Perceptions of Expert and Lay Users on Trust in the Use of Artificial Intelligence for Medical Decision-Making and Risk Prediction

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Background: Artificial intelligence (AI) is showing rapid uptake across all sectors, including healthcare. Adoption is enabled by increasing digitalization of medical imaging and health records, and the availability of deep learning software packages and computing power [1]. AI augmentation in clinical decision-making [2] promises reduced errors and improved outcomes. Yet, there is a disconnect between the developing technology and stakeholder expectations [3]. We aimed to assess physicians' and general public perceptions on the use of AI to assist medical decision making; in particular, the notion of uncertainty in outcome predictions, and how this might influence treatment decisions.

Methods: We created surveys based on low- and high-risk medical decision-making scenarios using real-life examples, in which we introduced AI suggestions; the low-risk decision was selecting an antiviral therapy combination; the high-risk decision was mechanical ventilation versus extracorporeal membrane oxygenation. The surveys, created in REDCap [4], were distributed to families and physicians at a tertiary pediatric hospital, recruited via posters in hospital clinics, patient engagement office and departmental mailing lists. Participation was incentivized with coffee card draws. Data were analyzed quantitatively and free text answers were analyzed using thematic analyses [5].

Results: Complete survey data from 26 family members and 21 physicians were available for analysis. Familiarity with AI varied, yet >90% of participants agreed that AI has the potential to improve medical services. Regarding liability for AI-augmented decisions, both families and physicians agreed that the physician was primarily responsible, yet families also assigned responsibility to AI design companies.
In low-risk scenarios, both groups trusted the AI's suggestion and emphasized patient-physician discussions of results: 92% of families and 95% of physicians would follow the AI's recommendation when positive outcomes [40% vs 20% effectiveness] were predicted; 43% of physicians (vs. 67% of families) reverted to physician judgment when AI risk assessment showed equal effectiveness.
High-risk scenarios revealed significant differences between the two groups: only 38% of physicians (vs. 69% of families) would follow an AI's suggested intervention if it was against common practice and only 38% of physicians were likely to discuss options with patients. Both groups would consider AI risk metrics when making treatment decisions: 62% of physicians and 88% of families for short-term differences in outcome [44% vs. 66% mortality]; 52% of physicians and 81% for long-term differences [worse immediate mortality, but 20% vs. 50% improved 5-year outcome]. Physicians strongly reverted to physician judgment when AI-generated risk assessment showed equal effectiveness: only 5% would follow the AI recommendation, compared with 52% of families.

Conclusion: These surveys suggested that families were accepting of AI-assisted medical decision making. Physicians were more hesitant in trusting AI predictions in the high-risk scenario; this may be in part due to assumed liability favoring a more conservative clinical approach. Results of this survey may inform the development of AI and decision support systems to make these technologies more acceptable to expert and lay users.

References: [1] Nat Med. 2019;25(1):44-56; [2] JAMA. 2018;320(21):2199-2200 [3] N Engl J Med. 2017;376(26):2507-2509 [4] J Biomed Inform. 2009;42(2):377–81. [5] Curr Pharm Teach Learn. 2018;10(6):807-815