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Strategic Quality Management at the Human–Animal Health Interface: A Narrative Review within the One Health Framework

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Abstract

Strategic quality management has become an important element of resilient health systems by integrating quality improvement, organizational governance, and risk-informed decision-making into long-term health system management, while the One Health concept emphasizes the need for collaboration between human, animal, and environmental health sectors. This narrative review aimed to analyse the principles of strategic quality management in human and veterinary medicine and to evaluate the role of interinstitutional integration in strengthening health system quality and resilience within the One Health framework. A structured literature search was conducted in PubMed, Scopus, Web of Science, Google Scholar, and official publications of international organizations, followed by thematic and comparative analysis. The review identified five common principles of strategic quality management: quality and outcome orientation, data-driven management, interinstitutional coordination, risk management, and leadership and quality indicators. Although human and veterinary medicine differ in their operational focus and quality indicators, both sectors increasingly rely on integrated information systems, coordinated surveillance, risk-based decision-making, and strong institutional capacity. The findings show that fragmented information exchange, limited coordination, and workforce shortages remain major barriers to effective quality management. Strengthening interinstitutional integration through interoperable information systems, coordinated risk assessment, and sustainable governance mechanisms may improve the quality, resilience, and preparedness of health systems. Interinstitutional integration should therefore be regarded not only as an organizational requirement, but also as a strategic management tool within the One Health framework.

Keywords: One Health; quality management; health systems; veterinary services; interinstitutional integration; risk management.

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Introduction

The increasing frequency of emerging infectious diseases, zoonoses, antimicrobial resistance, and other cross-border health threats has highlighted the need for more resilient health systems and integrated approaches to quality management. International initiatives increasingly emphasize that health system resilience depends not only on clinical performance but also on effective governance, risk management, and collaboration across sectors. In this context, strategic quality management may be understood as a long-term management approach that integrates quality improvement, organizational governance, evidence-informed decision-making, and risk management to strengthen health system performance. Unlike operational quality control, which focuses on monitoring compliance with predefined standards, strategic quality management provides the broader organizational framework within which quality assurance and risk management support long-term system resilience and preparedness. The Sendai Framework for Disaster Risk Reduction (UNDRR, 2015) and the WHO Health Emergency and Disaster Risk Management (Health EDRM) framework both recognize that reducing health risks requires coordinated action extending beyond the healthcare sector (UNDRR, 2015; Wright et al., 2020).

Many countries still face severe shortages of healthcare professionals. The most serious deficits are reported in Africa, where 36 out of 47 countries suffer from critical workforce shortages. In response to this challenge, the World Health Organization launched the Global Strategy on Human Resources for Health: Workforce 2030 (WHO, 2016a). It calls for coordinated action across the health, education, labour, and finance sectors, together with regulatory authorities, civil society, professional organizations, and the private sector. However, limited managerial capacity, fragmented governance, and inconsistent implementation of national policies continue to exacerbate workforce shortages, unequal staff distribution, and poorer health outcomes (Ahmat et al., 2022). These examples underline that strategic quality management and the integration of human and veterinary health cannot be considered separately from the broader context of system resilience, human resources and global risk governance. Accordingly the implementation of the One Health approach, including the integration of veterinary medicine into broader health governance models at European and national levels, including in Bulgaria, is of particular importance.

Establishing a quality management framework in human medicine requires the integration not only of clinical outcomes but also of managerial and information-related components. The

scope of quality in healthcare encompasses the effectiveness of organizational processes, patient safety, resource management, and the ability of the system to respond to evolving risks (Kunkel et al., 2007). These elements are traditionally considered through the relationship between structure, process, and outcome, as reflected in the classical model for healthcare quality assessment (Donabedian, 1988). Various studies have shown that physicians perform a wide range of managerial roles, from the lowest to the highest levels of the organizational hierarchy within healthcare institutions (departments, hospital complexes, and others), although these responsibilities for managerial decision-making are only partially formalized. Clearly defined decision-making responsibilities for physicians create opportunities to integrate the clinical perspective into strategic decisions, including those related to patient safety and organizational processes (Rotar et al., 2016). This highlights that quality management is not limited to measuring indicators and monitoring outcomes but represents an organizational model in which professional autonomy and managerial responsibility are closely intertwined. Evaluating individual activities within the overall patient care process demonstrates how a quality framework can incorporate process indicators that reflect the entire healthcare delivery process rather than only the final outcome (Tawfiq et al., 2020).

In veterinary medicine, quality management is mostly implemented through health security systems, disease surveillance and disease control with an emphasis on institutional capacity and efficacy of veterinary services (Schneider, 2005). International standards therefore play a crucial role. The World Organisation for Animal Health (WOAH) recognizes the quality of veterinary services as a critical element for the early detection and control of diseases, the protection of public health and safe international trade. In this context, the One Health concept provides a governance framework for improving quality through coordinated actions across veterinary medicine, human healthcare, and related sectors (WOAH, 2024a).

An example of such integration in practice is the alignment of WOAH Performance of Veterinary Services (OIE-PVS) assessments (WOAH, 2024b) with the World Health Organization Joint External Evaluation (JEE) (WHO, 2022). This approach allows the parallel identification of gaps in preparedness and response to both human and animal health threats (WHO, 2023; Pelican et al., 2019). Analyses show limited involvement of veterinary authorities in several national health security programmes addressing zoonotic diseases and other emerging infectious disease threats. Integrating veterinary expertise into preparedness and coordination mechanisms strengthens

intersectoral collaboration and contributes to more effective responses to public health emergencies within the One Health framework. Experience from Tanzania shows that the joint implementation of JEE and OIE-PVS helps overcome sectoral fragmentation and improves coordination and quality management in human and veterinary medicine (Kitua et al., 2019). This highlights the need for sustained interinstitutional coordination mechanisms and more comprehensive integration of the veterinary sector into national health security systems (Strupat et al., 2025).

Information systems are among the key instruments for the practical implementation of the One Health approach (FAO et al., 2022). Experience in managing antimicrobial resistance demonstrates that monitoring and surveillance are most effective when based on interinstitutional coordination and standardized methodologies for data collection and exchange across the human, veterinary, and environmental sectors (Oberin et al., 2022; Redman-White et al., 2023; Majumdar et al., 2026). Integrated surveillance systems for antimicrobial use and antimicrobial resistance facilitate the early detection of emerging problems and support a coordinated response (Delpy et al., 2024; Na et al., 2025). Conversely, the lack of compatible information systems, harmonized reporting standards, and efficient data sharing limits the capacity for timely risk management (FAO et al., 2022).

At the organizational level, information technology is among the main tools for improving the quality of health services. Well-designed electronic health records and automated systems for prescription entry lower the likelihood of medical errors, improve clinical outcomes, and allow for data tracking over time (Alolayyan et al., 2022; Velardo et al., 2017). Electronic animal identification and tracking systems, laboratory information systems, and epidemiological monitoring platforms also help quality management in veterinary medicine, as in human health. These technologies increase traceability, help in early disease diagnosis and enable cooperation among veterinary services, laboratories and responsible authorities (VanderWaal et al., 2017; Tanchev and Balieva, 2024; Balieva et al., 2026). Information systems thus provide a shared information basis for the implementation of the One Health concept, supporting integrated quality and risk management in human and veterinary health.

The aim of this review was to analyse the principles of strategic quality management at the human-animal health interface and to evaluate the role of interinstitutional integration in strengthening the quality and resilience of health systems within the One Health framework.

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Materials and methods

This study was conducted as a narrative literature review based on a structured search and thematic analysis of the scientific literature.

The literature search was performed in PubMed, Scopus, Web of Science, and Google Scholar, complemented by strategic documents and official publications from the World Health Organization (WHO), World Organisation for Animal Health (WOAH), Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP), and United Nations Office for Disaster Risk Reduction (UNDRR). Search terms included combinations of quality management, One Health, health systems, veterinary services, health governance, interinstitutional coordination, health information systems, surveillance, antimicrobial resistance, and risk management.

Peer-reviewed articles, international strategies, guidelines, and regulatory documents published in English and directly relevant to the objectives of the review were included. Publications focusing primarily on unrelated clinical interventions or topics outside the scope of strategic quality management and One Health were excluded. Priority was given to recent publications, while seminal works were retained where necessary to provide conceptual context. The structured literature search initially identified approximately 175 potentially relevant records. After applying the inclusion and exclusion criteria, more than 50 peer-reviewed publications and international policy documents were included in the final thematic analysis.

The five principles presented in the Results section were derived inductively through thematic synthesis of the reviewed literature rather than being predefined according to an existing theoretical framework. The included publications were analysed comparatively to identify recurring management concepts and strategic elements common to both human and veterinary medicine.

Generative artificial intelligence (ChatGPT, OpenAI) was used exclusively as a language-support tool to improve grammar, readability, and text organization. The scientific interpretation of the literature, synthesis of the evidence, formulation of conclusions, and all final editorial decisions were performed exclusively by the author.

Results

The literature analysis identified five main principles of strategic quality management that are common to human and veterinary medicine, regardless of the specificities of the two sectors. They include quality and outcome-oriented management, data-driven management and information systems, interinstitutional coordination, risk management, and leadership and organizational capacity. Table 1 summarizes the main findings of the literature analysis, while the following sections present each principle in greater detail.

Table 1. Summary of the main findings of the literature analysis across the five principles of strategic quality management in human and veterinary medicine.

Strategic management principle	Main tools/mechanisms	Indicators	Main limitations	Main outcomes	Key references
Quality and outcome orientation	Quality management systems	Performance indicators	Heterogeneous metrics	Continuous improvement	Donabedian, 2005; Kunkel et al., 2007; Rooke et al., 2021; WOAH, 2024a
Data-driven management	Information systems	Data quality	Limited interoperability	Evidence-informed decision-making	WHO, 2016b; FAO, 2011; Engdawork et al., 2025
Interinstitutional coordination	One Health platforms	Coordination	Fragmented governance	Integrated management	Okello et al., 2014; Rüegg et al., 2017; FAO et al., 2022
Risk management	Surveillance; preparedness	Early detection	Uneven preparedness	System resilience	Mackenzie & Jeggo, 2019; FAO et al., 2022
Leadership and organizational capacity	Governance; workforce	Organizational capacity	Workforce shortages	Sustainable implementation	Rotar et al., 2016; WHO, 2016a; Ahmat et al., 2022

Quality orientation and outcome-based management

The literature review shows that the orientation to quality of provided services and achieved results is among the basic principles of strategic management in human and veterinary medicine. In human healthcare this principle is assessed by indicators related to safety of patients, effectiveness of the treatment process, availability and continuity of healthcare. In veterinary medicine, quality assessment is focused on the efficiency of veterinary services, the health status of animals, the capacity to monitor and control diseases and the functioning of laboratory systems.

Both sectors, despite the differences in the objects of management, are oriented to the measurement of results and continuous quality improvement (Table 2).

Table 2. Comparison of quality-oriented management approaches in human and veterinary medicine

Aspect	Human healthcare (Donabedian, 2005; Kunkel et al., 2007; Tawfiq et al., 2020)	Veterinary medicine (Rooke et al., 2021; WOAH, 2024a)
Quality management focus	Patient safety, effectiveness, accessibility and continuity of care, patient satisfaction	Quality of veterinary services, animal health status, disease surveillance and control, laboratory capacity
Outcome assessment	Clinical and organizational outcomes	Animal health outcomes and performance of veterinary services

Data-driven management and information systems

The literature analysis demonstrates that data-driven management is one of the basic principles of modern quality management in human and veterinary medicine. Despite the differences in structure and purpose of each system, information platforms perform similar functions that relate to the collection, validation, analysis and exchange of data in support of management decisions.

In human medicine, information systems integrate clinical, laboratory and administrative data to support the quality monitoring of healthcare and managerial decision-making. In veterinary medicine, the same functions are performed by the systems of epidemiological surveillance, laboratory information networks, registers of diseases, monitoring of antimicrobial resistance and platforms for tracking the movement of animals and animal products. The analysis shows that, regardless of sectoral differences, the effective functioning of these systems is based on standardized data exchange, technical compatibility and coordination between the participating institutions (Table 3).

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Table 3. Information systems and their role in quality management in human and veterinary medicine

Aspect	Human healthcare (Häyrinen et al., 2008; WHO, 2016b)	Veterinary medicine (FAO, 2011; Tanchev & Balieva, 2024; Engdawork et al., 2025)
Core information systems	Electronic health records, hospital information systems, clinical registries, and telemedicine	WAHIS, ADIS, TRACES, RASFF, laboratory information systems, and animal identification and traceability systems
Role in quality management	Quality monitoring, support for clinical and managerial decision-making, and outcome assessment	Disease surveillance, traceability, information exchange, and support for health risk management

Interinstitutional coordination and One Health integration

Various organizational models are used to implement interinstitutional integration, depending on the national health system and institutional structure. The most commonly described mechanisms include national One Health platforms, interagency coordination units, technical committees, and thematic working groups. Such models have been applied in countries such as Uganda, Chad, and Cameroon, where they support joint zoonotic disease surveillance, information sharing, and coordination of activities across sectors (Okello et al., 2014).

Comparative analyses indicate that, regardless of the organizational model, effective coordination depends on clearly defined roles, stable mechanisms for interaction, and common criteria for assessing joint work (Rüegg et al., 2017). These principles are also reflected in the One Health Joint Plan of Action, which identifies interinstitutional coordination as a key mechanism for managing health risks (FAO et al., 2022), as well as in the conceptual framework proposed by Mackenzie and Jeggo (2019), which emphasizes the need for integrated management across sectors.

Risk management and health system resilience

Risk management is a critical component of strategic quality management and is directly tied to the resilience of health systems to respond to new health hazards. In human healthcare, risk management is implemented through early warning systems, risk assessment frameworks, emergency preparedness plans and coordinated response mechanisms. Similar objectives are fulfilled in veterinary medicine through disease surveillance systems, biosecurity measures,

zoonoses control programmes and contingency plans for transboundary animal diseases. The specific tools differ between sectors, but both rely on the early identification of hazards, prompt risk assessment, and coordinated response to sustain vital health functions. Recent One Health frameworks further highlight that resilient health systems require integrated risk governance, shared surveillance, and cross-sector preparedness, rather than isolated sectoral responses (Mackenzie & Jeggo, 2019; FAO et al., 2022).

Leadership and organizational capacity

Leadership and organizational capacity are key components of strategic quality management, determining the ability of health systems to implement, coordinate, and sustain quality improvement initiatives. Effective governance in both human and veterinary medicine depends on an adequate workforce, clearly defined responsibilities, and decision-making mechanisms operating at different organizational levels.

In human healthcare, the literature places greater emphasis on the involvement of clinicians in organizational management and quality improvement. In veterinary medicine, greater attention is given to strengthening institutional capacity, workforce development, laboratory infrastructure, and the performance of veterinary services. Despite these sector-specific differences, both fields recognize leadership, a competent workforce, and strong institutional capacity as fundamental prerequisites for resilient, high-quality health systems.

Discussion

At this stage in the development of management in human and veterinary medicine, despite the use of various indicators for assessing quality, in both areas there is a shift from the assessment of individual activities to the assessment of the overall functioning of the system. According to Hughes (2008), quality management is not only based on the measurement of indicators, but also on the systematic comparison of results with pre-established standards and good practices through internal (comparison of different structures within the same organization) and external (comparison with other organizations) benchmarking. A recent scoping review further confirms that continuous quality improvement has evolved from isolated quality control activities towards integrated organizational approaches combining leadership, process improvement, data-driven decision-making, and continuous monitoring (Endalamaw et al., 2024). Additional research in hospital practice has demonstrated that physicians' involvement in management processes helps to

implement quality improvement initiatives, as the clinical perspective is included in strategic decisions (Parand et al., 2014; Rotar et al., 2016).

This is far less common in veterinary medicine, where quality assessments focus on institutional capacity, regulatory compliance and the effectiveness of oversight functions (Schneider, 2005). The WOAH Performance of Veterinary Services (PVS) system evaluates quality through indicators related to human resources, technical capacity, laboratory infrastructure, surveillance, and the regulatory framework (WOAH, 2024b). The Terrestrial Animal Health Code considers the quality of veterinary services as essential for effective disease control, safeguarding public health, and ensuring safe international trade (WOAH, 2024a).

A more detailed analysis shows that the effectiveness of these systems depends not only on data quality and the technologies employed, but also on strategic, tactical, and operational management, as well as on clearly defined organizational responsibilities (Winter et al., 2023). Practical examples include TRACES and the Rapid Alert System for Food and Feed (RASFF), which facilitate information exchange between competent authorities and support the management of risks related to food safety and the cross-border movement of animals and animal products (European Commission, 2024; Pigłowski, 2025).

In addition to integrated information systems, European policies increasingly emphasize interinstitutional collaboration as a core component of the One Health approach. In 2024, the European Centre for Disease Prevention and Control (ECDC), the European Food Safety Authority (EFSA), the European Medicines Agency (EMA), the European Environment Agency (EEA), and the European Chemicals Agency (ECHA) adopted a joint One Health Framework for Action, further institutionalizing this approach by establishing common priorities for risk management, data sharing, scientific collaboration, and capacity building. Together, these initiatives provide practical examples of how the One Health approach is being operationalised through integrated governance, interoperability, data sharing, and coordinated risk management in the European Union (European Parliament and Council, 2022; Bronzwaer et al., 2024).

Practical experience demonstrates that both sectors face similar challenges regarding data quality and surveillance systems. In human healthcare, quality improvement interventions involving data verification, supportive supervision, and staff training have been shown to improve the accuracy of reporting and reduce data falsification (Estifanos et al., 2022). Comparable challenges have been reported in zoonotic disease surveillance. In Nigeria, the prolonged absence

of reported monkeypox cases before 2017 has been linked to limited diagnostic capacity and weaknesses in surveillance systems, resulting in delayed outbreak detection (Ogunleye et al., 2024).

Similar findings were reported during the investigation of anthrax outbreaks in Tanzania, where, despite successful multisectoral collaboration, delays in reporting, limited laboratory capacity, and insufficient integration between human and veterinary surveillance systems were identified (Kitua et al., 2019). Likewise, in West Africa, the lack of coordinated information sharing between medical and veterinary services has been recognized as a major factor limiting effective rabies control (Savadogo et al., 2023). In the veterinary sector, the case of antimicrobial use management in Israel illustrates a different type of problem. Although national legislation has moved closer to European standards, there is still no centralized system for monitoring antimicrobial use at farm level and antimicrobial resistance in animals. Available data indicate antimicrobial use several times higher than the average reported for selected European countries, together with high levels of multidrug resistance among foodborne pathogens (Berman et al., 2023). This example underlines that, without reliable information systems, quality management and biosecurity remain difficult to implement effectively.

Differences are also evident in the degree of institutional integration. In Tanzania, the National One Health Platform brings veterinary and human health institutions into a common coordination framework, including a One Health Coordination Desk, working groups, and a national multisectoral technical committee (Kitua et al., 2019). This makes the veterinary quality framework closely linked to interinstitutional processes for risk management. In human healthcare, similar integration mechanisms are more often expressed through horizontal professional and scientific networks, such as the WHO Health EDRM research network, which aims to standardize approaches to health risk management and provide an evidence base for policy development (Wright et al., 2020).

Digital surveillance further demonstrates the need for coordination between data sources, institutions, and decision-makers. Studies on influenza, COVID-19, and dengue fever show that online search activity, social media data, and mobility patterns can support predictive models and may help detect signals of potential outbreaks before they are captured by traditional surveillance systems (McClymont et al., 2024). However, the practical value of such tools depends on their integration with existing registries, access to real-time data, financial sustainability, and clear rules

for data sharing.

It also requires a shared information environment that supports joint planning, risk assessment, and decision-making. In this context, risk-based models for data analysis and prioritization may help improve the use of available resources and strengthen operational coordination between sectors (Moeti et al., 2023).

Experience from Japan shows that the use of a national COVID-19 database makes it possible to monitor indicators such as the effective reproduction number, the proportion of cases without an identified epidemiological link, and the time between symptom onset and laboratory confirmation. These indicators are used for continuous risk assessment and support decision-making at the national level, while feedback between system developers and end users contributes to improving data quality and surveillance procedures (Ninomiya et al., 2022). A similar approach has been applied in the surveillance system for acute respiratory infections in Catalonia, where the integration of data from primary care, laboratories, and hospitals enables the early detection of trends and the assessment of influenza activity using predefined risk thresholds (Torner et al., 2019).

From a quality management perspective, these examples demonstrate that risk assessment is not an isolated activity but a tool for improving organizational preparedness and supporting managerial decision-making. This is further supported by capacity assessments from Southeast Africa, particularly Malawi, where strong performance in policies and coordination was not always accompanied by the same level of operational preparedness and resource availability at the local level (Dewa et al., 2021). These examples indicate that the resilience of health systems depends not only on the existence of risk assessment mechanisms but also on the ability to translate the results of those assessments into concrete management actions and preventive policies.

Leadership and organizational capacity determine the extent to which the other principles of strategic quality management can be effectively implemented in practice. Regardless of the availability of quality assessment mechanisms, information systems, and risk management tools, their effectiveness depends on an adequate workforce, clearly defined responsibilities, and strong institutional capacity (Rotar et al., 2016; WOAH, 2024a). Despite the existence of national strategies, workforce shortages continue to limit the effective implementation of health policies in many countries (Ahmat et al., 2022), indicating that improving quality requires not only regulatory changes but also sustained investment in institutional capacity.

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Conclusion

The present review demonstrates that strategic quality management in human and veterinary medicine is based on common management principles despite differences in organizational structures, regulatory frameworks, and the populations they serve. Across both sectors, effective quality management depends on outcome-oriented approaches, reliable information systems, coordinated risk management, interinstitutional collaboration, and strong organizational capacity.

The One Health concept provides a practical framework for integrating these principles by promoting collaboration between human, veterinary, and environmental sectors. The findings suggest that the main challenges are not the absence of policies or technical expertise, but rather fragmented information exchange, limited institutional coordination, workforce constraints, and difficulties in translating strategic objectives into routine practice.

Strengthening interoperable information systems, sustainable coordination mechanisms, and integrated risk assessment processes could substantially improve the quality, resilience, and preparedness of health systems. Overall, interinstitutional integration should be regarded not merely as an administrative objective, but as a strategic management approach that supports evidence-based decision-making and contributes to more effective responses to current and emerging health challenges.

From a practical perspective, the findings of this review suggest that health policies should prioritize the establishment of permanent interinstitutional coordination mechanisms within the One Health framework, supported by interoperable information systems and standardized procedures for data sharing and risk assessment. Institutions should also strengthen workforce training, clearly define responsibilities across sectors, and promote the routine use of joint preparedness exercises and integrated surveillance systems. These measures may improve the quality, resilience, and effectiveness of health systems in responding to current and emerging health threats.

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