webPOISONCONTROL®: An innovative app that saves lives and health care costs

Revised December 10, 2020

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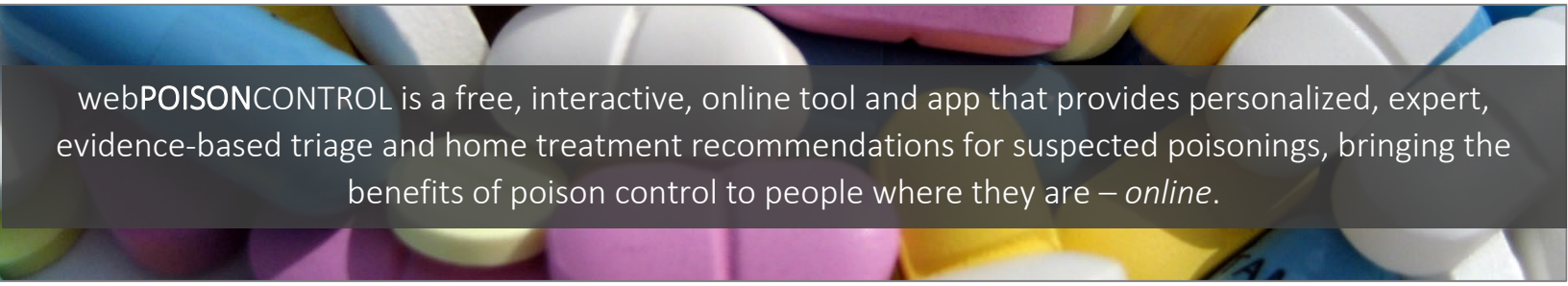
Introduction

Poison control is an unsung public health triumph: it has been quietly saving lives and healthcare dollars for decades by preventing unnecessary emergency department (ED) visits, reducing health care expenses, and improving poisoning outcomes.[1–11] Even so, poison control phone call volume has been decreasing in recent years[12], while unintentional poisoning has become the leading cause of injury death in the US.[13] Traditionally, poison control has been accessible only by telephone, until the development of web**POISON**CONTROL®.



webPOISONCONTROL is a free, interactive, online tool and app that provides personalized, expert, evidence-based triage and home treatment recommendations for suspected poisonings, bringing the benefits of poison control to people where they are – *online*.

The following problems and needs led to the development of web**POISON**CONTROL:

Limited awareness of poison control and reluctance to call: Although poison control hotlines are free, available 24/7/365, confidential, and staffed by toxicology experts, there is a lack of public awareness of poison control services and an increasing unwillingness to call.[14] More and more people prefer to use the internet over the telephone to access health information.[15–21] Almost 6,000 people call US poison centers for guidance each day, yet an estimated 4,000 to 9,000 others experience a poison exposure but do not call, thereby losing out on the health and cost benefit of poison control guidance.[22]

Inaccurate & unsafe information online: Inaccurate and unsafe poisoning guidance abounds on the internet.[16,23,24] web**POISON**CONTROL provides a trusted online resource developed by toxicology experts, the same experts that direct U.S. poison control centers.

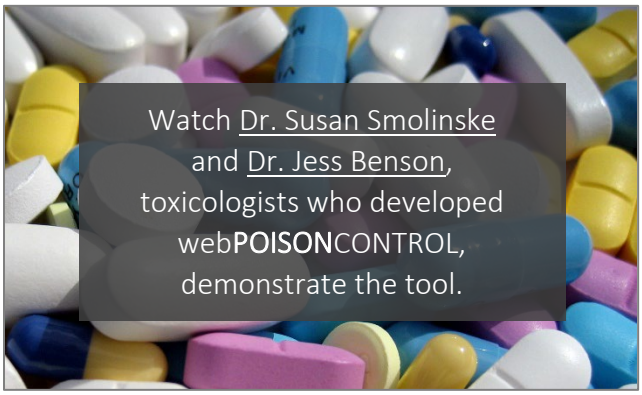
The need to reduce unnecessary healthcare costs even more than the savings already realized from traditional poison control phone services: As with telephone *calls* to poison control, most web**POISON**CONTROL cases are managed at home, saving the cost and burden of unnecessary ED visits and freeing up specialists who answer the poison control hotline to manage the more serious and clinically complex cases, which are on the rise.[12] However, compared to a traditional phone-based service, it costs much less to manage a poison exposure case online, and web**POISON**CONTROL can manage even a 10-fold volume increase at a minimal additional cost.

Poison control centers struggle to secure adequate, reliable funding: Many people do not realize that poison control is not a government entity. Poison control centers depend on patchwork funding from a variety of sources and are chronically under-funded.[25–27] web**POISON**CONTROL cuts costs without cutting services, managing poisonings online at 1/3 the cost of the personnel-intensive phone-based method without compromising the quality of care, all while remaining free to users.

webPOISONCONTROL is the product of a collaboration of experts from poison control centers led by the National Capital Poison Center [NCPC; a 501(c)3 nonprofit organization)] and a 17-member software development team. Today, webPOISONCONTROL manages around 160,000 cases per year from all over the US, and even internationally. User feedback is overwhelmingly positive, and the project was a top 10 finalist for the 2018 Drucker Prize for Nonprofit Innovation and a semifinalist for the 2020 National Safety Council Green Cross for Safety Innovation Award. It was also featured in *The Washington Post*.[28]

Who are we?

webPOISONCONTROL is brought to you by a group of forward-thinking poison control centers. It is the first fully automated virtual poison center. The logic, algorithms, and recommendations that power the tool are written by board-certified toxicology experts, each with decades of experience in poison control. As of December 2020, 24 accredited U.S. poison centers are participating in the webPOISONCONTROL project.



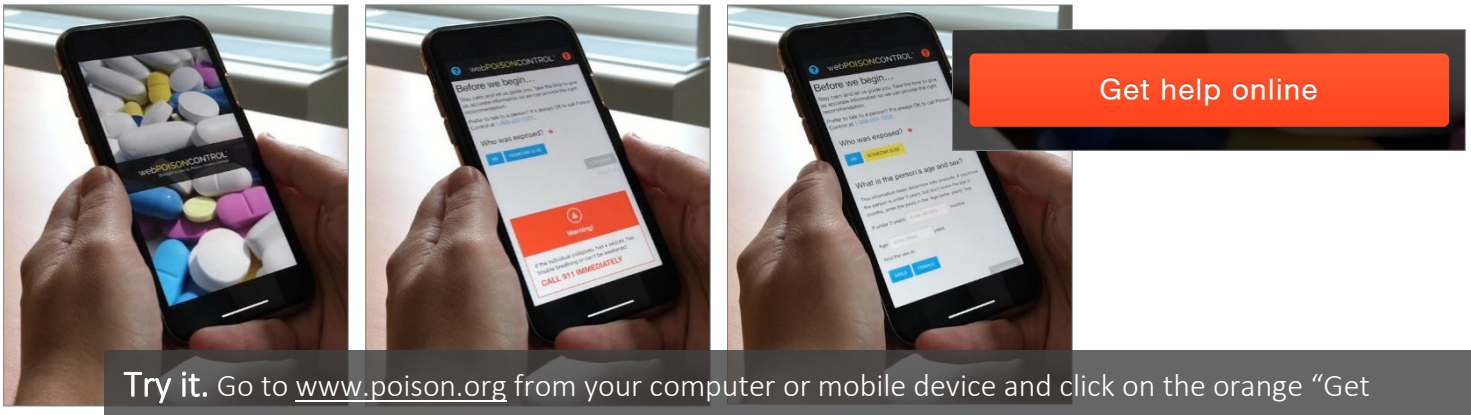
What is webPOISONCONTROL?

webPOISONCONTROL is an online tool and app that determines the appropriate triage for suspected poisonings without having to call poison control.

To get a personalized recommendation, users are prompted to enter the substance, amount, age, and time since the poison exposure. They can also scan or enter a unique product code (UPC, a.k.a. barcode) or type in a pill imprint, helping ensure substance accuracy.

Upon answering a few brief questions about the exposure, users immediately receive one of three triage recommendations:

1. it is safe to stay home because toxicity is minimal,
2. ED evaluation is required, or
3. a call to poison control is warranted because further information is needed to evaluate the case.



Try it. Go to www.poison.org from your computer or mobile device and click on the orange "Get Help Online" button. Or, download the free mobile app on the App Store or on Google Play.

If the tool determines the case can be managed at home, the user is given instructions for treatment and observation, specific symptoms likely to occur (yet not of concern), and symptoms that should trigger a call to poison control or an ED visit, if they develop. The user receives a copy of the detailed recommendation by email and automated follow-up ensues. During automated follow-up, the user chooses from a list of specific symptoms that developed, if any. The symptoms are compared to the worrisome effects of the poison, triggering a change in the triage recommendation if indicated. Follow-up reminders are sent at intervals appropriate to the kinetics of the implicated product or substance.

Data & Surveillance

2019 Case Statistics

Table 1. Age distribution for webPOISONCONTROL cases, nonduplicated public cases

Age (years)	Case Count	%
<1	11,125	6.86%
1	36,967	22.81%
2	26,284	16.22%
3	12,595	7.77%
4	5,536	3.42%
5	2,890	1.78%
6-12	7,130	4.40%
13-19	12,637	7.80%
20-64	44,624	27.53%
≥65	2,283	1.41%
Blank or invalid age	8	0.01%
Total	162,071	100.00%

The majority of webPOISONCONTROL cases are pediatric exposures; over half (53.66%) involve children under 4 years old. However, the tool also provides personalized guidance for teens, adults, and seniors.

Table 2. Initial Triage for webPOISONCONTROL cases, nonduplicated public cases

Initial Triage	Case Count	%
Home	112,780	69.58%
Poison Control	46,529	28.71%
ED Referral	2,770	1.71%
Total	162,079	100.00%

Almost 70% of webPOISONCONTROL cases are initially triaged to home management, and users are given instructions for treatment and observation.

Table 3. Route of Exposure for webPOISONCONTROL cases, nonduplicated public cases

Route	Case Count	%
Mouth (alone)	134,658	83.08%
Mouth (in combination with other routes)	8,194	5.06%
Eye (alone)	6,956	4.29%
Inhalation (alone)	5,523	3.41%
Skin (alone)	3,489	2.15%
Bite/sting	1,743	1.08%
Injection (alone)	295	0.18%
Other route combinations	1,221	0.75%
Total	162,079	100.00%

Most webPOISONCONTROL cases involve ingestions. However, the tool can manage cases that involve other routes of exposure as well.

Table 4. Top 10 substance categories for webPOISONCONTROL cases triaged to home, nonduplicated public cases

Substance Category	Count	%
1. Cosmetics & personal care products	21,195	13.1%
2. Cleaning substances	18,011	11.1%
3. Analgesics	13,375	8.3%
4. Foreign bodies & toys	8,043	5.0%
5. Pesticides	7,695	4.7%
6. Dietary supplements	7,854	4.8%
7. Topicals	7,768	4.8%
8. Essential oils	5,135	3.2%
9. Antihistamines	5,271	3.3%
10. Plants	3,952	2.4%
Total, Top 10	98,299	60.6%
Nonpharmaceuticals	94,234	58.1%
Pharmaceuticals	67,845	41.9%
Total	162,079	100.0%

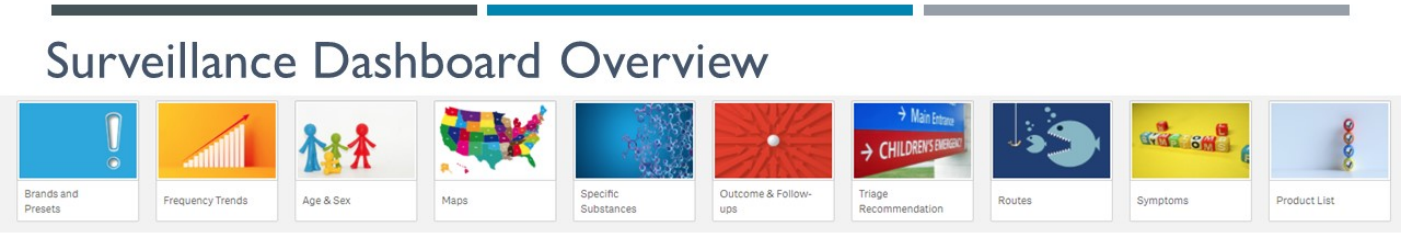
Of the cases triaged to home management, almost one third involve cosmetics and personal care products, cleaning substances, and analgesic medications. The ratio of cases involving nonpharmaceutical to pharmaceutical products and substances is roughly 3:2.

Mean cases per day = 444.1
Median time to complete a case = 2.7 minutes

Real-Time Surveillance Dashboard

The webPOISONCONTROL surveillance dashboard provides a mechanism to visualize poison exposure data and trends in near real-time, focusing on a single product, group of products, or brand family, compared to a reference group of the user's choice. Data are from cases from 2017 up to midnight on the day prior to the analysis. As of December 2020, webPOISONCONTROL has managed more than 500,000 cases.

The following data points are viewable in the dashboard:



The dashboard provides visualization of:

- User's location
- Exposed person's age and sex
- Product or substance, analyzed by individual product, a group of products, a brand, or a generic category
- Route of exposure
- Initial symptoms
- Initial triage recommendation

If the user provides an email address, additional information is collected via automated follow-up, including:

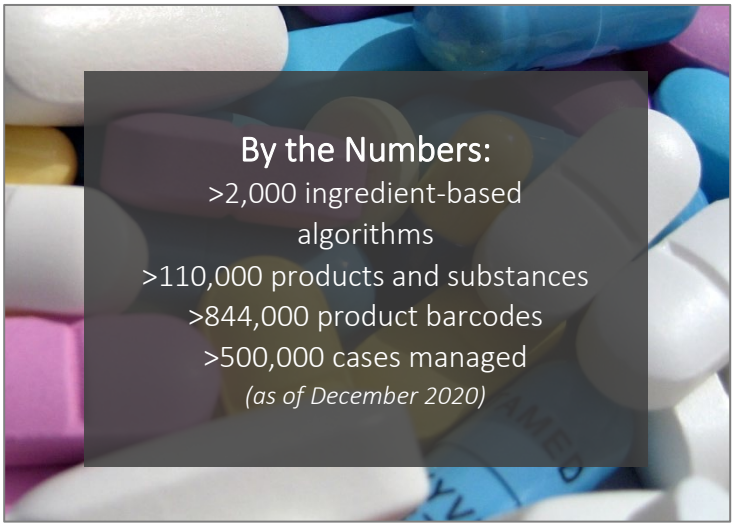
- Action taken - what was actually done?
- Specific symptoms that developed after initial triage recommendation
- Final triage recommendation
- Outcome: No effect, Minor, Moderate, Major, Death, Unknown minimally toxic, Unknown potentially toxic.

For a more detailed surveillance dashboard description with screenshots, please see Appendix B.

What is webPOISONCONTROL's source of product information?

We used multiple sources of product information to build webPOISONCONTROL's robust substance database and continue to add products and UPCs daily. We have licenses to use information from a few different proprietary databases from which we can also pull in barcodes, but we also use a lot of publicly available information, such as product labels and a drug database for pharmaceutical ingredients. We also frequently reach out to product manufacturers to ask for product ingredients directly, and usually once they understand why we need the information, how we use it, and who has access to it, they are more than happy to help us in the interest of public safety. Our preferred method is obtaining product information directly from the manufacturer because it is the most accurate. Having accurate information on product ingredients prevents us from having to assume a worst-case scenario for a potentially toxic ingredient's concentration in a product. When we are forced to assume a worst-case scenario, it leads to unnecessary excess referrals to emergency rooms and unnecessary extra calls to poison control. Neither public users of webPOISONCONTROL nor our partners or any other company has access to proprietary product information.

How does webPOISONCONTROL determine whether a poison exposure is serious?



webPOISONCONTROL is powered by more than 2,083 ingredient-based algorithms, each matched to the corresponding ingredient(s) in 110,428 products and substances. As of December 2020, 844,867 product barcodes are linked to these 110,000+ substances. More algorithms, products and barcodes are added daily. The application core, the ingredient algorithms, provide age- or weight-based thresholds for each ingredient. Algorithms also outline the justification for the threshold, list the expected minor symptoms and the symptoms which require further medical evaluation, recommend specific home treatment where appropriate, define the onset and duration of symptoms, and set a risk window beyond which significant toxicity is unlikely if clinical manifestations have not already begun. Special logic is incorporated to handle each formulation type, multi-ingredient products, multiple routes (swallowed, eye, skin, inhalation, bite/sting, injection), unknown amounts, unknown weight, and the minimum possible weight for each age. Users are encouraged (but not required) to provide an email address to receive a copy of the case and recommendations. The email address also serves as the key to case follow-up. Users are emailed at intervals appropriate to the substance kinetics and urged, for their own safety, to follow a link to a follow-up module. That module gathers information on what was actually done (stayed home, went to ER, admitted to hospital, etc.) and what specific symptoms developed, if any. Symptoms are further evaluated and compared to worrisome effects of the poison exposure, triggering a change in the triage recommendation for the case if indicated.

How was webPOISONCONTROL developed?

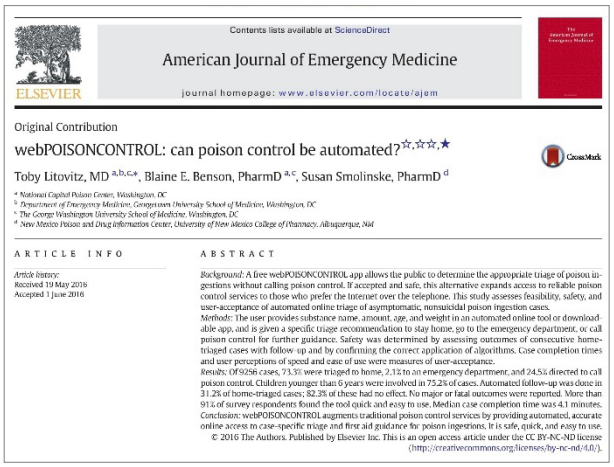
In the early stages of development, our toxicologists worked with software UX experts to transform the unstructured poison control phone interview into a user-friendly but structured series of questions that would determine the triage recommendation for a specific poison exposure scenario. We focused on asking the fewest questions necessary for an individual case, asking those questions in the easiest way possible, and providing enough answer choices that the user would find one that fit their situation. User feedback guided the many subsequent revisions. From the users, we learned which questions needed to be simplified, omitted, made optional, or re-arranged, what new capabilities were needed, and what products and algorithms were missing.

While software developers implemented these revisions, toxicologists expanded the scope of the effort by:

- writing algorithms to cover more product ingredients;
- developing a database of household products, plants and creatures that bite or sting, to expand beyond pharmaceuticals;
- adding eye, skin, inhalation and bite/sting exposure routes;
- expanding to double dosing of medicines, a common reason for poison control utilization;
- adding barcode scanning capabilities so more specific recommendations can be provided and faster;
- developing an interface so participating poison centers could also use the product information and algorithms to facilitate telephone-based case management;
- developing analytics to measure usage, detect hazards, and track trends.

Outcomes

The pilot phase of webPOISONCONTROL was launched on December 30, 2014. An analysis published in The American Journal of Emergency Medicine demonstrates its safety, feasibility, and public acceptance.[29] Maintenance and development work have continued since the conclusion of the pilot phase.



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Original Contribution

webPOISONCONTROL: can poison control be automated?☆,☆☆,★

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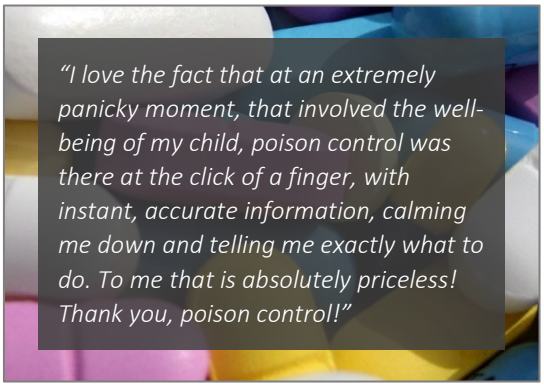
ABSTRACT

Background: A free webPOISONCONTROL app allows the public to determine the appropriate triage of poison ingestions without calling poison control. If accepted and safe, this alternative expands access to reliable poison control services to those who prefer the Internet over the telephone. This study assesses feasibility, safety, and user-acceptance of automated online triage of asymptomatic, nonsuicidal poison ingestion cases.
Methods: The user provides substance name, amount, age, and weight in an automated online tool or downloadable app, and is given a specific triage recommendation to stay home, go to the emergency department, or call poison control for further guidance. Safety was determined by assessing outcomes of consecutive home-triaged cases with follow-up and by confirming the correct application of algorithms. Case completion times and user perceptions of speed and ease of use were measures of user-acceptance.
Results: Of 9256 cases, 73.3% were triaged to home, 2.1% to an emergency department, and 24.5% directed to call poison control. Children younger than 6 years were involved in 75.2% of cases. Automated follow-up was done in 31.2% of home-triaged cases; 82.3% of these had no effect. No major or fatal outcomes were reported. More than 91% of survey respondents found the tool quick and easy to use. Median case completion time was 4.1 minutes.
Conclusion: webPOISONCONTROL augments traditional poison control services by providing automated, accurate online access to case-specific triage and first aid guidance for poison ingestions. It is safe, quick, and easy to use.

Safety

When assessed in 2016, over 80% of the cases triaged to home with follow-up had no effect, with minor effects reported in 10.4% of cases and moderate effects in 1.4%. No major effects or deaths were reported. These results indicate the appropriateness of the triage thresholds that determine when it is safe for the exposed person to stay home, with follow-up. Twenty-six cases initially triaged to home (1.2% of 2,118 home-triage cases with follow-up) had a changed triage recommendation on follow up, with a subsequent deliberately cautious recommendation to call poison control (21 cases) or go to an ED (5 cases). Thus, the automated follow-up function of webPOISONCONTROL proved to be an important safety feature. Over the next 3 years following the conclusion of the pilot, poison control experts conducted next-day audits of 100% of 272,000 webPOISONCONTROL completed, nonduplicated cases, confirming the accuracy and safety of recommendations. More recent data show that severe outcomes are rare.

Feasibility & Public Acceptance



Between February 11 and 25, 2016, 1,339 online feedback survey respondents had used webPOISONCONTROL for a poison emergency, and 97.3% of respondents found it easy or somewhat easy to use; 91.3% found the time to get a recommendation was quick or very quick; and 95.8% found it met or more than met their needs. When considering all 15,000 survey responses collected to date, the tool continues to impress: 98% say the tool is easy or somewhat easy to use; 95% say it met or more than met their needs; 97% would likely or very likely use the tool again; and 96% say the speed is quick to very quick. On average, it takes 2½ minutes to enter one's information in webPOISONCONTROL and get a recommendation. Please see examples of real user feedback at the end of this document.

Cost Benefits

The financial impact of correct versus incorrect triage has never been directly measured, although at least a dozen studies estimate the return on investment for poison control services at $6 to $36 per dollar spent. One of the most comprehensive analyses shows an ROI of $13.39 in decreased healthcare cost and saved productivity for every dollar spent on a traditional poison control center.[9] Nationally, it costs about $50.04/case for a traditional poison center to handle a case at home (without healthcare referral). It costs only 1/3 as much ($17.46) for webPOISONCONTROL to manage a case completely online (without referral to a healthcare facility or to a phone-based poison center). Unlike the personnel-intensive traditional phone-based poison center, the marginal cost for webPOISONCONTROL to handle 10 times the case volume is minimal. Thus, promotion of webPOISONCONTROL and subsequent increased use could markedly decrease the cost of providing poison control guidance to less than $2 per home-managed case.

Other Outcomes

We have also observed the following, unforeseen benefits of webPOISONCONTROL:

- **Disaster response:** The tool has a tremendous disaster response capability. webPOISONCONTROL can easily manage surges in demand since it does not require dedicated 24/7 staffing, as does the call-based service. Between early March and the end of April 2020, webPOISONCONTROL case volume increased by 51%, with prominent spikes in exposures to hand sanitizing products, household cleaners, and disinfectants.
- **Optimizing limited resources:** webPOISONCONTROL frees up limited poison control resources by handling the less complicated cases online, allowing call center staff to dedicate more time to the increasingly complex, and often more clinically serious cases. However, webPOISONCONTROL will not eliminate the need for traditional poison control centers because its scope is focused, designed to handle unintentional poison exposures in a person who is not pregnant and has no underlying serious illness. Definitive guidance is only provided for cases that can safely be managed at home, without intervention by a healthcare provider. That leaves the more difficult cases – the complex, intentional, nuanced, or serious cases - to be handled by the human experts at traditional phone-centric poison centers. It also leaves the consults poison control centers provide for healthcare professionals caring for poisoned patients, education for health professional trainees, hazard and chemical/bioterrorism surveillance, and input into state and local responses to emerging substances of abuse, foodborne outbreaks, product hazards, preparedness and planning, all of which traditional poison control centers provide.
- **Consistent care:** The evidence-based algorithms created for this tool are based on case data and arduous scientific literature review. webPOISONCONTROL uniformly adheres to these algorithms, a phenomenon not observed in call-based poison centers because of insufficient numbers of algorithms and individual deviation from them where they exist. Adherence to guidelines enhances patient care, minimizes conflicting recommendations and patient confusion, and makes triage decisions more of a science than an art. As more centers (currently 24) use webPOISONCONTROL algorithms to guide the telephone management of poison exposures, the algorithms help eliminate regional differences in responses and harmonize triage guidelines nationally.

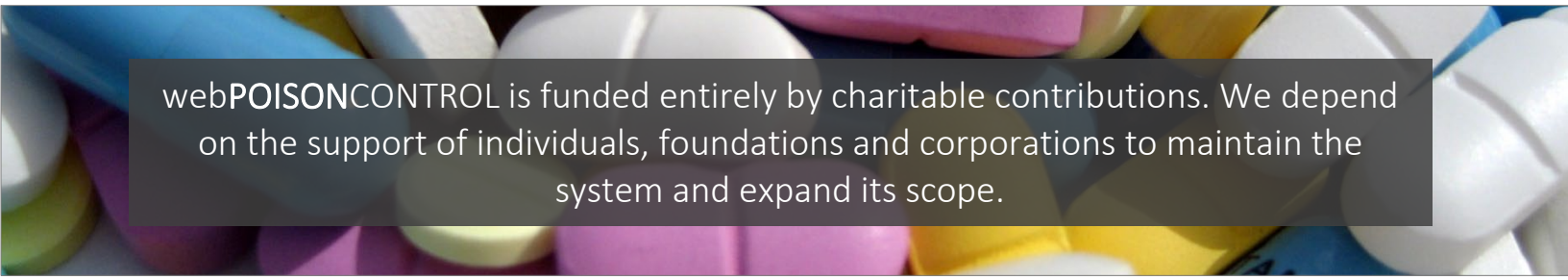
Opportunities for Improvement and Future Development

webPOISONCONTROL is a game changer. For the first time, poison control services are delivered in a fully automated manner, at a lower cost than the traditional phone-based service.

Future changes and ways webPOISONCONTROL can continue to improve include:

- Increased public usage of online poison control services by those who do not want to call. We plan to continue driving up utilization through continued SEO efforts, word-of-mouth, and social and traditional media coverage. We also hope to form strategic partnerships and secure endorsements from respected health- and parenting-related organizations, to increase awareness.
- Increased scope in terms of the addition of products, barcodes, images, and triage algorithms so we can provide definitive guidance to as many users as possible.
- Continued quality assurance. As more clinical and research data become available, we update algorithms to optimize safety and efficiency. We now audit 30% of completed, nonduplicated public cases (down from 100% that were audited from 2015 to July 2019). Weekly quality assurance processes are performed to capture and address any anomalies. We also closely monitor and act on user feedback.
- Optimizing triage thresholds. While it is important for the tool to be conservative in its advice, a threshold that is too low will result in too many users referred unnecessarily to EDs or directed to call poison control.
- Increased use by traditional phone-based poison centers leading to harmonized triage in the US.

Funding



$2 million/year annual budget covers maintenance and enhancements, including:

- $1.2 million/year software development and maintenance
- $800,000/year quality assurance, product entry, algorithm development, toxicologists, databases

Additional enhancement funding needed to expand the app's scope and features during the next 3 years:

- $450,000 would fund development of a pilot API (application program interface) to provide a seamless exchange of case information between webPOISONCONTROL and traditional poison control centers, facilitating continuity of recommendations.
- $250,000 would expand analytic capabilities, improving reporting, trending, and quality assurance at both the national and center level.
- $1,000,000 would substantially complete algorithm development, leaving only the ongoing addition of algorithms for unique ingredients in newly marketed products and continuous review of existing algorithms.
- $700,000 would substantially complete the product database, except for new products that would need to be added as they are introduced.
- $2,000,000 would keep the app operational for a full year.

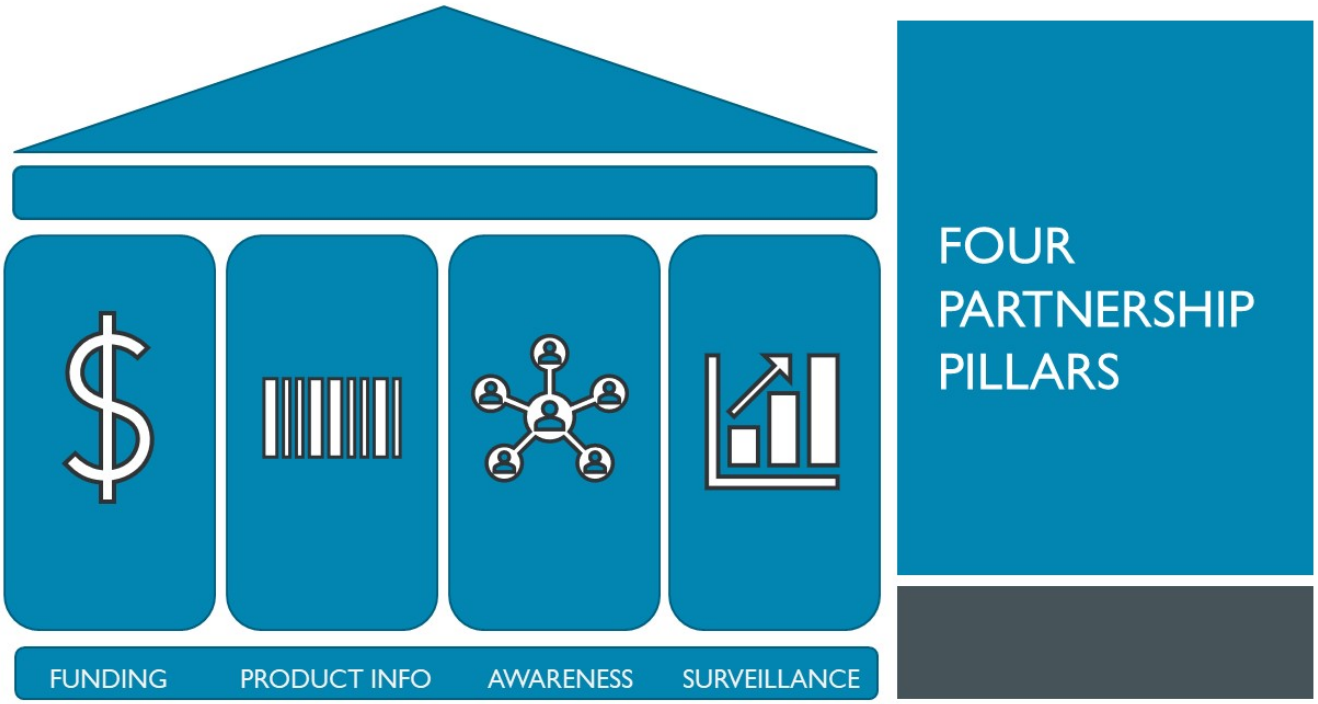
Conclusion & Partnership Opportunities

In a time when unintentional poisoning is the leading cause of injury death in the U.S. and EDs are once again in danger of being overwhelmed by COVID-19 patients, poison control plays a critical role in the nation's public health response. webPOISONCONTROL is an innovative solution that expands the public's access to safe, accurate, and quick triage for poisoning, mitigates the burden of unnecessary ED visits, and renders the entire poison control enterprise more cost-efficient. In developing webPOISONCONTROL, the National Capital Poison Center, a 501(c)3 nonprofit organization, put forth the enormous time and resources required to meet the challenges of the evolving information age and has proven the power of innovation to effect change.

Now that we have shown what bringing poison control into the information age can do, we need your help.

What do we need?

It is important to understand that while in the context of poison control's long history webPOISONCONTROL may be new, it is not a "startup." It was launched just over 5 years ago and has been sustained ever since with philanthropic funding. It has been proven safe and easy to use and is beloved by those who have used it. Now, we feel it is time to diversify our partnership base and invite those who manufacture and/or sell the products and substances for which consumers are using webPOISONCONTROL to participate.



NCPC needs partners who are willing to do four things alongside us:

1. Ensure webPOISONCONTROL's sustainability with funding.
2. Improve the tool by giving us product information to make our substance database as robust as possible.
3. Raise awareness of webPOISONCONTROL and drive traffic to it.
4. Monitor trends and conduct unintentional product exposure surveillance using webPOISONCONTROL data. (webPOISONCONTROL data are separate from national poison control call data captured in the National Poison Data System.)

Partner Benefits

Benefits of a partnership with webPOISONCONTROL may include:

1. Enhanced consumer safety information accessibility.
2. Product safety liability mitigation.
3. An opportunity to reinforce a brand or company's positive reputation among consumers and the safety community.
4. Social responsibility and product stewardship.
5. Insight to detect product safety hazards quickly and inform public education efforts and packaging reforms.

Contact Us

We hope you will consider contacting us to discuss a partnership model that works for your organization.

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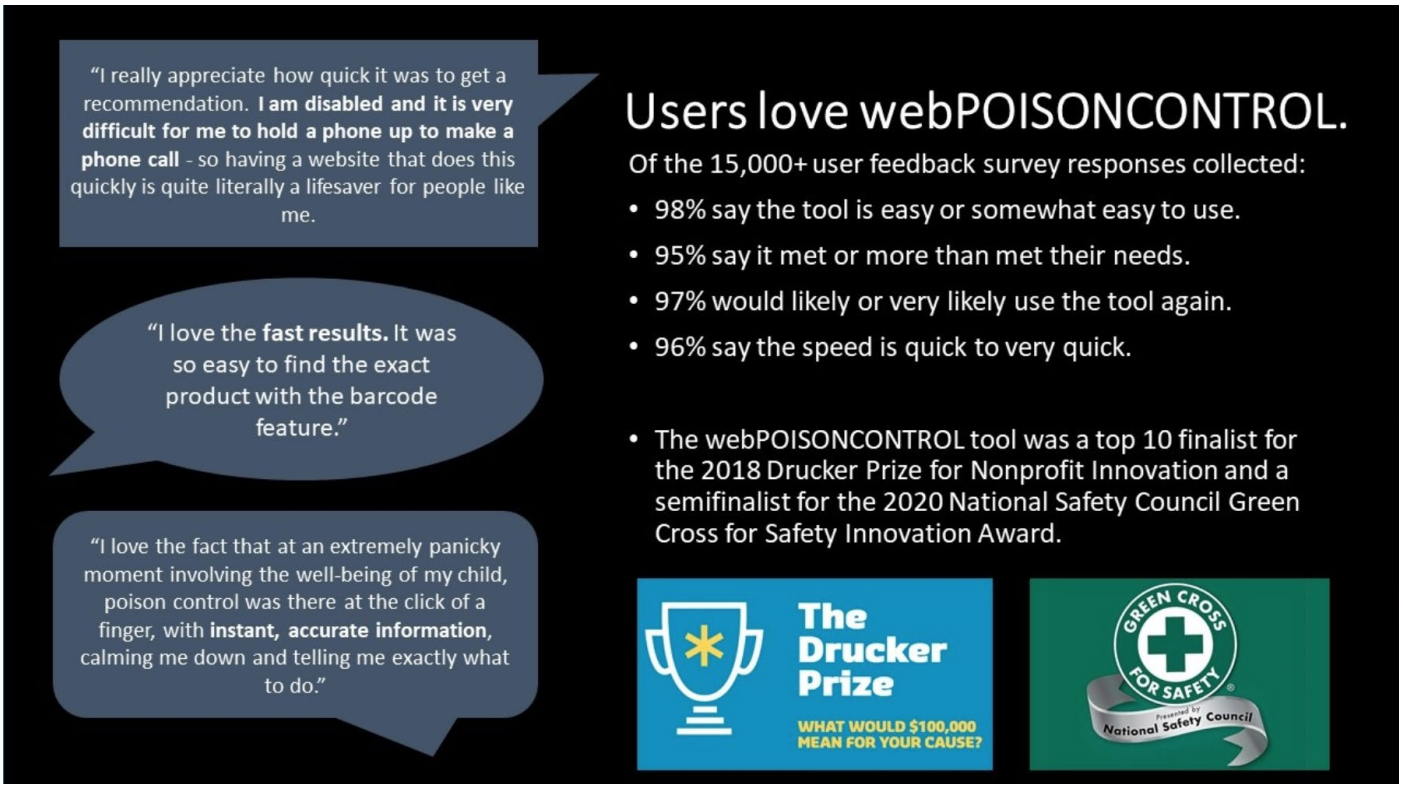
Appendices

Appendix A: External Vetting & User Feedback



We have over five years' worth of user feedback and we use that feedback to continuously improve webPOISONCONTROL. A sample of real user comments are listed below. The tool has also been evaluated by external parties. In 2019 the project was a semifinalist for the Drucker prize for innovation, and in 2020 it was a semifinalist for the National Safety Council's Green Cross Safety Innovation Award. In October 2020 NCPC gave a webinar to the Children's Safety Network, for which more than 800 people registered.

The following is a selection of the many comments we received from real webPOISONCONTROL® users between May and November 2019 in response to the survey question, "What did you like most about webPOISONCONTROL?"

- Ability to type in brand of product exposed to. I couldn't believe you had the brand of nail polish remover I was having the issue with!
- Don't have to talk to anyone and it is very fast and convenient
- Easy accessibility. Gave answers. No shame. The follow up.
- Easy and love the App with photos to help identify plant
- Easy to use and asked questions I wouldn't think of. Gave pictures of item that may have caused poison symptoms. Also put my mind at ease by telling me exactly what to look for.
- Easy to use and fast results. It was easy to look up the product with the bar code feature.
- Easy to use and gave me piece of mind without calling so not to freak out my child.
- Easy to use, love the app and no fussing with a call. The follow up is great too!
- Gave me side effects when the toxin label wouldn't. Provided me with information google searching didn't produce.
- How quick I got a response I love that I can scan the product barcode to find it even faster! Great thinking on that. Then I know I got it matched perfectly
- How simple the process was. Nothing was confusing or made you have to figure out what you were supposed to do next. I was panicked because my boyfriend had accidentally inhaled chlorine gas, and the simple instructions were easy to follow even in my panic.
- I can only thank this brilliant service.
- I could process the info at my pace, with interruptions from my children not a big deal. (Like it would be if I was listening to someone)

- I didn't have to try to talk to someone while talking to my son, trying to calm him down.
- I didn't have to wait on a phone call. I was able to quickly get results.
- I had accidentally eaten something that had been tainted by a bug fogger. The app had the actual brand I used, so I was impressed. It was also very intuitive to use
- I have a hearing loss and using the online tool was extremely helpful and user friendly for someone who does not use the phone.
- I like that it does not incite panic. I was worried my child may have taken an Advil tablet and it asked if she had taken more than 12–she definitely did not! The recommendation said we did not need to go to the ER.
- I like that it had specific brands of medications to choose from and that it had an option to scan a bar code
- I liked everything! From asking which product to telling me the symptoms or what to watch for ! I just love !
- I liked that it had multiple brands in search criteria ready when i typed.
- I liked the quick accurate response. I also LOVE THE fact that it is all CONFIDENTIAL
- I liked the web because it was quick. I am also a new worrisome mom and the situation was mild, so I knew my baby was probably okay, I just wanted to check. Poison Control Web let me do that without feeling silly.
- I Love the fact that at an extremely panicky moment, that involves the wellbeing of my child, Poison Control was there at the click of a finger, with instant, accurate information. Calming me down & telling me exactly what to do to save my child's life. To me that is absolutely priceless! Thank you Poison Control!
- I loved that I didn't have to talk to someone about something that turned out to be super minor. It gave me the information quick and I love the follow ups just in case.
- I realized at the end that the questions didn't ask the quantity taken. Then I saw a paragraph at the bottom of the recommendations stating why they didn't ask quantity. They anticipated my concern, and it was perfect!
- I really appreciate how quick it was to get a recommendation. I am disabled and it is very difficult for me to hold a phone up to make a phone call - so having a website that does this quickly is quite literally a lifesaver for people with similar disability. I had no idea this would go so in-depth, that you would be able to include the medication dosage, how long since the last dose, and that it would give so much information as to what I should expect to see. I am beyond grateful and impressed with how well done the Poison control web access is. I honestly expected it to just say monitor your symptoms and seek emergency care if there was any severe reactions. I will definitely be telling everyone I known about this now.
- I was able to find the product in question on the site. I didn’t have to fumble with the container or try to describe it unsuccessfully. It was so easy to use.
- I was able to use it silently, without causing my child to be alarmed.
- I was offered a list of products related to my search, and able to find and pick the EXACT product that my child got into.
- I was trying to persuade my friend who lives out of town, that she needed to call poison control. She was reluctant. When your site took her info and said she needed to call right away she took it seriously and called.
- I'm not a phone person, as I'm autistic and it's just never been my preferred method of communication. Thus -- as a mama with a poison emergency question, the web option makes it all the more comfortable for me to contact Poison Control. Shaving off all the "hemming & hawing" time I have to go through prior to picking up the phone. So - I guess what I like most about webPOISONCONTROL is that it's going to help MANY MANY people - those who find using telephones in general, maneuvering telephones physically, or speech in general difficult. Poison Control will now be easily accessible. Thousands of additional people will feel able to utilize Poison Control now. And that's awesome!!
- It was a helping hand provided at no cost which relieved my worry that I wouldn't get help if I couldn't pay.
- It was instant answers while I was in a panic. I found the tool while I was waiting on hold with poison control on the phone, and found my answer faster than my call could be answered.
- It was quick and easy to find an answer and I could go back and re-read the information as needed.
- It was really easy and very very helpful, and it didn't feel like the situation was serious enough to call poison control but I was a bit worried so this was very helpful.
- It was very fast. I felt the information given was personalized and accurate.
- No need to talk to a person/anonymity, medication pictures, detailed explanations at the end about recommendation
- Questions were specific, easy to understand, and easy to answer. Ability to scan barcode.
- Quick response/information. Very thorough information and directions. Easy to use, convenient.

Put my mind at ease because I could read the advice and return to my case to get more info!
- Quick, easy answers. My toddler ate an unknown amount of TUMS and I was pretty certain that it wouldn't hurt him, but I wasn't positive. I did a quick Google search and was lead to this website. It was easy enough to enter all important info quickly and I received answers right away. The info confirmed little to no risk of harm. Before using this website, I already assumed I didn't need to rush my son to the hospital to see a Dr and that he didn't need any treatment, but I couldn't guarantee for sure. Plus I didn't know if I needed to call poison control over TUMS or not. Using this tool took away all my worry, confirmed my thought that there was no need to seek medical attention, and gave a precise and clear answer to my question of needing to call poison control or not. All aspects of this tool seem incredibly useful and helpful and make terrifying moments less scary by getting easy to understand answers QUICKLY in difficult times.
- Simple and to the point questions with applicable answers to choose from. Easy to understand, results were fast and posed in a NON-alarming way. Very informative.
- That I didn't have to talk on the phone. It's hard to talk with kids all talking at the same time.
- That I was able to, twice, avoid putting my son through stressful doctor or er visits because I am very much a "better safe than sorry" mother
- That there is an option to just try it out
- The pill identification was soooooooooooooo accurate
- The quick information, which saved me an unnecessary call to poison control and/or local first responders/ambulance. Superb Service!
- The relief of knowing I was ok. The end results that were clear on what to expect, and the red Info icons that clarified questions. Also I loved the "this is a test case" option.
- The short answers. That there weren't many questions. Answered and got straight to the point of letting me know if we needed to go to the ER. Letting me know symptoms and what to do. The follow up's show how personal this "tool" is. Shows that a concerned & worried & panicked parent is understood. I just don't know how to thank you & anyone involved with this. I hope my overwhelmingly gratitude is felt in this feedback. I am going to share this tool to everyone I know with a child & post it on every social media account I have. God bless you all.
- User friendly! Much easier than being on the phone while monitoring my toddler who ingested glue.
- Very intuitive interface, very specific list of drugs
- Was very impressed with the follow up emails. I really liked that feature.
- We were trying to decide whether to contact the pediatrician's office, if we should go to the emergency room... because we didn't know if our son actually ingested anything, and he seemed to feel perfectly fine, we decided to try this tool first. I felt confident we were doing everything that needed to be done given our situation thanks to the reassurance from webPOISONCONTROL.

Appendix B: The webPOISONCONTROL Surveillance Dashboard

As of December 2020, webPOISONCONTROL has managed more than 500,000 cases. The webPOISONCONTROL surveillance dashboard provides a mechanism to visualize poison exposure data and trends in near real-time. Data are from cases from 2017 up to midnight on the day prior to the analysis. The dashboard is available to sponsoring partners.

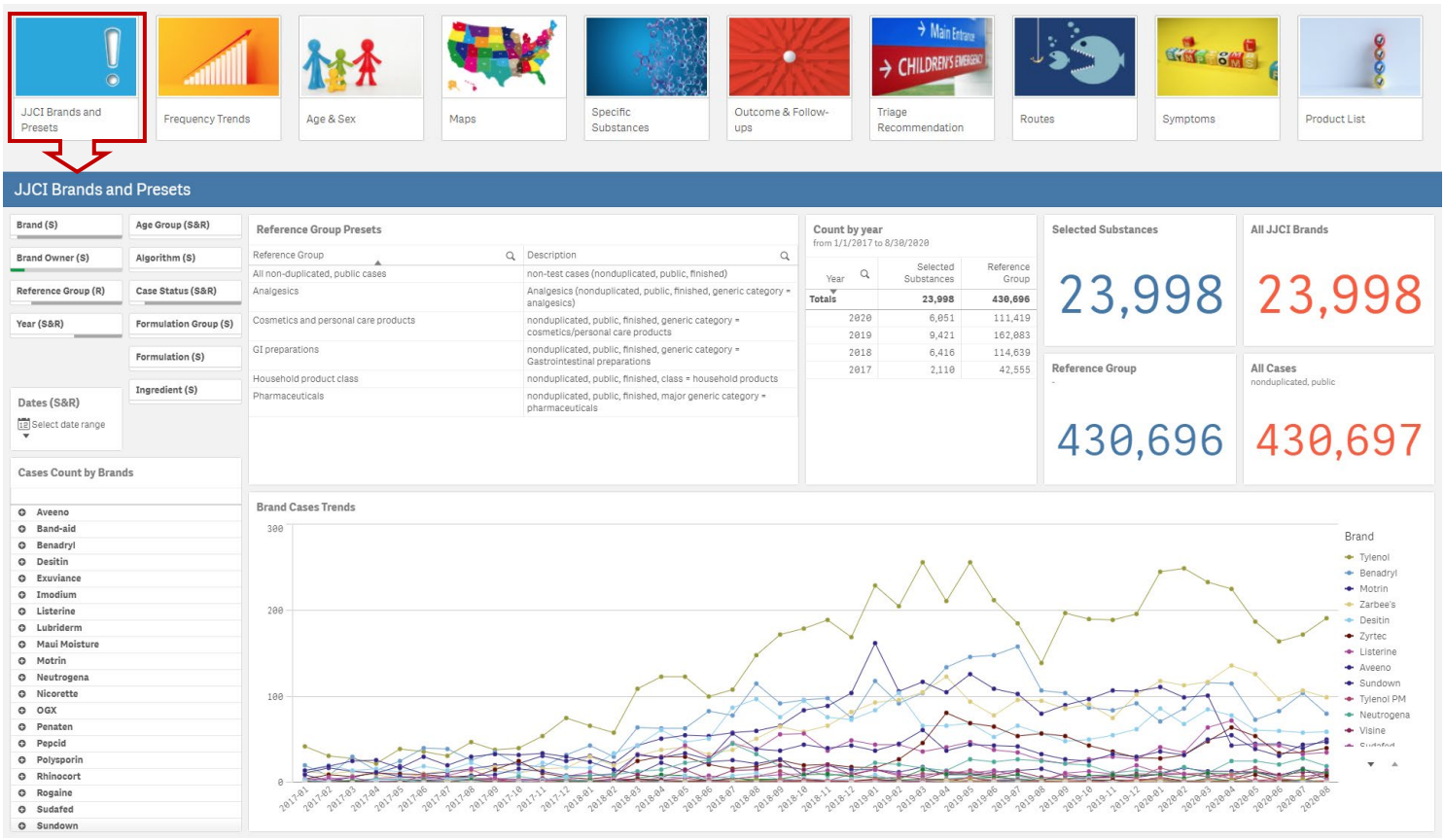
The following data points are viewable in the dashboard:

- User's location visualized in the "Maps" section of the dashboard. Users are asked to give permission for geolocation.
- Exposed person's age and sex. The exposed person must be between 6 months and 79 years old. Pregnant individuals are excluded. Age and sex are visualized in the "Age & Sex" section of the dashboard.
- Product or substance. Captured via substance name, pill imprint, or barcode, and analyzed by individual product, a group of products, a brand, or a generic category.
- Route of exposure. Depending on the substance and formulation, options include mouth, eye, skin, inhalation, bite or sting, injection, or combinations of routes.
- Amount. Users are offered multiple options for units of measurement, appropriate to the substance's formulation.
- Weight. In pounds or kilograms, if required by the associated ingredient algorithms to determine the recommendation.
- Time. Time from exposure to case start, in minutes, hours, or days.
- Initial symptoms. Whether the exposed person is experiencing any symptoms at the time the user completes the triage tool, and if so, any that are severe or not expected for the implicated ingredients.
- Initial triage recommendation. Home, call poison control, or go to an ER.

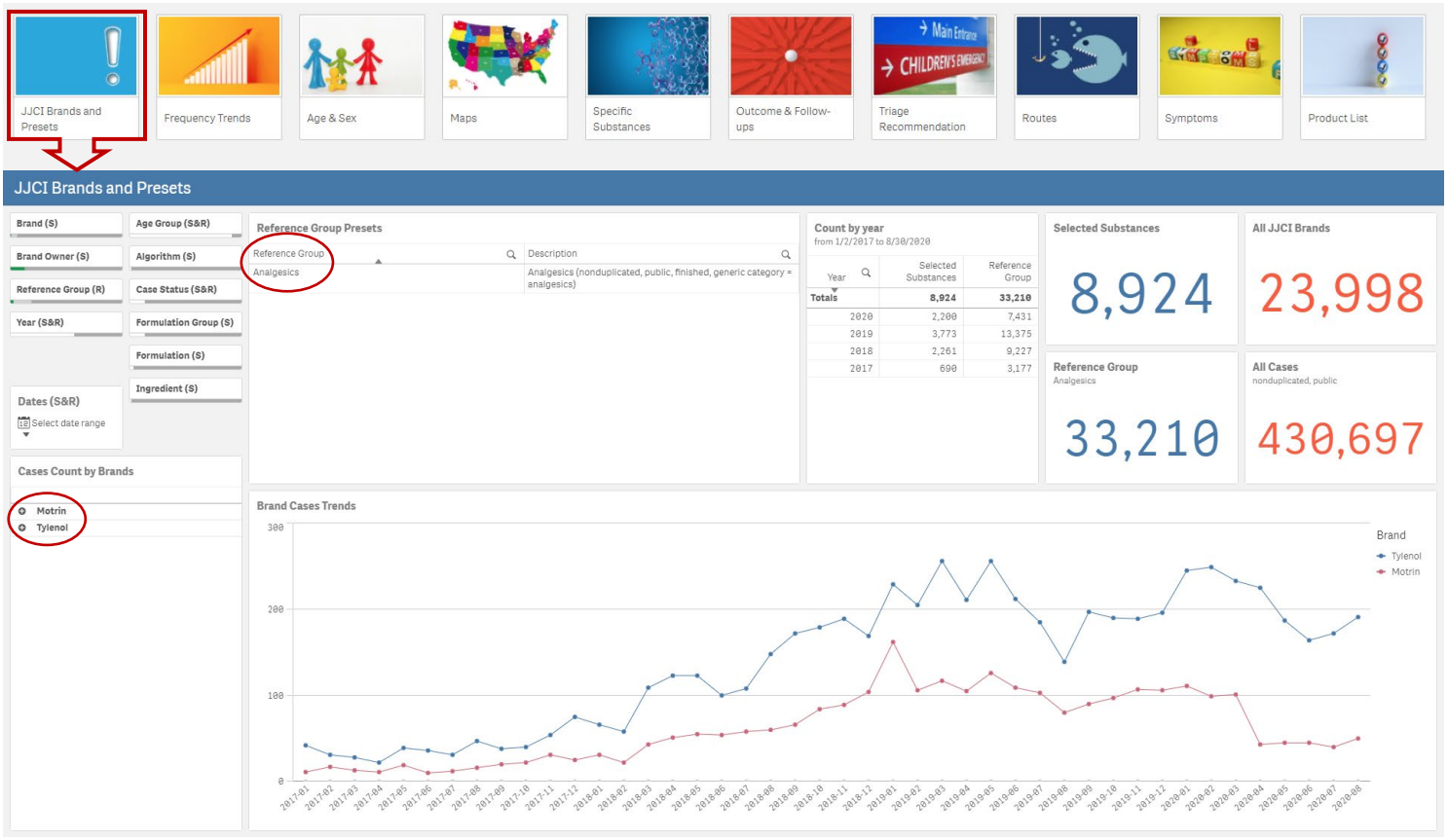
If the user provides an email address, automated follow up ensues, and additional information is collected, including:

- **Action taken**. What was actually done?
- **Specific symptoms** that developed after initial triage recommendation, the severity of each of those symptoms, and whether each symptom has resolved.
- **Final triage recommendation.** Reflects a change in the triage recommendation if one was required based on the symptoms that developed. Changes in the triage recommendation are infrequent.
- **Outcome:** No effect, Minor, Moderate, Major, Death, Unknown minimally toxic, Unknown potentially toxic.

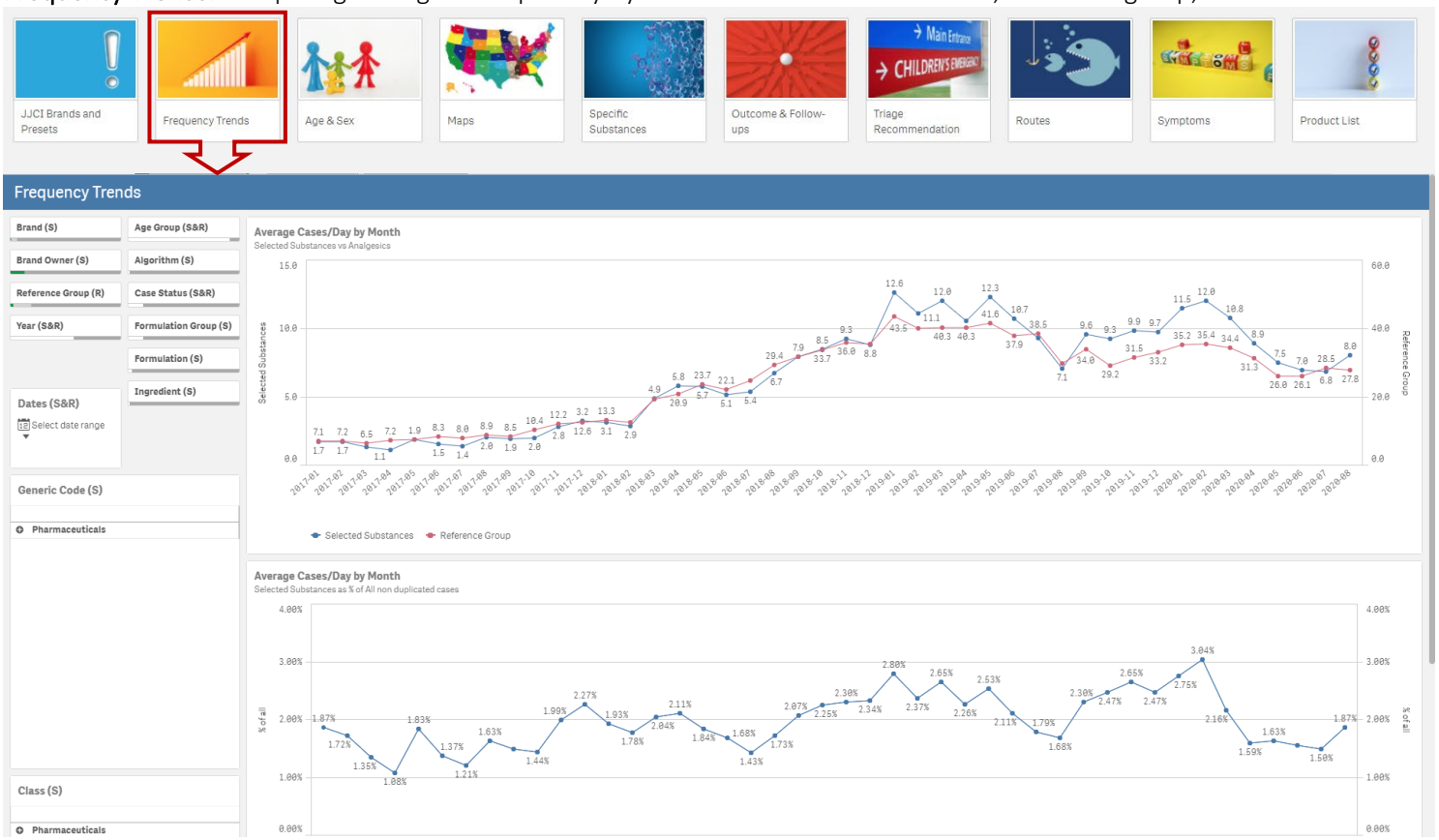
To begin using the dashboard, the user configures filters and selects a reference group. Filters include brands and products, ingredients, age group, formulation, triage algorithm, and date range. Each sheet, represented by an icon and title below, contains multiple graphs and tables, allowing the user to "slice and dice" multiple data elements and paint a comprehensive picture of unintentional exposures to one or more products.



The power of this dashboard is best realized by analyzing individual products, groups of related products, or brands. For the following examples, JJCI's Tylenol® and Motrin® are the selected brands and Analgesics is the reference group.

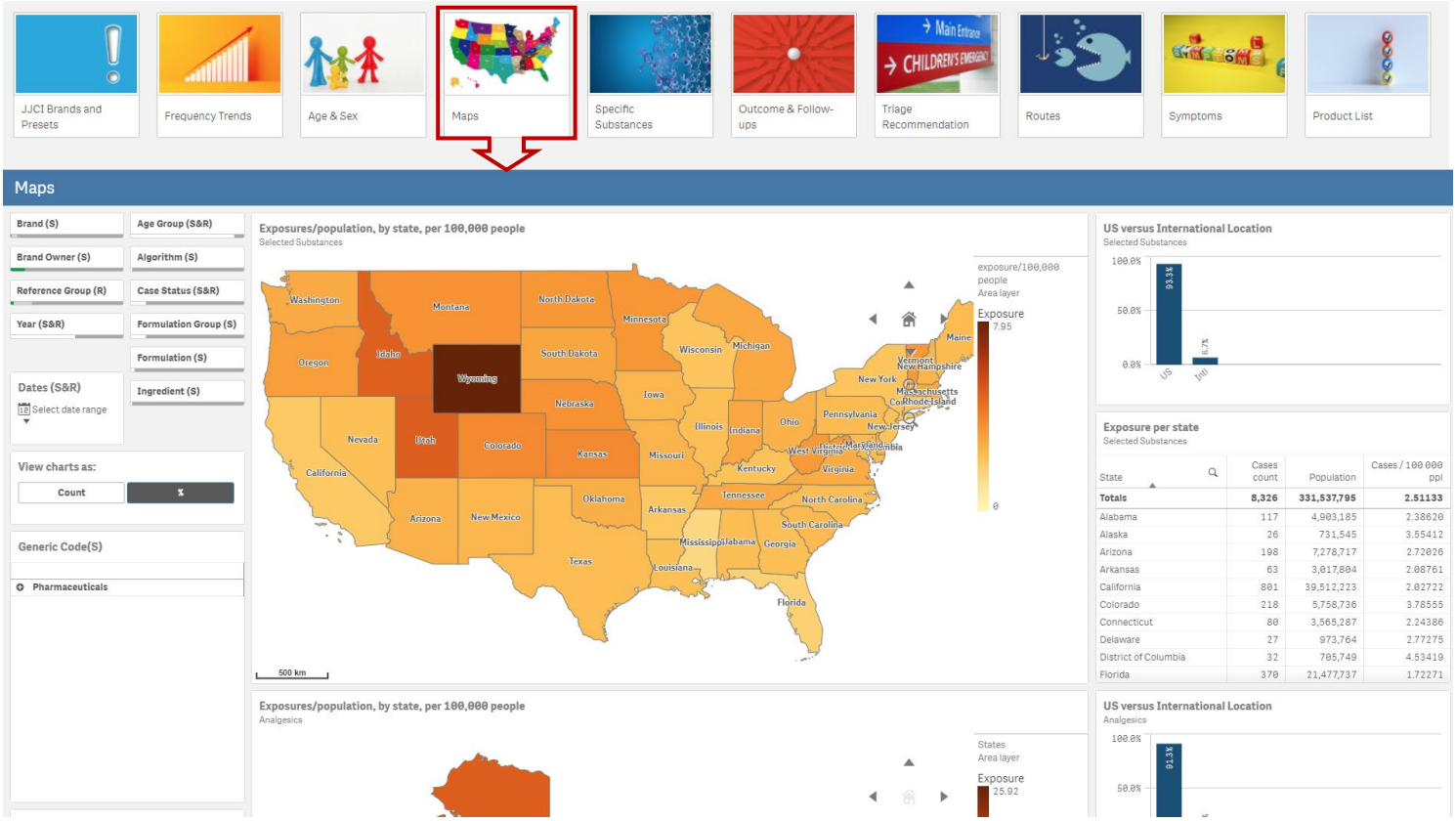


Frequency Trends: Comparing average cases per day by month for selected substances, reference group, and all cases.

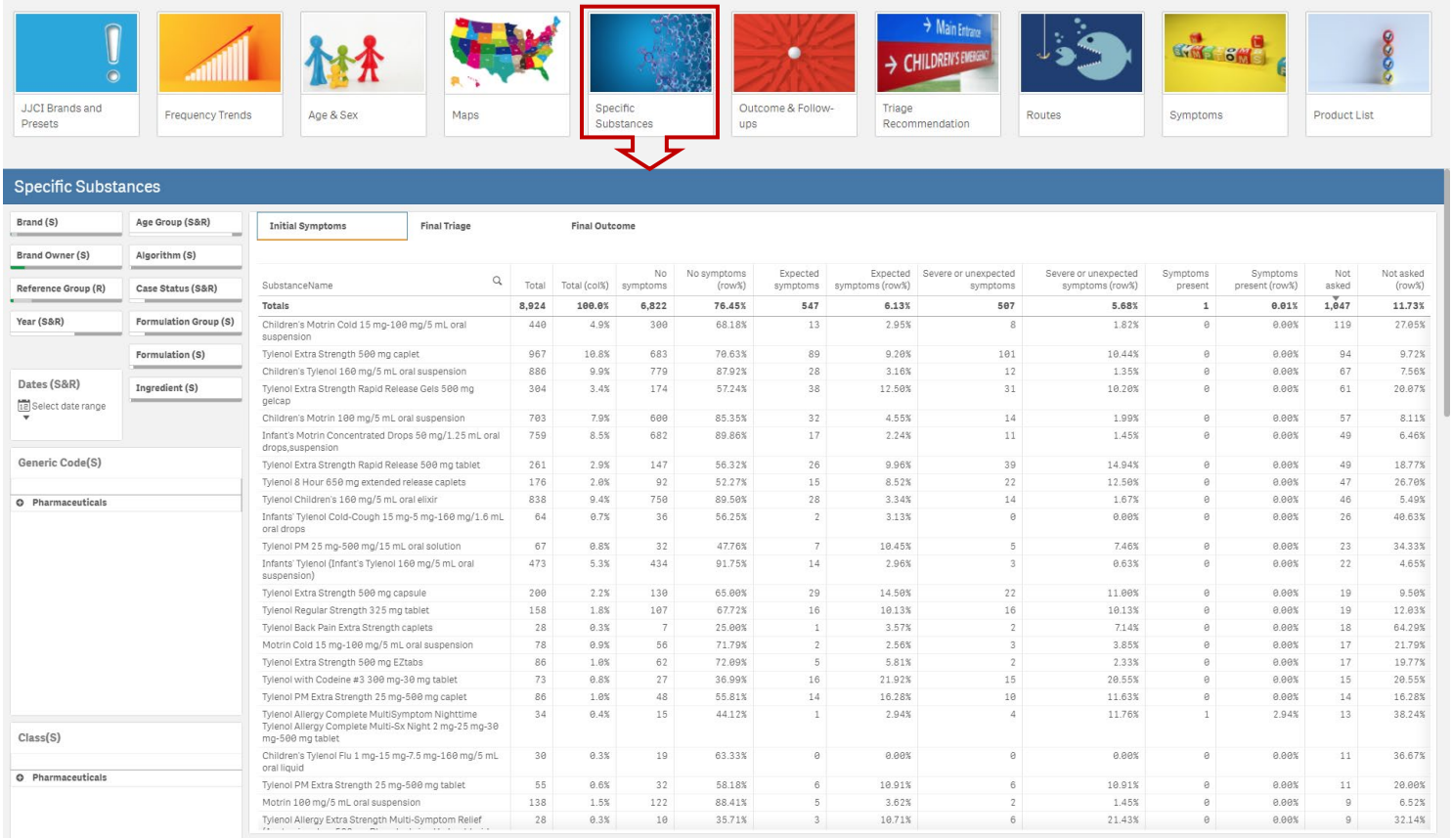


Age & Sex: Age and sex distributions of selected substances and reference group, by case counts or by percent of cases.

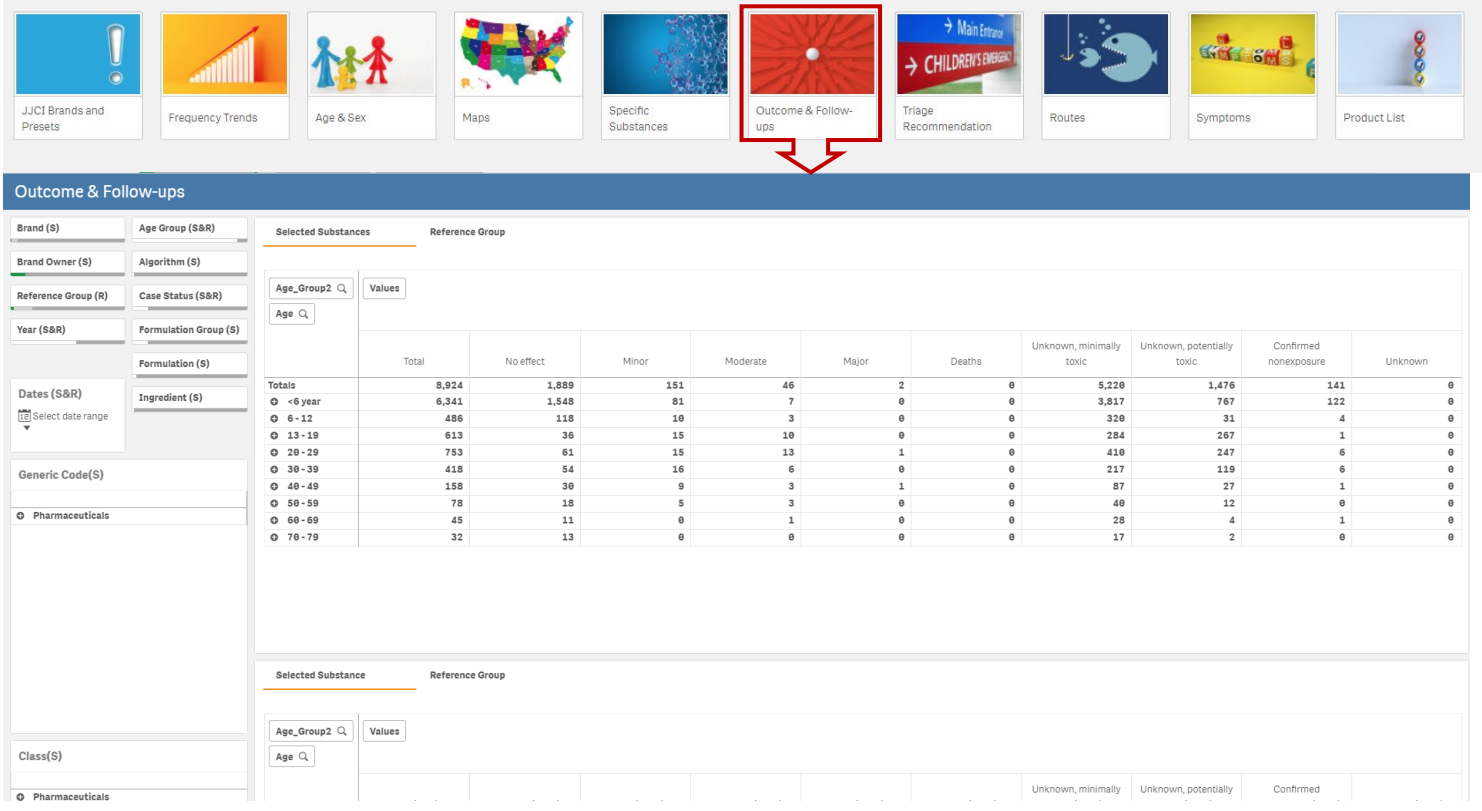
Maps: Heat map showing exposures per population, by state, per 100,000 people. Also U.S. vs. international location for selected substances and reference group.



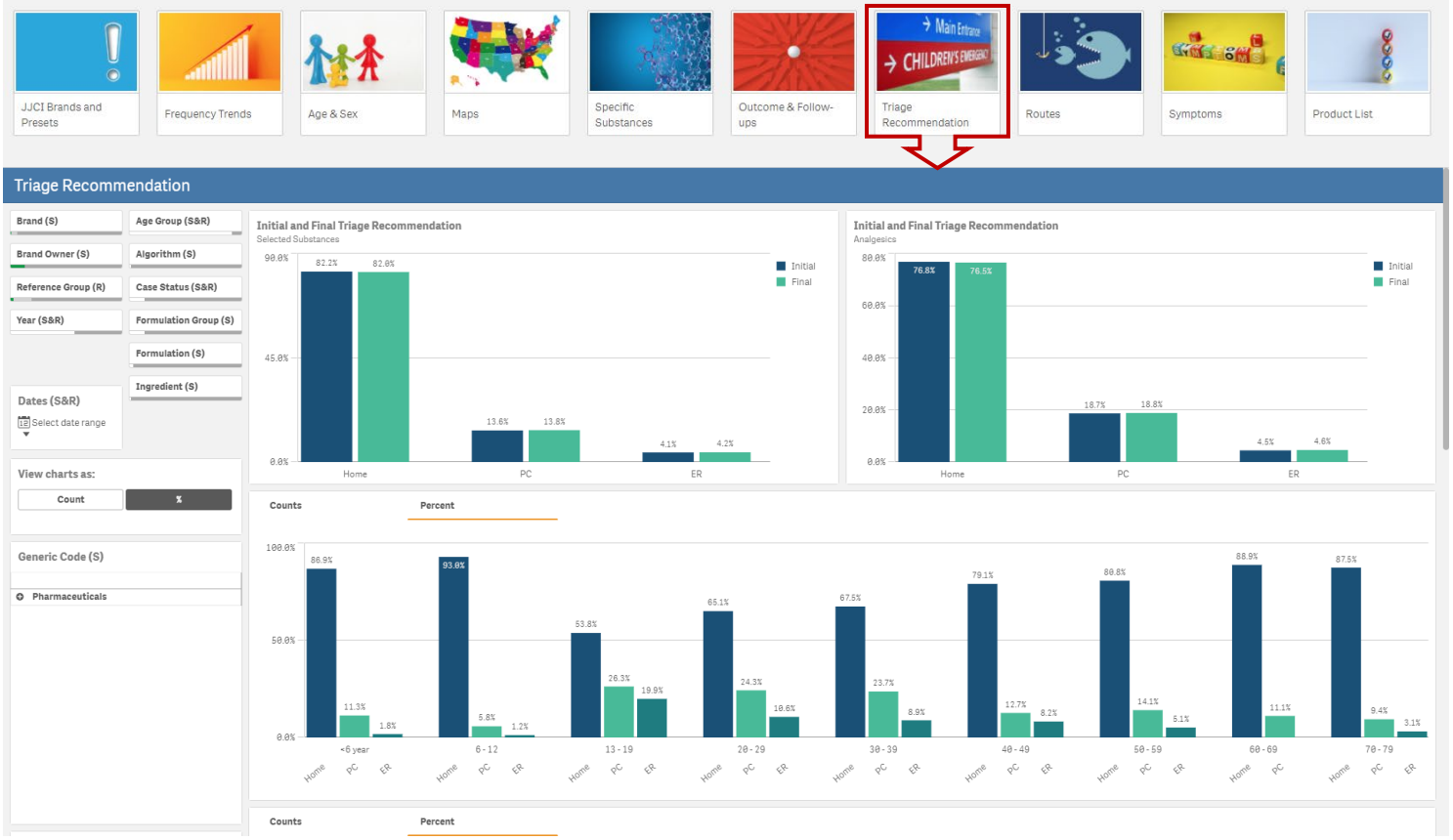
Specific Substances: Initial symptoms, final triage recommendation, and final outcome by specific substance or product.



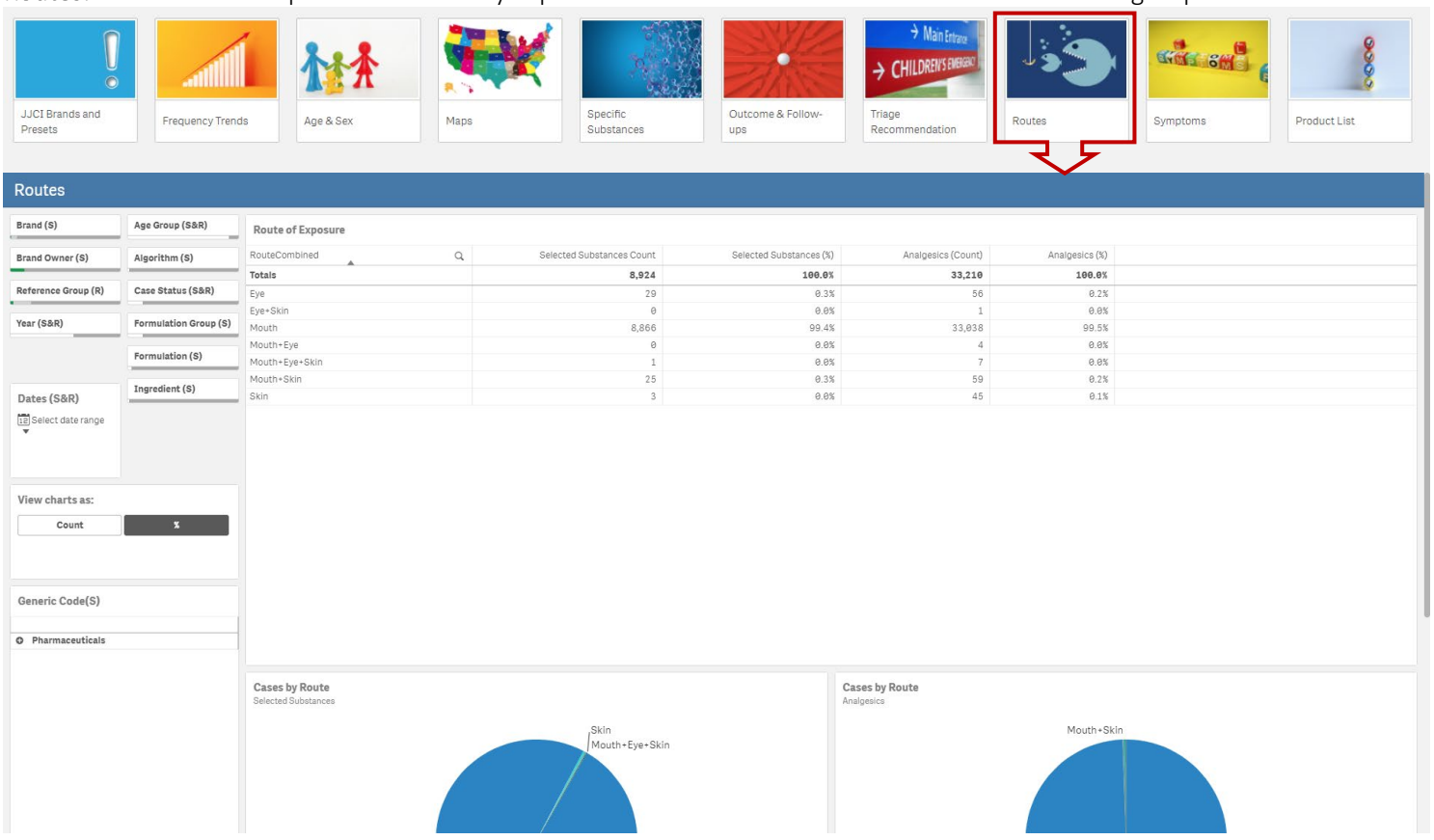
Outcome & Follow-ups: Final outcome by age group for selected substances vs. reference group, and cases grouped by number of follow ups for selected substances vs. reference group.



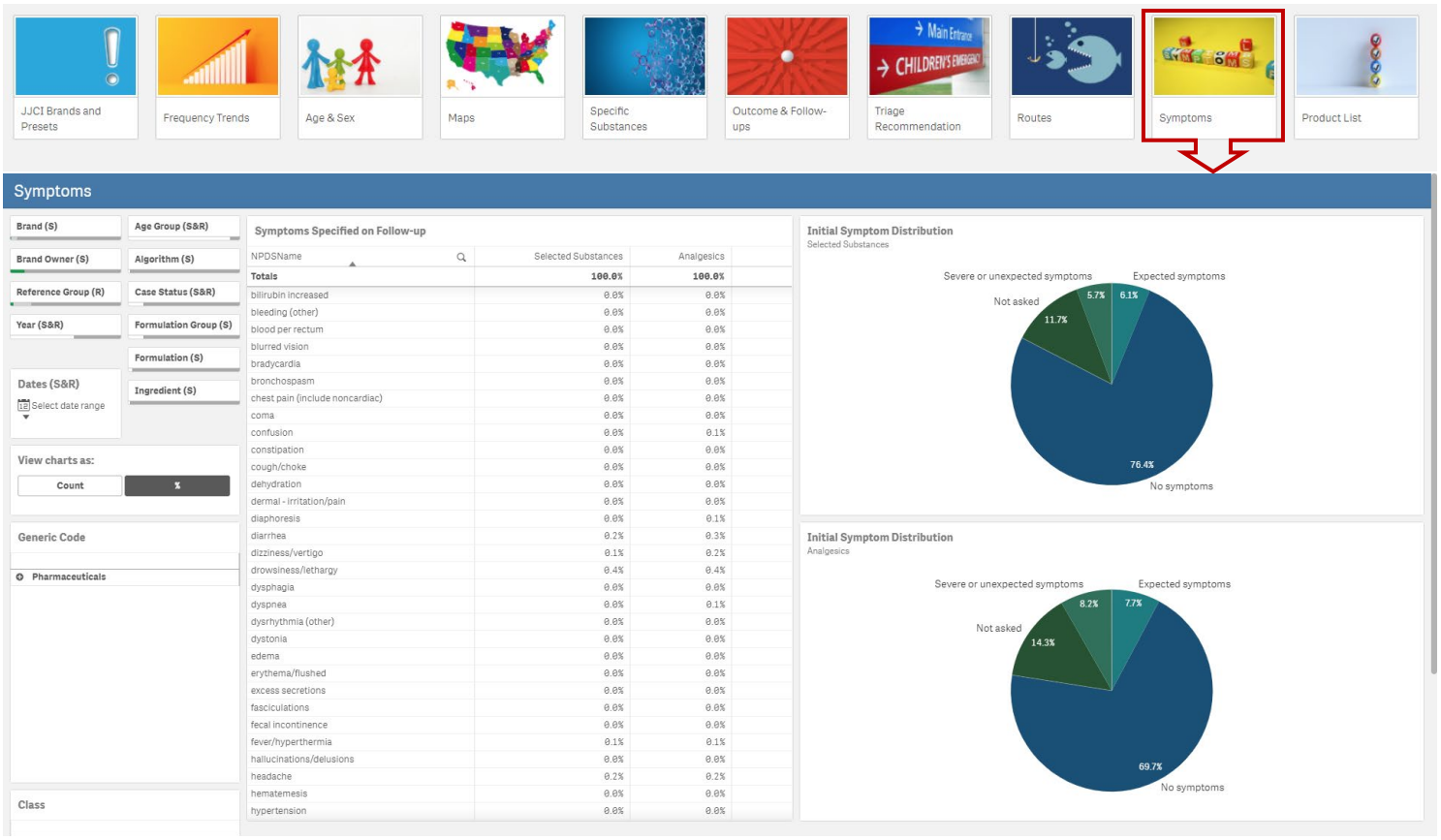
Triage Recommendation: Initial vs. final triage recommendation for selected substances vs. reference group as a percent of total cases, and by age group and route of exposure.



Routes: Case counts and percent of cases by exposure routes for selected substances vs. reference groups.



Symptoms: Symptoms specified on follow up and initial symptom distribution.



Product List: Substances in the web**POISON**CONTROL database, ingredients and algorithms, and unique product codes (UPCs) with associated images.