

**Artificial intelligence in spine surgery** Karhade, A.V.

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## Stellingen behorende bij het proefschrift getiteld

## Biomedical Informatics for Prognosis, Diagnosis, and Management in Spine Surgery

- 1) Use of flexible modeling methodologies in medicine requires the same rigorous standards and accountability for algorithm performance assessment as the use of conventional statistical methods. *(This thesis)*
- 2) The result of using any clinical prediction model is a decision: the binary determination (yes or no) of whether to change any part of the default planned management strategy for that patient on the basis of the model predictions *(This thesis)*
- 3) Creating accessible tools that provide both predictions and explanations for complex modeling strategies should be minimal standards for machine learning-based clinical predictions models *(This thesis)*
- 4) Natural language processing for automated detection of complications from electronic health records will improve the efficiency and reliability of national registries, quality and safety efforts, and clinical outcomes research *(This thesis)*
- 5) "Achieving high value for patients must become the overarching goal of health care delivery, with value defined as the health outcomes achieved per dollar spent." *(Michael E. Porter, NEJM, 2010)*
- 6) "The risk of faulty algorithms is exponentially higher than that of a single doctor-patient interaction, yet the reward for reducing errors, inefficiencies, and cost is substantial. Accordingly, there cannot be exceptionalism for AI in medicine—it requires rigorous studies, publication of the results in peer-reviewed journals, and clinical validation in a real-world environment, before roll-out and implementation in patient care." (*Eric J. Topol, Nature Medicine, 2019*)
- 7) "The excitement that lies ahead, albeit much further along than many have forecasted, is for software that will ingest and meaningfully process massive sets of data quickly, accurately, and inexpensively and for machines that will see and do things that are not humanly possible. This capability will ultimately lay the foundation for high-performance medicine, which is truly data-driven, decompressing our reliance on human resources, and will eventually take us well beyond the sum of the parts of human and machine intelligence." (*Eric J. Topol, Nature Medicine, 2019*)
- 8) "Machine learning is not a magic device that can spin data into gold, though many news releases would imply that it can. Instead, it is a natural extension to traditional statistical approaches. Machine learning is a valuable and increasingly necessary tool for the modern health care system." (*Andrew L. Beam, Isaac S. Kohane, JAMA, 2018*)
- 9) "Software and hardware should evolve to extend our capacity to recollect the past, predict the future, and experience the present."