

# Medical Imaging Outpatients' Experiences With Receiving Information Required for Informed Consent and Preparation: A Cross-Sectional Study

Journal of Patient Experience  
2018, Vol. 5(4) 296-302  
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DOI: 10.1177/2374373518765794  
journals.sagepub.com/home/jpx  


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## Abstract

**Background:** Medical imaging outpatients often experience inadequate information provision and report high levels of anxiety. However, no studies have assessed patients' receipt of preparatory information in this setting. **Objective:** To examine medical imaging outpatients' perceived receipt or non-receipt of preparatory information from health professionals and imaging department staff prior to their procedure. **Method:** Computed tomography and magnetic resonance imaging outpatients at one Australian hospital self-completed a touchscreen computer survey assessing their perceived receipt of 33 guideline-recommended preparatory information items. **Results:** Of 317 eligible patients, 280 (88%) consented to participate. Eight percent (95% confidence interval: 5%-12%) of participants reported receiving all information items. The median number of information items not received was 18 (interquartile range: 8-25). Items most frequently endorsed as "not received" were: *how to manage anxiety after* (74%) and *during the scan* (69%). Items most commonly endorsed as "received" were: *reason for referral* (85%) and *how to find the imaging department* (74%). **Conclusion:** Few medical imaging outpatients recalled receiving recommended preparatory information. Preparatory communication needs to be improved to better meet patient-centered service imperatives.

## Keywords

communication, patient education, imaging, survey data

## Introduction

International medical imaging bodies endorse the importance of appropriately communicating procedural risks and benefits to patients before the point of care (1–5). Providing comprehensive preparatory information is a legal and ethical imperative, as it supports patient autonomy, quality of care, and informed patient consent (1–7). The provision of this information may also improve patient outcomes, such as reducing anxiety and distress (8). General recommendations regarding preparation for potentially threatening medical procedures highlight the need to communicate procedural, behavioral, sensory, and psychosocial information (9,10). This information refers, respectively, to the sequence of events and equipment to be used, the patient's role in facilitating the procedure, the sensations that will be felt, and the management of emotions and should relate to the time before, during, and after the procedure (9–12).

Magnetic resonance imaging (MRI) and computed tomography (CT) medical imaging outpatients are an increasing population undergoing a potentially threatening, high technology medical procedure, who require such preparatory

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information. For example, in Australia, the four year service growth rate since 2010 for MRI and CT scans was 47.4% and 29.4%, respectively (13). Similar growth has been seen internationally, including in the United States, Canada, and Turkey (14,15). Although these procedures occur frequently, they are considered potentially threatening because of their association with high levels of anxiety (16–19). Consistent with broader international literature, a recent Australian study found that 56% of MRI and 59% of CT outpatients reported raised state anxiety (using the short-form state scale of the State-Trait Anxiety Inventory) prior to undergoing their procedure (20). Such anxiety contributes to patients feeling a loss of control during the procedure (17,19). Research findings in France, the United States, and Scotland suggest that communication could be improved for these patients (16,21,22). Inadequate communication prior to diagnostic medical procedures contributes to negative patient experiences (23), and efforts are being made to enhance patient–provider communication within medical imaging settings (24–26). However, very limited research has assessed MRI and CT medical imaging outpatients' experiences with receiving preparatory information, and no Australian-based studies have been completed. Therefore, this study examined MRI and CT medical imaging outpatients' perceived receipt and non-receipt of preparatory information from health professionals and imaging department staff prior to their imaging procedure.

## Methods

### *Design and Setting*

A cross-sectional survey of medical imaging outpatients scheduled for MRI or CT examinations was conducted in one medical imaging clinic within the John Hunter Hospital located in Newcastle, New South Wales, Australia. In this setting, MRI and CT medical imaging outpatients are typically provided with mailed written preparatory information and verbal information when scheduling and attending their appointment.

### *Sample*

Eligible patients were: (a) attending for an outpatient MRI or CT appointment at the Hunter New England Medical Imaging Department at John Hunter Hospital and (b) 18 years or older. Patients were excluded if they had (a) insufficient English language proficiency or (b) a cognitive or physical impairment that precluded informed consent and/or survey completion.

### *Procedure*

Medical imaging receptionists identified potentially eligible patients when they presented for their appointment, informed them about the research, and invited them to speak with a trained researcher. The researcher provided interested

patients with written and verbal information about the study and gained verbal informed consent to participate. The age, gender, and scan type of non-consenting patients was recorded with their permission.

Patients who consented to participate were provided with a tablet computer and asked to self-complete an online questionnaire prior to their scan. The researcher was available to help participants who had difficulties using the tablet computer, and paper and pen versions of the questionnaire were available for those who requested it. If the patient was called for their procedure prior to finishing the questionnaire, only those questions that had been completed were used for data analysis. Ethics approval was obtained from the Human Research Ethics Committees of the Hunter New England Local Health District (16/10/19/5.11) and University of Newcastle (H-2016-0386).

## *Measure*

*Patient perceived receipt of information.* Patient perceived receipt of information was measured using a series of investigator-developed items. General standards addressing patient preparation for potentially threatening medical procedures were initially used to identify the preparatory domains (ie, procedural, behavioral, sensory, and psychosocial) that items should address (9,10,27). Domain-related items were developed using these general standards (9,10,27). As this study was based in Australia, items were also informed by the Royal Australian and New Zealand College of Radiologists (RANZCR) Standards of Practice (2), consumer materials (28,29), and informed consent guidelines (1). Behavioral scientists, radiographers, and imaging department management staff initially reviewed and agreed upon the face validity of the questionnaire. This version was then reviewed by members of the general public and health professionals in the aging, disability, and nursing sector, for ease of comprehension and completion time. Minor amendments to survey item wording and screen presentation were made. The revised questionnaire was pilot-tested with patients across a two week period in the medical imaging department, which resulted in further changes to item structure and presentation. The final questionnaire included 33 items that asked participants whether they had received information from imaging department staff or health care professionals prior to arriving for the scan procedure, with response options: “no, but I wanted this information”, “no, but I didn't want this information”, “yes, but I didn't want this information”, and “yes, and I wanted this information”. This analysis was centered on patient experiences with receiving information, given the legal and ethical implications, as well as the requirement for information delivery to facilitate patient preparation. As such, “no” responses and “yes” responses were combined to indicate the non-receipt and receipt of preparatory information, respectively. The internal consistency (Kuder-Richardson

coefficient) of these dichotomized preparatory information items was 0.96 (30).

### Study Factors

**Sociodemographic and scan characteristics.** Standard items assessed age, gender, marital status, highest level of education completed, postcode, scan type, and prior scans. Postcode was mapped to the Accessibility/Remoteness Index of Australia Plus (ARIA + 2011) classification to examine remoteness (31).

### Data Analysis

The gender, age group (<65 years vs ≥65 years), and scan type of consenters and non-consenters were compared using chi-square tests. The median number of received and non-received items (and interquartile range [IQR]) were reported due to non-normally distributed data. The proportion of participants reporting (a) non-receipt of each information item and (b) 0 to 33 non-received information items was calculated with 95% confidence intervals (CIs). Due to an absence of theoretically or empirically sound hypotheses, this study was not powered to explore patient characteristics associated with perceived receipt or non-receipt of information.

## Results

### Sample

Of the 394 patients considered for the study during the six week recruitment period, 317 were eligible and invited to speak with the researchers. Of eligible patients, 280 (88%) consented to take part in the study. There was no significant difference between consenters and non-consenters based on gender ( $\chi^2 = 2.200$ ;  $P = .138$ ) and age group ( $\chi^2 = 0.003$ ;  $P = .956$ ). Significantly more CT patients than MRI patients declined the study participation invitation ( $\chi^2 = 6.565$ ;  $P = .010$ ). Of consenting participants, 273 (98%) started the survey, 234 (84%) started “information received” items, 218 (78%) completed these items, and 208 (74%) completed all survey items. There were no significant differences in participant characteristics between those who did and did not complete all survey items (gender:  $\chi^2 = 0.614$ ,  $P = .433$ ; age:  $\chi^2 = 0.537$ ,  $P = .464$ ; scan:  $\chi^2 = 0.095$ ,  $P = .758$ ). Table 1 provides a summary of the sociodemographic and scan characteristics of participants who started the survey.

### Self-Reported Non-Receipt of Preparatory Information Items

The median number of preparatory information items received was 15 (IQR 8-25) and non-received information items was 18 (IQR 8-25). Eight percent (95% CI: 5%-12%) of participants reported receiving all preparatory information items, whereas 69% (95% CI: 63%-75%) reported not having received at least 10 information items, and 45% (95% CI:

**Table 1.** Participant Sociodemographic, Scan, and Information Preference Profile.<sup>a</sup>

Characteristic	n (%)
Mean years of age (SD)	57 (14)
Gender	
Male	130 (48%)
Female	142 (52%)
Marital status	
Married or living with partner	133 (63%)
Single or never married	28 (13%)
Divorced or separated	34 (16%)
Widowed	17 (8%)
Education completed	
High school or less	195 (71%)
More than high school	78 (29%)
Geographic location	
Metropolitan	209 (78%)
Nonmetropolitan	59 (22%)
Scan type	
CT	108 (40%)
MRI	157 (59%)
Don't know	3 (1%)
Prior scans	
Not had scan before	66 (25%)
Had scan <1 year ago	93 (35%)
Had scan ≥1 year ago	97 (37%)
Don't know	8 (3%)

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; SD, standard deviation.

<sup>a</sup>N = 273, completed at least 1 item. Item sample sizes vary due to missing data.

39%-52%) reported not having received at least 20 information items. As shown in Table 2, the proportion of respondents who reported not having received each preparatory information item from health professionals prior to their scan ranged between 15% and 74%.

## Discussion

This study explored patient experiences in relation to preparatory information communication in an Australian medical imaging setting. MRI and CT medical imaging outpatients perceived that they received approximately half of the assessed preparatory information items from health professionals and imaging department staff prior to their scan. These findings suggest that future improvements are needed to better meet patient-centered, legal, and ethical imperatives associated with preparatory information delivery.

### Most Patients Received Information About Scan Type, Reason for Referral, and Appointment Practicalities

Consistent with Chesson et al.'s (2002) Scottish cross-sectional study of 372 medical imaging outpatients, which reported that 82% of respondents were aware of why their examination was required, 85% of participants in this study

**Table 2.** Prevalence of Patient Perceived Nonreceipt of Preparatory Information Items.<sup>a</sup>

Rank	Item	Prevalence of Patient Perceived Non-Receipt of Preparatory Information Items
1	How to manage scan-related fear or anxiety after the scan?	150 (74%)
2	How to manage scan-related fear or anxiety during the scan?	151 (69%)
3	Who will be with you during the scan?	149 (66%)
4	How to manage scan-related fear or anxiety before the scan?	151 (65%)
6	What you will see during the scan?	147 (65%)
	Any after-effects in the day/s following the scan?	129 (63%)
	Whether someone should come with you to the scan?	144 (63%)
8	Where to find information about any aspects related to the scan?	144 (62%)
9	How to alert the radiographer if you have questions or concerns during the scan?	135 (61%)
10	How the scanner takes images of the body?	132 (59%)
12	Any physical sensations you may feel during the scan?	130 (58%)
	Whether you can drive home from the scan?	127 (58%)
14	What to do if you suffer from claustrophobia?	125 (56%)
	How long you will have to stay at the department after the scan?	123 (56%)
15	What the scanner looks like?	124 (55%)
18	What you will hear during the scan?	122 (54%)
	Where to park in the hospital?	124 (54%)
	Whether you can move during the scan?	122 (54%)
20	When to expect the results of the scan?	105 (51%)
	What you will be asked to wear during the scan?	117 (51%)
21	Any risks associated with the scan?	113 (50%)
23	Whether you will need an injection at the scan?	102 (45%)
	Who to speak to if you had any questions about the scan in the week/s before your appointment?	104 (45%)
24	Being required to lie on a table that moves in and out of the scanner?	99 (43%)
26	How you will receive the results of the scan?	84 (41%)
	How long the scan will take?	92 (41%)
28	The benefits of having a CT or MRI scan?	86 (37%)
	How long you will have to wait in the department before having the scan?	84 (37%)

(continued)

**Table 2.** (continued)

Rank	Item	Prevalence of Patient Perceived Non-Receipt of Preparatory Information Items
29	Steps you needed to take to prepare for your scan in the day/s before your appointment?	80 (34%)
30	What to eat or drink on the day of the scan?	78 (33%)
31	What to bring to the scan (eg, prior scan results)?	70 (31%)
32	How to find the imaging department in the hospital?	60 (26%)
33	Why your doctor referred you for a CT or MRI scan?	35 (15%)

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging.

<sup>a</sup>N = 234, completed at least 1 item. Item sample sizes vary due to missing data.

had received information about the reason for referral (22). Similarly, when arriving for their procedure, 99% of participants in this study were able to self-report the type of scan they were attending for. Information addressing the type and requirement for the scan was therefore received by patients, indicating appropriate service delivery in this element of preparatory communication.

At least two-thirds of patients reported they had received information that could facilitate timely appointment attendance and enhanced imaging quality: how to find the imaging department (74%), what to bring to the scan (69%), what to eat or drink (67%), and steps to prepare beforehand (66%). These findings align with a small US-based study conducted with patients undergoing diagnostic medical interventions, where a majority of participants, or their families, recalled receiving procedural (97.9%) or behavioral (100%) information about the intervention (23). Our study findings may reflect that the appointment letter received by patients specifies how to find the imaging department and what to bring to the scan. Alternatively, these findings may indicate that patients place a higher level of importance on practical aspects of preparation, which is reflected in higher rates of recall of this information. Future research is needed to assess the concordance between information delivery and patient-reported information needs, as well as the impact of patient-centered information provision on patient outcomes.

### Some Imaging-Specific and General Preparatory Information Items Were Commonly Not Received

Up to 74% of respondents perceived that they had not received preparatory information items from medical imaging department staff or other health professionals prior to their scan. This included between 37% and 50% reporting not having received items required for informed

consent (ie, procedural risks, benefits, and who to speak to with questions), despite being recommended by RANZCR Medical Imaging Consent Guidelines (1), and literature suggesting that receipt of the right amount of such information can reduce pre-procedural anxiety (32). However, these findings mirror those of otorhinolaryngology head and neck surgery patients preparing for invasive diagnostic or therapeutic medical procedures, in which patient recall of risk-related information ranged between 35% and 54% (33). While factors including patient age, education, time since information provision, and perceived relevance of information may influence recall rates (33), these findings indicate that there is room to improve information provision prior to medical imaging procedures and current practices may not be meeting medical imaging-specific standards.

Some general standards for preparation for potentially threatening medical procedures were also commonly not met in this medical imaging setting. Despite MRI and CT medical imaging outpatients experiencing high levels of anxiety (16–18), which is associated with procedure terminations, motion artifacts, and reduced diagnostic utility of images (18,34), information on how to manage anxiety before, during, and after the scan were among the most commonly non-received items (ie, by 65%–74% of respondents). This gap in patient-reported receipt of information may be a result of misalignment between medical imaging guidelines (which do not explicitly mandate the provision of such information) (2,4,5) and broader preparatory guidelines (which do recommend the delivery of anxiety-related information) (9,10). Although Australian and international medical imaging bodies advocate the importance of emotional support and alleviation of patient anxiety (3,29,35), these findings suggest a need for standards that more clearly guide communication of psychosocial information to patients.

The pre-procedural timing of survey completion is another important consideration for information provision findings. It is likely that the information required for informed consent is provided when patients attend for their scan. Additionally, anxiety management strategies, such as telling the patient that they can press the alert buzzer if they become uncomfortable, may be provided at the point of care when presenting the scan room and equipment. However, providing information in advance of potentially threatening medical procedures has been suggested to increase patient preparation and participation in health care (36). Further research is needed to assess medical imaging outpatients' post-procedural perceptions of information provision and whether the timing of information delivery meets patients' needs. There is also a lack of clarity about what low intensity, evidence-based approaches may assist patients to self-manage imaging-related anxiety (8,37). Consequently, we are undertaking a randomized controlled trial to test the impact of an information intervention on reducing anxiety among medical imaging outpatients.

### ***Most Imaging Patients Are Left to Self-Source Information About Their Scan***

Over half (62%) of the respondents reported not being informed of where to find further information about the scan. Medical imaging outpatients who self-source information most commonly do so from family and friends, drawing the accuracy of sourced information into question (22). To ensure information seekers' needs are met by credible sources, there is a need to enhance patient awareness of reliable information materials that are developed by peak medical imaging bodies.

### ***Limitations***

This research was designed to establish current patterns of preparatory information receipt, in order to inform service-wide improvements that may benefit all MRI and CT outpatients. This study was not intended to assess preparatory information receipt among medical imaging inpatients nor was it designed to test for differences in information receipt by specific CT or MRI scan type. Although the sample size was small relative to the volume of outpatients attending the department annually, it was sufficient for detecting prevalence estimates with 95% CIs with 7% margin of error. Findings may not generalize beyond the single, large metropolitan medical imaging department study setting. However, the age and gender profile of the sample was similar to that of participants in other large Australian (38,39) and international studies (40,41) with medical imaging outpatients.

Significantly more CT patients than MRI patients refused study participation, suggesting that the sample is less representative of CT patients. This may be due to some CT patients being asked to arrive at least 15 minutes in advance of their scheduled appointment (vs 30 minutes for MRI patients), thus perceiving they have insufficient time to participate in the research prior to their scan. The exclusion of those with insufficient English to allow survey completion may have led to an underestimation of the proportion of medical imaging patients who didn't receive information items (42). Patient self-report may have been influenced by recall bias, however, patient perceptions of past communication have been suggested to influence present health behaviors (43). While further evaluation of the psychometric properties of the information receipt measure is required, item development was informed by relevant guidelines, standards, and expert views and demonstrated excellent internal consistency.

### ***Conclusion***

This study contributes important knowledge regarding key preparatory information items that are commonly received and not received by MRI and CT medical imaging outpatients, and may inform enhanced medical imaging preparation guidelines and improved forms of information delivery.

Although information relating to scan type, reason for referral, and practicalities are commonly received, these findings suggest that not all recommended preparatory information is provided to patients. Further research is needed to assess whether current information provision is aligned with patient preferences for this information and determine the impact that preparatory information has on patient outcomes.

### Acknowledgments

The authors thank the patients for their involvement in this study, as well as the practice and managerial staff at Hunter New England Imaging for assistance with recruitment and data collection.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Mrs Lisa Hyde is supported by an Australian Government Research Training Program Scholarship. Dr Lisa Mackenzie is supported by a Postdoctoral Fellowship grant [PF-16-011] from the Australian National Breast Cancer Foundation. Dr Allison Boyes is supported by a National Health and Medical Research Council Early Career Fellowship [APP1073317] and Cancer Institute New South Wales Early Career Fellowship [13/ECF/1-37].

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