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SHARP
Strengthened International HeAlth
Regulations & Preparedness in the EU

WP9 Final Report

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Contents

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1. Introduction

This report forms Deliverable 9.3 of Work Package 9: Chemical Safety and Chemical Threats of the EU SHARP Joint Action (JA), as set out in the Grant Agreement. The EU SHARP Joint Action has received funding from the European Union, in the framework of the Third Health Programme (2014-2020).

This report summarises all the activities undertaken in Work Package (WP) 9 as part of the SHARP JA. For more detail, please refer to the full reports and outputs, available to download from the SHARP website.

The objectives of this report are to:

- Describe what was done by WP9 partners in SHARP
- Purpose of the outputs of WP9
- Recommendations for activities post-SHARP

1.1 WP9 activities

The main activities undertaken in WP9 and described in this final report are as follows:

- Fact-finding/gap analysis
- Surveillance of chemical incidents
- Training and exercises
- Standard Operating Procedures (SOPs)
- Other activities

The report will close with conclusions and recommendations/next steps to take, following the closure of the SHARP Joint Action

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2. Fact-finding/gap analysis activities

The D9.1 Fact-finding report aimed to: determine which areas within chemicals require further action, with a view to strengthen chemical core capacity implementation under IHR); to ascertain strengths and gaps of responding countries in their preparedness for chemical incidents; and to identify priorities for the WP9 training materials which would later be developed. As part of our fact-finding activities, SPAR reports and JEE reports undertaken in European countries were analysed to provide the needs of European countries in terms of chemical health threats. To follow this up, WP9 produced a questionnaire (in the SelectSurvey online platform, hosted by UKHSA) consisting of 49 questions. The questionnaire was intended to provide background information for the other WP9 activities, including current capacities in the responding countries, chemical topics which were high on the list of their country's training needs and views on a chemical laboratory network.

The questionnaire was sent out to individuals or in some cases organisations (to request a nomination of individuals with appropriate skills/experience), based on the contact lists of the SHARP and Healthy Gateways Joint Actions and covering all SHARP project partner countries. Those questioned were asked to recommend an alternative, suitable contact from their organisation if they thought they could not participate. A list of the questions can be found in Annex 1 and a full list (with answers) can be found in the WP9 fact-finding report. In total, over 90 people viewed the questionnaire with 19 completing it, with respondents representing 14 countries and 17 organisations within Europe. The sections of the questionnaire included: Preparedness and response; Surveillance; Existing mechanisms/resources; Chemical laboratory analysis networks and Training requirements.

Background information relevant to the questionnaire was collated in the Fact-Finding report (D9.1), including a background scan of SPAR and JEE reports which highlighted the need for strengthening chemical capacities in Europe. The answers collected from the questionnaire added further detail to this, as respondents reported the most important topics/areas that required further training regarding chemical health threats and included risk assessment, recovery, sampling and detection of chemicals, decontamination and improved collaboration.

While many countries had existing chemical plans which were tested through exercises, plans are often not updated following the results of the exercise. A need for improved multisectoral collaboration was also identified through the answers to the questionnaire and also the WP5 workshop held in Riga, Latvia in January 2020, where improving interconnections was identified as a main outcome for chemicals.

The questionnaire responses underlined a gap in the alerting and reporting of chemical incidents, as RAS-CHEM was an established tool for this purpose and is now no longer active. In addition, very few respondents (23%) are part of a chemical network in Europe, whereas over half would be strongly interested in joining one. This is

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addressed in the Chemical laboratory network report, along with suggested steps to take to establish such a network.

3. Surveillance of chemical incidents

Chemical surveillance literature review

A literature review was conducted focussing on chemical surveillance that included examples of existing systems in use, available methods, good practice and to assess which areas of surveillance needed improvement. Whilst many robust examples of public health surveillance systems for chemical health threats and exposures were found, alongside many examples of the utilisation of chemicals and environmental surveillance systems for public health use, there were significant gaps identified in the literature. These include:

- The review did not find any surveillance systems monitoring chemical incidents at industrial sites.
- No examples of long-term proactive water surveillance systems with a public health focus were found. Again, it may be a hole in the search strategy as water specifically was not searched for.
- There were no papers found investigating nor evaluating land chemical contamination surveillance. No papers were published or found on describing land contamination registries for surveillance purposes.
- There was only one example of the use of registries for public health surveillance of chemicals found in this review and this needs addressing.
- While quite a few studies emphasised the importance and need of biomonitoring surveillance, only one example from Russia that utilised biomonitoring surveillance of xenobiotic poisoning for public health and the large European Human Biomonitoring Initiative (HBM4EU) was found
- There was an unexpected lack of studies on paediatric lead surveillance systems
- While some systems exist (such as the EPHSS in the UK), no studies were found which formally evaluated a chemical surveillance system for public health, showing that this area needs further development

However, some of the things that were not picked up in the literature search may have been overlooked due to the search terms used, which focused on chemical incidents which affected public health. For example, specific terms such as water, contaminated land or biomonitoring were not searched for, which may explain their absence in the search results.

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From the review, it is recommended that future studies need to formally evaluate chemical surveillance systems for public health against the various standards set in international frameworks (e.g. IHR (2005), comparison with USCDC and ECDC standards). A comparison of standards set in international frameworks could also be integral for future work. From this, more formal evaluations against set criteria endorsed internationally could be carried out.

Surveillance strategy report

The surveillance strategy report aimed to review chemical health surveillance (globally, but with a focus in Europe), provide background information and highlight examples of good practice of surveillance methods. The report assesses the benefits of surveillance in relation to public health preparedness and provides a background on what surveillance is, why we do it and the requirements of countries to adhere to the International Health Regulations (IHR, 2005).

This report includes a wide range of useful resources to signpost the reader to further information, thus improving their own learning and understanding of chemical surveillance. It is hoped that the report itself will act as a resource for those seeking to implement chemical surveillance systems if they do not already exist or, to strengthen those that already exist. As every country will have different priorities, this report is not intended to be prescriptive, rather to highlight examples of good practice and the principles of chemical surveillance so that readers may strengthen surveillance in their country in line with existing legislation/guidelines/procedures.

This report has provided a basis for understanding what a surveillance system for chemicals is, what is entailed for such a system and how one could feasibly be established. Some of the main types of surveillance for chemical exposures have also been detailed, as has the range of indicators which can be used for more structured forms of surveillance. We have detailed key components for developing environmental public health surveillance focusing on chemical health risks.

The report has also given perspectives and examples from a range of countries, including systems which are in place in the UK, the US, Canada and Slovenia. For instance, Event-Based Surveillance (EBS) is a rapid, low-cost method to get a good idea of the kinds of chemical incidents which are occurring, allowing the mapping of certain trends. It also utilises unconventional data sources (e.g., social media and other online news sites). According to the SHARP questionnaire sent to project partners 64% of respondents already implement some EBS methodology in their surveillance. However, this method alone can be unreliable and should be combined with other methods for horizon scanning. We have identified key characteristics and examples of best practice form around the world.

Based on this report the gaps in chemical surveillance include: a lack of funding for dedicated chemical surveillance systems, often chemical surveillance systems can be

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left behind compared to other health threats (communicable disease) and as such, are using old tools and resources designed for communicable disease surveillance. In addition, chemicals are rarely included in integrated surveillance systems. Other gaps include the lack of dedicated guidance specifically for chemical health surveillance rather than generic guidance designed for communicable diseases (for which this report hopes to address), skilled staff with experience, and the lack of understanding of the priorities for the need of chemical surveillance by public health agencies.

The foreseeable future should see the adoption of chemical health surveillance by public health agencies, and the adoption of new technologies and developments in the role of Artificial intelligence (AI) in the future of surveillance. More effort should be made to include all hazard health threats in a surveillance system, to strengthen surveillance for all forms of health threats, maximise efficiency and use of funding and avoid duplication of effort. In addition, data should be connected from all local, national and global sources of information, data should be captured electronically and automated using AI where possible. There must be effort made to remain abreast of developments in tools, data systems and technologies which could improve the way chemical surveillance is conducted.

4. Training and exercises

WP9 produced a series of training materials, namely PowerPoint lectures, case studies and an exercise scenario. These materials were delivered in 2 online workshops (via zoom) on chemical health threats on the 6th-7th June and 12th-13th October 2022. The workshops were organised in collaboration with WP8 and WP2 and 27 participants (representing 7 countries) attended in June, while 83 (14 countries) attended in October. Both workshops utilised the same training materials, but the materials were modified for the second workshop to integrate the feedback received from the first.

The topics covered in the workshops were as follows:

- Introduction to chemicals and chemical incidents
- IHR (2005) and requirements for chemicals
- Chemical incident preparedness
- Chemical incident response
- Risk assessment of chemicals
- Multisectoral preparedness and response to chemical emergencies
- Recovery from a chemical incident

Following these lectures, case studies were presented and accompanied by questions designed to consider how the case studies were handled and the response could be improved, as well as testing the participants on what we had covered in the workshop

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up to that point e.g. how would a risk assessment be conducted, what should be in the preparedness plan of the incident site.

Finally, a chemical incident scenario, designed by WP9, was presented alongside a number of interactive questions (via live online questionnaire) to allow the participants to show what they had learned in the workshop, and consider how they would respond to such an incident in their country (e.g. what would be done differently in your country?).

Table 1 below shows the timetable from the WP9 workshops.

Table 1. WP9 Chemical health threats workshop timetable

Day 1		
Time (approx.)	**Content**	**Responsible Partner/ Speaker**
10:00 – 10:10	Welcome and introductions	Tom Gaulton
10:10 – 10:20	Overview of the workshop and of Day 1	Tom Gaulton
10:20 – 10:40	Introduction – Chemicals and chemical incidents	Anja Jutraž Tom Gaulton
10:40 – 11:00	IHR overview and requirements for chemicals	Anja Jutraž
11:00 – 11:15	Break	
11:15 – 11:35	Chemical incident preparedness	Anja Jutraž Matej Ivartnik
11:35 – 12:00	Chemical incident response	Tom Gaulton
12:00 – 12:50	Lunch	
12:50 – 13:20	Risk assessment of chemicals	Matej Ivartnik
13:20 – 14:50	Example case studies Questions on incidents to review day's material Go through IHR Annex 2	Tom Gaulton Matej Ivartnik Anja Jutraž Katarina Bitenc Majda Pohar Nina Pirnat Darko Mehikič
14:50 – 15:00	Review and End of Day 1	Tom Gaulton
Day 2		
Time (approx.)	**Content**	**Responsible Partner/ Speaker**
10:00 – 10:15	Review of Day 1 and Overview of Day 2	Tom Gaulton

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10:15 – 10:45	Multi-sectoral cooperation in a chemical incident	Tom Gaulton Matej Ivartnik
10:45 – 11:15	Recovery of a chemical incident	Tom Gaulton Matej Ivartnik
11:15 – 11:30	Break	
11:30 – 12:15	Interactive exercise part 1 (Slovenian case study Melamin)	Matej Ivartnik Anja Jutraž Katarina Bitenc Majda Pohar Nina Pirnat Darko Mehikič Tom Gaulton
12:15 – 13:15	Lunch	
13:15 – 14:15	Interactive exercise part 2	Tom Gaulton Matej Ivartnik Anja Jutraž Katarina Bitenc Majda Pohar Nina Pirnat Darko Mehikič
14:15 – 14:30	Review of day 2	Tom Gaulton

Evaluation questionnaires were sent to participants after the workshops were concluded, with a deadline of 1 week to complete. In the second workshop questionnaires were also sent beforehand to allow comparison between pre- and post-workshop results to assess the success of the workshops in improving the learning of participants. Below are the results of the general evaluations for the 1st and 2nd workshop (figures 1 and 2 respectively).

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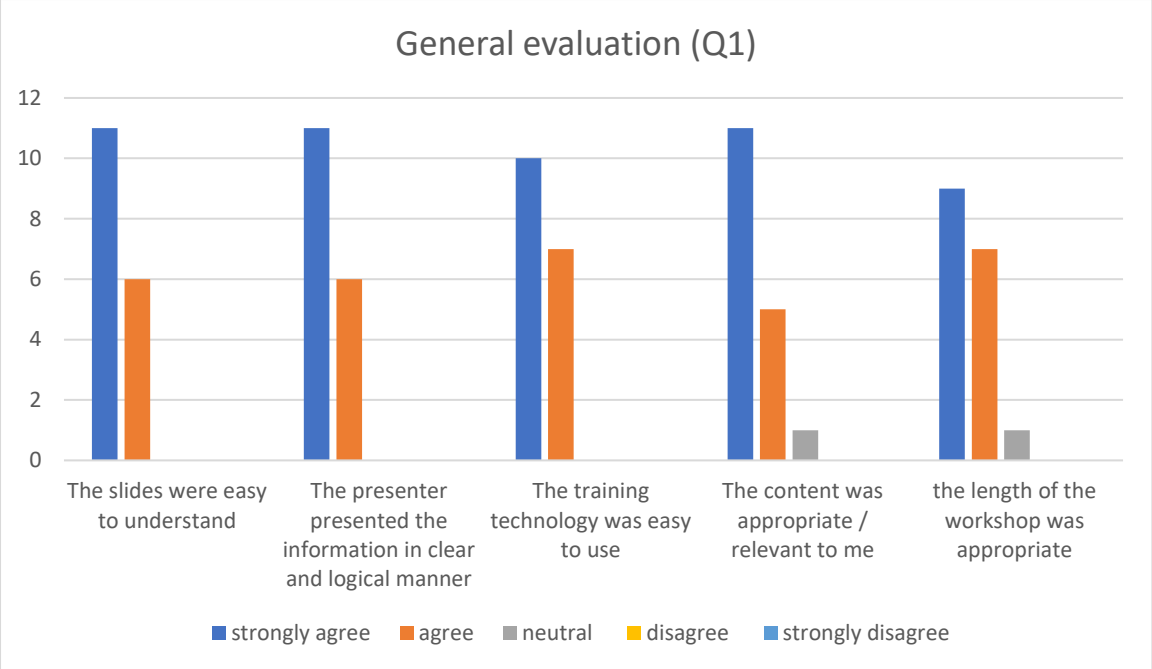

Figure 1. General evaluation of workshop 1

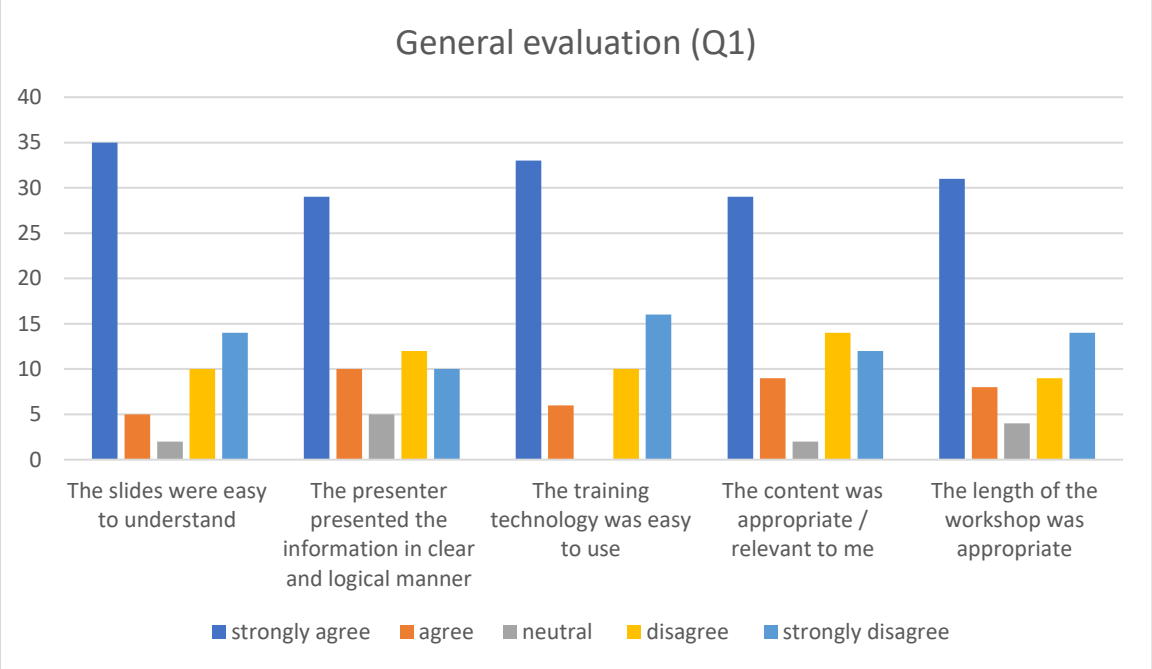

Figure 2. General evaluation of workshop 2

The workshops were well received and the responses to the surveys were mostly positive. Workshop 1 asked participants to rate the workshop and the responses were

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overwhelmingly positive and almost every participant said they would recommend the training to others. Recommendations were taken into account and used to amend the material for Workshop 2. Workshop 2 asked participants to complete both a pre- and post- workshop survey, to see if the workshops changed their opinions. In the pre-workshop survey, 42% of respondents rated their understanding of the requirements to prepare and respond to chemical incidents as average, 46 % as not good or poor, and only 12 % as good or very good. The same question was asked in the post-workshop survey and 22 % rated it as very good, 48% as good, 17 % as neutral, 11 % as not good and only 3 % as poor. This shows that the workshops had a positive impact in the understanding of participants relating to the response to chemical incidents. The remaining questions mirrored the survey for workshop 1, where responses to the questions were again very positive and complimentary (most responses were good or very good) and again almost every participant said they would recommend this training to others.

5. SOPs

As part of the chemical safety and chemical threats Work Package 9 (WP9) of the SHARP Joint Action (JA), previous work and outputs of WP9 were built upon to draft model Standard Operating Procedures (SOPs), which are intended as background documents to provide guidance to readers with little experience in the topic areas, which should be built upon with further research. A suggested sequence or stepwise procedure is included in the SOPs, to be adapted and used in accordance with local/regional plans

The SOPs are intended to suggest a procedure to begin these activities or to modify these activities if they already exist in country and should be adapted as such. The SOPs are also meant to be used in combination with existing local processes and protocols, to complement and not to replace them. It is hoped that the SOPs could improve knowledge of chemical health threats and some areas of the management of chemical incidents and to contribute to improved IHR core capacities for chemicals.

The SOP topics were chosen based on the results of the questionnaire and fact-finding report, where participants were asked to rate topics which were most relevant and required further training in their country and feedback from the WP9 chemical workshops which were delivered.

Below is a brief description of each SOP:

- **Surveillance (Event-Based Surveillance) of chemical incidents**
  SOP for Event-Based Surveillance of chemical incidents, which is crucial for ensuring rapid detection and response to potential hazards. It is a good place to start for a country/organisation that does not currently conduct regular surveillance for chemical incidents or exposures.

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- **Multisectoral collaboration during a chemical incident**
  SOP for multisectoral collaboration during chemical incidents provides background and examples of multisectoral collaboration from the UK, Slovenia and the Netherlands, with key principles and references to established guidance on managing a response to chemical incidents with multiple sectors.

- **Risk analysis process of chemical incidents**
  SOP for risk analysis of chemical health threats provides guidance to ensure the human health effects from chemical incidents are minimised. This SOP provides an overview on the risk analysis process for chemical incidents, how risk assessments are undertaken, how they change as the incident progresses and how they are used in reducing human exposure to chemicals.

- **Decontamination during a chemical incident**
  SOP for decontamination of chemical exposure provides background and key concepts of decontamination, which is critical for ensuring the safety of personnel and the environment during chemical incidents.

- **Sampling and monitoring during a chemical incident**
  SOP for sampling and monitoring during a chemical incident provides an overview of these important functions in the context of fires. Guidance is included on assessing the extent of contamination, identifying potential health risks, and guiding response efforts accurately.

- **Recovery from a chemical incident**
  SOP for recovery from a chemical incident provides background and key references to provide a structured and coordinated approach to restoring areas affected by a chemical incident to normalcy.

6. Other activities

Aside from the main activities in SHARP which resulted in deliverables and other major outputs, other activities undertaken in WP9 include:

Chemical laboratory response network – scoping report

This report was created for the Strengthened International HeAlth Regulations and Preparedness in the EU (SHARP) Joint Action, which aims to strengthen preparedness in the EU against serious cross-border threats to health and support the implementation of International Health Regulations (2005). As part of the SHARP Work Package on Chemical safety and Chemical Threats, the desirability and

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feasibility of setting up a European chemical laboratory network to respond to serious chemical health threats was investigated.

The desirability of a chemical laboratory network was assessed through a questionnaire developed for gap analysis of chemical capacities in European countries. Questions included: the interest of joining a network, the kind of input organisations would be prepared to provide and how likely it is that the organisation would commit to a network. The questions and responses reported herein were a part of a larger survey, of which the remainder of the results will be published in the WP9 fact-finding report. The feasibility of establishing a chemical analysis network was assessed by searching for examples of existing networks (either chemical or biological) and summarising the requirements of these networks and whether there are any lessons to be learned or examples to follow, from how these networks are set up and maintained, which could be applied to a chemical analytical network.

From the results of the WP9 questionnaire and interviews conducted for this report, it seems that there is desire for a chemical laboratory analysis network for health threats in Europe. There are also a number of lessons learned from other networks which can aid the successful initiation of such a network. However, further details on the requirements of the network are needed in order to receive greater buy-in from European organisations and their countries at this stage. Aspects of the network to be considered are, for instance: size, scope/remit, technical aspects (such as requirements for instrumentation/expertise and accreditation), costs involved and funding etc. Moreover, we suggest that the EC Scientific Committee for Health, Environment and Emerging Risks (SCHEER) is involved in the establishment stages, due to their expertise and experience in dealing with cross-border chemical health threats.

Strengthening existing mechanisms

At the start of SHARP, the WP9 team collated a number of existing mechanisms, resources and tools which have been produced by previous projects. These resources were used to contribute information and examples of further reading in the previously described WP9 outputs such as the training materials, the surveillance strategy report and the SOPs.

7. Conclusions

Despite the COVID-19 pandemic, which caused significant delays in all work areas of SHARP, the WP9 team were able to complete all the deliverables and milestones described in the SHARP Grant Agreement.

Our fact-finding report provided a good base to the other activities and guided the training materials, SOPs and surveillance outputs. Questions on the desirability of

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forming a European chemical analysis network were expanded to produce the report on establishing such as network, with recommended steps to take to establish a network. The surveillance strategy report and literature review build on the need for chemical surveillance and provide an excellent starting point for those who do not undertake chemical surveillance, with many useful points and examples to help those improve their existing surveillance methods. The training materials and workshops built further on the needs of the respondents to the questionnaire and can continue to be used in training staff with little experience in chemical health threats. The SOPs produced will also help greatly in training and understanding of key concepts in chemical health threats and chemical incidents.

It is hoped that these outputs will continue to be used and updated beyond SHARP, in the training, development and awareness raising among those who may be involved in the surveillance, reporting, preparing and responding to chemical incidents.

8. Recommendations/Next steps

Below are some recommendations to continue selected WP9 activities following the closure of the SHARP JA:

- The fact-finding report identified that very few organisations have access to a chemical reporting and alerting system. At the time, most of the respondents to the questionnaire were aware of RASCHEM, but now this system is no longer active, highlighting a serious gap in the alerting and reporting processes for chemical incidents (particularly cross-border incidents).
- The chemical laboratory analysis network report highlights a strong need for such a network across Europe, where countries with less infrastructure and capacity to analyse unknown chemicals could ask the network for assistance and expertise in dealing with a chemical incident. The report suggests steps to take to establish such a network and these should be explored once the SHARP Join Action has closed. This is recommended as a sustainable priority in the WP4 sustainability final report.
- The surveillance outputs should be used to establish chemical incident surveillance systems where none currently exist, or could be used to strengthen existing systems. The literature review provides a list of existing gaps and recommendations to mitigate these gaps. The foreseeable future should see the adoption of chemical health surveillance by public health agencies, and the adoption of new technologies and developments in the role of Artificial intelligence (AI) in the future of surveillance. More effort should be made to include all hazard health threats in a surveillance system, to strengthen surveillance for all forms of health threats, maximise efficiency and use of funding and avoid duplication of effort. In addition, data should be connected

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from all local, national and global sources of information, data should be captured electronically and automated using AI where possible. There must be effort made to remain abreast of developments in tools, data systems and technologies which could improve the way chemical surveillance is conducted.

- Some of the outputs from WP9 (namely the SOPs and training materials) could be used in comprehensive training programs for all personnel involved in chemical incident management. Feedback should then be provided from personnel who have used the materials either in real situations or in training (such as incident scenarios or exercises) on their usability and effectiveness. The results of these training /exercises could be used to update national plans and processes to ensure chemical preparedness is effective and up-to-date. The SOPs are also recommended as a sustainable priority in the WP4 sustainability final report.

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