Query Details

1. **Please check if the affiliations are presented correctly.**

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2. **Please check if all the tables are presented correctly. Also, the number of respondents and consultants in Table 2 totals to 51 and 46, respectively. Please check.**

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Clinicians' perceptions of the quality of outsourced radiology and actions taken around perceived imaging errors in practice

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Abstract

Objectives

Outsourcing of radiological reporting services has fundamentally altered communication between radiologists and clinicians in clinical decision making, which relies heavily on diagnostic imaging. The aim of this study was to understand clinicians' perspectives and experiences of interpretation of outsourced reports in clinical practice, if the author of imaging reports matters to clinicians, and actions taken to deal with perceived errors.

Methods

A printed survey was distributed to a purposive sample of 50 of the 250 senior medical and surgical staff of a large National Health Service hospital in the UK who regularly engaged with the Radiology Department between May and October 2017, representing 20% of this hospital workforce. The survey consisted of ten questions examining clinicians' opinions on radiology reporting, with comment options to encourage respondents to give further detail. Participants were requested to return the survey to the study investigators.

Results

The survey elicited a 100% response rate ($n = 50$). A constant comparative framework was used to guide analysis, revealing themes relevant to the ongoing inter-professional relationship between clinicians and radiologists. The disparity between in-house and externally sourced radiology reports and underlying issues of trust surrounding outsourced reports were the most significant themes identified.

Conclusions

This study found outsourcing of radiology reporting needs multi-disciplinary team availability regarding the interpretation and discussions around capacity for effective communication. It raises important issues around often under-acknowledged additional workloads imposed on in-house radiologists. There are financial and pragmatic clinical aspects in pathways of radiology practice which require further research and examination.

Key Points

• *Utilisation of outsourcing is increasing in practice in response to imaging demands.*

• *Outsourcing increases departmental primary reporting capacity but may increase the workload of the local radiologist.*

• *The development of strategies for outsourcing examinations may lessen demands on the in-house workforce.*

Keywords

Outsourcing
Workload
Clinical decision making

Introduction

The increasing demand for radiological expertise in the UK has not been matched by workforce capacity. This situation has led to chronic staff shortages, unfilled vacant consultant posts, often as a result of retirement, a need for long-term overtime and an increasing backlog of diagnostic imaging for interpretation. Between 2010 and 2016, the radiology consultant workforce grew by an average of 3% per year; in England, from 2013 to 2016, the number of computerised tomography scans performed increased by 33% and the number of magnetic resonance imaging scans by 31% [1]. Within the practice of radiology, peer discussion and feedback are encouraged, with an established multi-disciplinary team approach to review diagnostic imaging, auditing processes and discussion of issues of concern across clinical specialities. This approach is commensurate with the UK published guidelines on standards of practice for radiologists [2]. It has been evidenced that a multi-disciplinary approach can lead to improved cancer outcomes [3], but despite the positive benefits of this approach, the additional time needed to participate in multi-disciplinary

meetings places time and workload demands on radiologists [4]. One approach to supporting the radiology workforce issues of workforce capacity and the unrelenting increase in the need for diagnostic imaging in the UK is to outsource radiology reporting to external providers, usually within the private sector [5]. This is becoming an increasingly common option. In 2016, 78% of radiology departments in the UK reported outsourcing some reports to external providers compared to a rate of 33% in 2010 [1]. The interpretation of radiology reports is not an exact science as it is open to human interpretation; discrepancies between radiological interpretations are thought to occur at a rate of about 3–5% [6]. There is no consensus on the definition of what constitutes a radiological error, and many discrepancies in error reporting may not overtly influence patient management.

Outsourcing of diagnostic imaging interpretations has altered the potential for effective communication between clinicians and reporting radiologists in clinical environments [7]. With in-house report authors, there are often encounters between radiology and other staff in informal settings outside multi-disciplinary meetings, e.g. ‘corridor communications’ which puts faces to names and builds rapport between radiologists and clinicans in other disciplines. The practice of outsourcing has divided opinion within radiology, and other clinical specialities. Currently, there is little published evidence about whether the author of radiology report, be it internal or outsourced, matters to the clinician.

The aim of this study was to understand clinicians’ perspectives and experiences of outsourcing reports in clinical practice, if the author of imaging reports matters, and how clinicians handle what they perceive as errors in imaging reports.

Materials and methods

In order to capture a wide range of responses across the various clinical disciplines utilising the services of the Department of Radiology, surveys were chosen as the strategy for data collection. A survey was a pragmatic approach to being able to access a relatively large sample of clinicians who depend and regularly use diagnostic radiology reporting services in their everyday practice. The anonymous, ten-question written survey was then distributed to a purposive sample of 50 senior medical and surgical staff across a range of clinical specialties within a large NHS hospital, representing 20% of that workforce, in the North of England from May to October 2017. These participants were identified as regularly engaging with the Department of Radiology, and would therefore be able to provide relevant information.

The survey questions included space for respondents to add additional comments to their responses which would give context to and allow a more comprehensive understanding of their perceptions to be gained. To encourage open responses and maintain confidentiality, only basic demographic information was collected; therefore, it was not possible to send out a reminder to complete the survey.

The survey was designed to collect both quantitative and qualitative data, the latter owing to the subjective nature of the aim of the study. Adopting a qualitative dimension allowed the investigators to explore and interpret the perspectives and experiences of the participants, extract meaning and gain knowledge of situation [8]. A constructivist approach was taken by the research team. This is a philosophy which asserts there are multiple realities and interpretations of a situation, with meanings and actions constructed by the individual people experiencing or living with the phenomena [9], i.e. the management of errors in radiology reporting. We applied this in order to gain a deep, rather a superficial insight by which to understand what the participants reported in the collected data [10] and give context to the numerical data.

The questions were discussed and agreed with the research team and pilot tested with a representative sample to ensure that questions were understood and relevant to the aim of the study (see Table 1).

Table 1

Copy of survey

Number	Question	Response
1	What job grade are you employed as?	
2	Please state your clinical speciality	
3	When reading a radiology report, do you look who has written it? (please tick)	Yes____ No_____
4	Does the author of the report make a difference to you?	Yes____ No If yes, why/how?
5	If you perceived there to be an error on the report, what do you do?	a) Nothing____b) query it____c) depends on the error If you answered c) would you raise the query if it is: Typographical error Yes_____No____ Question regarding diagnosis Yes___No___ Question regarding a missed finding Yes___No____

Number	Question	Response
6	For a scan that was reported within the hospital radiology department, how would you raise the query?	
7	For a scan that was reported by an external company, how would you raise this?	
8	How comfortable do you feel raising queries on reports? (please circle response)	Very uncomfortable Slightly uncomfortable Comfortable Very comfortable Please give the reason for this:
9	Do you get feedback about the queries you raise? (please tick)	Yes____No____N/A_____
10	If you answered 'yes' to question 9, is this feedback helpful? (please tick) And do you receive this feedback in a timely manner? (please tick) Any other comments? (please state)	Yes___No___ Yes___No____

The surveys were collated, and the research team analysed the initial responses. Once basic descriptive statistics were collated, the participants' comments were further investigated using constant comparative analysis, which is a method of analysis which allows researchers to identify emergent concepts in the data [11], from which themes were constructed which provided context to the numerical data. Each survey was read independently by the two qualitative researchers, who then compared and discussed and an initial set of concepts. These concepts were then discussed with the rest of the research team, in order to reach consensus and agree on the final four themes generated from the analysis.

Results

A purposive sample of 50 senior clinicians across a broad range of clinical disciplines (see Table 2) was obtained; this represents 20% of the 250 senior medical and surgical staff employed in our Trust. All participants reported they looked at who had written the radiology report and that that the author was made a difference to them.

Table 2

Participant demographics

Specialty AQ2	No. of respondents	Grade

Specialty AQ2	No. of respondents	Grade
Rheumatology	7	5 consultants 1 specialty trainee level 3 1 specialty trainee level 7
Haemotology	5	Consultants
Acute medicine	1	Consultant
Clinical oncology	6	5 consultants 1 specialty trainee level 8
Gastroenterology	5	4 consultants 1 specialty trainee level 5
Endocrinology	1	Consultant
Accident and emergency	1	Consultant
General surgery	11	10 consultants 1 specialty trainee level 8
Urology	8	Consultants
Ear, nose and throat	3	Consultants
Maxillo-facial	2	Consultants
Upper gastrointestinal surgery	1	Consultant
Total respondents	50	45 consultants 5 specialty trainees

The actions taken when there is a perceived error on a report (internal or outsourced) varied, with all participants ($n = 50$) stating they would query the error. However, action was taken depending on what the participant deemed to be important. For participants who stated they would query a perceived error depending what the error was, 74% ($n = 37$) took action around a concern about the diagnosis, followed by a missed finding (72%, $n = 36$). Queries around typographical errors were only reported by 18% ($n = 9$) of respondents (see Table 3).

Table 3

Reasons for raising queries on reports

Reason	Raised	Not raised	Comments
Typographical error	18% ($n = 9$)	46% ($n = 23$)	10% ($n = 5$) would query if it was deemed to change the interpretation

Reason	Raised	Not raised	Comments
Question re-diagnosis	74% (*n* = 37)	0% (*n* = 0)	None
Question re-missed findings	72% (*n* = 36)	0% (*n* = 0)	None
No response	n/a	n/a	34% (*n* = 17)

There were noted differences in actions taken according to whether the report was done in-house or outsourced (see Table 4).

Table 4

Participant-reported actions on raising queries with scans

Action	In-house scan	Outsourced scan
Email the specialist consultant	12% (*n* = 6)	8% (*n* = 4)
Contact (email/telephone) radiologist linked to MDT	24% (*n* = 12)	32% (*n* = 8)
Contact clinical director/lead radiologist	8% (*n* = 4)	14% (*n* = 7)
Contact (email/telephone) with reporting radiologist	24% (*n* = 12)	12% (*n* = 6)
Discuss in radiology MDT	24% (*n* = 12)	24% (*n* = 12)
Response not clear	2% (*n* = 1)	2% (*n* = 1)
Contact external reporting company	n/a	4% (*n* = 2)
Contact radiology secretaries	4% (*n* = 2)	4% (*n* = 2)
Do not know	0% (*n* = 0)	4% (*n* = 2)

When participants were asked how they felt about raising queries on reports, 52% (*n* = 26) were comfortable, 24% (*n* = 11) were very comfortable and 10% (*n* = 5) were slightly and well-received in nearly all cases. The survey questions on feedback about report queries were positive, with 82% (*n* = 41) receiving feedback, 11% (*n* = 5) not receiving any and 7% (*n* = 3) sometimes. Feedback was reported as helpful by 97% (*n* = 45), with 92% (*n* = 46) receiving this in a timely manner.

The perspectives of the participants are further explored through the four themes constructed from the data. This was done to give context to the quantitative data and provide a greater understanding of the participants' experiences.

Theme I having confidence in reporting process

Despite the acknowledged inevitable margin for error in interpretation, there was an overall feeling of confidence in communication with the in-house radiologists. The processes for raising queries with both internal and external reports were largely the same, with varied methods of communication with the in-house radiologists preferred, such as email, telephone and face to face meetings, both in a multi-disciplinary team setting and individually. With respect to clarification of findings on an outsourced report, only 4% ($n = 2$) stated they would contact the external provider in the event of a query; this was usually done with an in-house radiologist.

Theme II trusting the in-house resources over external ones

There was an overarching theme of trust, both in the in-house staff and in-house reports, which was associated with a higher quality of provision. The majority of participants who provided comments stated feelings of mistrust with outsourced reports, with clinicians feeling more confident in knowing that in-house clinical expertise is utilised for specific scans, e.g. head and neck, and that this an unknown entity with outsourced reports. It was acknowledged that the quality of reports did vary whether internal or outsourced, but overall, the quality and confidence levels towards in-house reports were reported to be stronger. The theme of trust was further articulated in the participant-reported value of the multi-disciplinary team, which facilitated communication, i.e. knowing who to contact in-house to discuss pathology and be supported by an in-house radiologist in planning an appropriate course of action to ensure optimum patient outcomes.

Theme III feeling comfortable raising queries

As patient safety is an overriding principle of good clinical governance, with accurate imaging reports crucial to appropriate pathways of care for patients, it is vital that clinicians feel comfortable in highlighting and querying discrepancy, potential error and lack of clarity in imaging reports. The ability of clinicians to raise issues of concern regarding potential diagnostic error was important. There were mixed levels of confidence in raising concerns, but overall, it was acknowledged that patient care should override feeling uncomfortable in seeking advice. This appeared to be more challenging with outsourced reports, with participants stating the unknown author was the reason behind this. The majority

of participants who provided comments felt that the presence of a radiologist at multi-disciplinary team meetings assisted to reduce the discomfort and encouraged conversations. The interrelationships between the radiologist and the clinician were fundamental to their perception of trust, knowing the person and the concept of ‘challenging’ alongside ‘questioning’ key diagnostic features.

Theme IV negotiating ambiguous processes

The data showed that raising queries, reporting errors and receiving feedback, with internal and outsourced reports, were not a straightforward process, and there was a perceived element of ambiguity, despite regular multi-disciplinary meetings and reported pathways of communication:

Overall, these themes add a deeper insight into the findings. These themes consolidate the evident ambiguity perceived by clinicians in relation to current radiological reporting processes. This degree of ambiguity necessitates the use of greater skills of discernment, confidence and underpinning knowledge than a system without such degrees of ambiguity would warrant. Communicative capacity between the clinicians and radiologists is perceived as imperative in this process, as seen here.

Discussion

Overall, the findings show a high level of trust, interaction and communication between in-house radiologists and other clinicians. The experiences and perspectives of the participants appeared to be consistent across the 13 clinical specialties. Analysis of the comments showed that multi-disciplinary meetings provided a source of reassurance, debate and expertise, which was especially evident for queries on outsourced reports. Generally, clinicians felt comfortable raising queries about report content and potential radiological error with an acknowledgement that patient safety was an overarching governance principle. Direct contact with a radiologist in the context of a multi-disciplinary meeting helped many clinicians to deal with potentially difficult task of raising concerns about report accuracy and assisted clinical staff in negotiating ambiguous processes.

The addition of using multi-disciplinary meeting time to discuss queries with outsourced reports may add considerable burdens to an under-resourced workforce, making outsourcing a potentially less effective solution to this problem, with limited or no opportunity for effective communication between the clinician and the radiologist, leaving less time for other cases worthy of multi-disciplinary discussion.

There is an acknowledged margin for error within the interpretation of radiology reports, with many decisions made with a degree of uncertainty [12]. Regardless of clinical discipline or however advances in technology ensure efficiency in being able to obtain accurate diagnostic imaging, their radiology image interpretation and comparison with previous studies must still ensure professional accountability, clinical governance and effective inter-professional working and communication pathways. The practice of outsourcing into the reporting system adds a layer of complexity to dealing with queries, which are often down to human factors, of which the primary source of the query is not always available for discussion. Emphasis on the lack of available data on systems errors in radiology practice, despite much impetus being placed on the profession to create a culture of safety, was identified by Blumberg et al [13], and our findings show a lack of confidence by clinicians in the outsourced reports. This has also been found in a previous census of clinical radiologists and oncologists, with 75% ($n = 217$) of the latter reporting that outsourced reports were of lesser quality than those produced in-house [14]. The participant-reported errors of diagnosis and missed findings with outsourced reports have been found in other literature and consistent with our findings, showing that this is an ambiguous process in need of further research [15].

The limitations of this study are acknowledged. The findings are an interpretation of the perspectives and experiences of the participants working in a single hospital in a UK Trust, and policy and practice may differ elsewhere. Although the survey was distributed to a wide range of clinical specialities within the hospital, the possibility of bias owing to more respondents in some clinical specialities than others cannot be excluded. It is also acknowledged that the participants identified to take part in the survey were known to the study team, as they regularly engage with the radiology team, and this may have influenced the high response rate. However, it was important to recruit participants who accessed radiology reporting in order to understand current practices. The survey was limited to how queries were dealt with, and did not seek to find what actions were taken in the event of a query, i.e. repeated imaging, nor the impact of imaging queries on patients, which has been suggested to increase confidence in radiologists and services provided [16] which may have provided further insight. It is acknowledged that the qualitative findings are the interpretation of the research team involved with the study and that not all participants chose to provide written comments. Additionally, this study did not explore the common practice of performing scans in other centres, with findings reported by an external radiologist, as this is not generally performed in the hospital setting in which this study took place.

As reliance on outsourcing of imaging investigations looks set to further increase, hybrid solutions may become commonplace, with private sector radiologists who provide radiological reports for state hospitals remotely and/or physically participating in multi-disciplinary meetings and spending working time in those hospitals, particularly for error/governance meetings to enable the development of relationship building and communication with the referring clinicians. This will further facilitate improvement in both the safety and efficacy of diagnostic imaging services. Equally, the presence of radiologists at multi-disciplinary meetings by teleconferencing may be another method of establishing the inter-professional trust and relationships which are vital to excellent communication through the medium of radiology reports. Finally, more reliance on regional specialist networks of local radiologists may supplement outsourcing in a regional ‘chambers’ model.

Conclusion

There is a clear need to improve confidence in the accuracy of outsourced reports, as queries regarding these are taken up with core staff, adding to an existing overstretched workload. Future research is recommended in the following areas. Firstly, the implications for actions taken as a result of these queries on radiologist workloads in terms of measuring the financial and systems implications of outsourcing are a solution to an under-resourced workforce. Secondly, to explore how to develop clear pathways for queries relating to outsourced reports to ensure timely responses, acknowledgement of the clinical expertise of the external reporting radiologist and a named contact provided in the event of a query. Finally, the issues of trust and confidence amongst clinicians and with staff working within the outsourcing companies should be undertaken to improve communication, with potential solutions for communication identified by the workforce themselves.

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Informed consent Written informed consent was not required for this study because the participants were hospital staff, and written informed consent was waived by the Institutional Review Board.

Ethical approval Institutional Review Board approval was obtained.

Methodology • retrospective

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