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ARTIFICIAL INTELLIGENCE: WHY AND HOW IT IS REVOLUTIONIZING HEALTHCARE MANAGEMENT

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PREFACE

Reflections on Artificial Intelligence and Health Management: What We Know, What We don't Know, and What We Should Know

Federico Lega
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The artificial intelligence (AI) revolution has begun. Yet, as in the early stages of all revolutions, we know the triggers and the promises, but we don't know much about current and possible developments, positive and negative collateral effects. Public and scientific debate is divided into two camps: the opponents raise an alarm about the potential risks of AI, while the advocates rally in boundless optimism about the unprecedented benefits that AI will bring to the future of humanity. Media coverage fuels the conflict.

A closer look at the healthcare and life science sector reveals both a positive and a negative side – there are high expectations that AI will bring improved accuracy, safety, speed and efficiency to clinical decision-making but also ethical dilemmas, operational challenges and wide-reaching changes in the labour market. The ethical issues are of particular importance, since AI applications for clinical use

will need to weigh choices with complex trade-offs involving financial sustainability and cost-effectiveness. Studies have shown that AI can develop greater empathy than real physicians can; nevertheless, decisions on the best course of treatment for complex cases should not be left to AI algorithms, especially if we don't know which data the AI algorithm was feed. From an operational perspective, the central problem is supervising and controlling how, by whom, with what and when AI in clinical practice will be fed and trained.

Additional questions regard how many AIs can or should operate in a health system. Do they need authorization? Who has the right to develop them? Furthermore, how will AI affect the medical workforce and clinical researchers? How will healthcare organizations build their competitive advantage when AI applications are ubiquitous throughout a healthcare system (and yes, they need to be for the sake of equity), steadily encroaching on the professionalism established in years of personal study, practice, research and investment. How can life science change its inner dynamics of research and competition?

Presently, we do not know enough to answer these questions.

We know that AI performs better than real doctors, on average, in making an appropriate diagnosis and prescribing therapy in clinical decision-making. We know that its performance depends on how AI is fed and trained, as it will amplify biases present in the training data. For instance, distorted representation or unfair treatment of patients based on race, sex, language and ethnicity.

But we still don't know enough. We don't know how to manage the ethical issues AI raises. We don't know who will certify AI and how to counterbalance the agency's power. Who will decide who will feed it or how to design an authorization/

accreditation system for AIs in the health system or in a single organization?

We don't know how it will impact human resources for the implications for systems and organizations. What will the consequences be for countries like Italy, the United Kingdom, Scandinavia, Spain and Portugal where the public national health service is a major national employer, and the local health organization or hospital is the largest employer and driver of the local economy in some geographical areas?

These issues regard the political and the institutional environment, involve setting limits and authorization for the uses of AI in healthcare, responsibilities for its development and maintenance and means to guarantee equity in its accessibility and availability within the whole health sector. They should be on the agenda of politicians and authorities. For the governance of the health and life science sector. For the regulators and administrators of the system and the healthcare sector.

But these issues are not the focus of this book. Nor should they be on a health manager's strategy agenda. You won't find them addressed here.

So what can the reader expect to find? Everything related to the managerial responsibility of a hospital and health organization leader. Which is quite a tall agenda. Many aspects of AI that we should know and are often neglected or ignored by current research and debate.

If, for once, we turn away from the dominant perspective (and threat) of AI as a 'doctor' (or as a substitute for doctors, nurses or other health professionals) and try to envision its potential contribution to the management and the operations of a healthcare organization, we may then explore a new realm of possibilities. That's exactly what we should do and know. What we need to know if we want to improve the

proficiency of healthcare leaders in managing the adoption of AI in their organization.

There are myriad potential AI applications that extend beyond clinical care decision-making to include improvement in organizational dynamics that AI can facilitate, support, enhance and augment. This is the focus and the core of the book, the key content of the research presented here. The work is centred on the managerial and the operational implications (opportunities and changes) for the adoption of AI by a health organization, from board room to bed side. The book was designed to provide health managers and decision-makers with a framework for action, grounded on solid analysis of theory and evidence. The framework is developed through the central chapters of the book, following the introduction to AI and before the final chapter on issues in AI implementation.

An overview of the book's contents is given in Fig. 1 which illustrates the diverse impacts of AI on a healthcare organization beyond the usual area of support or substitution in clinical care decision-making. In this perspective, AI can serve several different areas of organizational operations and management, such as:

- Support, redesign and improve delivery processes. For instance, AI can impact scheduling, staff labour division, technology maintenance and planning, among others.
- Support and enhancement of clinical management functions, e.g. risk management, clinical governance, clinical competence management. For instance, analysis of organizational data, building of casual interrelationships, continuous comparison with research evidence, gold standards and best competitor performance can provide valuable feedback to inform efforts to minimize risk, facilitate option of best-in-class practices, assure continuous customized training and workforce re-training.

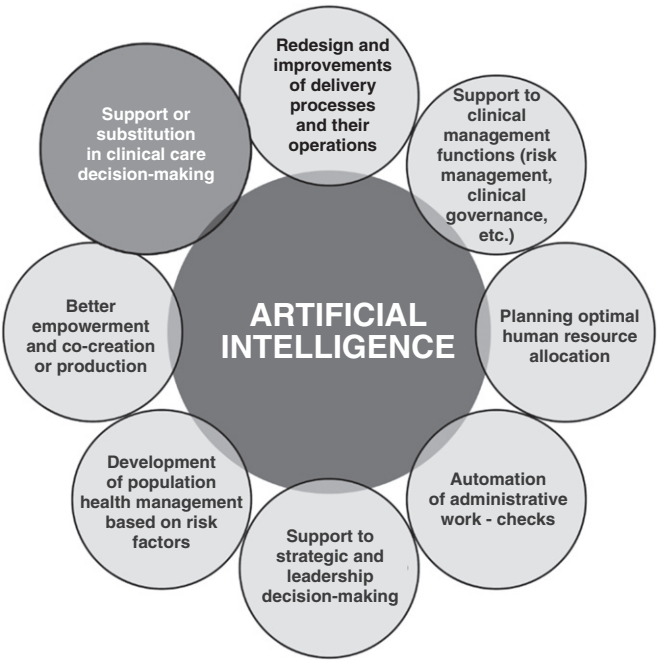

Fig. 1. Potential Impact of AI on Healthcare Management Dynamics. *Source:* The author.

- Planning optimal human resource allocation, from effective staff sizing and composition (skills mix) throughout a healthcare organization/hospital to planning short- and long-term recruitment policies.
- Automation of administrative tasks and controls. Bureaucracy can be substituted or managed more efficiently through AI, with improvement expected in speed, accuracy and streamlining. Whether the production of documents (e.g. certificates, clinical records) or payment management, substantial improvement can be expected.

- Support in strategic and leadership decision-making. Big data analysis, scenario writing, simulations, correlations, forecasts, plus all the information that AI can process and re-organize could impact the capacity and the capability of leadership in hospitals and healthcare organizations.
- Development of new and more effective approaches to population health management thanks to AI's greater capacity to generate and control risk factors associated with the healthy or chronic care population. Recognition of patterns through which AI can anticipate health status changes and/or new correlations between health indicators, behaviours, therapies, environment and health literacy can be an extremely powerful capability for healthcare organizations and systems to shift from reactive to proactive medicine.
- Greater empowerment and co-creation and co-production of services. For instance, AI can meet the needs of patients with chronic conditions and afford them better self-management of their illness. Alternatively, AI can support healthy citizens in maintaining their health through adaptive well-being behaviours and lifestyles.

All in all, AI holds promise for hospitals and healthcare organizations in their quest for better productivity, quality and sustainability. The development of AI for clinical use is well underway. The pharmaceutical and the medical device industries are competing for direct returns on investment in their business and for the chance to win a greater share of the current market or enlarge it (e.g. better adherence to therapy, risk factor control, prevention, novel therapies for rare diseases), whereas research and development of AI for management, operations and administration of hospitals and healthcare organizations lag far behind. Our case review presented here provides healthcare managers and top leaders

with a glimpse of what the near future holds when AI is deployed to serve the management dynamics of their organization. Furthermore, analysis and framing of the impacts AI can have on administrative processes and on operations of clinical delivery pathways provide insights for managers and clinical leaders engaged in planning the adoption and managing the implementation of AI for organizational tasks.

Finally, the investigation of AI and its potential role in the evolution of health systems from reactive to proactive postures is enlightening and reveals an opportunity that policymakers, leaders and managers cannot miss. Nothing will be as it used to be. Nothing will be the same. On the verge of this revolution, we believe that leaders at all levels of health systems, organizations and hospitals should acquire a better understanding of AI if they want to guide its introduction, adoption and implementation effectively. It is our hope that readers will find the discussion interesting and take it as a call to action.