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Annotated outline of the guidance document on risk-based drinking-water quality surveillance

The Protocol on Water and Health emphasizes the need to establish and maintain a legal and institutional framework for monitoring and enforcing standards for the quality of drinking-water and promote the operation of effective networks to monitor and assess the provision and quality of water-related services.

Supporting cost-effective drinking-water quality surveillance is a thematic priority area under the Protocol's 2014–2016 programme of work. The meeting on effective approaches to drinking-water quality surveillance (Oslo, 6–7 May 2015) identified key activities to advance the work under this thematic area, which include development of a guidance document for decision makers addressing risk-based surveillance approaches and establishing an expert group to conceptualize the document. The initial scope, key elements and an outline of the guidance document were discussed and agreed at a lead Parties' planning meeting (Bonn, 3–4 September 2015). The document aims to provide a rationale for the application of risk-based surveillance approaches, prioritization of surveillance efforts taking into account local circumstances and available resources and illustrate good practice examples.

An annotated outline was prepared by the lead Parties and the WHO Regional Office for Europe secretariat and updated considering the feedback and suggestions received at the ninth meeting of the Working Group on Water and Health (Geneva, 29–30 June 2016). The annotated outline provides an overview of the proposed structure, main contents and key messages to promote uptake of risk-based approaches to water quality surveillance in regulation and practice.

The Protocol on Water and Health makes several links to drinking-water quality surveillance:

- In accordance with Article 6 Paragraph 2 (a), the Parties shall establish targets for the standards and levels of performance that need to be achieved or maintained for a high level of protection against water-related disease, including on the quality of drinking-water supplied, taking into account the *Guidelines for Drinking-water Quality* (GDWQ) of the World Health Organization (WHO);
- In accordance with Article 6 Paragraph 5 (c), Parties shall establish and maintain a legal and institutional framework for monitoring and enforcing standards for the quality of drinking-water;
- In accordance with Article 14 (h) Parties shall promote the operation of effective networks to monitor and assess the provision and quality of water-related services, and development of integrated information systems.

The framework for safe drinking-water recommended by the WHO GDWQ promotes a risk-based preventive management approach to ensure safety of drinking-water. Drinking-water quality surveillance is one of the core components of this framework and is an essential public health function. To be effective drinking-water quality surveillance needs to be aligned with risk-based principles, including prioritization of monitoring parameters and surveillance efforts on the basis of water safety plan (WSP) outcomes. The European Union (EU), for example, also follows a risk-based approach: in 2015, the EU has introduced a risk-based approach through revision of Annex II of the Drinking Water Directive which allows countries to set monitoring programmes based on local risk assessments.

Supporting countries in building effective systems for surveillance of drinking-water quality is a priority area of work under the Protocol. A regional meeting on effective approaches to drinking-water quality surveillance held in Oslo in May 2015 recognized the importance and need for applying risk-based approaches in standard-setting and surveillance and recommended to develop an advocacy document for decision makers to support uptake of risk-based approaches in regulations and practice (for more details, please see meeting report available at: http://www.euro.who.int/en/health-topics/environment-and-health/water-and-sanitation/publications/water-and-sanitation-in-the-who-european-region-2014-highlights/effective-approaches-to-drinking-water-quality-surveillance).

This document aims to support decision makers, in particular regulators and national and sub-national public health officials, to better understand and appreciate the added value, concept and main principles of risk-based approaches in drinking-water quality surveillance and thereby strengthen surveillance systems for better protection of public health. It will provide a rationale for the application of risk-based surveillance approaches, prioritization of surveillance efforts taking into account local hazards and available resources. It will further provide good practice examples and short description of technical resource materials.

The document is envisaged to consist of four technical sections which are outlined in the table below and a two-page “crisp” stand-alone summary of the core principles and messages for policy makers.

Section	Purpose	Content	Key messages
Why are we concerned of drinking-water quality surveillance?	Problem statement: drinking-water quality and health in the WHO European region Position the strengthening of drinking-water quality surveillance as an essential public health priority in the Region	The following aspects need to be addressed: – Describe the situation of drinking-water quality, prevailing health risks related to water contamination and magnitude of infectious water-related disease incidents and outbreaks as well as non-infectious health outcomes caused from exposure to chemicals in drinking-water in the WHO European region based on available evidence – Highlight the main challenges and bottlenecks in undertaking the surveillance programmes, in particular in rural and/or small-scale water supply areas *Data sources for the above points: latest global assessment of the burden of disease from environmental risks; review report of water-related infectious diseases in the WHO European Region; national summary reports submitted under the Protocol; other available evidence materials (e.g. analysis of waterborne outbreaks in Nordic countries).* – Define WHO GDWQ definition of surveillance as the "continuous and vigilant public health assessment of safety and accessibility of drinking-water supply" – Describe the building blocks of the WHO GDWQ framework for safe drinking-water and the objectives and main components of drinking-water quality surveillance in the context of this framework – Establish the linkage to WSPs and address relationship with HACCP for countries where drinking-water is regulated by food law – Explain why surveillance of drinking-water is important by emphasizing that surveillance is beyond checking compliance with the standards but aims at developing an understanding of local risks and causes for contamination throughout the water supply chain from catchment to the point of consumption; providing advice to water suppliers; monitoring the effectiveness of control measures; analyzing water quality trends which inform remedial measures and policy interventions to foster improvement – Emphasize the surveillance of drinking water quality as a core public health function and a high priority in the Region	– Safe drinking-water is an important determinant of health and well-being – Waterborne diseases and outbreaks caused by contaminated drinking water still occur in many countries of the WHO European Region – Surveillance, including drinking-water quality surveillance, is a core public health function which is a responsibility of the Government – Securing an effective surveillance system should be in the priority agenda – *[More messages to be identified]*
Why risk-based surveillance?	Set the scene: Provide a strong rationale for risk-based surveillance Sensitize decision makers and regulators for uptake of such an approach in policy, regulations and practice	The following aspects need to be addressed: – Explain why focusing on end-product testing is "too late and too little"; explain what does "too late" and "too little" mean (e.g. missing critical contamination events) – Explain why "over-engineered" monitoring requirements do not add value in public health protection, are expensive to implement and thus not resource-effective – Explain why prioritization is needed in water quality standard setting and in practically selecting site-specific monitoring parameters – Explain the to focus on occurrence of parameters in drinking-water and local public health risks in selecting core monitoring parameters; address the link to the WSP approach – Emphasize about public health significance and other benefits (e.g. cost effectiveness) of risk-based surveillance – Explain how a risk-based approach enables the efficient use of limited financial, technical and	– Focusing on end-product testing and monitoring of long list of parameters do not provide significant public health protection and is not resource efficient – Resources for surveillance need to be directed to the areas where health risks can be prevented – Importance of introducing risk-based "thinking" in the

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		personnel resources by directing them to the areas where health risks can be prevented; thereby risk-based surveillance prevents from irrational use of resources for the areas which do not add value in public health protection *[Illustration by suitable case examples from Oslo meeting and elsewhere; see list of preliminarily proposed case examples below]*	context of surveillance – *[More messages to be identified]*
What does risk-based surveillance entail?	Support translating the WHO GDWQ into national standards and regulations towards making surveillance more effective Provide a definition of risk-based surveillance Present building blocks and key principles of risk-based surveillance	The following aspects need to be addressed: – Define what is " risk-based surveillance" and describe its main building blocks: water quality monitoring, sanitary inspection and WSP auditing – Explain that parameters covered by the WHO GDWQ are not intended to be included in national standards as a full set – Explain that regulators should establish national drinking-water quality standards and/or surveillance regulations that protect public health: the GDWQ should be adapted taking into account the health significance, prevailing national and local hazards and circumstances and available resources – Explain the need for "flexibility" when defining surveillance requirements in contrast to a fixed approach with all detailed requirements pre-determined – Explain different approaches for surveillance of microbial and chemical quality and the main criteria and considerations for prioritizing microbial and chemical parameters for drinking-water quality monitoring (*note: a conceptualized decision tree may be introduced to support prioritization of parameters in the national context)* – Propose a set of core/priority monitoring parameters and frequency of monitoring, taking into account different supply types (e.g. reduced frequency and limited range of parameters for small supplies) – Describe methodologies for design and setting up risk-based monitoring programmes (e.g. by addressing what samples/analyses, where, when, frequency, consideration of risk outcome and level of safety) – Elaborate specifics of small supplies in rural areas (e.g. remoteness, limited staffing and knowledge) in the context of surveillance and offer/discuss possible solutions (e.g. field testing , mobile-device based data transfer) – Explain differences between verification, operational and validation monitoring with a practical example – Microbial parameters: (I) Emphasize role of fecal indicator concept, including strengths and limitations; (ii) Emphasize that in addition to fecal indicator bacteria, microbial monitoring can include risk-based testing for reference pathogens and bacteriophages. – Chemical parameters: (I) Emphasize the principle: "don't measure what is not there" but focus on what is important; Emphasize need to select priority chemicals and to take into account a substance's risk (i.e. occurrence in the area, significance for public health and acceptability) – Discuss approaches for responding to exceedances to microbial and chemical parameters	– *Working option for defining risk-based surveillance:* Risk-based surveillance is a proactive approach to monitoring and controlling a core set of parameters which were chosen based on their health significance, acceptability and local risk assessment – *Working option for defining risk-based surveillance:* Risk-based surveillance is shifting focus from over reliance on end product testing of a pre-determined list of parameters to a proactive approach to monitoring and controlling critical risks in water supply – Risk-based surveillance enables prioritization of surveillance efforts based on public health risks and targeting resources where most needed, thereby lead to greatest benefit for health and resource efficiency – *[More messages to be identified]*

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		– Address emerging pathogens and emerging chemical contaminants in terms of priority setting, monitoring and actions – Highlight that water quality testing alone is not sufficient and the need to combine surveillance with local risk assessments in the form of sanitary inspection or WSP ("know your system"); highlight that water quality testing can be designed for more health-based quantitative risk assessment (for example quantitative microbial risk assessment) – Emphasize the changing role of surveillance agencies towards WSP auditing as core element in risk-based surveillance – Position need for baseline assessment in inform surveillance efforts (e.g. rapid assessments) *[Illustration by suitable case examples from Oslo meeting and elsewhere; see list of preliminarily proposed case examples below]*	

What are the prerequisites for facilitating uptake of a risk-based surveillance system?	Explain enabling factors that are important in successfully establishing or sustaining risk-based surveillance systems	The following aspects need to be addressed:
		– Establishing a legislative and institutional basis for implementing risk-based approaches to drinking-water quality surveillance that allow for local risk-assessments and flexibility in surveillance approaches
		– Review and update the national drinking-water quality standards and/or surveillance regulations, including clear definitions on roles and responsibilities
		– Use of surveillance data in improving water-quality regulations
		– Capacity building at different levels:
		  – Institutional, including laboratory capacity
		  – Human resource capacities, including systematic training programmes for public health officers, inspectors and water operators
		– Adequate financing of public health surveillance programmes
		– Building and sustaining an inventory/information systems (incl. basic information on water supplies, water quality and inspection data) that support effective surveillance, including data analysis and reporting
		[Illustration by suitable case examples from Oslo meeting and elsewhere; see list of preliminarily proposed case examples below]
			– The countries should establish risk-based drinking-water quality standards and surveillance requirements that protect public health
			– Securing adequate resources (human, lab and financial) is fundamental in strengthening and sustaining public health surveillance
			– *[More messages to be identified]*