Webinars
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Case Conferences
Journal Clubs
Grand Rounds
CE Available

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Evidence-based online courses on a variety of children's environmental health topics.
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Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals
Topics included:
Air Quality, Pesticides, Natural Disasters, BPA, Mold, Lead, Mercury
Prioritizing Toxic Chemicals in Children’s Consumer Products

Elaine Faustman and Marissa Smith
Center for Child Environmental Health Risks Research
Department of Environmental and Occupational Health Sciences, University of Washington
Learning Objectives

• Summarize the regulation of chemicals in consumer products in Washington State
• Identify the benefits and shortcomings of Washington’s approach
• Summarize the Children’s Safe Product Act and identify the types of data required to be reported
• Discuss the toxicity and exposure related concerns relevant to prioritizing chemicals in consumer products
• Assess the Toxic Substances Control Act Reform’s impact on children’s consumer product regulation
~85,000 chemicals found in consumer products sold or manufactured in the US (EPA)

- Small fraction evaluated for risks to human health
- Associated with increased risk of:
  - cancer
  - neurodevelopmental delays
  - obesity
  - infertility and other reproductive health problems

Children vulnerable to exposures because they interact with products in unique ways and have developing organ systems
~5-20% of neurobehavioral disorders attributable to environmental chemical exposures

$9.2 billion = US annual cost for environmentally attributable neurobehavioral disorders

Total costs were equivalent to 2.8% of United States healthcare spending

Reducing exposure can prevent disease!

Landrigan et al. 2002
Toxic Chemicals Found in Consumer Products

- Formaldehyde - Carcinogen
- Styrene - Carcinogen, neurotoxicant
- Phthalates - Endocrine Disruptors, Reproductive and Developmental Toxicants
- Toxic Metals - Carcinogens, neurotoxicants
- Parabens - Endocrine Disruptors
The Consumer Product Safety Improvement Act of 2008

- **Lead**
  - Not permitted in children’s products in concentrations greater than 100 ppm for total lead and 90 ppm for surface coatings.

- **Diethyl hexyl phthalate, dibutyl phthalate and butyl benzyl phthalates:**
  - Concentrations restricted to no more than 1000 ppm per individual phthalate in children’s toys and product designed to care for children under age three.

- **Diisononyl phthalate, diisodecyl phthalate and di-n-octyl phthalates:**
  - Restricted in concentrations greater than 1000 ppm per individual phthalate in children’s toys that can be placed in a child’s mouth and in products designed for care of children under age three.
Regulations in Washington

- Total phthalates- no greater than 1000ppm
- Eliminates some problems with regrettable substitutions
- Shared toxic impacts- especially on the reproductive system
- A 30 pound crib mattress can contain up to ½ ounce of phthalates combined (up to 3 oz by federal limits)
- Federal law preempts state regulations for some children’s products, but not all
- Cadmium- no greater than 40ppm
Purchased 159 items of inexpensive all-metal children’s jewelry and metal-based jewelry with plastic components.

Cadmium was detected in 16% (26/159)

High levels of cadmium—98.4%, 93.1%, 53.4%, and 39.7%—were detected in four necklaces sold along with children’s dresses.

One of these products had high levels of cadmium (93.1%) and lead (846 ppm).
Averting toxic exposures and avoiding future costs is the smartest, cheapest and healthiest approach.

**Department of Ecology’s approach to reducing toxic exposure**

Figure- Grice 2014
Children’s Safe Product Act (CSPA)

- Passed in 2008 in Washington State
- Requires manufacturers report the presence of 66 Chemicals of High Concern to Children in children’s products sold in WA state

- Target age group (under 3yo, 3yo and above)
- Chemical Function
- Product Category
- Concentration Range

**Chemical concentration range**

<table>
<thead>
<tr>
<th>Range</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 1</td>
<td>&lt; 100 ppm and &gt;= PQL</td>
</tr>
<tr>
<td>Range 2</td>
<td>&lt; 500 ppm and &gt;= 100 ppm</td>
</tr>
<tr>
<td>Range 3</td>
<td>&lt; 1000 ppm and &gt;= 500 ppm</td>
</tr>
<tr>
<td>Range 4</td>
<td>&lt; 5000 ppm and &gt;= 1000 ppm</td>
</tr>
<tr>
<td>Range 5</td>
<td>&lt; 10,000 ppm and &gt;= 5000 ppm</td>
</tr>
<tr>
<td>Range 6</td>
<td>&gt;= 10000 ppm</td>
</tr>
</tbody>
</table>

Children’s Safe Product Act (CSPA)

Segment
- Arts/crafts/needlework
- Baby care
- Beauty/personal care
- Clothing
- Footwear
- Household
- Personal accessories
- Toys/games

Example bricks
- Artists paints/dyes, Artists pastels/crayons, Jewelry craft materials, Sand art supplies
- Pacifiers/teething rings, Baby bath safety products, Baby changing mats, Baby furniture/transportation/safety
- Cosmetic aids/accessories, Fragrances, Hair-shampoo, Dental cleansing, Lip Balms
- Handwear, Headwear, Skirts, Socks, Trousers/Shorts, Sleepwear Variety Packs
- Athletic footwear, Boots, Shoes
- Cushions, Bed sheets/valances, Pillow cases
- Anklets, Earrings, Necklaces, Rings, Tiaras
- Board games, Practical jokes, Puppets, Developmental/educational toys, Outdoor games, Toy vehicles, Role play – kitchen toys
Identification of chemicals based on a three phase process based on:
- Toxicity-Carcinogenicity, Reproductive and Developmental Toxicity and Endocrine Disruption
- Evidence of the chemical in children’s products

Done in consultation with the Department of Health and UW’s Pediatric Environmental Health Specialty Unit

Data sources included:
- International Agency for Research on Cancer (IARC)
- U.S. National Toxicology Program
- U.S. Environmental Protection Agency
- European Commission, Joint Research Center, Institute for Health and Consumer Protection
- State of California List of Proposition 65 Chemicals
# Chemicals of High Concern to Children (CHCC)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Mixture/Compound</th>
<th>Chemical Name</th>
<th>CHCC Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formaldehyde</td>
<td>Molybdenum &amp; molybdenum compounds</td>
<td>Di-2-ethylhexyl phthalate</td>
<td>Phthalic Anhydride</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>Antimony &amp; Antimony compounds</td>
<td>Di-n-octyl phthalate (DnOP)</td>
<td>Butyl Benzyl phthalate (BBP)</td>
</tr>
<tr>
<td>Methyl paraben</td>
<td>Octamethylcyclotetrasiloxane</td>
<td>Diethyl phthalate</td>
<td>Diisodecyl phthalate (DIDP)</td>
</tr>
<tr>
<td>Propyl paraben</td>
<td>Cobalt &amp; cobalt compounds</td>
<td>Dibutyl phthalate</td>
<td>Diisononyl phthalate (DINP)</td>
</tr>
<tr>
<td>Ethyl paraben</td>
<td>Styrene</td>
<td>Ethylene glycol</td>
<td>Di-n-Hexyl Phthalate</td>
</tr>
<tr>
<td>Butyl paraben</td>
<td></td>
<td>Ethylene glycol monoethyl ester</td>
<td></td>
</tr>
</tbody>
</table>
A Toxicological Framework for the Prioritization of Children’s Safe Product Act Data

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How do we integrate this information?

- At the time of this work, CSPA had generated over 33K records.
- We developed a framework that mathematically combine variables about the product and chemical in each CSPA report.
- Three scores can be calculated:
  - Exposure score
  - Toxicity score
  - Total priority index

Do you care more about cobalt in a shoe or DEHP in a shirt?
What Matters in Prioritizing CSPA Chemicals?

Smith 2015
Exposure Score Variables

- Each variable was assigned a score between 1 and 3 with three indicating a higher priority
- Variables included:
  
  Lifestage  
  Concentration  
  Applied Directly to Skin  
  Exposure Duration  
  Exposure Routes  
  Absorption  

  \[ \text{CSPA} \quad \text{LogP} \]  
  \[ \text{Solubility} \quad \text{Vapor Pressure} \]
Variable Scoring From CSPA - Product Features

Lifestage: Age three and above=1, under age three=3

Concentration: From 0.5-3 based on the 6 ranges presented earlier

Accessibility: Inaccessible=1, accessible=3

Exposure Duration: Short-term=1, long-term=2

Applied directly to skin or body: Yes=3, no=1
Exposure Score Variables

- Each variable was assigned a score between 1 and 3 with three indicating a higher priority
- Variables included:
  
  Lifestage
  Concentration
  Applied Directly to Skin
  Exposure Duration
  **Exposure Routes**
  Absorption
  LogP
  Solubility
  Vapor Pressure
  Certainty of Toxicity
  Potency of Toxicity
Variable Scoring: Exposure Routes

Based on the Product Segment or Brick level

Exposure Routes: Oral, Dermal and Inhalation routes were assigned primary, secondary and tertiary routes.

- For example: a plastic cup would have a primary oral exposure route, secondary dermal and tertiary inhalation
- The tertiary inhalation includes potential exposure from house dust, as consumer products disintegrate
- For children under 3, a secondary oral exposure route was assigned for all products
Variable Scoring

Each variable was assigned a score between 1 and 3 with three indicating a higher priority.

Variables included:

- Lifestage
- Concentration
- Accessibility
- Exposure Duration
- Exposure Routes
- Absorption
- Dermal Permeability
- Solubility
- Vapor Pressure
Exposure Score Factors From Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Equation Abbrev.</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral exposure</td>
<td>$O_{MF}$</td>
<td>Tertiary</td>
<td>Secondary</td>
<td>Primary</td>
<td>Product segment (primary), Target age (secondary) [15]</td>
</tr>
<tr>
<td>Water solubility (moles/L)</td>
<td>$S$</td>
<td>&lt;0.001</td>
<td>0.001–0.01</td>
<td>&gt;0.1</td>
<td>Soluble (3), moderately soluble (2), insoluble (1) [16]</td>
</tr>
<tr>
<td>Oral absorption</td>
<td>$A_{b_{oral}}$</td>
<td>1%–5%</td>
<td>Absorbed at unknown rate</td>
<td>Above 5%</td>
<td>Absorption rate through oral exposure (ATSDR) [17]</td>
</tr>
<tr>
<td>Dermal exposure</td>
<td>$D_{MF}$</td>
<td>Tertiary</td>
<td>Secondary</td>
<td>Primary</td>
<td>As reported product segment (primary) [15]</td>
</tr>
<tr>
<td>Dermal permeability constant</td>
<td>$K_p$</td>
<td>&lt;3.39 $\times 10^{-3}$</td>
<td>$3.4 \times 10^{-2}$–$6.67 \times 10^{-3}$</td>
<td>&gt;6.7 $\times 10^{-3}$</td>
<td>Based on the tertiles of the $K_p$ [18,19]</td>
</tr>
<tr>
<td>Dermal exposure absorption</td>
<td>$A_{b_{dermal}}$</td>
<td>1%–5%</td>
<td>Absorbed at unknown rate</td>
<td>Above 5%</td>
<td>Absorption rate through dermal exposure (ATSDR) [17]</td>
</tr>
<tr>
<td>Inhalation exposure</td>
<td>$I_{MF}$</td>
<td>Tertiary</td>
<td>Secondary</td>
<td>Primary</td>
<td>As reported product segment [15]</td>
</tr>
<tr>
<td>Vapor Pressure mmHg at 25 degrees °C</td>
<td>VP</td>
<td>&lt;0.075 mmHg</td>
<td>0.075–32 mmHg</td>
<td>&gt;32 mmHg</td>
<td>VP ranges for volatile compounds (3), semi-volatile compounds (2) and nonvolatile compounds (1)</td>
</tr>
<tr>
<td>Inhalation exposure absorption</td>
<td>$A_{b_{inhalation}}$</td>
<td>1%–5%</td>
<td>Absorbed at unknown rate</td>
<td>Above 5%</td>
<td>Absorption rate through inhalation exposure (ATSDR) [17]</td>
</tr>
</tbody>
</table>

Smith et al. 2016. IJPHR. 13(4)
Exposure Score

From CSPA

\[
\text{(Lifestage + Exposure Duration + Applied to Skin + Concentration)} + \\
\left(\frac{(\text{Oral Exposure Modifying Factor}) \times (\text{Water Solubility} + \text{Oral Absorption} \times 2)}{2}\right) + \\
\left(\frac{(\text{Inhalation Exposure Modifying Factor}) \times (\text{Vapor Pressure} + \text{Inhalation Absorption} \times 2)}{2}\right) + \\
\left(\frac{(\text{Dermal Exposure Modifying Factor}) \times (\text{Dermal Permeability} + \text{Dermal Absorption} \times 2)}{2}\right) \\
= \text{Exposure Score}
\]
### Toxicity Score Factors From Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Equation Abbrev.</th>
<th>Score</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproductive and developmental toxicity certainty</td>
<td>RD&lt;sub&gt;certainty&lt;/sub&gt;</td>
<td>Potential RD ^</td>
<td>ECHA Existing Substances [20], Prop 65 [21], Global Harmonization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suspected RD ^</td>
<td>Standard [22]</td>
</tr>
<tr>
<td>Reproductive and developmental potency</td>
<td>RD&lt;sub&gt;potency&lt;/sub&gt;</td>
<td>NOAEL &gt; 397 mg/kg</td>
<td>NOAEL from ECHA Existing Substances [20]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOAEL 200–297 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOAEL &lt; 200 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity certainty</td>
<td>C&lt;sub&gt;certainty&lt;/sub&gt;</td>
<td>Potential Carcinogen ^</td>
<td>IARC [23], Prop 65 [21], Global Harmonization Standard [22], EPA IRIS [24]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suspected Carcinogen ^</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Known Carcinogen ^</td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity potency</td>
<td>C&lt;sub&gt;potency&lt;/sub&gt;</td>
<td>TD50 &gt; 465 mg/kg</td>
<td>Dose that causes a tumor in 50% of the study population (TD50) from the Carcinogenic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TD50 from 233 to 465 mg/kg</td>
<td>Potency Database [25,26]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TD50 &lt; 233 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Endocrine disruption certainty</td>
<td>ED&lt;sub&gt;certainty&lt;/sub&gt;</td>
<td>Potential ED ^</td>
<td>ECHA Endocrine Disruptor Substances of Concern [27], Global Harmonization Standard [22]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suspected ED ^</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Known ED</td>
<td></td>
</tr>
<tr>
<td>Endocrine disruptor potency</td>
<td>ED&lt;sub&gt;potency&lt;/sub&gt;</td>
<td>NOAEL &gt; 336 mg/kg</td>
<td>LOAEL from ECHA Endocrine Disruptor Substances of Concern [27]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOAEL 336–667 mg/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NOAEL &gt; 667 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Neurotoxicity certainty</td>
<td>NT&lt;sub&gt;certainty&lt;/sub&gt;</td>
<td>Known NT</td>
<td>Grandjean and Landrigan et al. (2014) [28], Global Harmonization Standard [22]</td>
</tr>
<tr>
<td>Neurotoxicity potency</td>
<td>NT&lt;sub&gt;potency&lt;/sub&gt;</td>
<td>All NTs</td>
<td>All known neurotoxicants are assigned a score of 2</td>
</tr>
</tbody>
</table>
Toxicity Endpoints and Data Sources

- **Carcinogenicity**: IARC, Prop 65, Global Harmonization Standard, EPA IRIS
- **Reproductive and Developmental Toxicity and Endocrine Disruption**: REACH Existing Substances, Prop 65 and Global Harmonization Standard
- **Neurotoxicity**: Grandjean and Landrigan et al. 2014 was used to identify neurotoxicants.
Based on the strength of evidence for endocrine disruption, chemicals were assigned to one of three categories:

- **Category 1**
  Evidence of endocrine disrupting activity in at least one species using intact animals

- **Category 2**
  At least some in vitro evidence of biological activity related to endocrine disruption

- **Category 3**
  No evidence of endocrine disrupting activity or no data available.

The results of these studies are compiled in a database.

- [http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances_en.htm#priority_list](http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances_en.htm#priority_list)
IARC Monographs identify environmental factors that can increase the risk of human cancer. Include chemicals, complex mixtures, occupational exposures, physical agents, biological agents, and lifestyle factors. Classified in Groups 1-4 based on evidence of cancer in human and animals.

- **Group 1**: Agent is carcinogenic to humans
- **Group 2**: Agent is possibly/probably carcinogenic to humans
- **Group 3**: Agent is not carcinogenic to humans
- **Group 4**: Insufficient information to determine carcinogenicity
Global Harmonized System for Hazard Communication

- Internationally harmonized chemical information
- United Nation, 2003
- Japanese National Institute of Technology Evaluation Interface - CHIRP
California Prop 65

• In 1986, California voters approved an initiative to address their growing concerns about exposure to toxic chemicals.
• Proposition 65 requires the State to publish a list of chemicals known to cause cancer or birth defects or other reproductive harm.
• List must be updated at least once a year
  • Includes approximately 800 chemicals
- Integrated Risk Information Systems
- IRIS Toxicity Values
  - Oral Reference Dose
  - Inhalation Reference Concentration
  - Cancer Descriptions
    - Carcinogenic to humans
    - Likely to Be Carcinogenic to Humans
    - Suggestive Evidence of Carcinogenic Potential
    - Inadequate Information to Assess Carcinogenic Potential
    - Not Likely to Be Carcinogenic to Humans
  - Oral Slope Factor: is an estimate of the increased cancer risk from oral exposure to a dose of 1 mg/kg-day for a lifetime. The OSF can be multiplied by an estimate of lifetime exposure (in mg/kg-day) to estimate the lifetime cancer risk.
- Inhalation Unit Rise
- 570 Chemical Records
Integration of Scores

Endocrine Disruption Score = Certainty * Potency

Reproductive and Developmental Toxicity Score = Certainty * Potency

Carcinogenesis Score = Certainty * Potency

Neurotoxicity Score = Certainty * Potency

Total Priority Index = Exposure Score * Toxicity Score
The scoring results are designed to interpret the CSPA data relative to itself.

Higher scoring products are a greater concern.

However, when no health outcome data is present records the total priority score is 0 points.

- Molybdenum, some phthalates, and some parabens
- These chemicals require more information before they can be fully prioritized, as of now, however the exposure score can be used to look at the potential for high exposures in children.
Formaldehyde, styrene and dibutyl phthalate have the highest total priority scores due to high toxicity and exposure scored.

DEHP, butyl benzyl phthalate, diisodecyl phthalate and butyl paraben also have high scores for toxicity and exposure.

Smith et al. 2016. IJPHR. 13(4)
High Priority Chemicals

- Chemicals that cluster together share toxicities

- Organic solvents such as methyl ethyl ketone and ethylene glycol, cluster with other known neurotoxicants, such as styrene (bottom circle)
- Phthalates that are well-characterized endocrine disruptors and reproductive and developmental toxicants cluster together as well (top circle)

Smith et al. 2016. IJPHR. 13(4)
Overall, this framework allows for the ranking of chemicals in products that may be hazardous to children’s health.

Integrates information from chemical and product features

Can be used in conjunction with other prioritization frameworks (e.g. ToxCast, ExpoCast)
Applications

- Allows for the identification of concerning chemical-product combinations with strong supporting evidence of toxicity and those with high exposure potential, but less well-characterized health outcomes
- Prioritize chemical for closer monitoring, regulation, alternatives research, etc…
Framework is dependent on extant data from
  • In some cases, existing data was limited
CSPA is still in a phase-in process with the largest manufacturers reporting their results, but requirements for smaller manufacturers are still being phased in
Achieve a balance between high throughput and high content for framework and interpretation
  • As of September, 2016, there were over 44,000 records in the CSPA database
Toxic Substances Control Act - Reform

- In June, 2016 President Obama signed the Frank R. Lautenberg Chemical Safety for the 21st Century Act, for reforming the Toxic Substances Control Act (TSCA) originally passed in 1976.
- Because TSCA was so outdated, many states had regulated chemicals in consumer products on their own.
- How will this affect CSPA?
  - Reporting frameworks are still okay at the state level
  - More stringent rules in WA could be changed if EPA takes action on these chemicals (phthalates, cadmium)
Introduction to Toxic Substances Control Act

- The Toxic Substances Control Act (TSCA) of 1976 provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures.
- Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.
- Addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls (PCBs), asbestos, radon and lead-based paint.
- The Office of Pollution Prevention and Toxics (OPPT) manages programs under the Toxic Substances Control Act and the Pollution Prevention Act.
- Under these laws, EPA evaluates new and existing chemicals and their risks, and finds ways to prevent or reduce pollution before it gets into the environment.

https://www.epa.gov/laws-regulations/summary-toxic-substances-control-act
Previous Weaknesses of TSCA

• No toxicity testing requirements or minimum datasets
• Without evidence of harm, chemicals were viewed as safe
• EPA was forced to rely on heavily on prediction models
• EPA could only require testing when it could show risk

https://www.epa.gov/laws-regulations/summary-toxic-substances-control-act
Toxic Substances Control Act Compared to Lautenberg Act

Toxic Substances Control Act (TSCA) vs. Lautenberg Act (FRL)

New chemicals (≈1,000 notices received per year)

EPA review of notice and risk determination:
- TSCA: Discretionary
- FRL: Mandatory

The EPA may issue order to require additional data

The EPA may propose an order to prohibit or impose restrictions

The EPA must, by rule or order, prohibit or impose restrictions necessary to protect against the risk

Company may begin manufacturing, and the EPA must publish finding

TSCA: No action by the EPA within 90-day review period
- FRL: Chemical is not likely to present an unreasonable risk

Chemical presents an unreasonable risk

TSCA: Insufficient information \textit{and} may present unreasonable risk or is produced in large amounts and significant release or exposure
- FRL: Insufficient information \textit{or} may present unreasonable risk or is produced in large amounts and significant release or exposure

Source: Adapted from materials prepared by the Environmental Defense Fund

Schmidt 2016 EHP
Toxic Substances Control Act Compared to Lautenberg Act

How the Lautenberg Act Works: Existing Chemicals

1. Identify Chemicals in Commerce
   - 85,000 chemicals on the TSCA Inventory
   - Inventory “reset”: the EPA identifies active, inactive chemicals

2. Prioritization
   - Chemicals identified as high priority
   - Chemicals identified as low priority

3. Evaluation
   - Risk evaluation
   - Does present unreasonable risk
   - Does not present unreasonable risk

4. Determination
   - Does present unreasonable risk
   - Does not present unreasonable risk

5. Risk Management
   - The EPA must issue a regulation banning or restricting the chemical

Safety standard: “No unreasonable risk to human health or the environment.”
- Based solely on risks to health/environment
- The EPA cannot consider costs
- Eliminates “least burdensome” requirement

Source: Adapted from materials prepared by the Environmental Defense Fund

Schmidt 2016 EHP
Other State programs:
- Oregon - in progress, very similar to WA, contains an enforcement element
- California - did not pass
- Vermont - Will start reporting in January 2017, working on product level reporting
- Main - Active, no data available yet
- Minnesota - in progress

Europe: Norway and Sweden (since 1970s) - data is not publicly available

Unique features of WA:
- Publicly available database since 2012
- Active follow-up with Ecology’s product testing program (Cadmium in jewelry results)
Conclusions

- CSPA mandates chemical of concern reporting and limits concentrations of phthalates and cadmium in children’s products
- Department of Ecology conducts an active monitoring of children’s products in tandem with the manufacturers’ reports
- Information on chemical concentration, toxicity, potency and product exposure factors can be used to prioritize chemicals in children’s products
- Dibutyl phthalate, styrene and formaldehyde were the highest priority chemicals found in this analysis
- These results can be used to guide future monitoring and enforcement efforts
Acknowledgements

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- Institute for Risk Analysis and Risk Communication
- This work was supported by EPA STAR graduate student fellowship: FP-91779601-0
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