CAPACITY/CAPABILITY ASSESSMENT

ECDC Public Health Emergency Preparedness Assessment for Estonia, 2024

Under Article 8 of the Regulation (EU) 2022/2371

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Abbreviations

ARI	Acute Respiratory Infection
EEA	European Economic Area
EU	European Union
EURLs	EU reference laboratories
ICD	International Classification of Diseases
ICU	Intensive Care Unit
IHR	International Health Regulations
ILI	Influenza-like illness
IPC	Infection Prevention and Control
MCM	Medical counter measures
RSV	Respiratory syncytial virus
SARI	Severe Acute Respiratory Infection
SOP	Standard operative procedure
SPAR	State Party Self-Assessment Annual Report
WGS	Whole Genome Sequencing

Executive summary

Background

As stated in Article 8 of the Regulation (EU) 2022/2371 on Serious Cross-Border Threats to Health, ECDC has the responsibility, in coordination with relevant Union agencies and bodies, to conduct Public Health Emergency Preparedness Assessments of all European Union and European Economic Area (EU/EEA) countries every three years regarding the state of implementation of their national prevention, preparedness and response planning. This assessment is based on 16 capacities included in the template used by countries when providing information on their prevention, preparedness and response planning in accordance with Article 7 of the Serious Cross-Border Threats to Health regulation. The aim of the assessments are to improve prevention, preparedness and response planning in EU/EEA countries by implementing the recommendations following individual country assessments. Within nine months of receiving the ECDC assessment report, if applicable, countries are requested to provide an action plan addressing the proposed recommendations of the assessment.

This report presents the findings and recommendations of the first assessment conducted in Estonia. The assessment involved a desk review of relevant documents, followed by a three and a half-day mission from 1 to 4 October 2024. The visit to the country was shorter compared to other missions because a Joint External Evaluation on core IHR capacities was conducted in Estonia in October 2023. The ECDC-led team assessed five capacities in depth and validated Estonia's responses to the Article 7 questions for the remaining capacities, while considering the results from the recent Joint External Evaluation. The five capacities assessed in depth were Laboratory capacity; Surveillance; Health Emergency Management; Zoonotic diseases and threats of environmental origin, including those due to the climate, and Antimicrobial resistance (AMR) and healthcare-associated infections (HAIs).

Key findings

The national-level legislation and policies cover processes for managing public health emergency events, including multi-sectorial and multidisciplinary aspects. Currently, Estonia is facing budgetary cuts, in addition to an already significant shortage of health workforce. Following the COVID-19 pandemic, significant investments were made in the Estonian laboratory capability and capacity, including the setting up and running of state-of-the-art technologies for whole genome sequencing and bioinformatic analysis. These capacity-building initiatives have a positive impact on preparedness for future emergencies and surveillance of communicable diseases. The surveillance for Acute Respiratory Infections (ARI), and Severe Acute Respiratory Infections (SARI) is very comprehensive.

Prevention, preparedness and response plans cover multiple hazards, ranging from the strategic to the operational level, and have been tested. A structured Incident Management System assigns the lead role in preparedness and response to health crises to the Health Board. Emergency logistics and supply chain management systems are in place at the national level for health emergency events. The stockpile mechanism is undergoing important reforms, aimed at further strengthening this capacity.

The legal basis for AMR and HAIs surveillance is solid and the overall AMR strategy and the Human Health National Action Plan on AMR has been drafted. However, the final legal framework should also address limitations with the current antimicrobial consumption data. There is no specific budget earmarked for the National Action Plan activities, but budget will be requested annually with operational plans. The Whole Genome Sequencing (WGS), performed by the national reference laboratory is used to support outbreak detection. During the assessment, challenges with infection prevention and control (IPC) and epidemiological training have been underlined. Without strengthened training and specialised workforce, existing structures for IPC, antibiotic stewardship and surveillance cannot be maintained.

Collaboration and coordination between the human health and animal health sectors are established for zoonotic disease surveillance, risk assessment, response, and communication. Food safety is part of the multi-sectorial collaboration in Estonia, but it was not covered by this assessment as these capacities are not part of the Serious Cross-Border Threats to Health regulation (Art 7 and Art 8). Key stakeholders are paying more attention to diseases associated with climate change, such as tick-borne and waterborne diseases which have been increasing in recent years.

Main recommendations for each capacity assessed in-depth

Capacity 3. Laboratory capacity

- There should be sustainable funding to maintain and further develop laboratory capacity and capability.
- A clear strategy for scaling up laboratory testing in emergency situations should be included in the preparedness plan.
- The Estonian biosecurity system should be strengthened and guidelines for this area should be developed and included in an updated legislative act or another suitable reference document.

Capacity 4. Surveillance

- Consider completing the automation of Severe Acute Respiratory Infection (SARI) surveillance data on patient admission to improve timeliness, reduce the need for manual data collection and evaluate sentinel ILI surveillance.
- Integrate the existing ARI/influenza and COVID-19 dashboards in the routine surveillance of respiratory infections to visualise proportions of ARI due to influenza, SARS-CoV-2 and RSV.
- In the upcoming planned revision of the legislation, include provisions that strengthen the surveillance mandate, ensure sustainable funding to maintain the systems and allow for increased flexibility in the reported variables.
- Continue linking the eHealth system with the information system for infectious diseases (NAKIS).

Capacity 6. Health emergency management

- Review and update the legislation related to prevention, preparedness and response to health emergencies, and the Emergency Response Plan. The plan should include a description of the roles and responsibilities of the regional offices during a crisis, be interoperable with other plans and methodologically reinforce the production of scientific risk assessments.
- Operational plans should address the management of a national crisis at the highest level, the State of Emergency, including the transitioning from the emergency levels under the lead of the Health Board and the recovery phase.
- Develop mechanisms to monitor and evaluate the implementation, timeliness and effectiveness of public health and social measures.
- Develop a specific methodology to compile the list of items of crisis-relevant medical countermeasures (MCMs) to be included in a strategic stockpile and ensure its implementation, considering relevant stakeholders at regional level.
- Develop tools to monitor supply and estimate demand of MCM and continue exploring arrangements to ensure that manufacturing of crisis-relevant MCMs can be scaled up in a timely manner.
- Clarify the division of competences between the Health Board and the Estonian Stockpiling Agency.

Capacity 10. Zoonotic diseases and threats of environmental origin, including those due to the climate

- Expand and formalise One Health coordination to include stakeholders from human, animal, food, and environmental sectors.
- Incorporate such a One Health approach in the prevention, preparedness and response plans under preparation, addressing zoonotic diseases and the health impacts of climate change and extreme weather events.
- Conduct a simulation exercise to test the One Health approach, involving all key sectors in a coordinated response to a simulated event to enable prioritisation of outbreak investigations and joint research.

Capacity 12. Antimicrobial resistance and healthcare-associated infections

- Finalise, gain approval and publish the overarching national One Health strategy on AMR and the National Action Plan on AMR in human health. Ensure adequate human and financial resources are available to address AMR at the national level, in healthcare facilities and in the community (primary care). New actions may be proposed and prioritised by the Intersectoral Coordination Mechanism and could require specific funding to fill gaps in AMR surveillance and IPC, related to the transfer of patients from neighbouring countries with a less favourable AMR situation.
- Ensure that the systems for surveillance of AMR, HAIs and antimicrobial consumption are considered in the upcoming legislative changes and technical updates to NAKIS-2, allowing wider usage of eHealth data while maintaining the high quality of data as previously reported to EARS-Net. Adequate IT resources should be secured and maintained to support the quality of national surveillance activities.

- Ensure the routine availability and use of e-prescription data to monitor and improve prescribing practices and prepare the system to provide feedback to individual prescribers in both in hospitals and in the community (primary care).
- Provide training on IPC, antimicrobial stewardship, and epidemiology to postgraduate health professionals and promote the development of expertise by offering incentives thus to increase the number of national experts in this fields.

Conclusions

The Public Health Emergency Preparedness Assessment was performed in a collaborative environment and facilitated by active discussions, which enabled the assessment team to form a clear view of public health emergency preparedness and response capacities in Estonia. This in turn led to a number of recommendations that are seen as concrete steps to sustain good practice and tackle challenges. The assessment confirmed that in Estonia there is a good understanding of the state of health emergency preparedness and response as well as a strong culture of testing and exercising. Collaboration between key stakeholders is functional, although often not formalised. Further commitment is needed to translate the recommendations from both the Joint External Evaluation (2023) and Public Health Emergency Preparedness Assessment (2024) into actions.

Background and legal basis

During the COVID-19 pandemic it was recognised that the legal framework for combatting serious cross-border threats to health, provided for in Decision No 1082/2013/EU, needed to be broadened and enhanced, to ensure a more effective response across the EU to deal with health-related emergencies. Hence, on 23 November 2022, the European Commission developed and published the Regulation (EU) 2022/2371 on serious cross-border threats to health[i].

Within the regulation it is recognised that prevention, preparedness and response planning are essential elements for combatting serious cross-border threats to health. In addition to creating a Union Health Crisis and Pandemic Plan, the regulation also outlined the importance in updating and seeking coherence with Member States' prevention, preparedness and response plans.

To monitor the implementation of the plans, Member States shall report to the Commission regarding their prevention, preparedness and response planning at the national level every three years. For this purpose, a reporting template was developed under Article 7 of the regulation[ii], complementary to the International Health Regulation (IHR) State Party Self-Assessment Annual Report[iii] (SPAR).

In order to support the assessment of those plans, as per Article 8 of the Serious Cross-Border Threats to Health regulation, ECDC has the responsibility, in coordination with relevant Union agencies and bodies, to conduct assessments of all 30 European Union and European Economic Area (EU/EEA) countries every three years. The procedures, standards and criteria for the assessments of the state of implementation of national prevention, preparedness and response plans and their relation with the Union prevention, preparedness and response plan are defined by a Commission delegated regulation adopted in March 2024[iv]. ECDC has developed a methodology for public health emergency preparedness assessments to implement the Article 8 of the regulation.

The 16 capacities included in the template under Article 7 of the Serious Cross-Border Threats to Health regulation are assessed during a Public Health Emergency Preparedness Assessment. The process is designed to maintain consistency within the EU/EEA countries throughout the three-year cycle, while considering national circumstances.

A Joint External Evaluation on the IHR core capacities was conducted in Estonia in 2023 (9-13 October)[v]. It noted the availability of action plans and strategic documents, as a necessary basis for further actions to sustain and improve capacities and capabilities. However, the Joint External Evaluation report highlighted the need to streamline actions given the constraints in human resource capacities. The conclusions and recommendation of the Joint External Evaluation were considered during the Public Health Emergency Preparedness Assessment. The national evaluation on the COVID-19 pandemic (Covid-19 nakatumise analüüs Eesti andmete põhjal-2023) provided valuable lessons for cross sectoral crisis preparedness and management, which were also considered as a reference by the Public Health Emergency Preparedness Assessment team

Aim and objectives

The aim of the Public Health Emergency Preparedness Assessment process drawn from Article 8 of the Serious Cross-Border Threats to Health Regulation is to improve prevention, preparedness and response planning in EU/EEA countries through the implementation of recommendations following individual country assessments. Within nine months of the receipt of the ECDC conclusions, if applicable, countries are requested to provide an action plan addressing the recommendations of the assessment.

[i] Official Journal of the European Union. REGULATION (EU) 2022/2371 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 November 2022 on serious cross-border threats to health and repealing Decision No 1082/2013/EU. 2022. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R2371&from=EN

[ii] European Commission. Commission Implementing Regulation (EU) 2023/1808 of 21 September 2023 setting out the template for the provision of information on prevention, preparedness and response planning in relation to serious cross-border threats to health in accordance with Regulation (EU) 2022/2371 of the European Parliament and of the Council. 2023. Available at**:** https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1808#ntr1-L_2023234EN.01010701-E0001

[iii] World Health Organization (WHO) IHR States Parties Self-Assessment Annual Report (SPAR): Web Platform. Available at: https://www.who.int/emergencies/operations/international-health-regulations-monitoring-evaluation-framework/states-parties-self-assessment-annual-reporting

[iv] European Commission. Commission Delegated Regulation (EU) 2024/1232 of 5 March 2024 supplementing Regulation (EU) 2022/2371 of the European Parliament and of the Council as regards assessments of the state of implementation of national prevention, preparedness and response plans and their relation with the Union prevention, preparedness and response plan. 2024. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401232

[v] World Health Organization (WHO). Joint external evaluation of the International Health Regulations (2005) core capacities for Estonia: mission report, 9-13 October 2023. 2023. Geneva. Available here: https://www.who.int/publications/i/item/9789240092921

The specific objectives of the assessment are to:

- Assess the self-assessment of preparedness by countries in the 16 capacities covered by the outputs from the most recent State Party Self-Assessment Annual Report (SPAR) and Article 7 template.
- Collaborate with countries to identify challenges, bottlenecks, gaps or areas for improvement concerning the 16 capacities referred to in Article 7 (a list of capacities assessed is available as Annex 1).
- Encourage the inclusion of key elements within the prevention, preparedness and response planning structure such as cross-sectorial and cross-border coordination, crisis management, response governance, communication, plan testing, evaluation and regular reviews, according to lessons identified from the response to public health emergencies.
- Use the opportunity of a standardised approach to the assessment process to contribute to the improvement of EU/EEA prevention, preparedness and response capacities by promoting a common understanding of key elements and a coordinated approach.
- Provide support to countries in enhancing their national prevention, preparedness, and response capacities through recommendations based on the assessment, and providing targeted assistance upon request.

Overview of the assessment process

The assessment of Estonia was held after the country had recently conducted a Joint External Evaluation. In addition, as the third Public Health Emergency Preparedness Assessment conducted by ECDC, this assessment was considered a pilot.

An assessment team composed of 11 experts together with 43 Estonian focal points and national experts worked on implementing the assessment process consisting of a desk review phase and a country visit between 1 and 4 October 2024. The assessment was a day shorter than regular assessments because Estonia conducted a Joint External Evaluation in October 2023 where most non-in-depth areas of the Public Health Emergency Preparedness Assessment had partially been already discussed. A shorter than usual time was allocated to these areas, while regular time was allocated for the five in-depth capacities. Moreover, coordination meetings for each of these areas were organised during the documentary review period, prior to the country visit. At these meetings, dedicated teams met to exchange information and discuss any clarifications needed.

As per the established assessment process, of the 16 capacities included in the Article 7 self-assessment template, the ECDC-led team assessed five capacities in depth and validated responses to the Article 7 questions for the remaining capacities, considering the conclusions in the Joint External Evaluation report. The five capacities assessed in depth were laboratory capacity (Capacity 3); surveillance (Capacity 4); health emergency management (Capacity 6); zoonotic diseases and threats of environmental origin, including those due to the climate (Capacity 10); and antimicrobial resistance (AMR) and healthcare-associated infections (HAIs) (Capacity 12).

The discussions prior and during the country visit were conducted with an open and transparent approach. The experts from the host country were very well prepared to present the developments and prospective actions after the Joint External Evaluation. The key stakeholders from Estonia were engaged in productive discussions, including providing an overview of actions and responding to questions from the assessment team.

The experts from the Health Board and from the relevant departments in the Ministry of Social Affairs, who participated in the organisation of the Public Health Emergency Preparedness Assessment, were very committed during the country visit and had prepared the assessment in great details. The documentation provided and clear presentations for the in-depth sessions allowed for a good common understanding of the capacities. Further details regarding the practical aspects of the mission including an agenda and the assessment team composition are available in Annex 2 and 3. Cross cutting aspects were discussed in context through a scenario developed to facilitate the discussion.

Findings and recommendations for in-depth assessed capacities

Capacity 3. Laboratory capacity

Estonia shows a high level of laboratory capability overall that has advanced in a short time including new technologies such as next generation sequencing (short reads and long reads approach) and bioinformatic capability to be able to handle emergency situations and surveillance of communicable diseases.

Due to the small size of the country, the laboratory capacity for preparedness and response in emergency situations and surveillance of communicable diseases is centralised to the laboratory of communicable diseases at the Health Board (even though during the COVID-19 pandemic the private sector was involved in nationwide testing). All reference laboratories are situated there except for two that are outsourced to clinical hospitals. Reference laboratories are funded by the government and their roles are described within the Communicable Diseases Prevention and Control Act. In addition to reference functions, the laboratory of communicable diseases at the Health Board sometimes also serves as a primary diagnostic laboratory. However, the laboratory of communicable diseases is not recognised as a healthcare provider which places legal restrictions on the laboratory data transfer and hamper the direct transfer of data to the surveillance system of the country. It is advised that the issue of handling personal data at the laboratory of communicable diseases at the Health Board is taken into consideration when revising the legislative acts.

The laboratory of communicable diseases at the Health Board is accredited according to ISO 15189 for clinical samples, ISO 17025 for environmental samples, and according to WHO standards, and shows a high-quality level. The laboratory is well equipped with experienced personnel with appropriate training. The laboratory is well organised, which ensures efficient performance and makes it possible to implement a new method to detect a pathogen of concern promptly. The laboratory also enables some level of scale-up in testing capacity in case of an emergency. During the COVID-19 pandemic, the need for large-scale testing exceeded the total public health laboratories capacity of the country and it was resolved by contracting private laboratories. However, the Estonian preparedness plan would benefit from more detailed description of how laboratory capacity can be scaled up in the future, should there be another health emergency that requires rapid and comprehensive access to laboratory testing.

Estonia has high-containment laboratory capacity. There are several biosafety level 3 (BSL-3) laboratories within the country, one of which is situated at the laboratory of communicable diseases at the Health Board. There is no biosafety level 4 (BSL-4) laboratory in Estonia, but this capacity is secured by cooperation with the Public Health Agency of Sweden. Issues regarding biosafety such as handling of infectious materials are regulated within the Communicable Diseases Prevention and Control Act at the national level, however strengthening is needed for aspects of biosecurity. Given that the legislative acts are currently revised, the inclusion of aspects strengthening biosecurity should be considered.

In addition to the laboratory of communicable diseases at the Health Board, there are 10 clinical microbiological laboratories in Estonia, all accredited by the Estonian Accreditation Centre and members of the Estonian Society for Laboratory Medicine (ELMÜ), a union between laboratory physicians, specialists, clinical microbiologists and other physical and juridical persons with interest in the development of laboratory medicine field. Since Estonia is a small country and getting hold of reference materials to be able to keep accreditation and validated up-to-date methods is challenging, it is advisable that the laboratory of communicable diseases at the Health Board take part in international associations and networks to be able to receive reference materials needed within the country. The EU reference laboratories (EURLs) in the area of public health that are being established will also serve as reference material providers for national reference laboratories.

In conclusion, following the COVID-19 pandemic, significant investments have been made in the Estonian laboratory capability and capacity, including the setting up and running of state-of-the-art technologies for whole genome sequencing and bioinformatic analysis. These capacity-building initiatives have a positive impact on preparedness for future emergencies and surveillance of communicable diseases. Moving forward, it is vital to ensure the sustainability of systems by sustainable funding (sequencing and bioinformatic capacity have only project-based EU financing, which will end in 2025) and further develop capacities and capabilities for laboratory testing as well as effective systems for handling and sharing data within and from laboratories to the public health sector.

Recommendations

- There should be a focus on acquiring sustainable funding to maintain and further develop laboratory capacity and capability.
- Bioinformatics and electronic laboratory systems for efficient data transfer should be considered when prioritising further development as data analysis and management will be key parameters for further strengthening of the laboratory system and aspects.
- The preparedness plan should include a clear strategy for scaling up laboratory testing in emergency situations.
- The Estonian biosecurity system needs strengthening and guidelines for this area should be included in an updated legislative act or another suitable reference document.

Capacity 4. Surveillance

Surveillance of communicable diseases in Estonia is performed at the national level by the Health Board. The legal framework for surveillance is based on the Communicable Disease Prevention and Control Act. According to the current legislation, 56 communicable diseases and 97 agents are under monitoring. The system involves both comprehensive passive and sentinel surveillance to track the spread of diseases across various regions and age groups. Routine surveillance focuses on the mandatory reporting of epidemiological and microbiological data by healthcare providers of all levels and all laboratories using the national health information system.

For acute respiratory infections, Estonia has robust national surveillance systems in place, covering all levels of care (primary care, hospitals and long-term care facilities). ICD-code-based ILI/ARI and SARI surveillances are at good speed, with aggregated data reported from all hospitals. ARI surveillance is mandatory and comprehensive, and includes data from all healthcare providers across the country via patient health records. The Health Board receives aggregated data from the national health information system, provided by the Health and Welfare Information Systems Centre using tableau. Thresholds have been established and at least weekly automatic updates of dashboards with visualisations are available and publicly accessible on the Health Board's website.

Automating of data flow is created upon admission of a patient. During COVID-19, manual hospitalisation data collection was done to track situation in real-time and to be able to implement measures promptly. Data collection is already mostly automated for respiratory infections (ARI, influenza, COVID-19, ILI (sentinel) + SARI and RSV) based on electronic health records available in TIS (eHealth system). Once the data is available in TIS, the Health and Welfare Information Centre creates automatic visual Tableau reports for aggregated influenza, ARI and COVID-19 cases, as well as ILI. Aggregated reports on hospitalisations, ICU and deaths are produced in a similar manner. Starting this season, SARI and RSV reporting have also been added to the surveillance system.

Pseudonymised case-based pathogen-specific hospitalisation data are available to the Health Board through the Health and Welfare Information Centre Tableau reports and datasets. The main challenge is not so much the automation itself but timeliness: health data in TIS becomes available only after the epi-crisis /case is closed, which occurs once the patient has a documented outcome (such as recovery, discharge, or death) (ICD-10 code).This leads to delays in reporting as the cases are included in the statistics only once they is marked as completed. Since an illness episode last for some weeks, a delay (for estimated >75% cases) of a approximately three weeks can be expected for hospital cases and approximately10 days for outpatients.

The surveillance of acute respiratory infections is linked with laboratory data that allow for the monitoring of influenza and SARS-CoV-2 viruses. Efforts to integrate case-based, comprehensive electronic health registry-based diagnoses of RSV are underway and are expected to be included in the existing dashboards by 2025-2026. The Health Board does not have direct access to individual case-based data, these remain with the Health and Welfare Information Centre, meaning that any additional indicator or analysis requires proper argumentation and additional legislative acts that could lead to delays in their implementation. The surveillance team is aware of the reporting lags and takes them into account in the data analysis and use different well-applicable methods to analyse the data. They also take part to the ECDC's Surveillance from Electronic Health Data project, as well as to other international initiatives.

Additionally, Estonia's surveillance system has an ILI sentinel surveillance framework. The sentinel system requires volunteer family doctors/GPs to follow specific guidelines, including taking samples from patients meeting the clinical definition of influenza-like illness. These samples are sent to the Health Board's Public Health Laboratory for testing. The specimens are tested for seven respiratory pathogens (adenovirus, SARS-CoV-2, RSV, rhinovirus, metapneumovirus, influenza A and B, parainfluenza). Efforts are being made to reinforce this sentinel network, contributing to a broader disease-monitoring infrastructure. However, the sentinel ILI surveillance covers 8.8% of the population and is mainly focused on big towns, therefore not having optimal geographical representativeness. Given the small size of the country this may not be an issue, but an in-depth assessment should be performed.

Additionally, all-cause mortality monitoring, hospitalisation rates, and ICU occupancy data are incorporated as complementary sources of surveillance. Notifications are processed through NAKIS, which has been partially integrated with TIS since 2021. Public health authorities aim to further develop the integration of these systems between 2024 and 2025, ensuring enhanced connectivity and data-sharing to optimise public health responses. Results from both routine and sentinel systems are anonymised and included in the online report.

The system also includes event-based surveillance alongside the indicator-based approach, allowing for immediate notification and rapid response to significant health events. The event-based surveillance is based on a priority list of 17 communicable diseases with immediate reporting by phone or via NAKIS, even upon suspicion of individual cases, clusters or outbreaks of unknown origin.

During the COVID-19 pandemic Estonia implemented new variables on healthcare capacity and still manually collects rich weekly data on respiratory virus hospitalisations, available beds, ICU beds, and ventilators, and has also included these in a dashboard. The manually collected data are used for short-term predictions on healthcare capacity, as case-based monitoring becomes available with some delay and can only be analysed retrospectively thus not being used for capacity planning prediction purposes. Estonia also has ongoing long-term care facilities COVID-19 surveillance activities for cases, hospitalisations and deaths – thus showing excellent surveillance initiatives also in this vulnerable population, which often show the first signs of severity and population-level impact of respiratory viruses. In the future, via the eHealth system, having the patient location (e.g. in a nursing home) might allow similar surveillance in a more automated fashion. Public health actions were successfully linked with present thresholds of occupancy allowing for prompt evidence-based actions to mitigate the impact of COVID-19 on the healthcare system. Adding these new indicators required significant legislative efforts to be implemented. Since the COVID-19 pandemic, the Health Board has implemented wastewater surveillance for SARS-CoV-2 to monitor general trends per county and quantify variants; this has been added to the existing poliovirus surveillance in the major towns.

A tool to facilitate the detection, validation, management and communication of event-based surveillance data across sectors is not routinely used. However, the SitRep tool can be activated by the Ministry of Interior to facilitate communication between sectors. The Ministry of Interior owns the tool, but the Ministry of Health can also activate it, while there are administrators in every governmental institution involved in crises management. Furthermore, the Health Board can also activate the SitRep to manage an event, not only during crises, but also in case of local outbreaks, for example to coordinate the response between the human health and animal health sectors.

Analysis for severity or vaccine effectiveness can be improved by having access to pseudo-anonymised case-based identifier data. Additional analyses on disease severity were conducted during the COVID-19 pandemic with special funding from the Ministry of Health, and similar mechanisms could be investigated in the future for additional analyses as Memorandums of Understanding already exist with two Estonian universities.

Recommendations

- Consider completing the automation of SARI surveillance data on patient admission to improve timeliness, reduce the need for manual data collection and evaluate sentinel ILI surveillance.
- Integrate the existing ARI/influenza and COVID-19 dashboards in the routine surveillance of respiratory infections to visualise proportions of ARI due to influenza, SARS-CoV-2 and RSV.
- In the upcoming planned revision of the legislation, include provisions that strengthen the surveillance mandate and allow for increased flexibility in the variables available to the Health Board.
- Continue linking the eHealth system with NAKIS.
- Evaluate the process and the attributes of the sentinel ILI surveillance focusing on the usefulness and representativeness of the system, and explore ways of using existing health data to monitor the respiratory virus circulation.
- Access sources of sustainable funding to maintain the systems set during and after the COVID-19 pandemic.
- Explore using existing tools for cross-sectorial collaboration such as lowering the threshold for utilisation of the SitRep tool or other existing tools used in other countries.

Capacity 6. Health emergency management

The Joint External Evaluation concluded that Estonia has good capacity in emergency risk and readiness assessment (score 4), risk management (score 5), and activation and coordination of healthcare personnel during a public health emergency (score 4). The evaluation also found reasonably good capacity for emergency and supply chain management, and for the operation of a public health emergency operation centre (both score 3). The Joint External Evaluation recommended to ensure the availability of medical personnel and medical counter measures, especially in primary care, during an emergency.

Planning

Estonia applies an all-hazard approach to prevention, preparedness and response planning for health emergencies. The local, regional and national plans are interlinked and complementary to each other. The scope of the plans ranges from strategic to threat-specific operational plans. Key plans for the health sector include the Health Emergency Response Plan (2021, operational plan), the Disaster Medicine Plan (2022, overarching framework), and the COVID-19 preparedness plan (2022/2023 season, targeting the public). There are also disease specific epidemic response plans such as the National HIV Action Plan for 2017–2025 of Estonia There is a certain fragmentation of plans related to health from different sectors or agencies (e.g. plan related to climate change or extreme weather events), which may give rise to unclarity, gaps or overlaps in specific situations. Plans have been tested and updated regularly.

Estonia has an agreement on cross-border mutual aid among the Baltic States which also includes provisions for the joint procurement and loan of medicines and medical supplies in case of supply shortages.

The legislative framework for health emergency management includes the Emergency Act, the Public Health Act, the Communicable Diseases Prevention and Control Act and the Health Services Organisation Act, as well as associated regulations and government decrees. The International Health Regulations have been implemented with a specific Act. Several acts are currently under revision. The Regulation (EU) 2022/2371 on serious cross-border threats to health is directly applicable in Estonia.

For planning the continuity of the vital services, every other year, the service providers shall prepare updated scenario-based risk assessments and plans, and submit these to the supervisory authority for approval, as spelled out in the Requirements and Procedure for a Continuity Risk Assessment and Plan of a Vital Service, for the Preparation Thereof and the Implementation of a Plan.

Risk profiling and risk assessment

Regular health emergency risk profiling occurs at local, regional and national levels as defined by the Emergency Act. At the local level, hospitals are required to update their contingency plans annually under the supervision of the Health Board. The Rescue Board chairs regional crisis committees which conduct regional risk profiling. At the national level, the Health Board participates in the national risk profiling, which happens every other year. Based on the national risk analysis, the Health Board has prepared analyses of prioritised health threats such as epidemics and mass poisoning events.

In the event of a serious cross-border threat to health, the Health Board provides a situation report, accompanied by a risk assessment, on the dedicated SitRep platform. This platform also allows for input from representatives of other sectors, e.g. of the Agriculture and Food Board or the Environmental Board. The risk assessment process is not explicitly differentiated from the risk management process.

Incident Management System

The Incident Management System is embedded in the legal acts and is described in the Health Emergency Response Plan. The Health Board has been assigned the lead role in preparedness and response to health crises. The Health Emergency Response Plan has three levels of activation during which the Health Board is empowered to implement certain public health measures. The SitRep platform allows for information exchange between involved sectors. The Incidence Management System is activated in case an event exceeds the capacity of the local authorities. The roles and responsibilities of the regional offices are not described in great detail. The Emergency Law and Health Emergency Response Plan defines the State of Emergency as the highest crisis level. In serious health crises requiring multisectoral collaboration and considered a State of Emergency, the government will temporarily take over the crisis management from the Health Board. However, no operational plan is available for how the crisis is managed during such a situation. Moreover, it is not clear how the transition should happen, nor how downscaling from this state should be managed.

The Health Board has duty arrangements and a dedicated procedure for alert notification and initial risk assessment of public health threats and serves as the National Focal Point to the WHO and the National Competent Authority to the Early Warning and Response System. The Health Board duty officer can be contacted by healthcare providers and other national officials. Threat assessment and notification take place as per the flow chart on the IHR, Annex 2.

The levels for the activation of the Health Emergency Response as described in the Health Emergency Response Plan correspond to emergency healthcare levels defined in the Health Services Organisation Act. The plan foresees that the Health Board appoints an Emergency Chief Medical Officer to coordinate the activity of healthcare providers during a healthcare emergency. If needed, as during the COVID19 pandemic, an ad hoc group of scientific experts can be created to provide advice and support risk assessments. The health authorities intend to develop autonomous capacity in the regions in the coming four years so that regional hospitals can serve as crisis centres. As referred to in the Joint External Evaluation, Estonia has a strong culture of preparedness activities

embedded in the legislation. Several simulation exercises are organised every year, ranging from national to individual hospital and ambulance service level.

Public Health and Social Measures

Although decisions regarding public health and social measures (PHSM) may be captured in the SitRep tool, there is no explicit log of decisions taken and advice given. Collecting data on risk management would be relevant both for sharing with other EU Member States, e.g. through the Early Warning and Response System, but also to allow for national after-action-reviews, learning and research.

Medical Counter Measures

Estonia has identified crisis-relevant Medical Counter Measures (MCM) for preparedness and response, including necessary pharmaceuticals and medical devices for stockpiling. This list is not included in any legal document due to its sensitive nature. The list is compiled based on assessments from regional hospitals that host the stockpiles, taking national risk assessments into account. Currently, there is no centralised methodology for developing this list.

Estonia is considering national policies and plans for monitoring supply and estimating demand for crisis-relevant MCMs. The Health Board monitors supply on an ad hoc basis, while the Estonian State Agency of Medicines also conducts ad hoc monitoring of wholesaler stocks, shortages, manufacturers, and distribution within the country. The State Agency of Medicines and service providers would inform the Health Board in the event of a serious shortage. However, there is no regular exchange of data, nor is the data consolidated at a central level. A project is being considered to develop a general platform where all hospitals, including those hosting stockpiles, would report their data.

Estonia has developed a series of provisions and mechanisms to mitigate supply chain vulnerabilities related to crisis-relevant medical countermeasures. The national prevention, preparedness, and response plan includes provisions that allow for the distribution of emergency stockpiles in case of supply chain disruptions. Additionally, a cooperation agreement exists between the Baltic States for the joint procurement and loan of medicines (e.g. vaccines) and medical supplies in case of supply shortages. Ongoing discussions also involve potential product or capacity reservation contracts to ensure that certain specific crisis-relevant MCMs can be scaled up promptly during a crisis.

Estonia maintains physical strategic stockpiles covering approximately 250 types of MCMs, including pharmaceuticals and medical devices. These stockpiles are hosted by regional hospitals on a rotational basis.

Strategic stockpiles in Estonia are managed by different organisations. The Health Board maintains a critical stockpile of hospital pharmaceuticals, while the Estonian Stockpiling Agency (ESA) is responsible for managing the state's PPE stockpile. ESA already manages a stockpile of over-the-counter prescribed pharmaceuticals for the population. Within the prevention, preparedness, and response plan, provisions are in place to ensure the timely distribution of stockpiles for operational readiness and to respond to public health emergencies. For example, in a Level 1 public health emergency, the Health Board can initiate restocking and provide specific advice on what needs to be replenished. At Levels 2 and 3, the Health Board can authorise the use of stockpiles.

Ongoing work includes a forthcoming parliamentary amendment to the legislation concerning stockpiles, which is foreseen to decentralise and enhance regional management. The amendment is expected to increase the number of hospitals involved in managing the strategic stockpile, extend the stockpile, and expand its composition.

Recommendations

- Review and update the legislation related to prevention, preparedness and response to health emergencies, and the Emergency Response Plan. The plan should include a detailed description of the roles and responsibilities of the regional offices during a crisis, and the relationship between related plans should be clarified. We recommend that operational plans also address the management of the highest crisis state, State of Emergency, including the transitioning from the emergency levels under the lead of the Health Board and the recovery phase.
- The Health Board should make specific arrangements in its Emergency Response Plan to methodologically reinforce the production of scientific risk assessments, possibly with the involvement of experts from other sectors, handled separately from the decision-making process for crisis management, drawing inspiration from the scientific advice committee set up during the COVID-19 pandemic and the NITAG regarding vaccination recommendations.
- Develop mechanisms to monitor and evaluate the implementation, timeliness and effectiveness of public health and social measures. This may take into account considerations from the ECDC guidance document on this topic.
- Develop a specific methodology to make the list of items of crisis-relevant MCMs to be included in its strategic stockpile and ensure its implementation, considering relevant stakeholders at regional level where relevant.

- Develop tools to monitor supply and estimate demand of MCM, considering the reporting requirements that may be applicable in case of a public health emergency at the European Union level. The relevant tools should collect information for all relevant types of products that fall under the definition of crisis-relevant MCM.
- Continue exploring arrangements to ensure that manufacturing of crisis-relevant MCMs can be scaled up in a timely manner.
- Clarify the division of competences between the Health Board and the Estonian Stockpiling Agency, potentially via the development of a standard operating procedure, to ensure coordination, information sharing and data consolidation. In case of a public health emergency at the European Union level, consider having a point of contact with the overview of the national stockpile and needs.

Capacity 10. Zoonotic diseases and threats of environmental origin, including those due to the climate

In Estonia, a collaborative and coordinated framework between the human and animal health sectors exists for zoonotic disease surveillance, risk assessment, response, and communication. The monitoring of zoonoses is organised by the Agriculture and Food Board in cooperation with the Health Board, in accordance with the Estonian Communicable Diseases Prevention and Control Act (2003) and the Estonian Veterinary Act (2021). Zoonoses under surveillance in humans include anthrax, avian influenza, bovine tuberculosis, brucellosis, campylobacteriosis, cryptosporidiosis, echinococcosis, leptospirosis, listeriosis, rabies, salmonellosis, Shiga toxin-producing *Escherichia coli*, trichinosis, tularaemia, *Yersinia enterocolitica* infection. Except for echinococcosis and *Yersinia enterocolitica* infection, the same zoonoses are under surveillance in animals, with the addition of bovine spongiform encephalopathy and foot and mouth disease.

The primary One Health partners include:

- The Health Board, responsible for i) the surveillance of zoonoses in humans, ii) the investigation and reporting of foodborne infections, iii) laboratory investigations in humans and environment, iv) the surveillance of drinking and bathing water;
- The Agriculture and Food Board, responsible for i) the surveillance of zoonoses in animals and ii) the investigations of non-foodborne zoonotic infections, and iii) the preparation of the annual reports on zoonoses submitted to EFSA, in collaboration with the Health Board and the Agricultural Registers and Information Board;
- The National Centre for Laboratory Research and Risk Assessment, responsible for laboratory investigations in animals and their environment;
- The Agricultural Registers and Information Board, collaborating with the Agriculture and Food Board in the preparation of annual reports on zoonoses.

A cooperation agreement between the Health Board and the Agriculture and Food Board, initially established in 2012, outlines principles of collaboration, obligations, rights, and procedures for information exchange between the two boards. This agreement is currently being updated. Furthermore, an operational guide outlining zoonoses of interest, reporting forms, frequency of communication and communication pathways between the two boards has been recently revised. This document guides information exchange when zoonoses are identified in humans or animals, or when zoonotic agents are identified in food of animal origin or in drinking water.

The effectiveness of this One Health collaboration has been tested over the past three years. While certain aspects, such as information exchange, outbreak investigations, AMR surveillance, and the use of eHealth data, have proven very effective, challenges remain. These include the absence of a clearly defined One Health coordinating authority, limited exchange of samples and genomic data between human and animal laboratories, and constraints in financial and human resources, all of which hinder full collaboration potential.

Moreover, the environmental sector plays a relatively minor role in the Estonian One Health framework, and collaboration remains fragmented across various authorities. The Health Board oversees environmental topics related to waterborne pathogens in drinking and bathing water safety (e.g., vibriosis from swimming waters), tickborne pathogens (e.g., monitoring ticks for borreliosis and tickborne encephalitis). Other areas, such as vector and vector borne pathogen surveillance, are managed in collaboration with multiple stakeholders, including the Estonian University of Life Sciences. Additional collaborations involve the Environmental Board and the Hunters Association. Regarding public communication on how to behave when sick or dead animals are found, the Agriculture and Food Board provides a web platform where users can report the location of dead birds or wild boars, as well as a national helpline offering guidance.

Significant improvements to the Estonian One Health collaboration could be brought by a rapid update of the existing cooperation agreement between the Health Board and the Agriculture and Food Board, revision of the outbreak investigation guidelines, manuals and instructions, enhanced, faster and system-integrated exchange of genomic surveillance data between the human and animal sectors, an increased community and healthcare professional awareness on zoonotic diseases, a more structural involvement of the environmental sector in the One

Health collaboration, and regular exercise to test the One Health collaboration. The national level authorities can consult with ECDC publication "One Health: a joint framework for action published by five EU agencies" for inspiration on key stake holder mapping and engagement approaches.

The planning in relation to health effects of climate change and extreme weather events would benefit from a closer connection to the Health Emergency Response Plan. The EU drinking water directive (2020/2184) is in the implementation phase in Estonia with emphasis on quality.

The authorities intend to update the guidelines for outbreak investigation as it is observed that some pathogens' transmission patterns are rapidly changing, as a result of climate changes. Awareness and preparedness of communities and health professionals are another area requiring the attention of authorities to enhance One Health approach understanding. However, currently, there are no training programs on One Health.

Over the past decade, numerous documents prepared by the government of Estonia, the Health Board, and other stakeholders have shaped efforts to anticipate and mitigate the impact of climate change and extreme weather events. The Climate Change Adaptation Development Plan 2030, developed in 2016 by the Ministry of Environment, serves as a key strategic document. It provides guidance for policy development across various climate sectors, emphasising the need to enhance preparedness at national, regional, and local levels. The plan highlights the importance of raising awareness about the health impacts of climate change and underscores the necessity of strengthening the healthcare system's capacity to respond to extreme weather events.

The Climate Change Adaptation Development Plan 2030 is based on the scientific findings of the report 'Estonian Future Climate Scenarios 2100,' a collaboration between the Ministry of Environment, the University of Tartu, the Estonia University of Life Sciences, the Estonia Academy of Security Sciences, and the Norwegian Institute for Urban and Regional Research. Data for this report were sourced from the National Meteorological Service database, collected during the 'EstKliima' project.

The Emergency Act, which governs emergency planning, training, public communication, management, declaration, and response measures, acknowledges the need for the system to adapt to climate change. In line with this, the Rescue Board has developed risk analyses for potential emergencies related to extreme weather events, including floods in densely populated areas, extreme temperatures, and large-scale fires. The Epidemic Emergency Risk Assessment, prepared under the guidance of the Health Board, supports emergency management efforts. Although the risk analyses do not explicitly reference climate change, the existing measures contribute to managing climate-related threats.

While the projected public health impact of climate change is not considered as severe as the effects on agriculture and infrastructure, several climate-related diseases have shown an increase in incidence and seasonality in recent years. For example, notifications of tick-borne encephalitis (TBE) have not only increased but have also been reported outside the usual season. Similarly, notifications of borreliosis, another tick-borne disease, have risen. Additionally, the reported incidence of waterborne infections, such as cryptosporidiosis, giardiasis, legionellosis, leptospirosis, and vibriosis, has grown, likely linked to warmer freshwater and marine environments. To address these emerging threats, new surveys and risk analyses can further explore the specific public health risks posed by climate change and improve preparedness for health emergencies related to climate change and extreme weather events.

Recommendations

- Expand and formalise One Health coordination (possibly extending the current AMR Coordination Committee) to include stakeholders from human, animal, food, and environmental sectors. This broader coordination will enable better management of zoonotic diseases and environmental threats, improving collaboration and communication across all sectors involved.
- Incorporate such One Health approach in prevention, preparedness and response plans under preparation, addressing zoonotic diseases and the health impacts of climate change and extreme weather events.
- Conduct a simulation exercise to test the One Health approach, involving all key sectors in a coordinated response to a simulated event. The results will help prioritise tasks such as outbreak investigations and joint research, strengthening preparedness and intersectoral collaboration.

Capacity 12. Antimicrobial resistance and healthcare-associated infections

Antimicrobial resistance was included in the Estonian National Health Plan 2020-2030. An overarching national One Health AMR strategy led by the Ministry of Social Affairs with multisector involvement is currently being developed, with approval and publication planned for 2024-2025. Under this strategy, Estonia's National Action Plan on AMR in animal health/food safety 2024-2030 has already been approved, the National Action Plan on AMR in human health is under development and is expected to be finalised in 2025 for approval and publication. Possible activities related to the environmental sector will be discussed within Intersectoral Coordination Mechanism (ICM) and included into the ICM annual working plan. ICM has been established and approved by the Minister of Social Affairs with all relevant stakeholders. ICM is responsible for the development, update and evaluation of the national One Health strategy. It also oversees and coordinates the implementation of the One Health strategy by sectorial working groups through the sector-specific action plans and activities. Sector-specific AMR working group (AMR WG) for human health has been established and consists of different agencies and professional societies involved in AMR-related activities. The Health Board is leading the AMR WG and is responsible for the development of the sector-specific National Action Plan. The AMR WG is responsible for drafting the National Action Plan in human health, although its terms of reference are still in draft form, awaiting final approval.

For the National Action Plan on AMR in human health, the responsibility for implementation monitoring through indicators will fall on the ICM and the AMR WG. The National Action Plan on AMR in human health is set to feature clear, measurable indicators and targets, including the three AMR targets (pathogen-antimicrobial combinations) from the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01). Implementation plans for some activities in the National Action Plan have already begun, as funding from the respective ministries is already available. Additional funding to support the implementation of the National Action Plan will be obtained through specific operational plans once the National Action Plan is finalised. Currently, there is no dedicated funding earmarked for implementation of the National Action Plan on AMR in human health.

Estonia already has legislation for both surveillance of AMR and HAIs. However, the legislative updates planned for 2025-2026 will be important for improving these areas. The changes might allow for wider use of the national eHealth system for surveillance of HAIs in different settings, such as acute care hospitals and long-term care facilities (LTCFs) and enhance the automation of surveillance. Estonia has an extensive national eHealth system that includes all patient health records, including laboratory results. However, these data are not routinely available to the Health Board for infectious disease surveillance or prevention.

Even with the upcoming legal changes, ensuring data quality remains crucial, especially since initial automation efforts in 2024 decrease the data quality reported to EARS-Net. Therefore, prioritising continuous surveillance system evaluation, feedback, and reporting back to the participating facilities is essential. While all clinical microbiology laboratories have access to adequate species identification and phenotypic antimicrobial susceptibility testing (AST), either within their laboratory or through outsourcing, challenges remain in collecting and analysing data sent by clinical microbiology laboratories to the NAKIS. This registry is scheduled to be updated to NAKIS-2 in 2025-2027, to further facilitate the automatic transfer of data directly from the national eHealth system.

Estonia participates in EARS-Net (AMR surveillance) with complete coverage of clinical microbiology laboratories in the country, and all laboratories also participated in the related external quality assessment (EQA) exercise. Through WGS and related analyses conducted at the National Reference Laboratory (NRL) on an as-needed basis, Estonia has successfully identified outbreaks of multidrug-resistant organisms (MDROs) in the country. Estonia has strong capabilities for the detection and investigation of AMR outbreaks, which is crucial for their control. In Estonia, active surveillance to detect and monitor AMR in bacteria from food-producing animals is systematically carried out, and the results are made publicly available in EU summary reports.

Estonia has also participated in the ECDC point prevalence survey (PPS) of HAIs and antimicrobial use in acute care hospitals, with almost all hospitals participating in 2022-2023. In addition, Estonia participates with smaller numbers of the country's hospitals in all ECDC HAI surveillance modules, i.e. *Clostridioides difficile* infection (CDI), HAIs in intensive care units and surgical site infections. Recently, the first national report on CDI in acute care hospitals was published, but for other HAIs the number of participating hospitals has been too small to publish separate national reports. While Estonia did not participate in the ECDC PPS in LTCFs, the country performs continuous surveillance of COVID-19 in LTCFs, demonstrating good public health function and support in these settings. In the future, a lighter and simpler version of surveys of HAIs in LTCFs may be key to improving infection prevention and control (IPC) and HAI surveillance in LTCFs.

According to the current national legislation (Regulation no. 117), each hospital is responsible for developing local protocols and guidelines for surveillance of HAIs and of MDROs and for IPC. The legislation also mandates that hospitals implement IPC activities through IPC teams. In addition to these activities, IPC doctors are responsible for antimicrobial stewardship by reviewing hospital prescriptions and intervening when antimicrobial treatments are inappropriate. The results of hospital activities are typically reported to the respective hospital management but are not shared with other hospitals or at a national level. This leads to gaps in national oversight and in monitoring of implemented activities, as well as in benchmarking of HAI rates between healthcare facilities.

The sharing of hospital guidelines is partially formalised through the Estonian Society for Infectious Diseases, with which the Health Board maintains regular contact. Smaller hospitals often base their guidelines on the work performed in larger secondary or tertiary hospitals. National primary care guidelines for the diagnosis and treatment of common respiratory tract and urinary tract infections have been approved, while guidelines for skin, soft tissue, and gastrointestinal infections are under development. Networking between hospitals through surveillance, training, and the sharing and preparation of guidelines, is beneficial and remains important to maintain through the Estonian Society for Infectious Diseases and possibly through other informal methods, such as PPS trainings and meetings.

According to EARS-Net, Estonia reports low AMR proportions compared with the EU/EEA population-weighted mean. Antimicrobial consumption, monitored by the Agency of Medicines (data from ESAC-Net) is also low compared to other European countries. Although an e-prescription system has been in place since 2010, data on prescriptions are neither readily available for analysis nor provided to prescribers as feedback. Several *ad hoc* studies in Estonia have demonstrated the usefulness of such analyses, and the upcoming legal changes to make prescription data routinely available present an opportunity to improve the situation. Furthermore, for hospitals, a comprehensive hospital-based surveillance system for antimicrobial prescribing would be important to monitor prescribing at the hospital and ward level and to implement and monitor the implementation of antimicrobial stewardship interventions.

Finally, Estonia faces challenges with the availability of specialised healthcare staff and especially experts in IPC and epidemiologists. This is mainly due to limited training opportunities and the low motivation of young healthcare professionals to work in these less attractive fields. The Health Board has ongoing discussions with universities to establish formal training courses on these topics.

Recommendations

- Finalise, gain approval and publish the overarching national One Health strategy on AMR and the National Action Plan on AMR in human health. This is essential for preparing operational plans and securing additional funding for further surveillance, IPC, and antimicrobial stewardship activities included in the National Action Plan. Ensuring that adequate human and financial resources are available to address AMR at national level, in healthcare facilities and the community (primary care) is also essential. While the AMR situation of Estonia has so far been favourable, new actions may be proposed and prioritised by the ICM and could require specific funding to fill gaps in AMR surveillance and IPC, in particular related to the transfer of patients from neighbouring countries with a less favourable AMR situation.
- Ensure that the systems for surveillance of AMR, HAIs and antimicrobial consumption are considered in the upcoming legislative changes and technical updates to NAKIS-2, allowing wider usage of eHealth data while maintaining the high quality of data as previously reported to EARS-Net. Adequate IT resources should be secured and maintained to support the quality of national surveillance activities.
- Ensure the routine availability and use of e-prescription data to monitor and improve prescribing practices and prepare the system to provide feedback to individual prescribers in both in hospitals and in the community (primary care). As demonstrated in previous studies, the currently available data on treatment indications for antibiotic use could be explored using the WHO AWaRe (Access, Watch, and Reserve) classification of antibiotics.
- Provide training on IPC, antimicrobial stewardship, and epidemiology to postgraduate health professionals and promote the development of expertise by offering incentives thus to increase the number of national experts in this fields.

Findings and recommendations regarding non-in-depth assessed capacities

This chapter presents the findings and recommendations from the review of non-in-depth capacities.

Capacity 1. Policy, legal and normative Instruments to implement the International Health Regulations (IHR) 2005

In Estonia, legal documents and policies at the national level provide the foundation for public health preparedness and response. Legislation and plans are comprehensive. The overall framework includes overarching acts such as Public Health Act, Communicable Diseases Prevention and Control Act, Health Services Organization act, and Emergency Act. General plans support the policy implementation in mid- and long-term perspective, include 'Eesti 2035'; National Health Plan 2020-2030; Welfare Development Plan 2023-2030; Civil Protection Framework and Action Plan 2024-2027; and Rescue Network Strategy (until 2025). The specific plans in place include Emergency Response Plan, Disaster Medicine Plan and a minister's decree on childhood immunisation program.

The work in progress, outlined by the Estonian experts, include development of user-friendly documents for pandemic preparedness components targeted as information leaflet to the general population. A new Public Health Act has been developed and is in the process of approval by the Estonian Parliament. In addition, a One Health strategic framework is to be finalised.

Multi-sectoral coordination mechanisms and cross-agency agreements and plans for information sharing, IHR reporting, health emergency response and capacity building have not yet been formalised, as flagged by the Joint External Evaluation report. However, effective coordination takes place based on informal and person-based mechanisms. Simulation exercises could further help raise awareness and underline coordination needs.

Recommendations

- In line with the Joint External Evaluation recommendation, formalise multi-sectoral coordination mechanisms and cross-agency collaboration for IHR implementation.

Capacity 2. Financing

The Joint External Evaluation assessed Estonia to have high capacity (score 4) both in financing for IHR implementation and public health response. Recommendations from the evaluation included the analysis of gaps for financing IHR implementation.

State financing of prevention, preparedness and response to health emergencies in Estonia is based on the State Budget Act. Public health services are financed mainly by a state budget that has been allocated to the Health Insurance Fund. Management of public health emergencies is primarily funded within the statuary budget through budget reallocations. If additional funding is needed, the government can decide on an amendment of the state budget. External funds from international or regional partners might be available. The Health Emergency Response Plan describes financing of health services in case of an emergency health event. Estonia has a regulation stating the conditions and procedure for the utilisation of resources required for resolving healthcare needs during events including ambulance, specialised medical care, and GP service providers both during an emergency. During the fiscal year, budget reallocations can also be made. During the COVID-19 pandemic, the government of Estonia adopted several supplementary state budgets, but tests of financial resources for contingency funding during emergencies have not been conducted.

Recommendations

- Regularly test (at least every three years) the accessibility and functionality of contingency funding mechanisms. Such exercises can enhance awareness of and familiarity with the financial structures in place, identify potential gaps, bottlenecks and inefficiencies, and ultimately ensure agile and efficient responses to public health emergencies.

Capacity 5. Human resources

Estonia has considerable workforce shortages in family medicine and nurses, especially in remote areas. The National Health Plan (2020–2030) covers human recourses, however the multisectoral workforce strategy does not address areas related to field epidemiology and the veterinary sector. In Estonia, there is medical specialisation in public health and continuous professional education, including training for management of emergency situations and joint exercises for multidisciplinary teams; however, the country is not utilising the opportunities of the ECDC Fellowship Programme on Field Epidemiology and Public Health Microbiology (EPIET/EUPHEM) training. The findings of Joint External Evaluation report also refer to a lack of clear description of career tracks and job descriptions in the workforce strategy. Health professionals could be better motivated to specialise in the areas of epidemiology, infectious diseases and infection prevention and control, and bioinformatics. Such incentives can help retain staff at the national and regional level.

During the Public Health Emergency Preparedness Assessment discussions it was noted that policies for attracting and retaining staff are gradually being introduced into the system, e.g. 'Back to Healthcare' initiative. The authorities will conduct analysis of workforce usage and tasks and optimise planning by development of a national healthcare workforce framework with clear roles and responsibilities.

In the Serious Cross Border Threats to Health regulation Article 7 self-assessment, Estonia reported to have a mechanism to ensure a surge in human resources in the event of a public health emergency for hospital services. Yet, such mechanism is not in place for laboratory and for outpatient primary care services. Certain hospitals are considered as vital service providers and included in emergency preparedness planning, both at national and regional level where regular trainings and simulation exercises are performed for the staff. It is legally mandated that nationwide exercises should be conducted at least once every five years. Vital service providers are obliged to have SIMEX every two years, with the Health Board monitoring the related implementation. The Hospital Network Development Project (till 2040) describes the planning of workforce capacity and infrastructure. Regarding primary healthcare doctors, there is a plan to develop criteria and select several to be considered as providers of vital services and trained on public health emergency preparedness and response functions.

Recommendations

- Make a comprehensive analysis of the public health workforce and ensure opportunities and incentives for professional development, especially in epidemiology of infectious diseases.

Capacity 7. Health service provision

The Joint External Evaluation assessed Estonia to have high level of capacity in case management, utilisation of essential health services and continuity of essential services (all with score 4). The evaluation recommended finalising the case management guidelines, expand the stockpiles of MCMs, consider public health service providers as vital services, establish prioritisation criteria for care and invest in digital services.

Provision of health services in Estonia is regulated by the Public Health Act, the Health Services Organisation Act and in emergency situations also by the Emergency Act. Based on the Emergency Act, if the Health Board decides to activate the emergency plan at levels 1 to 3, the provision of health services is impacted. At stage 1, the services face increased demand and are required to operate at their maximum capacity under regular standards of care. At stage 2, the care is prioritised to vital services, elective care is deferred, and operating hours are extended. At stage 3, access to care is further prioritised to life-saving situations, the requirements for competence and availability of personnel are reduced, and the standard of care might also be impacted by lack of medicines and medical devices.

Estonia has interdisciplinary crisis management coordination between all actors of the healthcare system in case of emergency. An emergency chief medical officer appointed at emergency healthcare risk levels 1–3 has a coordinating role between two regions – north and south and between health service providers.

Twenty hospitals and ten ambulance care providers are considered as vital service providers by law. These hospitals are required to develop and regularly revise their risk analyses, continuity plans (approved by the Health Board) and participate in simulation exercises. The continuity of health services is limited to emergency care. Estonia has a dedicated operational plan for continuity of health services in case of increase demand, tested in the last three years for hospitals and outpatient primary care services. The continuity plans do not address the prioritisation of services. Instead, decisions on prioritisation are taken ad hoc if need be. Therefore, there is a need to better define the continuity of the emergency health services during emergencies and update the relevant national preparedness and response plans.

Outpatient laboratory services and primary care providers are not required to plan for the continuity of their services, but they have defined roles and responsibilities in the emergency response structure. As part of the national implementation of the critical entities' Directive (2022/2557), there is a plan for some primary healthcare providers to be identified as critical entities which will require them to enhance their preparedness planning.

Estonia is able to map available health services in the country in the case of a public health emergency, but mostly in hospital settings. The country does not have provisions for the medical transfer of patients or mobile medical teams with other countries.

Recommendations

- Ensure the regular participation of vital health-service providers, including primary health services, in simulation exercises to test the mechanisms of prioritisation of care. Revise the contingency plans based on the gaps identified.
- Upgrade or develop the SitRep tool for situational awareness to collect information on access and availability of care also from the primary care and private sector including pharmacies, laboratory services, nursing homes and rehabilitation centres.
- Include provisions on medical transfer of patients and/or mobile medical teams with other countries in the prevention, preparedness and response plans.

Capacity 8. Risk communication and community engagement

The Health Board is responsible for communication in health crises. The strategic risk communication plan, including crisis communication, is under development. At the government level, risk communication, community engagement and infodemic management are outlined in the Government Communication Handbook (2018), however roles and responsibilities for infodemic management are not clearly described.

The small communication team at the Health Board is responsible for both external and internal communications. Following the Joint External Evaluation in 2023, large communication campaigns are handled by the Estonian Health Insurance Fund, for example seasonal vaccination campaigns (flu, COVID-19) and childhood immunisation campaigns. The Health Board communication team has also performed stakeholder mapping for community engagement projects, and there are collaboration mechanisms in place.

Collaboration with the National Institute for Health Development could provide insights on approaches to extended networks of stakeholders for analysing and communicating public health emergency risks. Moreover, the Health Development Institute advises municipalities, including publishing and analysing data for municipalities which could add to enhanced collaboration between national and local entities. Involvement of associations of schools, general practitioners, nurses, etc. can enhance community preparedness. There are remaining training needs, especially for spokespersons, and the dedicated communications budget has limitations.

Recommendations

- Engage umbrella associations (e.g. medical doctors, nurses, pharmacists, paramedics, schoolteachers, medical students) in joint after-action reviews and conduct simulation exercises together to strengthen community preparedness, awareness and collaboration.

Capacity 9. Points of Entry and border health

Routine and emergency capacity at Points of Entry (PoE) in Estonia are well developed, and PoEs are integrated in the national surveillance system. The digital passenger locator form can be used at airports. Training for PoE staff on the use of PPE and isolation procedures as well as peace-time agreements with airlines for contact tracing have been named as needed by the country.

Information on public health risks can be rapidly shared with the public and officials via established communication channels including online platforms. The development and potential implementation of international travel-related measures is the responsibility of an intersectoral working group including the Ministries of Social Affairs, of the Interior and the Economic Affairs and Communication which comes together on an ad hoc basis.

Capacity 11. Chemical events

The capacity assessment regarding chemical events relates to three areas: i) the response to large scale chemical release, both accidental and deliberate, ii) health risk assessments of chemical threats, and iii) surveillance for chemical intoxication in individuals and groups of people.

Estonian health authorities have undertaken several actions to prepare for chemical events, including the mapping of hazardous sites, a risk analysis for mass poisoning, and a recent exercise (2023) of an industrial accident. The risk analysis has revealed a lack of a comprehensive overview of hospital capacity and operational guidelines for managing large-scale poisoning events. This exercise has resulted in useful suggestions for the improvement of the preparedness and response to chemical events, which are now being considered in the updated planning.

For surveillance, assessment and management of intoxications, authorities refer to the 24/7 available Poison Centre within the Health Board. For the management of major events, the authorities refer, in the absence of a specific plan for the response to chemical events, to the generic response plan.

Recommendation

- Develop a comprehensive specific chemical response plan, either as a standalone plan with clear connection to the generic response plan or integrated in the general response plan.

Capacity 13. European Union-level coordination and support functions

Estonia's EU priorities are defined at the Government level in the Estonia's European Union Policy Priorities 2023–2025. The Foreign Relations Act sets provisions for EU and international coordination and collaboration. Roles and responsibilities of coordination in relation to biological threats within the European Union are clearly defined in the Estonian Communicable Diseases Prevention and Control Act and in the Requirements for International Cooperation and Information on Communicable Diseases and Procedures (Nakkushaiguste tõrjeks tehtava rahvusvahelise koostöö ja teavitamise nõuded ning kord) . Estonia's Emergency Medicine plan includes Union level coordination and Union support functions in health emergencies.

The infectious diseases department of the Health Board serves as the 24/7/365 National Focal IHR point and as the National Competent Authority to the Early Warning and Response System. According to the Health Board's internal SOP, the duty officer monitors the Early Warning and Response System and informs the senior officers of a notification of a serious cross-border threat to health. Threats of biological origin are discussed in the Health Board's regular roundtable, and decisions are taken on risk assessment and public health measures. In case of notifications of foodborne or environmental threats, the Health Board will pass the information to the responsible officials such as the Environmental Board or the Agriculture and Food Board.

In the event of foodborne or environmental threats of domestic origin, after an assessment of a serious cross-border threat to health of biological, chemical, environmental or other origin, the Health Board is responsible for notifying other Member States and the European Commission through the Early Warning and Response System. However, the information sharing and decision-making procedures between the European Union level and the national, regional and local levels have not been tested. In particular, the lack of awareness of IHR in the other relevant sectors might delay information sharing and coordination from the local level to the European Union level. Decision making related to the consultation and coordination within the Health Security Committee and dissemination of Health Security Committee opinions follows the same information sharing and decision-making procedure.

The Ministry of Social Affairs represents Estonia at the Senior Level Health Security Committee. The Health Board takes part in the technical working groups of the Health Security Committee and the HERA board. Depending on the topic, experts from other agencies – such as the National Stockpiling Agency, the Health Insurance Fund or from the State Agency of Medicines – can be involved in the meetings. There is no written procedure for coordination between the Ministry of Social Affairs and the Health Board regarding decision-making at the European Union level, but reports from the meetings are shared between the agencies.

The Health Emergency and Response Plan addresses arrangements for mobilising international assistance. The European Commission, such as the Directorate-General for Health and Food Safety, the Health Emergency Preparedness and Response Authority and the Directorate-General for European Civil Protection and Humanitarian Aid Operations, and European Union Agencies, such as ECDC and the European Chemicals Agency , are mentioned as sources of expertise. European Union support mechanisms, such as the Union Civil Protection Mechanism and Medevac, are highlighted.

The SitRep tool is used for situational awareness within the Incident Management System. Information on public health and social measures as well as communication measures and speaking points could also be found in the SitRep. However, the platform is not digitally interoperable with the Early Warning and Response System but requires the Health Board to transfer the information manually between the systems.

Recommendation

- Test the interoperability of the Incidence Management System with the coordination mechanisms at EU level including the Health Security Committee, the Union Civil Protection Mechanism and the the Health Emergency Preparedness and Response Authority board. Ensure the flow of information regarding threat detection, risk assessment, notification of serious cross-border threat to health, and public health and social measures from the local level to the European Union level, and vice-versa, as well as across sectors.

Capacity 14. Research development and evaluations to inform and accelerate emergency preparedness

The Joint External Evaluation found that Estonia has reasonably good capacity for research, development and innovation (score 3, under health emergency management). The evaluation recommended strengthening preparedness to perform outbreak- or emergency-related research.

Estonia has 22 institutes performing research work. The State Agency of Medicines regulates clinical trials in the country, with standardised monitoring through a centralised trial registration platform. A website allows for consultation on which research is being performed by which institutions, resulting in a good level of transparency.

The Health Board is limited in its capacity to perform or support outbreak-related research, due to both workload and limited capabilities. The Emergency Response Plan does not include provisions for research and innovation. The Health Board may consider developing template study protocols to be used during crises or outbreaks. To this end, the Health Board may further deepen the collaboration with universities or research institutions.

Recommendation

- The Health Board should integrate the need to conduct emergency- and outbreak-related research in its preparedness plans and provide staff with sufficient training in outbreak investigation and outbreak-related research.

Capacity 15. Recovery elements

Lessons learned exercises and after-action reviews are regularly conducted to evaluate responses to major incidents. In July 2022, ECDC facilitated a one-day lessons learned exercise in Tallinn, focusing on the COVID-19 response during 2020 and 2021. In 2023, the Health Board published the comprehensive lessons learned document Descriptive Analysis and Insights Gained from the COVID-19 pandemic, which outlines the progression of the SARS-CoV-2 pandemic in waves, details the response measures implemented, and includes related assessments. Additionally, it provides a general summary of insights gained and includes structured interviews with key individuals who were central to the pandemic response. The exercise mentions areas for improvement. The Health Board has compiled the lessons learned and will integrate them into the Response Plan to strengthen future preparedness and response efforts.

Furthermore, the National Audit Office conducts regular audits to ensure that public funds are used effectively and lawfully. For example, it reviewed the government's use of the emergency reserve for COVID-19 in 2020 and has also examined the use of emergency medical resources in Estonia. In its 2022 annual report, the National Audit Office addressed the shortage of healthcare professionals, and in 2018, it evaluated the government's preparedness for emergencies.

Capacity 16. Actions taken to improve gaps found in the implementation of prevention, preparedness, and response plans

Following the Joint External Evaluation, the country has already identified necessary actions to address gaps and will develop an action plan to implement both Joint External Evaluation and Public Health Emergency Preparedness Assessment recommendations.

Recommendations

- Using the current momentum, consult with the Government Office to discuss the development, costing and possible legal instruments for an action plan considering the recommendations of the Joint External Evaluation 2023 and the Public Health Emergency Preparedness Assessment 2024.
- Findings and recommendations of lessons learnt exercises, in- and after-action reviews and simulation exercises performed during and after the COVID-19 pandemic should be integrated into a comprehensive framework, such as the National Action Plan for Health Security, or an equivalent document. This framework should outline specific actions, assign responsibilities to relevant stakeholders, and establish clear timelines to address weaknesses identified in the response.
- The National Action Plan for Health Security, which will be expanded, should refer to the Joint External Evaluation and Public Health Emergency Preparedness Assessment reports.

Conclusions

The Estonian authorities provided relevant documents for the documentary review. The sessions during the country mission were well prepared with rich information per area, including an overview of pending actions after the Joint External Evaluation. Representatives from most institutions relevant for the assessment participated in the sessions, although participants from the sub-national level were not present. The Public Health Emergency Preparedness Assessment was performed in a collaborative atmosphere and through active discussions, which enabled the assessment team to form a clear view of the public health emergency preparedness and response capacity in Estonia. This, in turn, led to several recommendations which are concrete steps to sustain strengths and tackle challenges.

The Public Health Emergency Preparedness Assessment considered the recommendations published in the Joint External Evaluation report (2023). The responses indicated by Estonia in the self-assessment Report on Prevention, Preparedness and Response Planning 2023 (under Article 7 of the Serious Cross Border Threats to Health Regulation) were considered by the assessment team as valid and corresponded well to those assigned by the Joint External Evaluation team.

The assessment demonstrates that in Estonia there is a good understanding of the state of health emergency preparedness and response and a strong culture of testing and simulation exercises. Collaboration between key stakeholders is functional, although often not formalised. Further commitment needs to be mobilised to translate the recommendations from both the Joint External Evaluation (2023) and the Public Health Emergency Preparedness Assessment (2024) into actions.

Annex 1. List of capacities included in the assessment

Capacity 1.	IHR implementation and coordination
Capacity 2.	Financing
Capacity 3.	Laboratory
Capacity 4.	Surveillance
Capacity 5.	Human resources
Capacity 6.	Health emergency management
Capacity 7.	Health service provision
Capacity 8.	Risk communications and community engagement
Capacity 9.	Points of Entry and border health
Capacity 10.	Zoonotic diseases and threats of environmental origin, including those due to the climate
Capacity 11.	Chemical events
Capacity 12.	Antimicrobial resistance and healthcare-associated infections
Capacity 13.	Union level coordination and support functions
Capacity 14.	Research development and evaluations to inform and accelerate emergency preparedness
Capacity 15.	Recovery elements
Capacity 16.	Actions taken to improve gaps found in the implementation of prevention, preparedness and response plans

Annex 2. Agenda

	Tuesday 1 October 2024	Wednesday 2 October 2024	Thursday 3 October 2024	Friday 4 October 2024
08:30	Welcome & Registration	Registration	Registration	
09:00	Opening Remarks (Estonia)	Assessment of In-Depth Capacities	Assessment of In-Depth Capacities	
09:15	Overview and key aspects of the assessment process (ECDC)			Registration
09:30		*1. AMR/HAIs*	*1. Laboratory*	Main Findings and recommendations, conclusions and next steps (ECDC presentation and discussion with Estonia)
09:45	Overview of the country public health structure and preparedness and response mechanisms in the country (Estonia)	*2. Health emergency management*	2. Zoonotic diseases	
10:00				
10:30	Break	Break	Break	
11:00	Overview of the generic and specific plans available in the country relevant for the assessment process - presentation on the Joint External Evaluation main take aways and action plan (Estonia)	Assessment of In-Depth Capacities	Assessment of In-depth Capacities:	Break
			1. Laboratory	
11:30		*1. AMR/HAIs*	*2. Zoonotic diseases*	Debrief on the ECDC Pilot (structure, preparation, organization)
12:00	Assessment of Cross-Cutting Aspects - Scenario based discussion	*2. Health emergency management*		
12:30	Lunch	Lunch	Lunch	Concluding Remarks (Estonia)
13:00				
13:30	Assessment of Cross-Cutting Aspects - Scenario based discussion	Assessment of In-Depth Capacities	C.14 Research	
14:00		*1. Surveillance*		
14:30		*2. Health emergency management*	C.15 Recovery, C.16 Action plan and next steps Joint External Evaluation	
15:00	Break	Break		
15:30	C.13 Union level coordination (plus follow-up on IHR if needed)	Assessment of In-Depth Capacities	Assessment team debriefing	Plenary
				Breakout
16:00	Follow-up from Joint External Evaluation (PoE, RCCE, Chemical events, Finance, HR, Health service provision)	*1. Surveillance*		Breaks
		2. Health emergency management		
17:00	Wrap-up Day 1 (ECDC together with Estonia)	Assessment team meeting		

Annex 3. Assessment team

Sections included in the assessment		Lead experts (ECDC)	Supporting experts
A. International Health Regulation Capacities			
Capacity 1.	IHR implementation and coordination	Thomas Hofmann	Leonidas Alexakis
Capacity 2.	Financing	Ettore Severi	Paula Tiittala
Capacity 3.	Laboratory	Jessica Beser	Leonidas Alexakis Tommi Kärki Martin Sojka
Capacity 4.	Surveillance	Leonidas Alexakis	Jessica Beser Tommi Kärki Aikaterini Mougkou
Capacity 5.	Human resources	Svetla Tsolova	Emmanuel Robesyn
Capacity 6.	Health emergency management	Emmanuel Robesyn	Ettore Severi Sebastiano Lustig Paula Tiittala
Capacity 7.	Health service provision	Svetla Tsolova	Paula Tiittala
Capacity 8.	Risk communications and community engagement (RCCE)	Svetla Tsolova	Tommi Kärki
Capacity 9.	Points of Entry (PoEs) and border health	Thomas Hofmann	Aikaterini Mougkou
Capacity 10.	Zoonotic diseases and threats of environmental origin, including those due to the climate	Ettore Severi	Emmanuel Robesyn Svetla Tsolova
Capacity 11.	Chemical events	Emmanuel Robesyn	Jessica Beser
B. Additional capacities as per the regulation			
Capacity 12.	Antimicrobial resistance (AMR) and healthcare-associated infections (HAIs)	Tommi Kärki Aikaterini Mougkou	Jessica Beser Leonidas Alexakis Martin Sojka
Capacity 13.	Union level coordination and support functions	Thomas Hofmann	Paula Tiittala
Capacity 14.	Research development and evaluations to inform and accelerate emergency preparedness	Emmanuel Robesyn	Ettore Severi
Capacity 15.	Recovery elements	Ettore Severi	Aikaterini Mougkou
Capacity 16.	Actions taken to improve gaps found in the implementation of prevention, preparedness and response plans	Thomas Hofmann	Martin Sojka

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