(6):978-83.

Cancer Clusters, Unusual Patterns of Cancer
Aborg. *Unusual Patterns of Cancer*. [DOI:10.1136](#)

Chemical Exposures and Childhood Cancer - Specific Pollutants:
Air Pollution
Boothe VL, Boehmer TK, Wendt AM, Yip FY. Residential traffic exposure and childhood leukemia: a systematic review and meta-analysis. *Am J Prev Med* 2014;49(4):413-422.

Caesarian Section as Risk Factor for Leukemia
Marcellin H, et al. Caesarian delivery and risk of childhood leukemia: a pooled analysis from the Childhood Leukemia International Consortium (CLIC). *Lancet Haematol*. 2016 Apr;3(4):e176-85.

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Childhood Cancer and the Environment
A project to raise awareness of environmental influences on childhood cancer

PEHSU
Pediatric Environmental Health Specialty Units

*A Story of Health multimedia eBook explores how our environments interact with our genes to influence health across the lifespan. CE credits for health professionals are offered by the CDC.

Get the facts about childhood cancer



Minimizing children's exposure to environmental hazards can lower risk for childhood cancer and other diseases.

Childhood Cancer & the Environment

A project to raise awareness of environmental influences on childhood cancer

PEHSU
Pediatric Environmental Health Specialty Units

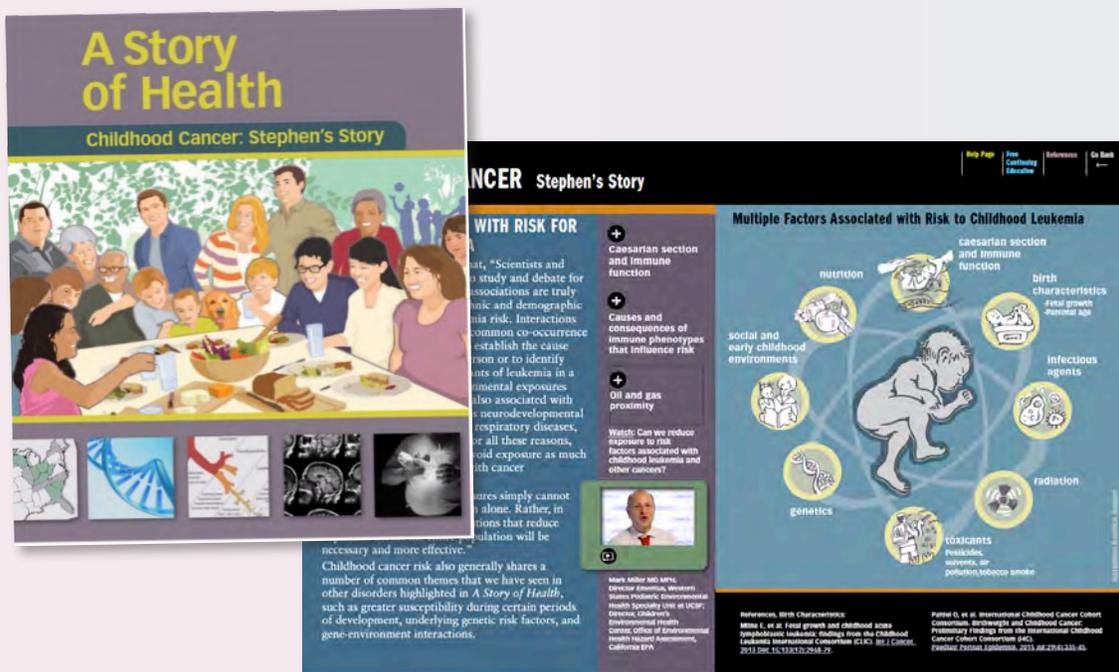
Childhood cancer and the environment resource guide

Resource materials

3 Develop resource materials on childhood cancer and the environment, including a fact sheet, a resource list and a presentation with speaker notes for clinicians.

These were informed by virtual session participants, expert advisors and WSPEHSU staff for use by PEHSU champions as well as trainees from the two in-person sessions and other clinicians.

- ▶ The resource guide is a compilation of scientific resources.
- ▶ The fact sheet is a reference for clinicians as well as a handout for patients
- ▶ The slide presentation is designed to be a 30 minute or hour lecture and is annotated with speaker notes so that it can be adapted and presented at meetings such as grand rounds, conferences or professional association meetings.



A Story of Health, Childhood Cancer: Stephen's Story ebook chapter

Additionally, the WSPEHSU updated significantly the current version of [A Story of Health eBook](#) and CE course on childhood cancer (Stephen's story). The revision expanded from childhood leukemia to include information on cancers other than childhood leukemia such as brain cancer and Wilms tumor and includes a significant amount of new information on environmental influences on childhood cancers.

- ▶ Nearly 25,000 registrations - *A Story of Health* CE courses hosted by ATDSR/CDC have been among the most popular since they were launched in a collaborative project with ATSDR/CDC in 2015, with nearly 25,000 registrations to date.
- ▶ CE increases during the workshops - The Childhood Cancer, (formerly Leukemia), chapter saw a dramatic improvement in CE registrations during the time we conducted the first Childhood Cancer workshop in April, 2023, tripling from 110 to 313 during that quarter, representing a total of 287 CE hours granted.
- ▶ Nurses are major CE takers - It's notable that an overwhelming majority of registrants for all the six environmental health-oriented courses on cancer as well as asthma, developmental disabilities, infertility/reproductive health, cognitive decline and health effects of wildfires have been nurses. This should be a flag to us that we need to capitalize on the nurse/nurse practitioners who seem more interested in environmental health issues, as well as we need to more aggressively outreach to physicians.

- ▶ Increase from 1.75 to 3.75 CME credits - We spent considerable time updating and adding to the leukemia chapter to update the science as well as include other cancers, and we're pleased to report that the new Childhood Cancer chapter has been awarded 3.75 hours CME credits for physicians and a concomitant amount for five other health care provider specialties including nurses, health educators and public health professionals. This increase recognizes the wealth of information included in the new, free CE course.

Examples of follow-up activities by PEHSU Champions

In the months following the workshops PEHSU Champions conducted presentations based on what they had learned during the educational sessions. These included:

- ▶ **Perry Sheffield, MD, MPH** presented "How Physicians Can Advocate for Patients Who Have Concerns About Environmental Exposures" at a conference titled "Cancer and the Environment" sponsored by several NYC area cancer centers including Columbia Herbert Irving Comprehensive Cancer Center and the Weill Cornell Sandra and Edward Myer Cancer Center that had about 400 attendees in person and online from around the country.
- ▶ **Nikki Wood DO** presented a webinar "Childhood Cancer and the Environment" sponsored by the Iowa Cancer Consortium, a statewide organization, where she shared information on environmental causes of pediatric cancers and tools clinicians can use to learn to better communicate with families regarding environmental exposures and risk reduction strategies.

Next steps

Due to the success of this first year of the project, second year planning is underway to include wider and tailored outreach including through community health workers, a goal to recruit a major cancer center to conduct in-depth training and develop a childhood cancer and the environment consulting service in conjunction with the regional PEHSU, and other educational activities.

For more information, visit the [WSPEHSU website on Childhood Cancer](#).



Childhood Cancer & the Environment

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This project Children's Cancer & the Environment was supported by cooperative agreement *FAIN: NU61TS000296* from the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry (CDC/ATSDR). The U.S. Environmental Protection Agency (EPA) provided support through Inter-Agency Agreement DW-75-95877701 with CDC/ATSDR. The American Academy of Pediatrics supports the Pediatric Environmental Health Specialty Units as the National Program Office. The findings and conclusions presented have not been formally disseminated by CDC/ATSDR or EPA and should not be construed to represent any agency determination or policy. Use of trade names that may be mentioned is for identification only and does not imply endorsement by the CDC/ATSDR or EPA.