The role of artificial intelligence in human and veterinary medicine: current applications and future opportunities

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Artificial intelligence (AI) is transforming the landscape of healthcare, offering tools that can enhance diagnostics, optimise workflows and improve patient outcomes. Human medicine has already adopted AI in a wide range of areas, and veterinary medicine is now beginning use some of these tools. This article summarises some of the current applications of AI in human and veterinary healthcare and explores potential areas for expansion in veterinary practice.

Current use of AI *in human medicine*

In human healthcare, AI is already embedded in a variety of clinical areas[1]:

- **Medical imaging:** AI-powered tools, particularly those using deep learning, can detect abnormalities in medical imaging with accuracy comparable to experienced radiologists. These tools can assist the detection of cancers, fractures, neurological diseases and cardiovascular conditions
- **Diagnostic medical devices:** Medical devices with embedded AI are available; these devices can be used to aid in the diagnosis of pathologies. One example is the Eko digital stethoscope with embedded AI which has several FDA approvals to detect and grade cardiac murmurs and to detect arrythmias such as atrial fibrillation.[2-4]

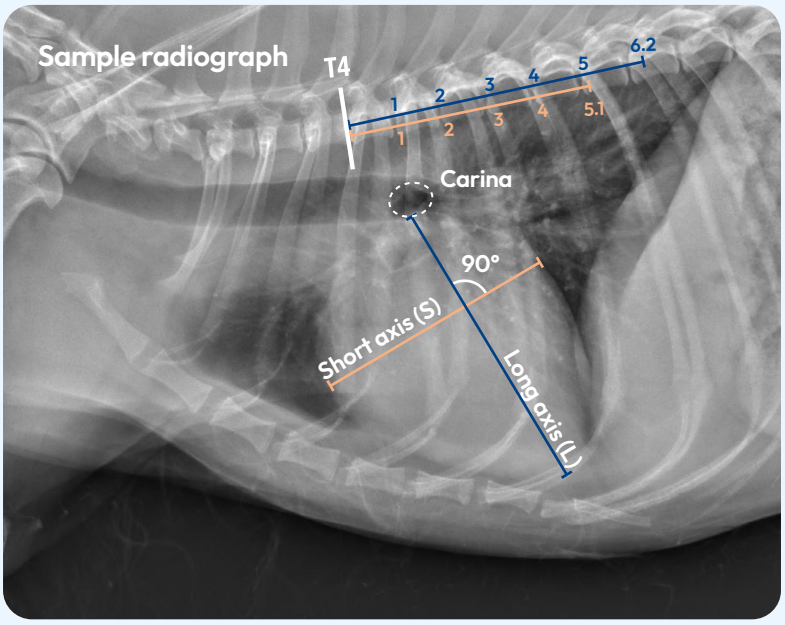
- **Predictions:** AI algorithms can analyse large datasets from electronic health records to predict patient deterioration, hospital readmissions and disease progression, aiding in early intervention.

- **Pathology and laboratory medicine:** Automated image analysis in histopathology and cytology has been used to aid identification of disease markers more efficiently and consistently.[5,6]
- **Administrative efficiency:** AI is streamlining administrative processes such as appointment scheduling and patient triage through natural language processing (NLP) and robotic process automation.
- **Personalised medicine:** AI supports the integration of genomics, biomarkers and clinical data to tailor treatments to individual patients, especially in oncology and rare diseases.[7]

Current use of AI *in veterinary medicine*

Veterinary medicine often lags behind human medicine, and the rate of AI adoption is similar. Potential reasons for this lag include limited funding and availability of good-quality data. Nevertheless, several applications have been developed in areas including:

- **Diagnostic imaging:** Veterinary AI tools have been developed to aid in radiograph interpretation. Examples include publications reporting the use of AI for the diagnosis of thoracic pathologies on radiographs,[8-10] differentiating lesions on magnetic resonance imaging,[11] as well as commercially available services for radiograph interpretation and reporting, such as Vetology AI and Idexx Web PACS to measure vertebral heart scores.[12]



- **Clinical pathology and histopathology:** Interpretation data by AI to aid in disease diagnosis. For example, AI has been used to differentiate between inflammatory bowel disease and alimentary lymphoma in cats using clinical pathology data,[13] and AI detection of regions of necrosis to improve tumour grading in histopathology.[14]
- **Wearable technologies and health monitoring:** AI processes data from wearable biosensors, including activity trackers for companion animals such as PetPace[15] and FitBark.[16] These devices can be used to identify early signs of disease to facilitate early intervention.

- **Disease prediction:** AI models help monitor epidemiological data for early warning of zoonotic disease outbreaks. Similarly, AI models can be used to predict the onset of chronic kidney disease in cats from clinical and biochemical data.[17]
- **Natural language processing (NLP) of medical records:** Early implementations of NLP are helping veterinary practices extract structured data from free-text clinical notes for research, audit and clinical decision-making.[18,19]
- **Practice management software:** AI such as Digitail[20] can assist in appointment scheduling and workflow optimisation.
- **Medical record keeping:** AI aids in the writing of clinical notes using language recognition (such as Heidi Health[21] or PawfectNotes[22]) or writing discharge instructions from clinical notes.

Future opportunities for AI *in veterinary medicine*

As data availability, interoperability and computational power continue to improve, the potential for AI in veterinary practice is vast:

1. **Tools to assist with clinical decision-making**
   - Integrating point-of-care AI tools into day-to-day practice may aid decision-making and could help veterinarians manage complex cases, especially in general practice where specialist advice may not be easily available.
   - Examples of decision assistance tools include AI-assisted stethoscopes and further applications of AI tools for medical imaging, such as radiography and point-of-care ultrasound.
2. **Medical records**
   - Use of AI assistance with capturing, transcribing and summarising conversations in consultations and producing clinical notes is likely to increase with time. Similarly, AI can be used to extract specific information that would otherwise take a long time to identify in medical records.
3. **Disease prediction and earlier diagnosis**
   - Combining clinical signs, clinical pathology, imaging and wearable data into multiparameter AI models is likely to improve the early diagnosis of diseases and assist with monitoring progression or response to treatment of chronic diseases.
4. **Client services and communication**
   - AI chatbots and symptom-checkers tailored for pet owners are likely to increasingly support remote triage, client education and post-visit follow-up.
5. **Veterinary pathology and cytology**
   - With growing digital slide repositories and availability of slide scanners, AI will assist in many areas: for example, automated cell counting, tumour grading and parasite identification.
6. **Teaching and educational tools**
   - AI technologies can help with the training of veterinary students and further education materials for veterinarians at all stages of their careers.
   - AI is particularly useful for summarising large quantities of information and presenting information in different formats which may be useful to students with different learning styles.

A new collaboration between Eko, a leader in the production of validated and FDA-approved AI-assisted stethoscopes for use in humans, and Boehringer Ingelheim will bring an AI-assisted stethoscope to the consulting room of vets in 2026. This technology has been trained on the largest canine cardiac auscultation training set, including over 4,500 sound recordings annotated by specialists. This practical tool for routine use in first-opinion veterinary practice is an exciting opportunity to improve the care of veterinary patients.

Challenges

To fully harness the benefits of AI in veterinary medicine, several hurdles must be addressed:

- **Data quality and quantity:** A lack of standardised, high-quality, labelled datasets limits the training of robust AI models and may mean that AI models are only applicable to a specific subset of patients, rather than being generalisable. It is therefore important that well-curated, reliable and representative training data is used for AI models, and information on the applicability of the AI tool is shared with users. Similarly, appropriate testing is essential to confirm performance and reliability.
- **Interoperability:** Fragmented record-keeping and different practice management systems between practices complicate data integration and use.
- **Cost and accessibility:** Many AI tools are still prohibitively expensive or tailored to large-scale operations which are not as commonplace in veterinary medicine.
- **Ethical and regulatory concerns:** AI raises questions around liability, consent and transparency associated with data collection and sharing.
- **Trust in AI models:** As with many new technologies, there is often scepticism about reliability and accuracy. Clinicians may be concerned that AI algorithms are not aware of all relevant data so may be biased in their classification. This may reduce the likelihood of adoption of new AI technologies by clinicians.
- **Back box tools:** Some AI tools make the processes being performed by the algorithms unclear and do not allow interrogation by the user, for example, to confirm that mistakes have not been made, so may be less likely to be adopted by veterinarians.

With the incorporation of any new tools into practice, it is important to understand how the tool works, along with any limitations and strengths. Training of clinicians in AI is therefore essential to ensure that tools are used in the correct manner, with the correct interpretation. AI tools are not here to replace clinicians, but rather to save time and improve sensitivity and accuracy of diagnoses and disease management.

Conclusion

AI is rapidly reshaping human healthcare and beginning to be used in veterinary practice in a variety of areas. As data infrastructure, regulatory frameworks and interdisciplinary collaboration evolve, AI holds the potential to improve efficiency, diagnostic accuracy and clinical decision-making in veterinary medicine. Collaboration between academia, industry and clinical practitioners will be critical to ensure these technologies are developed responsibly with high-quality data. Training of practitioners in how to use and interpret AI tools is essential to ensure appropriate use and application.

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