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Brief Research Report

Danish cardiologists' attitude towards clinical AI support: a survey study

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ABSTRACT

INTRODUCTION. AI represents a conceptual change in medicine, and AI-based tools are rapidly being developed and implemented in clinical medicine. This study aimed to evaluate how clinicians at selected Danish cardiology departments perceive the role of AI in clinical decision-making.

METHODS. We conducted a ten-item anonymous survey among clinicians in Danish cardiology departments to evaluate physicians' attitudes towards AI support in clinical decision-making for ischaemic heart disease. Key focus areas included perceived impact on patient outcomes, safety, workflow and clinician training. Responses were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree), with 4 or 5 collectively categorised as agreement. Participants were stratified by seniority (< 10 years versus ≥ 10 years).

RESULTS. A total of 60 Danish clinicians at cardiology departments participated. The highest level of agreement was observed for AI optimism/expectations (68%, mean: 3.7), willingness to invest time in training (65%, mean: 3.8) and interest in AI use (63%, mean: 3.6). Although nosignificant, junior clinicians showed greater enthusiasm for training and adoption, whereas concerns about trust, safety and time-saving potential persisted across seniority.

CONCLUSIONS. Danish cardiologists generally expressed moderate to high expectations, interest and willingness towards AI support in clinical decision-making. However, the study revealed concerns about accuracy, patient safety and whether AI will ultimately save clinicians' time.

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TRIAL REGISTRATION. Not relevant.

Over 50 years ago, an article in the New England Journal of Medicine predicted that computers would eventually "...augment and, in some cases, largely replace the intellectual functions of the clinician" [1]. Today, that has become the reality; AI already assists clinical practice (i.e. electrocardiography interpretation, magnetic resonance imaging optimisation) [2-4] and demonstrates immense potential in clinical applications - from surveillance of infectious diseases to electroencephalography pattern recognition and cancer treatment assistance [5-7].

In Region Zealand and the Capital Region of Denmark, the PM-Heart project – a network-based machine-learning algorithm predicting mortality in patients with ischaemic heart disease (IHD) – is being evaluated in a randomised controlled trial [8]. While AI advances rapidly, key questions remain about its role in healthcare: Are clinicians ready to implement and use AI? A central concern is whether clinicians and patients are willing to trust AI-assisted decision-making. Studies show that clinicians are highly interested in AI but often doubt its reliability [9]. Initiatives that neglect both technical progress and human apprehensions may struggle to gain traction [10], and, notably, most clinicians lack formal training in AI [11]. Public perception of AI in medicine is mixed – about half of patients view AI positively, even so "AI-driven" advice is often seen as less trustworthy [12-14].

This study explored Danish cardiologists' perceptions of AI-based clinical decision support and provided insights into their readiness to adopt and embrace AI in clinical practice.

Methods

Throughout 2024, we conducted anonymous, non-digital, cross-sectional surveys distributed by convenience sampling at cardiology departments across hospitals on Zealand. The surveys targeted cardiologists and clinicians who participated as treating physicians in the PM-Heart trial to evaluate their attitudes towards AI support in clinical decision-making. Clinicians rated their agreement with ten statements using a five-point Likert scale (1 = strongly disagree, 3 = neutral, 5 = strongly agree):

1) Outcomes: AI will improve outcomes for patients with IHD

2) Accuracy: I trust AI to deliver accurate predictions

3) Support: AI will improve my clinical decision-making

4) Interest: I am interested in using AI in the treatment of my patients

5) Time: AI will save me time in decision-making processes

6) Safety: AI will improve the safety of handling patients

7) Optimism: I am optimistic about AI's role in the future of cardiology

8) Training: I am willing to invest time in learning and adopting AI technologies in the clinic

9) Workflow: AI tools will fit into my current workflow

10) Adoption: I believe my colleagues will adopt AI earlier than I will.

Statistical analysis

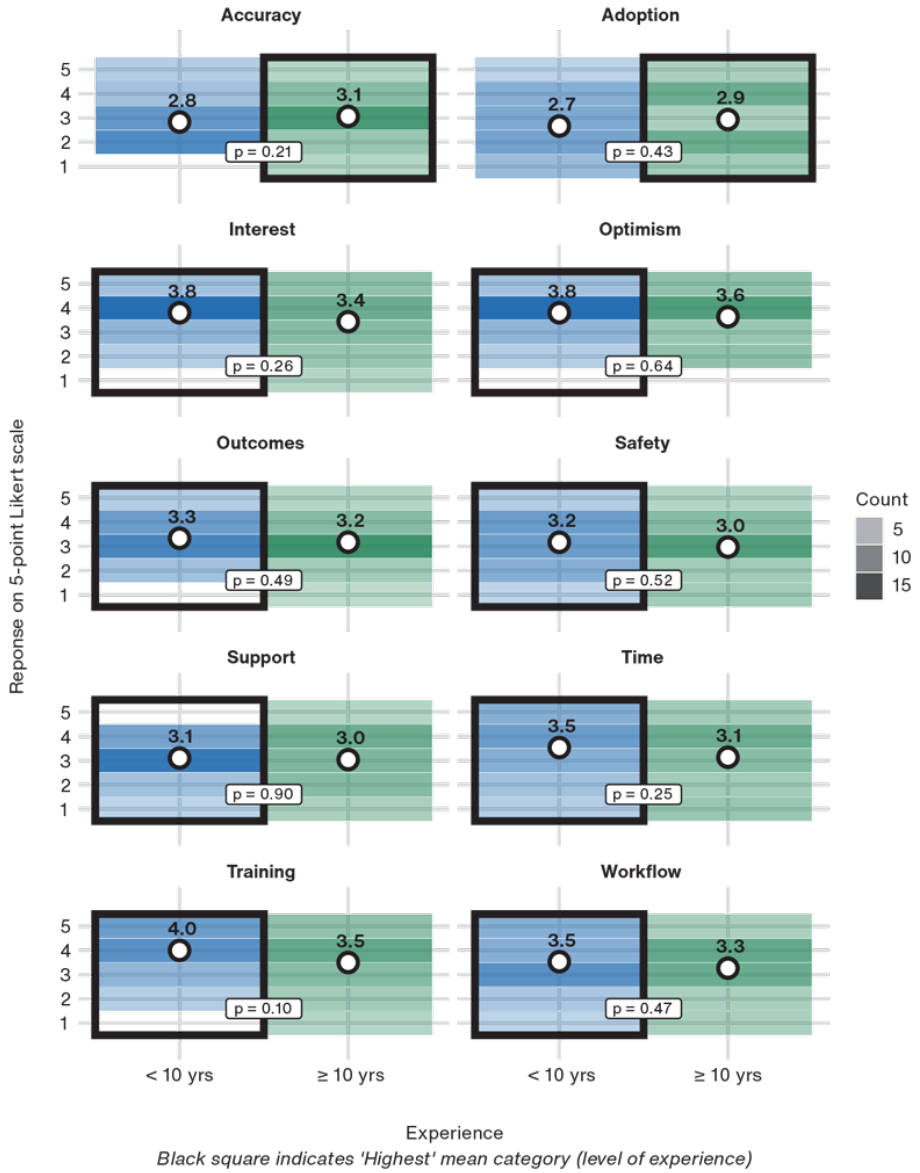
Descriptive statistics summarised survey responses. Mean scores and agreement levels (4-5 = high) across ten statements were compared between junior (with < 10 years' experience) and senior (≥ 10 years' experience) cardiologists using the Mann-Whitney U test. No imputation was performed. We also assessed intra-individual differences, response variability and visualised findings in a heatmap. Analyses were conducted in RStudio (v4.3.3).

Trial registration: not relevant.

Results

Sixty clinicians at eight Danish cardiology departments completed the survey (50% with ≥ 10 years' experience). Complete responses were obtained for 59/60, with only a single response missing. The highest agreement rates were seen for future *optimism* (68%, mean: 3.7), willingness to invest time in *training* (65%, mean: 3.8) and *interest* in using AI for their own patients (63%, mean: 3.6; **Figure 1**). The highest disagreement rates concerned confidence in *accuracy* (33%, mean: 3.0), improvement of patient *safety* (27%, mean: 3.1) and *time-saving* in decision-making (25%, mean: 3.3; Figure 1). Interestingly, the mean score for whether respondents believed peers would adopt AI earlier than themselves was below neutral (mean: 2.8), suggesting above-average self-expectations.

FIGURE 1 Attitude towards AI tools by years of seniority. Responses were recorded using a five-point Likert scale (1 = strongly disagree, 3 = neutral, 5 = strongly agree). One individual had missing data on seniority level and was assigned as a senior clinician. Experience refers to the level of seniority (junior (< 10 years' experience) versus senior (≥ 10 years' experience)). Mean values per group are highlighted by a white circle with the group mean indicated above. Responses between groups were compared using the Mann-Whitney U test, where a statistically significant difference was considered as a $p < 0.05$.

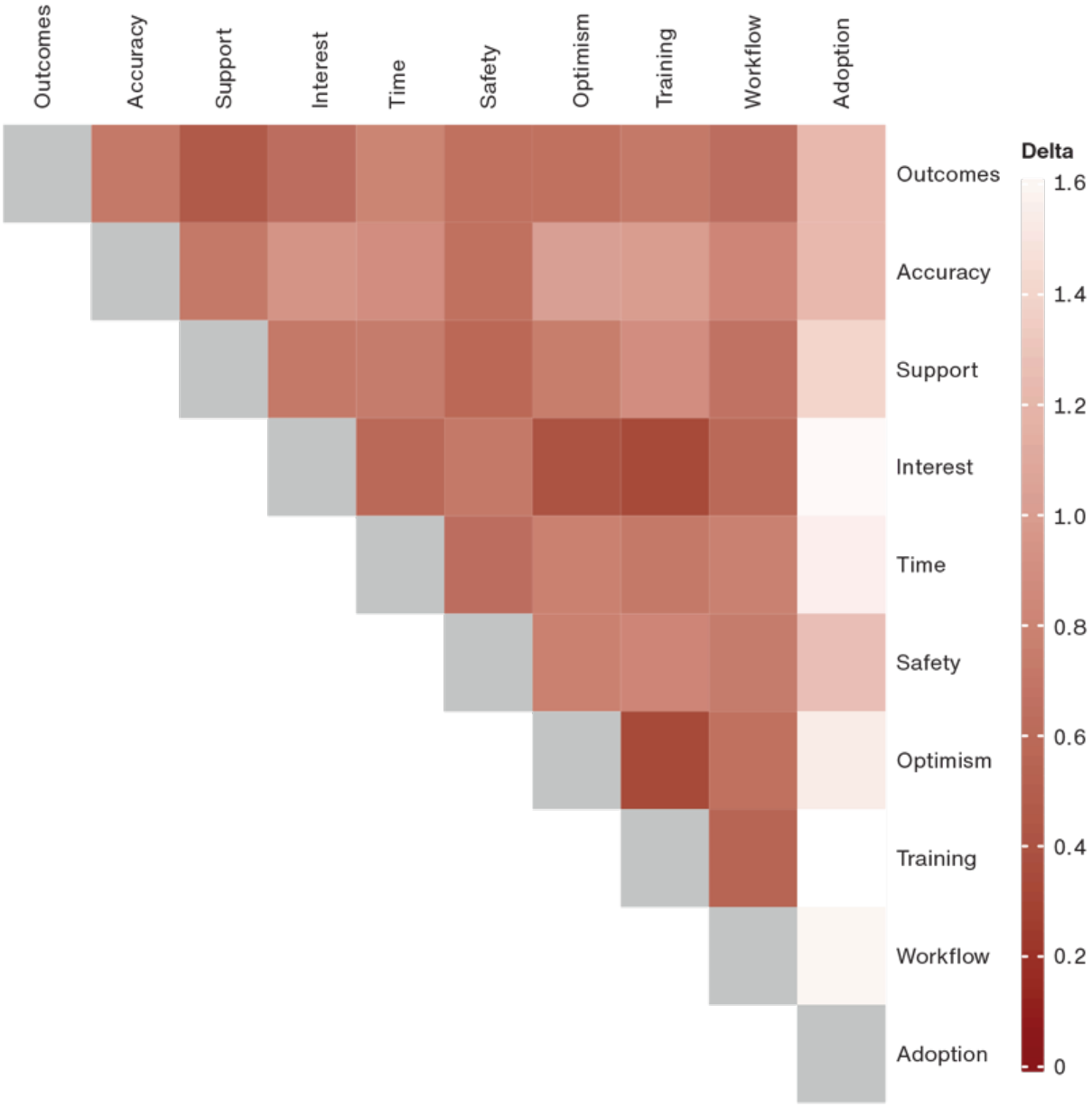


No statistically significant differences were found between junior and senior clinicians. However, the largest numerical gaps were observed for willingness to invest time in training (mean 4.0 versus 3.5), belief that AI will save time in decision-making (mean 3.5 versus 3.1) and interest in using AI for own patients (mean 3.8 versus 3.4).

Intra-individual differences

A heatmap of intra-individual deltas (**Figure 2**) illustrates consistency in agreement for each respondent. Overall, responses were relatively uniform, with mean deltas ranging from 0.3 to 1.7. High similarity was seen between willingness to invest time in training and both interest in using AI for their own patients and future optimism about AI. In contrast, responses varied more for the statement on whether peers would adopt AI earlier, showing greater divergence from other statements.

FIGURE 2 Intra-individual difference towards AI tools across the ten domains in the survey. Fields are calculated as delta values between two statements for each clinician (intra-individual) and then summarised across all 60 respondents to understand if attitude towards AI was consistent across statements.



Discussion

This study explored the attitudes of Danish cardiologists in Eastern Denmark towards AI in clinical decision-making, using IHD as a case example. While optimism about AI was generally moderate to high, key barriers emerged – namely, concerns about accuracy, patient safety and workflow integration –mirroring previous findings [12-16]. Notably, responses on AI integration aligned with clinicians' interest in AI (Figure 2), and both have been cited as major implementation barriers to digital technology adoption [17]. These findings align with earlier studies that emphasise the need to address both technical and human factors for successful AI adoption

[10, 18].

Junior cardiologists (< 10 years' of experience) showed greater willingness to invest in training and a stronger interest in using AI for patient care, though differences were not statistically significant. Similarly, a recent study found that 83% of medical students viewed AI knowledge as important for their future roles as physicians, despite limited prior experience [19].

Similarly, concerns about AI reliability – also reported in studies showing that advice labelled as 'AI-generated' is perceived as less trustworthy – are reflected in our findings, where only a third of cardiologists expressed high confidence in an AI clinical-decision-making tool [12-14, 20]. The strong link between training and optimism supports the idea that clinicians who are optimistic about the future use of AI are also more willing to invest time in AI training/education.

The survey was conducted at PM-Heart inclusion sites, which may have influenced responses. The questionnaire was informed by literature and clinical experts to ensure relevance, though psychometric methods – commonly used to assess survey validity and reliability – were not applied. Due to the dynamic clinical setting, a formal response rate was not calculated, though most present cardiologists participated.

Our survey study reinforces the duality of addressing both technical capabilities and human factors to ensure the successful adoption of AI in clinical practice. In more practical terms, education and training in AI are needed for the successful implementation of AI in healthcare [19].

Conclusions

Danish cardiologists view AI as a promising tool for clinical decision-making and enhancing patient outcomes. However, confidence in the accuracy, time-saving potential and patient safety benefits of AI must be addressed for successful adoption in clinical practice. Overall, there was a high degree of willingness to invest time in training/education on AI.

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