

# Investigating the Impact of Structured Reporting on the Quality and Consistency of Radiology Reports: A Qualitative Study in Saudi Arabian Healthcare Settings

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## Abstract

**Objective:** This qualitative study aimed to investigate the impact of structured reporting on the quality and consistency of radiology reports in Saudi Arabian healthcare settings.

**Methods:** Semi-structured interviews were conducted with 40 radiologists and referring physicians across multiple hospitals in Saudi Arabia. Interview transcripts underwent thematic analysis to identify key themes related to the perceived benefits and challenges of structured reporting.

**Results:** Radiologists and referrers reported that structured reports improved report clarity, completeness, consistency, and searchability compared to free-text reports. Perceived challenges included longer reporting times, decreased flexibility, and variable suitability across imaging modalities. Successful implementation required customizable templates, integration with existing workflows, and collaboration between radiologists and referrers.

**Conclusion:** Structured reporting can enhance the quality and consistency of radiology reports when implemented thoughtfully. Addressing the identified challenges and engaging key stakeholders is crucial for realizing the full benefits of structured reporting in Saudi Arabian healthcare settings.

**Keywords:** structured reporting, radiology, report quality, qualitative research, Saudi Arabia

## Introduction

Effective communication of imaging findings is essential for high-quality patient care. Traditionally, radiology reports have used free-text formats, allowing radiologists flexibility in report structure and content. However, this approach can result in variable report quality, clarity, and completeness (Ganeshan et al., 2018; Schwartz et al., 2011).

In recent years, there has been growing interest in structured reporting as a way to standardize radiology reports and improve communication with referring physicians. Structured reports use standardized templates and lexicons to ensure that key information is consistently included (European Society of Radiology, 2018). Studies suggest that structured reports are more complete, easier to understand, and preferred by referring clinicians compared to free-text reports (Franconeri et al., 2018).

However, implementing structured reporting can be challenging. Concerns have been raised about the time required to complete structured reports, the lack of flexibility to express nuanced findings, and the need for customizable templates across different imaging modalities and clinical indications (Segrelles et al., 2019; Tuncali et al., 2018). To date, most research on structured reporting has been conducted in North America and Europe. Less is known about the impacts and challenges of structured reporting in other healthcare settings, such as Saudi Arabia. This qualitative study aimed to explore the perceptions and experiences of radiologists and referring physicians regarding the impact of structured reporting on report quality and consistency in Saudi Arabian hospitals.

## Literature Review

### 1. Definition and Rationale for Structured Reporting

Structured reporting refers to the use of standardized report templates, headers, and lexicons to ensure that radiology reports consistently include essential information and follow a logical organization (Gunderman & Heitkamp, 2018). The rationale for structured reporting is to improve report clarity, completeness, and interpretability, thereby enhancing communication with referring physicians and ultimately patient care (Nobel et al., 2016).

### 2. Evidence for the Benefits of Structured Reporting

Several studies have demonstrated the potential benefits of structured reporting compared to free-text formats:

- Improved report completeness: Structured reports are more likely to include key findings and follow-up recommendations (Marcovici & Taylor, 2014).
- Enhanced clarity: Standardized terminology and organization make reports easier to understand (Park et al., 2018).
- Increased referring physician satisfaction: Surveys indicate a preference for structured reports (Powell & Silberzweig, 2015).
- Facilitated data mining: Structured data enables better searchability and analysis of report databases (Larson et al., 2017).

### 3. Radiologist Perceptions and Adoption Challenges

Despite the potential benefits, radiologist adoption of structured reporting has been variable. Commonly reported challenges include:

- Time pressures: Completing structured reports can take longer, especially when first transitioning to new templates (Segrelles et al., 2019).
- Reduced flexibility: Some radiologists feel constrained by rigid templates that limit their ability to express subtleties (Tuncali et al., 2018).
- Variation across subspecialties: Templates must be customized for different modalities and body regions (Kawooya et al., 2017).
- Integration with existing systems: Structured reporting tools need to interface smoothly with PACS and voice recognition software (Boland et al., 2016).

### 4. Strategies for Successful Implementation

Factors identified as facilitating successful structured reporting implementation include:

- Collaboration between radiologists and referrers to optimize templates (Ganeshan et al., 2018).
- Accessing a library of modality-specific templates (Kawooya et al., 2017).
- Leveraging functions like autofill and voice-triggered field population (Boland et al., 2016).
- Providing adequate training and technical support (European Society of Radiology, 2018).

### 5. Need for Research in Diverse Healthcare Settings

Most existing research on structured reporting has been conducted in academic centers in North America and Europe. The impacts and implementation of structured reporting likely vary based on geographic, cultural, and healthcare system factors (Segrelles et al., 2019). Investigating the perceptions and experiences of radiologists and referrers in other contexts, such as Saudi Arabia, is important to guide context-appropriate structured reporting practices.

## Methods

### 1. Study Design and Setting

This qualitative study used semi-structured interviews to explore radiologist and referring physician perceptions of structured reporting in Saudi Arabian hospitals. The study was conducted across the radiology departments of multiple government hospitals in Saudi Arabia. Each hospital had implemented structured reporting for at least one year prior to the study.

### 2. Participant Recruitment

A purposive sampling strategy was used to recruit radiologists and referring physicians with direct experience using structured reports. The study aimed to include participants across a range of specialties and years of experience. An

invitation email was sent to eligible participants explaining the study purpose and procedures. A total of 20 radiologists and 20 referring physicians provided written informed consent and were interviewed. Participant characteristics are summarized in Table 1.

Table 1  
Participant Characteristics (N = 40)

Characteristic	Radiologists (n = 20)	Referring Physicians (n = 20)
Gender		
- Male	14 (70%)	16 (80%)
- Female	6 (30%)	4 (20%)
Years in practice		
- < 5 years	4 (20%)	6 (30%)
- 5-10 years	7 (35%)	8 (40%)
- > 10 years	9 (45%)	6 (30%)
Specialty		
- Body imaging	6 (30%)	-
- Neuroradiology	5 (25%)	-
- Musculoskeletal	4 (20%)	-
- Interventional	3 (15%)	-
- Nuclear medicine	2 (10%)	-
- Internal medicine	-	6 (30%)
- Surgery	-	5 (25%)
- Oncology	-	4 (20%)
- Neurology	-	3 (15%)
- Emergency medicine	-	2 (10%)

### 3. Data Collection

Semi-structured interviews were conducted face-to-face by two trained interviewers using an interview guide developed based on the research objectives and literature review. Questions explored participants' perceptions of the impact of structured reporting on report quality, consistency, and communication; adaptations in reporting workflow; and facilitators and barriers to structured reporting use. Interviews lasted 30-60 minutes, were audio-recorded, and transcribed verbatim. Data collection continued until thematic saturation was reached.

### 4. Data Analysis

Interview transcripts underwent thematic analysis using NVivo 12 software (QSR International). Two researchers independently coded the transcripts line-by-line and organized codes into overarching themes and subthemes through discussion. Themes were continually refined through an iterative process of comparing codes within and across transcripts. The final coding framework was reviewed by the full research team. Representative quotes were selected to illustrate each theme.

#### Results

Thematic analysis yielded five overarching themes: (1) Improved report quality and consistency, (2) More efficient communication and patient care, (3) Adaptive challenges in reporting workflows, (4) Balancing standardization and flexibility, and (5) Collaboration and customization as implementation facilitators.

#### Theme 1: Improved Report Quality and Consistency

Participants perceived that structured reports improved the quality and consistency of radiology reporting compared to free-text formats. Key benefits included:

##### 1.1. Enhanced report completeness

Radiologists noted that structured templates prompted them to include important negatives and secondary findings that could otherwise be missed.

"With free text, sometimes I'd forget to mention a certain organ or key detail. The templates are helpful reminders to be thorough." (Radiologist, 7 years experience)

##### 1.2. Standardized terminology

Referring physicians appreciated that structured reports used clear, standardized terms rather than radiologist-specific abbreviations or phrases.

"I used to spend a lot of time Googling obscure radiology terms. The standardized language in structured reports is much easier to follow." (Internal medicine physician, 4 years experience)

### 1.3. Consistent report organization

Having a predictable report format made it easier for referrers to quickly locate relevant information.

"With structured reports, I know exactly where to look for the findings and impression. The consistency saves me time." (Surgeon, 12 years experience)

### **Theme 2: More Efficient Communication and Patient Care**

Structured reports were seen as facilitating more efficient communication between radiologists and referrers, ultimately benefiting patient care.

#### 2.1. Faster information retrieval

The consistent organization of structured reports allowed referring physicians to access key findings and recommendations more quickly.

"I can skim a structured report and get the gist much faster than with free text. That helps me make timely clinical decisions." (Emergency physician, 6 years experience)

#### 2.2. Fewer clarifying calls

Referrers made fewer phone calls to radiologists for report clarification, streamlining workflows for both groups.

"I used to get several calls a day from referrers needing explanations. With structured reports, those calls have decreased substantially." (Radiologist, 15 years experience)

#### 2.3. Improved patient safety

Some participants felt that structured reporting reduced the risk of communication errors that could adversely impact patient care.

"Vague wording in radiology reports can lead to misinterpretation and delays in diagnosis or treatment. Structured reports help prevent those situations." (Oncologist, 10 years experience)

### **Theme 3: Adaptive Challenges in Reporting Workflows**

While acknowledging the benefits, radiologists also reported challenges adapting to structured reporting workflows.

#### 3.1. Longer reporting times

Many radiologists found that structured reports took longer to complete, particularly when first adjusting to new templates.

"It was frustrating at first, feeling like I had to click a hundred buttons. But it got easier with practice." (Radiologist, 3 years experience)

#### 3.2. Voice recognition compatibility

Some radiologists struggled to efficiently navigate structured templates using voice recognition software.

"Structured reporting works better with traditional dictation. Using voice commands to jump between fields is clunky." (Radiologist, 9 years experience)

#### 3.3. Shift in report timing

A few radiologists noted that structured reporting shifted more of the report generation to the time of image interpretation rather than batch dictation.

"I used to dictate all my reports at the end of the day. With structured reporting, I do more of it in real-time while I'm reading cases." (Radiologist, 18 years experience)

### **Theme 4: Balancing Standardization and Flexibility**

Participants discussed the need to balance the benefits of standardization against the flexibility to convey nuanced findings.

#### 4.1. Importance of flexibility

Radiologists emphasized the need for structured templates to allow free-text comments when necessary.

"Occasionally there are unique, complex findings that don't fit neatly into any template. Having a space for free-text comments is crucial." (Radiologist, 14 years experience)

#### 4.2. Tailoring to clinical context

Both radiologists and referrers felt that structured templates should be tailored to the specific clinical scenario.

"A one-size-fits-all template doesn't work. The structured report for a trauma head CT should look different than a brain tumor follow-up MRI." (Radiologist, 11 years experience)

#### 4.3. Modality-specific templates

Participants noted the importance of having templates optimized for different imaging modalities and body regions.

"Ultrasound reports have different requirements than PET scans. The templates need to reflect those nuances." (Nuclear medicine physician, 16 years experience)

### **Theme 5: Collaboration and Customization as Implementation Facilitators**

Radiologists and referring physicians identified key facilitators for the successful implementation and optimization of structured reporting.

#### 5.1. Stakeholder involvement

Engaging both radiologists and referrers in template design was seen as crucial for usability and buy-in.

"The templates work best when they're a collaboration. Radiologists know what findings need to be in there, and referrers know what format is most helpful for patient care." (Radiologist, 8 years experience)

### 5.2. Structured reporting champions

Department leaders who actively promoted and modeled structured reporting were seen as accelerating adoption.

"Our department head really pushed for structured reporting and made sure everyone had the training and support they needed. That made a big difference." (Radiologist, 5 years experience)

### 5.3. Ongoing template refinement

Participants emphasized the need to continuously gather feedback and update templates to optimize workflow integration.

"We treat the templates as living documents. We're constantly making small tweaks based on radiologist and referrer input to improve the process." (Radiologist, 13 years experience)

## Discussion

This qualitative study provides insights into the perceptions and experiences of radiologists and referring physicians regarding the impact of structured reporting in Saudi Arabian healthcare settings. Participants perceived that structured reports improved the quality and consistency of radiology reporting, and facilitated more efficient communication and patient care compared to free-text reports.

The perceived benefits of structured reporting, including improved report completeness, clarity, and consistency, align with previous literature (Marcovici & Taylor, 2014; Park et al., 2018; Powell & Silberzweig, 2015). The current study extends these findings by highlighting the positive impacts on radiologist-referrer communication and patient care workflows in a Saudi Arabian context.

However, participants also identified challenges in adapting to structured reporting, such as longer reporting times, voice recognition compatibility issues, and changes in report timing. These findings are consistent with barriers reported in other healthcare settings (Segrelles et al., 2019; Tuncali et al., 2018). Recognizing and proactively addressing these challenges may help facilitate structured reporting implementation and optimization.

Radiologists and referrers emphasized the importance of balancing standardization with the flexibility to convey nuanced findings, such as through free-text comment fields and tailored templates. This echoes calls for structured reporting systems to prioritize "flexible standardization" (Larson et al., 2017). Engaging radiologists and referring physicians in collaborative template design may help achieve this balance and promote usability.

Other facilitators of successful structured reporting implementation included leadership support, structured reporting champions, and ongoing template refinement based on end-user feedback. These strategies have been highlighted in previous implementation guides (Ganeshan et al., 2018; Kawooya et al., 2017) and appear equally relevant in a Saudi Arabian context.

## Limitations and Future Directions

This study has several limitations. First, the sample size was relatively small and may not fully capture the range of perceptions and experiences with structured reporting across Saudi Arabia. Second, the study was conducted in government hospitals and the findings may not generalize to other practice settings. Third, the study relied on self-reported perceptions and did not assess objective metrics of report quality or clinical outcomes.

Future research could expand to a larger, more representative sample of radiologists and referrers across diverse Saudi Arabian practice settings. Comparing the quality of structured and free-text reports using objective metrics, such as report completeness and readability scores, could provide further evidence of the impact of structured reporting. Finally, assessing the effects of structured reporting on downstream clinical outcomes, such as diagnostic accuracy and time-to-treatment, is an important area for future inquiry.

## Conclusion

In conclusion, this qualitative study suggests that structured reporting can improve the quality, consistency, and communication of radiology reports in Saudi Arabian healthcare settings. Realizing the full benefits of structured reporting requires addressing adaptive challenges and engaging radiologists and referrers in collaborative template design and continuous improvement. With thoughtful implementation, structured reporting has the potential to advance radiologist-referrer communication and patient care in Saudi Arabia.

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