

Moving beyond words: Artificial intelligence and the transformation of radiology.

A brief historical view of radiology

Yesterday's cumbersome process of reading printed images, dictating reports, and waiting for transcription has evolved into today's more efficient workflows. The advent of highly accurate speech recognition technology, structured reporting, and other tools such as natural language processing (NLP), have enabled this transition and contributed to improved report quality, consistency, turnaround time, and referring provider satisfaction while reducing costs.

Yet in spite of these strides, many of the same challenges remain: maintaining (or increasing) reporting volumes to sustain revenue streams, satisfying referring providers and other downstream users, and counteracting the (mis)perception that the radiologist has a limited, backseat role in the patient care continuum.

The changing world of healthcare delivery

Today, the world of healthcare is changing in ways that were nearly unfathomable just a few decades ago. Value-based care is the new economic model, and technological advances are coming at breakneck speed. Radiology finds itself at the heart of many of these changes. However, along with this has come a number of emerging challenges. The transition to value-based care and payment models such as MACRA/MIPS puts pressure on all providers, including radiologists. Physician burnout is rampant, particularly among radiologists. And healthcare has become evidence-based and data-driven to support better outcomes, which adds even more demands.

As a result of these changes, radiologists must transform themselves. They must demonstrate the value of their profession by bringing their knowledge, value, and expertise to the forefront, beyond what any computer algorithm can offer.

Perspective from a practicing radiologist

When radiologists look at the short- and long-term future of their careers and their profession as a whole, what is top of mind? How do they see evolving technologies impacting their everyday practice? In the remainder of this paper, Tarik Alkasab, MD, PhD, shares his perspective on how artificial intelligence (AI) and machine learning (ML) are valuable tools for not only achieving but thriving during this transformation.

Dr. Alkasab is an emergency radiologist at Massachusetts General Hospital (MGH) and Assistant Professor at Harvard Medical School. He serves as the Service Chief for IT Informatics and Operations in MGH's Department of Radiology, as well as the clinical lead for radiology at the Partners Healthcare eCare project, for the enterprise-wide electronic health record (EHR)

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system. Dr. Alkasab is also the Chairman of the Assisted Reporting Committee at the American College of Radiology (ACR) and a Senior Scientist for Framework at the ACR's Data Sciences Institute. With his broad experience and expertise, Dr. Alkasab uniquely understands how new and evolving technologies—including AI and its subset, ML—will continue to transform everyday practice in new and exciting ways.

AI and the radiologist

According to Dr. Alkasab, radiologists can achieve the goals of this transformation and work toward elevating their value as integral members of the patient care team by creating more valuable, data-driven reports that can be used more broadly and contain more clinically usable information. In order to do so, however, better and more convenient tools are necessary. These tools must allow radiologists to:

- More easily incorporate and integrate clinical and imaging data
- Obtain a better understanding of the clinical problem(s) the imaging exam needs to address
- Reduce repetitive tasks so radiologists can focus on the big picture
- Effectively provide the most useful information to downstream systems and users

Meanwhile, Dr. Alkasab notes, these tools must also reduce and alleviate the tedious, repetitive tasks that contribute to burnout.

AI and ML should be viewed as tools to assist, not replace, radiologists. The power of AI lies in augmenting human intelligence and allowing radiologists to provide more value with less effort, Dr. Alkasab explains. Moreover, the best time for radiologists to take advantage of these tools is while generating the radiology report.

In essence, AI will power the next generation of “Assisted Reporting” and will move radiologists beyond words into a new realm of active, valuable participation in patient care.

AI will help radiologists provide more valuable, data-driven reports

Through this transition to value-based care, radiologists can rely on AI to provide more valuable, meaningful, and data-driven reports that will also support ongoing initiatives like Imaging 3.0.

Before image review and interpretation even begin, AI tools can help radiologists reach into the EHR and identify the open clinical questions for patients. This step can maximize the clinical relevance of reports and ensure they are as complete and comprehensive as possible, thereby improving patient care.

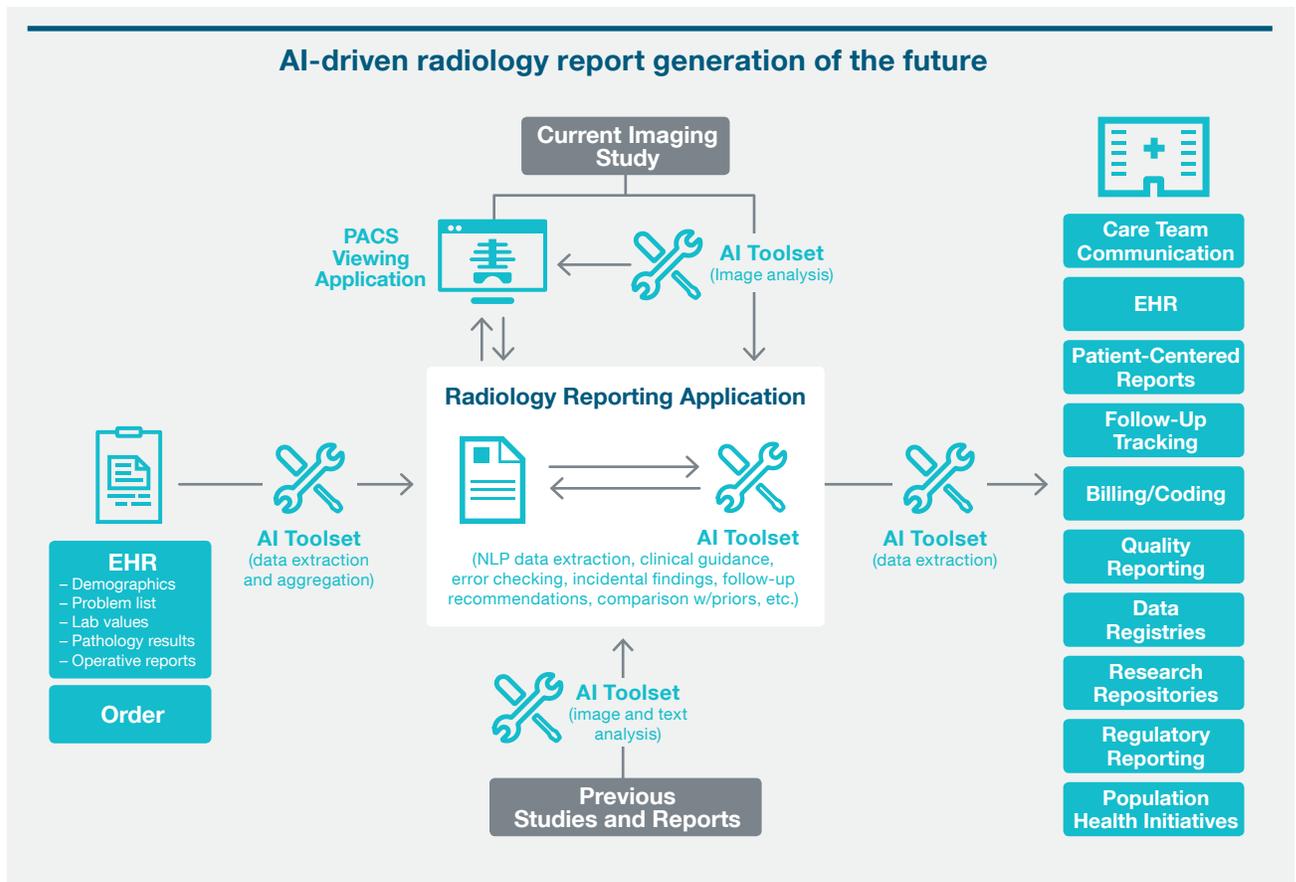
Image review and interpretation can benefit from AI in several ways. For example, AI tools can be trained to recognize particular characteristics in the acquired images and, with an appropriate interface, prompt radiologists to review features of interest and perhaps suggest clinical assessment and next steps. This is particularly useful in the identification of incidental findings. Similarly, an AI tool could readily assist in making comparisons with

prior images, thus expediting an otherwise painstaking and time-consuming task. Through these technologies, radiology reports can become more clinically valuable and complete, while the entire reporting workflow is streamlined.

Another broad and powerful way in which AI tools can provide far-reaching value is on the back end. AI can extract more clinically useful data for referring providers, care teams, patients, and other downstream consumers of the report. This can also provide better data for EHRs, billing and coding, regulatory reporting, and other internal and external systems.

AI will reduce the effort required to create reports

Dr. Alkasab also notes that computerized tools for radiology based on AI and ML promise tremendous benefit in reducing tedious and repetitive tasks, such as finding pulmonary nodules, measuring tumors, and comparing with previous studies. The ability to seamlessly incorporate these measurements as well as automatically generate many portions of the report, such as guideline-based follow-up recommendations, will similarly reduce the time and effort required to create quality reports.



Ultimately, this new ability of the reporting system to incorporate AI-based tools will aid in image analysis and actively assist radiologists in generating their reports. This will save time, improve productivity, enhance report quality and consistency, and help alleviate the widespread problem of burnout by reducing burdensome tasks. Delegating the lower-level search/find/describe tasks to machines will allow radiologists to focus on more important critical judgment calls and the bigger context of patient care.

What does this truly mean for radiology?

While these benefits are worthy in and of themselves, Dr. Alkasab explains that AI will create new opportunities for radiologists to assume more active roles in the patient care team—and that is what's truly exciting.

By generating a higher-value report that contains clinically useful structured data that can be used to automatically drive downstream decisions, patient care improves. With AI tools that allow them to be more efficient with less effort, radiologists will be freed up to focus on the larger patient picture. With tedious and burdensome tasks reduced, radiologists can assume a more participatory role in patient care, with more time to interact with and advise other members of the patient care team. Going forward, this will move radiologists to the driver's seat as they begin to manage the flow of imaging data.

Implementation is key

Any tool or technology, including AI-based tools, must be convenient, reliable, and easy to use if it is to be effective and widely adopted. The key to driving adoption is to make these AI tools readily and seamlessly available

within the reporting application—the radiologist's "point of care," where they spend most of their time.

We've already witnessed how speech recognition and other advanced tools such as clinical guidance and error-checking for laterality and sex mismatches can have a tremendous impact on report quality and radiology workflow. In fact, these tools have become virtually transparent to the user and today are part of the everyday reporting process for most radiologists. Eventually, the same will hold true for the more advanced AI tools of the future. They will blend into the background and become part of the process, with their advantages reaped transparently and effortlessly.

Pulling it all together: The transformation of radiology

Undeniably, radiology is undergoing a transformation. Leveraging AI tools within the radiology reporting process will allow the radiologist to become less of a data-entry clerk and more a manager/supervisor of the flow of data, resulting in increased value of the clinical information produced and transmitted to downstream systems and users. This transformation will allow radiologists to be more responsive to referring providers and patients. It will support radiologists' ability to make more informed patient care decisions and take on a more active role in the patient care continuum. It will help bring radiologists out of the reading room, make them more relevant, and make their daily work more valuable and rewarding. AI will move them beyond words. And it will not replace them anytime soon.

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