

IN YOUR WORDS:

How AI is advancing
the impact of radiology
in healthcare



INTRODUCTION

If you made a short list of medical fields to study in order to better understand the complex practical and financial challenges facing healthcare, and the potential for technology to improve the cost, quality, and outcomes of delivering care, radiology would be near the top of the list.

- Radiology sits at the nexus of dozens of medical specialties and sub-specialties and is essential for informing patient diagnosis and treatment. Yet radiologists sometimes are perceived as specialists in darkened rooms reading images and dictating reports, removed from patients and care teams.
- Radiology workloads keep increasing, but radiologists and other physicians are subject to alarming rates of professional burnout caused by inefficient systems and processes.
- The radiologist's work product—the radiology report—is the foundation for diagnosis and health screening, implementing treatment and assessing its effectiveness, insurance reimbursements, population health programs, and many other aspects of healthcare delivery. But the ability to derive full benefit and value from report findings, recommendations, and related data is limited by inefficient processes.

Radiologists are traditionally viewed as pioneers of new healthcare technology, so their work often presages its adoption in other areas.

They are fulfilling that role again today by working closely with healthcare IT vendors to develop solutions using artificial intelligence (AI), natural language processing, cloud computing, and other technologies to forge new pathways for healthcare.

That message became clear in a study conducted from January through March 2019 by Porter Research. Porter Research interviewed radiologists from 9 health systems across the United States. The radiologists discussed in detail how their organizations are using technology to improve the consistency of recommendations, the ability to access and use essential data within radiology reports, work as integral members of patient care teams, and, especially, improve health outcomes for their patients. They shared how they expect an advanced new solution from Nuance Communications, PowerScribe One, can help radiologists achieve those multiple goals. Each radiologist had familiarity with the origins and development of PowerScribe One and the game-changing capabilities it can bring to radiology workflow and reporting.

This paper uses the radiologists' own words from the recorded interviews to convey their biggest challenges and concerns and their everyday practical goals and long-term strategic objectives. Their responses relate their views on the role that AI can and must play, the anticipated benefits of PowerScribe One, and how they believe the solution can advance the practice of radiology.



METHODOLOGY

Porter Research conducted structured conversational telephone interviews with 9 radiologists. Each radiologist was asked 23 questions and discussion points related to current radiology and clinical management practices, their practical and strategic challenges, their plans and goals for implementing new technologies, and how they expected to be able to apply the features of PowerScribe One within their organizations. The interviews were conducted between January and March 2019.

- **Tarik K. Alkasab, MD, PhD**, IT/Informatics and Operations Office, Massachusetts General Hospital Department of Radiology
- **Marta E. Heilbrun, MD, MSCI**, Vice Chair for Quality, Associate Professor, Emory University School of Medicine
- **David S. Hirschorn, MD**, Chief of Informatics, Northwell Health
- **Brian Kaineg, MD**, Neuroradiology, Quantum Radiology
- **Marc Kohli, MD**, Director of Clinical Informatics, University of California, San Francisco
- **Terry Matalon, MD, FSIR, FACR**, Chairman of Radiology, Einstein Healthcare Network, Professor of Radiology, Sidney Kimmel College of Medicine, Jefferson University
- **Jonathan M. Messinger, MD**, Medical Director of Imaging, Baptist Health South Florida and Chief of Radiology, South Miami Hospital
- **Alexander Towbin, MD**, Radiologist, Department of Radiology and Medical Imaging, Associate Chief, Clinical Operations and Informatics, Neil D. Johnson Chair of Radiology Informatics, Cincinnati Children's Hospital
- **Keith White, MD**, Medical Director, Imaging Services, Intermountain Healthcare

CURRENT CHALLENGES

Addressing burnout and improving provider job satisfaction:

Healthcare organizations are focused on optimizing operational and financial performance to meet market demands. Increased patient and reporting workloads have created what the president of the World Medical Association has called a “pandemic of physician burnout.” Addressing that in radiology means changing inefficient processes and providing tools that harness AI and natural language processing for workflow optimization to improve radiologists’ abilities to deliver quality care.

“I was surprised when I first started looking at physician burnout rates—at the number of radiologists that feel some sense of burnout and dissatisfaction, and how high radiology ranks in surveys among medical specialties. In thinking about the reasons, we have seen how our existing tools are often inadequate to deal with the increasing volume and complexity of the exams, as we try to strike a balance with our other responsibilities outside the reading rooms. However, I believe there is an opportunity to alleviate some of the burden leading to frustration and improve the work experience for myself and my colleagues.”

– Jonathan M. Messinger, MD

“We’re trying to make sure our patients have the best possible care, the best possible outcomes as well; and when they’re here, being treated in a respectful way. I think that goes hand in hand with having our employees feel comfortable, respected, and supported when dealing with a stressful scenario. Workflow efficiency is something that I believe is important.”

– Alexander Towbin, MD



“We all face the challenges of increasing volumes with static resources and that is causing increasing burnout in physicians. My challenge is to reduce as much as possible contributing factors associated with burnout.”

– Terry Matalon, MD, FSIR, FACR

Patient experiences and outcomes in a changing market:

Increasing patient volumes, the industry shift from volume- to value-based reimbursement, and system complexity reduce the time physicians can spend in patient care. Inefficient processes require radiologists to manually complete documentation steps or reenter data into multiple systems while keeping up with heavier workloads.

“We all know hospital costs or medical costs are out of control and no one can afford them; so we need to be...cognizant of what we spend and what we ask for our patients. At the same time, we’re trying to make sure that their experience here is as good as it can be. I work at a children’s hospital, so that means not only caring for our patients, but caring for the entire family and having a good experience for a child as well as for a parent.”

– Alexander Towbin, MD

“We have four hospitals, nine outpatient sites, 11 academic divisions, many of which overlap; and then we have subspecialty, community, and emergency divisions. We do over 1.4 million exams a year and we have a hybrid medical record that still uses a number of paper processes.”

– Marta E. Heilbrun, MD, MSCI

“Leadership in imaging is facing the requirement to provide higher-quality outcomes at lower cost. I think that is associated with increasing volume and potentially decreasing reimbursement and those are very challenging conditions in the labor market to attract and retain good talent.

From a patient care perspective, increasing volumes can lead to decreases in quality—if you do not provide some technology that offsets the increased volume by increasing efficiency and allowing quality to either remain the same or increase.”

– Terry Matalon MD, FSIR, FACR

Integration with care teams:

Collaboration across the care team is crucial as the shift to value-based care continues. Enabling radiologists to communicate findings and recommendations using structured, consistent report templates, and feeding the results into the EMR directly impacts the patient experience and treatment outcomes. It reduces the occurrence of missed or failed follow-up exams caused by inefficient systems that can hinder effective communication.

“The biggest challenges we face are being more effective at integrating ourselves with the care of the patient, so making sure that we’re providing better value with the work that we do, that we’re maximizing our contribution to each individual case. That means everything from making sure that we’re providing the answers to the questions that are being asked, that we’re doing that in a timely way, that we’re doing exactly the right exam, that we’re making the appropriate communications about the results that we’re seeing. All of that is a big part of taking the work that the radiologist is doing and maximizing the value that they’re providing to the care of the patient, which is now being done in a much more team-oriented environment.”

– Tarik K Alkasab, MD, PhD

“Being able to extract the structured data is really critical because right now what we have is a manual process that relies on a radiologist remembering to use the right macros. For example, we have macros built with terms that



are unique. We can do a retrospective report search, and then we have a person track these findings and enter them into another database to see what's happening with a particular group of patients. The ability [for automated data extraction] to us would benefit our efficiency and increase our effectiveness in patient care."

– Marta E. Heilbrun, MD, MSCI

Integrating AI into radiology workflows:

There is strong interest in using AI to optimize workflows, improve accuracy and consistency of reports, support recommendations with clinical intelligence, and elevate the value of radiology reporting for patient care. However, those new capabilities need to be integrated into the radiology workflow to make them useful and usable.

"The challenge would be making sure that the use or the application of AI is very efficient and seamless into the workflow of the radiologist or the administrator, depending on who's using it, in particular the radiologists, because most of the time they're dealing with stuff at a high-acuity level, so they have to take care of stuff very quickly. It has to be very seamless into their workflow, meaning it can't take a long time for them to access the AI or utilize the AI."

– Brian Kaineg, MD

"It's getting the tools on to the appropriate system in a standards-based way, so it works, and how do you implement those clinically across large platforms? How do we deal with multiple algorithms doing the same thing and doing that in a vendor agnostic way? I don't want to have to buy every single algorithm out there and having a way to implement them, I can't have 50 different servers running algorithms."

– Alexander Towbin, MD

POWERSCRIBE ONE AS A SOLUTION

PowerScribe One leverages a cloud-powered, continuously learning, and context-aware language-understanding platform to convert unstructured speech-to-text and other types of inputs into structured data to transform radiology workflows, increase the clinical value of radiology reporting, and improve patient outcomes. Structured data enables enhanced sharing of concrete and actionable information among care teams and all along the care pathway.

PowerScribe One adds even more value by integrating access to AI algorithms within the radiology workflow, adding powerful capabilities to improve efficiency and throughput, increase diagnostic accuracy and specificity, and ensure consistent evidence-based follow-up recommendations. AI models can be obtained via PowerScribe One's connection to the Nuance AI Marketplace, a one-stop access point to an increasing number of diagnostic and workflow prioritization solutions.

The study indicated radiologists view the potential of PowerScribe One as a significant milestone in the journey to find meaningful and workable solutions to these challenges. The technology that drives PowerScribe One helps radiologists accomplish more in less time, more efficiently, consistently, and accurately.



ALLEVIATING BURNOUT

Empowering and augmenting radiologists to improve both the effectiveness and efficiency of their workflows is seen as a direct way to address radiologist burnout. The access to AI, pre-populating data within reports, automating repetitive or time-consuming routine tasks, structured reporting formats, and other features are recognized as high-value capabilities.

“We know that providers are burning out like crazy across medicine and we are trying to do things to prevent that in our department. Cutting down on interruptions, making workflow as efficient as possible, not having to over-document where it doesn’t make sense, and documenting appropriately, basically. Having systems that work for us, not having us work for systems, are some important principles that we’re trying to apply.”

– Alexander Towbin, MD

Radiologists interviewed for this study consistently agreed that the AI-driven language understanding capabilities and augmented intelligence accessible from within PowerScribe One can reduce time spent documenting reports and streamline accurate report completion. Using AI within the workflow facilitates automated documentation without interrupting the care process or adding steps. AI extracts structured data while radiologists are dictating so that they are not required to change their behavior. Respondents view this as critical for ensuring the technology improves the process rather than becoming a burden.

“One of the things that’s going to be the biggest is that it does a lot of natural language processing in a way that is going to allow us to have much

better structured data-oriented reporting; that’s going to be super exciting. Then the other is that it’s going to be a super valuable infrastructure for integrating a lot of the AI tools that we’ve been thinking about. That’s going to turn out to be more and more important as we go forward with it. Those are the big things that I’ve been thinking about with the new PowerScribe One. I anticipate they’re really going to be incredibly valuable for us.”

– Tarik K. Alkasab, MD, PhD

“What I’ve seen with this is the ability to more freely be able to talk and speak, and still be able to extract the important structured pieces of that [using] a conversational type of reporting. I think that’s a must. I don’t think that you can, getting back to what we started with, expect the radiologist to be able to do all that. That’s where some of this AI technology has to come in and make it easier.”

– Jonathan M. Messinger, MD

Driven by the ACR’s Imaging 3.0 initiative, more highly structured reporting has become a goal of many radiology practices. However, providing reports in a structured format has also posed challenges to radiologists, requiring time-consuming changes to the ways they document. The AI-driven capabilities in PowerScribe One that extract and apply structured data automatically can ease the transition. This ensures that each detail is complete and streamlines the process for the radiologist, and downstream care teams have the patient information they need at the point of care.

“AI makes it as easy as possible for each member of the team to provide everything needed in a description every single time. For example, a lung mass needs to be described to the oncologist and he needs specific details each time.”

– Tarik K. Alkasab, MD, PhD



“We see AI as a means of pre-populating those discrete observations and putting them into the radiologist workflow at the point of care. As the work product of a dictation process instead of just having a narrated document, they have discrete computable data that can be used to actually drive downstream decisions on care. AI is a means of generating some of that data and pre-populating it.”

– Keith White, MD

“[With conversational AI,] I would be able to extract data and put it into more structured reports. That would be ideal because then you could set up a template that everything populates into and the radiologists wouldn't necessarily need to change the way they're routinely dictating.”

– Brian Kaineg, MD

AI also automates the necessary but often tedious and time-consuming processes of measuring and quantifying observations.

“One of the opportunities of AI is to automate those laborious actions that were typically done by physicians in the past. For example, measuring and quantifying observations and doing those in a more automated way. The ability to then take that data and to import that into a report is the next step that will provide additional efficiencies. Those two activities together will markedly improve and reduce the workload of the physician.”

– Terry Matalon, MD, FSIR, FACR

“On the horizon, referring providers will expect us to deliver more knowledge from imaging studies. One example is volumetric measurements for lung nodules, which will drive the need to purchase AI tools and integrate into our reports for follow-up tracking.”

– Marc Kohli, MD

IMPROVING OUTCOMES

A consistent top-of-mind issue for radiologists throughout our discussions is improving patient outcomes. Radiologists indicate that PowerScribe One is designed to deliver more complete and accurate reports as well as clear and actionable follow-up recommendations that contribute to improved outcomes. When findings and follow-up recommendations are in the same place in each report and articulated in a consistent manner, the care team can more easily find and use that data.

“Structured data can reduce missed findings. Physicians would know where to look for everything in a report. So if a study was read by radiologist X or radiologist Y, all clinical information would be in the same location in the report for the referring clinician and for addressing pertinent follow-up.”

– Brian Kaineg, MD

“When you look at safety events, they relate to a number of different areas [including] inaccurate or incomplete imaging reports and failure to communicate critical findings adequately. Taking advantage of the capabilities of PowerScribe One is one way to address these safety issues.”

– Keith White, MD

“The more structured our reports are, the easier it is for our clinical colleagues to extract the information that they want to see and understand. Just as importantly, it's information that is then mineable for us and for our clinical colleagues to use, for example, for population health.”

– Terry Matalon, MD, FSIR, FACR



In addition to facilitating the creation of more standardized reports, the discrete structured data captured within PowerScribe One reports can be accessed and used in downstream EHRs via seamless integration.

“When care pathways for our patients that are based on our imaging results can be automated, when a radiologist is making a diagnosis, that diagnosis is based on data in their report that can be stored in a structured way. Then in the EMR, it can result in the clinical decision support for the patient’s care team, who can then use that to automatically drive the patient to the most appropriate next step in the patient’s care, or track things like necessary follow-ups.”

– Tarik K. Alkasab, MD, PhD

PowerScribe One can extract follow-up recommendations and deliver those critical pieces of information to the EHR as discrete data, making it easily viewable for ordering clinicians.

“[With PowerScribe One], the follow-up primary care physician not only has access to the information very rapidly, but also is notified in a non-intrusive type of a way that allows them to identify follow-up recommendations that are needed. That’s probably one of the most critical things to all of this. If it’s not being identified by the follow-up clinicians in the electronic medical record then you essentially have done no real good for the patient.”

– Brian Kaineg, MD

“Adding more radiology-related data to the EHR and other systems is going to be incredibly valuable for management of many chronic conditions, screening, and population health.”

– Marc Kohli, MD

The respondents also indicated downstream care can be better prioritized and managed, further improving patient outcomes.

“When we bring up the idea of a follow-up study, for example, for a pulmonary nodule, we want to make sure that we’re providing all the details that are needed to make appropriate decisions.”

– Tarik K. Alkasab, MD, PhD

“We can get more rapidly to that place where we all understand that the information that we are communicating in a standardized and a systematized approach is truly the high-value information. That we are meeting our goals of reporting on safety measures and reporting on entities that we know are important to patient care. The fact that this allows a more modular approach and a more discrete data capture approach is really important.”

– Marta E. Heilbrun, MD, MSCI

Radiologists also are anticipating the one-stop cloud-based access from within the PowerScribe One workflow to an increasing number of AI algorithms in Nuance’s AI Marketplace for Diagnostic Imaging.

“That’s where that cloud technology comes into effect because there may be a number of different algorithms. Just like you go on the App Store on your phone and you say, ‘I like this app for this and here’s another one that does a similar thing. Can we get that too, and I’ll compare the two and maybe use a little bit of both or something?’ You’re going to want all of that access, and that cloud capability will be important for that.”

– Jonathan M. Messinger, MD

“If there are algorithms of interest, we would use that as a way to purchase them and to implement them. The other way would be to develop our own algorithms, and there’ll be a place to upload them for either validation or our financial gain.”

– Alexander Towbin, MD



IMPROVING CARE TEAM SATISFACTION

At a time when radiologists may feel disconnected from the care team due to the nature, volume, and complexity of their work, improving integration with care teams becomes more important. Participants in the study indicated that using PowerScribe One can potentially improve care team satisfaction and their connection to the patient care process. The power of providing care team members with complete, consistent, timely, and accurate reports has a strong impact on collaboration and teamwork. Participants indicated that PowerScribe One can support that priority effort.

“What we’re trying to become better at is being not just somebody sitting in the darkened room reading a case and spitting out a bunch of facts and handing it to the physician. I think we have to get better than that. We have to start to be able to make recommendations.”

– Jonathan M. Messinger, MD

“It is very important for quality but also important for the radiologist’s perception within the care team of our patients, that we take seriously doing things, that we try to figure out the most appropriate, most cost-effective, most outcome-oriented way of taking care of our patients, and then we make sure we do it that way most every time. That’s what we need to be moving toward.”

– Tarik K. Alkasab, MD, PhD

PowerScribe One uses AI to add clinical guidance and improve recommendations included in the radiology report. Better evidence-based recommendations can ease the burden on referring physicians and improve the relationship between the radiologists and the care team.

“We continue to use the templated recommendations. I think they were extremely well received by our clinical colleagues, who see an evidence-based recommendation as a much more meaningful, actionable piece of information than a simple individual radiologist’s opinion.”

– Terry Matalon, MD, FSIR, FACR

“Radiologist guidance, driven by natural language is critically important for the future. The number of classification systems and coding schemes is increasing, and the data shows radiologists have a hard time remembering all of them.”

– Marc Kohli, MD

“The clinical guidance is certainly something that we’ve been looking at. I’m well aware of what it is, and I personally think it’s something that we should be using.”

– David S. Hirschorn, MD

Furthermore, integration with downstream systems will provide necessary imaging and reports to care team members. Participants indicated this will improve the ability to make the radiologist’s report and recommendations more actionable in the care process.

“The interoperability between PowerScribe One and the electronic medical record is critical. Where we notify or display that information in the electronic medical record to referring clinicians is critical to the downstream care of a patient. I think that is a very critical component that sometimes had been overlooked in the past—how to get that information into a usable setting. I think that is very important.”

– Brian Kaineg, MD



NEXT-GENERATION RADIOLOGY

Radiologists are facing significant challenges as workloads increase and documented outcomes drive reimbursements.

Study participants indicated that they expect PowerScribe One can help radiologists address these challenges and improve connection with the care team. The solution seamlessly converts narrative reporting into structured data and integrates clinical intelligence and AI-generated findings directly into the workflow to automate and augment the reporting process. It facilitates standardized reporting with accurate, consistent recommendations and connects to required EHRs and downstream systems to support care team collaboration.

The technology represents the next generation of radiology reporting that changes the way radiologists interact with imaging data and their reporting platforms. It will also improve their ability to communicate more effectively with and become a more integral part of the care team.

“Data elements in a structured format affords the capability of data mining in the future that will be central to quality assessments. This will create opportunities to improve the accuracy of AI products by linking the observations to the outcome.”

– Terry Matalon, MD, FSIR, FACR

“The ability to have higher-level logic in the radiology report template is critical for the next generation of speech recognition, as it helps to drive the use of the clinical guidance and streamline discrete data capture. Those are the three things that are really going to be critical for the next generation of speech recognition. Also, there is, with this new era where we’re asked to generate more and more discrete data, the interchange of things like radiology report templates are going to be even more important in the future.”

– Marc Kohli, MD

“With the paradigm changing in radiology, our tools must also change so we can empower radiologists to provide more effective care in the most efficient way. Nuance’s PowerScribe One can help radiologists move to the next phase of data-oriented radiology where we will be able to work so much smarter and deliver so much more value to our referring providers and our patients.”

– Tarik K. Alkasab, MD, PhD



ABOUT PORTER RESEARCH

Porter Research works with healthcare and IT companies to develop and execute market research programs and create strategies using market intelligence uncovered. With 30 years of experience, we have worked with more than 300 IT companies, and complete thousands of interviews each year. This means we know your industry, we know how you need to use the data, and we execute the right research program to uncover what you can't find on your own. We also apply the data to help you develop actionable plans and strategies to achieve your goals. Learn more at www.porterresearch.com.

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