ORIGINAL RESEARCH

Provider Perspectives of Patient Experiences in Primary Care Imaging

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Background: **Imaging tests are a widely used tool in primary care with many known benefits. Without an understanding of which outcomes matter the most to patients, clinicians are challenged to balance the benefits and harms of imaging tests. This study aimed to explore the perceived impacts imaging tests have on patients from the perspective of the primary care providers (PCPs) and determine PCPs' understanding of patient-centered outcomes (PCOs) from imaging tests.**

Methods: **Recruitment of PCPs occurred at 4 family medicine clinics in Washington and Idaho. Primary care physicians, nurse practitioners, or physician assistants who order imaging tests were eligible to participate. Semistructured interviews explored providers' perceptions of patient experiences during the process of ordering, performing and following up on imaging tests. Classic content analysis generated themes and subthemes.**

Results: **Sixteen PCPs, including 11 physicians, 3 physician assistants, and 2 nurse practitioners, completed interviews. Two themes were identified: 1) perceived PCOs, and 2) factors influencing the incorporation of PCOs into clinical management. Perceived outcomes included emotions related to the answer a test provides and costs to the patient such as monetary, physical, and added risk. Patient expectations, provider-patient communication, and inadequate knowledge all contributed as barriers to incorporating PCOs into clinical management.**

Discussion: **PCPs recognize different outcomes of imaging tests that they consider important for patients. While providers are perceptive to patient outcomes there remains a challenge to how patient outcomes are used to improve care. Communication with patients and improving provider knowledge are needed to incorporate identified PCOs. (J Am Board Fam Med 2019;32:392–397.)**

Keywords: **Family Physicians, Nurse Practitioners, Physician Assistants, Primary Health Care, Qualitative Research, Shared Decision Making**

One in 6 US ambulatory care office visits results in imaging tests,[1] frequently ordered inappropriately. Unnecessary testing was identified by 73% of physicians as a serious problem,[2] exposing patients to avoidable harms.[3] Drivers of overuse include overestimation of test benefits, diagnostic uncertainty, medico-legal concerns, and patient requests.[4]

Physicians report that having evidence-based recommendations to share with patients about care options would help encourage appropriate testing.[2]

This article was externally peer reviewed.
Submitted 25 September 2018; revised 15 January 2019; accepted 31 January 2019.

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Funding: The Patient-Centered Outcomes Research Institute (Grant "Patient-Centered Research for Standards of Outcomes in Diagnostic Tests (PROD)") funded this study. This work was also supported through a Patient-Centered Outcomes Research Institute (PCORI) Program Award (ME-1503-29245). All statements in this report, including its findings and conclusions, are solely those of the authors and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors or Methodology Committee. This study was also supported by the National Center for Advancing Translational Sciences of the National Institutes of Health under

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In addition to diagnostic accuracy, recommendations should be based on outcomes of importance to patients—known as patient-centered outcomes (PCOs). Understanding which PCOs are most important could help align imaging decisions in primary care with patient values and preferences.

This qualitative study aims to explore primary care providers' (PCPs') perspectives on the impact of imaging tests on patients, to inform understanding of how PCPs and patients could better navigate the benefit and risk tradeoffs of imaging decisions together. This is the second of 3 qualitative studies from the Patient-Centered Research for Standards of Outcomes in Diagnostic Tests (PROD) Study, a multiyear project to identify PCOs of imaging tests through the experiences of patients, PCPs, and radiologists.

Methods

A convenience sample of PCPs from 4 primary care clinics across Washington and Idaho were recruited from a 5-state practice and research network. At each site, recruitment flyers were circulated at provider meetings and through staff email. Eligible PCPs were family physicians, internists, family medicine nurse practitioners, or family medicine physician assistants. The University of Washington Human Subjects Division approved the study. All participants provided informed consent.

Interview guides were informed by existing PCO literature related to diagnostic testing, PCOs identified from patient interviews and the PROD study stakeholder advisory board (consisting of patient advocates, caregivers, clinicians, methodologists, and nonprofit and industry representatives).[5,6] Site champions reviewed the guides to confirm clinical and cultural relevancy of the questions.

Interview guides were organized into 4 sections: 1) PCP reasons for ordering imaging tests, 2) PCP observations of the impact of imaging tests on patients, 3) PCP experiences communicating imaging test information, and 4) provider demographics. Participants completed a single audio-recorded interview, conducted in-person or by phone by trained interviewers (MZS or MJT). Recordings were professionally transcribed and identifiers removed. Two researchers crosschecked transcripts against the audio-recordings for accuracy. Interviews ranged from 40 to 60 minutes and were conducted from January to March 2017. Study data were maintained in a Research Electronic Data Capture (REDCap) database.[7]

Data interpretation was based on classic content analysis methods.[8,9] PCOs from patient interviews guided development of criteria for defining data. Through immersion, 3 transcripts were open coded by 2 coders (MZS, VH) to identify initial codes.[6] These were discussed and differences reconciled by a third researcher (MJT). Remaining transcripts were double-coded with revised codes (MZS, VH) and reconciled in the same manner. Researchers (MJT, MZS, VH) interpreted the results of coding by grouping text excerpts into categories and subcategories to create final patient experience themes as perceived by the PCPs.[10] Data collection continued to the point of theoretical saturation.

Table 1. Characteristic of Primary Care Providers (PCPs) Interviewed

	N = 16
Gender	
Female	10 (62.5%)
Male	6 (37.5%)
Race and ethnicity	
Asian	3 (19%)
Black or African American	0
Hispanic or Latino	0
White	13 (81%)
Provider type	
Nurse Practitioner	2 (12.5%)
Physician	11 (69.75%)
Physician Assistant	3 (18.75%)
Year completed training	1975 to 2015
Age, Mean years (range)	45 (29 to 67)
Clinical practice setting	
Outpatient	11 (68.75%)
Inpatient and Outpatient	5 (31.25%)

Results

Sixteen PCPs (11 physicians, 3 physician assistants, and 2 nurse practitioners) participated (Table 1). Years since completing medical training ranged

Award UL1 TR002319. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Conflict of interest: none declared.

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Table 2. Perceived Patient Outcomes Identified by PCPs and Exemplary Excerpts

Outcome 1: Imaging tests' ability to provide answers influences emotional outcomes
One provider framed patient reassurance in the following terms, *"I feel like sometimes it gives patients reassurance, whether it's a good or bad outcome. If it's a bad outcome then they're like, okay at least I can fix it. Then they at least know what's wrong and if it's normal, then it's just reassurance of like, okay, I'm okay."–PCP 09*
"Sometimes the patient just wants something for that peace of mind, and they don't really care what the risks and benefits are. They just want to know that they don't have a tumor inside of their stomach. I think it has value, but I don't know how important it is, and I have no idea how to measure that."–PCP 14
"It [the imaging test] can reassure them, it can scare them, it can frustrate them depending on what they're going . . . I mean I think about back imaging and the frustration when somebody finally gets that MRI and it still doesn't show a reason for their back pain."–PCP 10
Outcome 2: Burden (monetary, added risk, physical effects) to the Patient
"The con [of the test] would be cost, even these days people with insurance, whether it's Medicare or private. There's copays, deductibles, so cost I think is the biggest stress that patients get, would be kind of my gut feeling."–PCP 13
"This diagnostic cascade. They for the most part don't mind going down it at the time. It's only in retrospect that their like, "I wish I didn't have to do all that." At the time, how can you know."–PCP 02
"I can't think of anything that was necessarily harmful, which I don't think is too surprising, because more information is usually rarely a bad thing. But I do think some imaging just leads to more imaging, which leads to more imaging, which leads to a diagnostic invasive study, which ultimately leads nowhere."–PCP 01
"Mammograms are uncomfortable. If someone is not real spry, pretty much any exam is difficult. Some people have claustrophobia. They have trouble with the CT scans and either don't want them, or need to be pre-medicated." –PCP 06

CT, computerized tomography; MRI, magnetic resonance imaging; PCP, primary care provider.

from 3 to 43. Ultrasound and/or radiograph imaging were available onsite at 3 of the 4 clinics; all other imaging was conducted offsite. PCPs were perceptive to patients' experiences through general observations, anecdotes, and interactions. Analysis revealed 2 main thematic outcomes: imaging tests' ability to provide answers influences emotional outcomes, and the burden of the test to the patient. We also identified a third theme around the factors that influenced these outcomes.

Thematic Perceived Patient Outcomes

Outcome 1: Imaging Tests' Ability to Provide Answers Influences Emotional Outcomes

PCPs recognized positive and negative impacts of imaging tests on emotions through tests' capacity to yield a diagnosis or clinically helpful information. PCPs perceived that the test often had significant emotional impact on patients, depending on results (Table 2). PCPs reported that patients displayed feelings of worry, anxiety, disappointment, discomfort, and frustration after inconclusive results. Benign incidental findings created additional patient concerns. PCPs felt that patients experienced stress while waiting for testing results, which often influenced when and how PCPs communicated to patients. Finally, when a conclusive test contributed to a management plan or definitive diagnosis, PCPs felt imaging led to patient feelings of hope, relief, and reassurance.

Outcome 2: Burden (Monetary, Added Risk, Physical Effects) to the Patient

PCPs believed financial costs of tests negatively impacted some patients (Table 2), but acknowledged that the financial burden of imaging testing might not be evident to all patients. Although PCPs attempted to be cognizant of cost, they noted that they were often unaware of the cost, preventing cost from factoring into imaging decisions. PCPs understood downstream effects of tests on patients, such as the need for additional testing. However, they acknowledged that these were not obvious to their patients, representing a potential unappreciated added risk. Patients who were initially receptive to testing subsequently experienced regret from costs and effort associated with additional interventions. PCPs also noted the burden associated with negative physical effects of tests, including pain or discomfort (eg, from holding a certain body position), contrast material reactions, or claustrophobia.

Mediators that Influence Outcomes in Imaging Testing

PCPs noted several factors impeding their ability to discuss and improve PCOs in patient care of imaging tests (Table 3).

Patient-Provider Communication

PCPs noted that communicating the steps of the decision making process and what to expect from tests were difficult. PCPs reported potential pit-

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Table 3. Influencers of Patient Outcomes in Imaging Testing Settings and Exemplary Excerpts

Patient-provider communication
"It's really driven by the time that you have. Most of the patient encounters are now 15 minutes, some only 10 minutes. You want to discuss the most important things, and while often there isn't any more time available to go into any more depth, and sometimes I feel that it's appropriate, because sometimes patients get lost in the depth, and then they may not focus on the bigger picture. . . My personal goal is to make the best use of the time that I'm given. I'm not into should I get 20 minutes, or not get 20 minutes. My goal is to try to give them as much information as possible at a level they can understand in the time that's allotted."–PCP 03
"It's hard because there are so many different kinds of imaging. For example, sometimes little cysts are found in the kidneys, or on an ultrasound, sometimes a small cyst is found that's thought not to be clinically significant. Because there's so many little things that can be found that may or may not be significant, it's a little difficult to discuss those possibilities before you actually do the test."–PCP 04
"They [imaging tests] can create a lot of anxiety and sometimes my own clinical decision-making process at that point depends to some extent on my personal comfort with ambiguity and the patient's comfort with ambiguity. If I'm comfortable with it and the patient's comfortable with it, then it's something that we can wait, maybe do follow-up study a few months down the line, or whatever. If I'm comfortable with it, and the patient is going to be lying awake at night worrying, then I'm going to be more likely to go ahead and pursue at that point. So, it involves the discussion with the patient."–PCP 16
"I think in general, because there's not a lot of risk. I mean there are risks, but we don't see bad things happen very often . . . Then, I think some of it is "oh, the radiology department will tell them, they'll double check, they'll make sure, they'll up their XYZ medicine before they get their tests," so I think it's a lot of someone else is gonna do that."–PCP 12
Inadequate knowledge
Providers
"The cost thing, I frequently just simply do not know what something ultimately is going to cost. There's so many variables in terms of insurance, and slides, and discounts, and all this kind of stuff. That's not discussion . . . I don't tend to get into the weeds with my patients on things like that. If it's somebody who's got major concerns, then I send them to talk to one of our financial people, before they go get the test done."–PCP 16
"Talking about the risks of the procedure. Again, when you're trying . . . Even then, it's actually really hard quantify what that risk is. What does it mean when you say you're going to get extra radiation from your CAT scan to your head. Is that more than taking an airplane flight and that kind of stuff and you have that kind of ambient radiation that you have. That's actually really hard to quantify. Part of it is we don't know. We actually can't . . . I can't even say, I don't know exactly from a radiation standpoint what the risk is. It becomes a little bit more abstract." –PCP 02
Patients
"And I think I probably overestimate their [the patient's] understanding as does probably every provider. I do try sometimes . . . if my alarm is raised, that maybe someone who doesn't understand, I sometimes do have them teach it back to me. So, tell me what you're going to do or what is the benefit. Or sometimes I'll write it out for them in terms of instructions. So those are probably the big ones I would use." –PCP 01
"Selective hearing; that people hear it but don't hear it, forget it. There's a lot of information in a visit."–PCP 04
Balancing Risks & Benefits
"How do you balance the risks and benefits of the imaging study with the benefit that you're going to get in terms of diagnosing things? Because not all the tests are obviously a hundred percent accurate. Right. So, you may find something that isn't the problem or you may not find the problem even though you've done the test. So, letting people know that it doesn't always show up on this type of test or that." –PCP 07
"So that's something I am working on, is whittling those who don't need imaging. But then also asking myself "is this imaging going to change the plan? Like, will it make me give antibiotics or am I already going to do that? Do they need a referral to orthopedics, or you know that kind of thing?"–PCP 08
Patient Expectations
"I think patients have the false understanding that if they get this imaging then they'll see the thing that's causing them this problem they're having. . . Everybody wants an MRI. So you might end up spending a lot of time trying to tell people why they don't want the test. People really don't understand the downside of the test. They don't understand false positives and procedures that can follow. Even if you explain all that, they still are like oh, I'm not worried. They just don't worry about it. That's one of the more frustrating things. I can't really think of anything that would make it easier."–PCP 05
"It [the test] can falsely reassure them. "Oh the imaging was negative, that means I'm fine." There might be something going on which is not yet big enough to show on imaging. Imaging only looks at anatomy, which is a structure. It doesn't look at physiology, which is the function and so it could be falsely reassuring as well." –PCP 03

CAT, computerized axial tomography scan; MRI, magnetic resonance imaging; PCP, primary care provider; XYZ, form of speech; placeholder for a medication name.

falls of providing too much information that could cause undue stress. Insufficient consultation time was noted as a major impediment to discussing testing options. The strength of the patient-provider relationship influenced test-ordering and communication. PCPs with a long-standing patient relationship could determine patient needs more easily and the relationship allowed greater diagnostic uncertainty. PCPs described a more cautious approach with new patients because of unfamiliarity with their medical history.

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Inadequate Knowledge

PCPs had limited knowledge about certain risks and benefits of imaging tests, including inadequate knowledge of physical risks and costs. PCPs noted this significantly impaired their ability to compare the pros and cons of alternative tests, negatively impacting shared decision making. Furthermore, PCPs perceived limitations to patients' abilities to understand complex terminology as another potential barrier to discussing imaging tests.

Patient Expectations

PCPs received requests from patient for imaging tests, and these were often based on fears of diagnoses, information learned from the internet, or anecdotes. Patient expectations for imaging often directed what was communicated. PCPs struggled to reconcile patient demand with test performance and consequences, including false reassurance, failure to provide definitive diagnoses, and further testing.

Discussion

Our study provides new information on outcomes that PCPs perceive are important to patients undergoing imaging tests and identifies factors influencing how PCOs are integrated in clinical management. We identified 2 main patient outcomes of imaging testing: emotional outcomes from imaging test results and patient burden (monetary, added risk, physical effects). PCPs' ability to incorporate PCOs in their discussions and shared decision making with patients was enhanced by familiarity with patients through existing relationships. PCPs found it difficult to quantify and discuss risks and benefits with patients. In some cases patient requests drove test ordering, which were perceived by PCPs to be based on incomplete patient understanding of risks and benefits.

Previous research on the impacts of imaging testing on patients, from PCPs' perspectives, is limited to communication, clinical utility, and overuse of imaging tests.[11–15] Studies that have explored patient perspective are consistent with our study, identifying PCOs such as emotions (eg, anxiety and relief), physical risks, knowledge gains, and ability to manage disease.[6,16] In our study, PCPs cited varying comfort with uncertainty. Previous research suggests clinicians use imaging as a tool to reduce return visits or to make a correct and definitive diagnosis.[13,17] Vis et al[18] found that gynecologists feared patients could become dependent on testing by constantly seeking reassurance. Reassurance overall was viewed positively but in our study concerns about false reassurance showed potential negative consequences.

Lack of time was raised as a major barrier to communication. Although 2 recent studies support this finding, one found that good communication is not necessarily time consuming.[13,14] Patients report that providers are their most common and preferred source for medical information.[19] However, neither PCPs nor patients are fully knowledgeable about all the risks and benefits of testing.[20] Improving provider knowledge, and their ability to communicate that knowledge, could help reduce unnecessary imaging testing.

This study is a novel investigation of patient outcomes from the provider perspective, further confirming that tests themselves are associated with outcomes above and beyond impacts on treatment choices. PCPs reported general observations, suggesting applicability to a broad range of primary care scenarios. However, studies in other clinical settings and specialties might identify different outcomes. It is possible PCPs preferentially recall noteworthy over routine clinical situations, potentially impacting the generalizability of our findings. Qualitative analysis may be limited by the research team's perspective and biases may exist from the convenience sampling methods.

PCPs are aware of outcomes of importance to patients; however, communication of potential risks and benefits of tests related to these outcomes is limited by inadequate information and time pressures. Our findings suggest that PCPs need access to comprehensive evaluations of tests including PCOs, and tools to more effectively communicate this information. To facilitate more patient-centered decision making, research on methods for efficiently assessing and reporting patient-centered risks and benefits of imaging tests in comparative effectiveness research is needed.

The authors acknowledge the support and contributions of the PROD Study Team—a body of stakeholders, study site champions and coordinators, and researchers. We would also like to acknowledge Jessica Cruz for her assistance with data cleaning, as well as our participants whose time and stories made this work possible.

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