

# Assessing the Generic Structures of Medical Imaging Reports in Iran

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## Abstract

**Background:** Recent advancements in medical technology have significantly influenced social life through the advancement of scientific research.

**Objectives:** This study examined the Generic Structure Potential (GSP) of medical diagnostic reports in Iran, specifically focusing on Radiology Case Reports (RCRs), Magnetic Resonance Imaging (MRI) reports, and Computed Tomography-Scan (CT-scan) reports.

**Methods:** This descriptive corpus-based study analyzed a corpus of 300 diagnostic medical reports collected from Tabriz Medical Science University over a three-month period during the autumn of 2024. The research employed Hasan's (1989) Generic Structure Potential (GSP) model, integrated with Halliday's Systemic Functional Linguistics (SFL) framework, to investigate both the macro-structural elements (obligatory, optional, and recursive) and the micro-structural features (field, tenor, and mode) of these reports.

**Results:** The analysis revealed that the obligatory elements dominated medical diagnostic imaging reports (94.3%), with "Findings" being the most frequent (59.1%), underscoring their central diagnostic role. Normal structures appeared less frequent (23.4%), highlighting the emphasis on pathological findings over normal observations. Optional elements (5.7%) like impressions and recommendations were rare, while recursive elements were entirely absent. The study found no significant presence of recursive elements, indicating a preference for a clear and concise reporting style.

**Conclusion:** The findings of the present study suggest that this structured approach enhances the utility of diagnostic medical reports in supporting accurate diagnosis and patient care within the Iranian healthcare context. These findings have significant implications for researchers, emphasizing the crucial role of understanding and embracing the generic structure of medical reports as a fundamental aspect of scholarly writing within their respective domains.

**Keywords:** Medical Imaging Reports, Generic Structures, Medical Science, Systemic Functional Linguistics

## 1. Background

Medical imaging has emerged as a cornerstone of modern medical diagnosis, offering significant benefits to patients.<sup>1</sup> Over the past decade, Information Technology (IT) has been increasingly recognized as a crucial enabler for enhancing the quality and efficiency of healthcare systems.<sup>2</sup> Digital imaging systems, among the pioneering health IT innovations, have been integrated into healthcare centers since the 1980s.<sup>3,4</sup> The widespread adoption of digital imaging modalities in hospitals worldwide has been driven by the need to enhance diagnostic accuracy, streamline procedures, increase productivity, and ultimately improve patient care.<sup>5</sup> However, these modalities alone are not sufficient to optimize service delivery or reduce costs. Their full potential can only be achieved through the integration of complementary technologies, such as Picture Archiving and Communication Systems (PACS).<sup>6</sup> PACS systems play a pivotal role in managing medical images, facilitating their accurate and timely capture,

storage, transfer, and display.<sup>7</sup> The primary objective of PACS is to streamline the retrieval and display of medical images across all departments within healthcare organizations, with a particular emphasis on radiology departments.<sup>8</sup> PACS seamlessly integrates with various imaging modalities, including radiography, Magnetic Resonance Imaging (MRI), Computed Tomography (CT), sonography, and Nuclear Medicine (NM), as well as other related technologies.<sup>9,10</sup>

In medical communication, diagnostic imaging reports play a vital role as a primary medium of interaction between radiologists and referring clinicians.<sup>11</sup> These reports, especially when written in English, not only document medical findings but also significantly impact clinical decision-making.<sup>12</sup> To enhance clarity and deepen the understanding of their structure, this study adopts Systemic Functional Linguistics (SFL), a framework developed by M.A.K. Halliday in the late 1970s. Unlike formal linguistics, which emphasizes abstract linguistic

structures, SFL integrates context, semantics, and lexicogrammar, offering a holistic perspective on how language functions in specific communicative settings.<sup>13</sup> This approach is particularly relevant for analyzing the organization of diagnostic imaging reports, as it reveals how generic structures and linguistic choices work together to shape meaning and ensure effective communication.<sup>14</sup>

Within the SFL framework, the concept of genre is pivotal, as it establishes a crucial link between linguistic patterns and their underlying social and cultural contexts.<sup>15</sup> Swales<sup>16</sup> aptly describes genres as "communicative vehicles for the achievement of goals", emphasizing that genre-specific features, such as structural conventions and audience expectations, are fundamental to understanding how texts function within specific discourse communities. In the context of diagnostic imaging reports, these genre-specific features encompass both the generic structure and the lexicogrammatical choices that contribute to the report's clarity and effectiveness.<sup>17</sup> While extensive research has been conducted on the generic structures and lexicogrammatical features of various professional and academic texts,<sup>18-20</sup> studies specifically focusing on diagnostic imaging reports, particularly those written in English in Iran, remain limited.

## 2. Objectives

This study aimed to address the gap in the literature by investigating the generic structures that govern the ordering of information within English medical diagnostic imaging reports in Iran. By analyzing how these elements are constructed and how they contribute to the overall coherence of the reports, this research seeks to provide valuable insights that can enhance the quality of medical communication within this context. Ultimately, the aim of this study was to support the development of more effective training and educational programs for medical professionals, enabling them to produce diagnostic imaging reports that are both accurate and effectively communicated.

## 3. Methods

### 3.1. Design and Participants

This retrospective corpus-based and descriptive study analyzed a corpus of 300 diagnostic medical reports retrieved from the archives of Tabriz University of Medical Sciences. Diagnostic medical reports constitute a crucial source of clinical information, serving as a basis for clinicians to establish a diagnosis. This process often involves classifying the reported findings as positive or negative (indicating the presence or absence of a disease), typically based on established criteria derived from statistical and conceptual analyses.<sup>21</sup>

The study corpus encompassed a diverse range of diagnostic reports, including Radiology Case Reports (RCRs), MRI reports, and Computed Tomography-Scan

(CT-scan) reports. These reports exhibited variations in length. Data collection and analysis were conducted over a three-month period. This corpus excluded non-textual elements such as tables, figures, dates, and signatures to ensure the focus remained on linguistic content.

### 3.2. Instrumentation

This study employed a well-established theoretical framework for data analysis. The analysis of the generic structures of diagnostic medical reports in Iran was guided by Hasan's<sup>22</sup> Generic Structure Potential (GSP) model. Recognizing the crucial role of both the writer and reader in academic discourse, the study utilized the SFL as a tool to investigate the distinctive rhetorical structures and identify the inherent GSP within diagnostic medical reports in the Iranian context. Furthermore, the analysis explored transitivity patterns within these identified generic structures.

According to Halliday and Hasan,<sup>23</sup> the defining characteristic that distinguishes text from non-text is its inherent textual unity. This textual unity, in written or spoken language, is primarily characterized by two key features: unity of structure (macro-level) and unity of texture (micro-level). Within the SFL framework, unity of structure, conceptualized as Generic Structure Potential by Halliday and Hasan,<sup>23</sup> signifies that each genre possesses a distinct set of structural elements. These elements can be categorized as obligatory, optional, or recursive. Obligatory elements are essential components without which the text would not be considered an instance of the specific genre. In contrast, optional elements may be present or absent without altering the core identity of the genre. Therefore, GSP is outlined as follows:

- (1) *What elements must occur?*
- (2) *What elements can occur?*
- (3) *Where they must occur?*
- (4) *Where they can occur?*

As Ren<sup>24</sup> asserts, Hasan's GSP theory offers a robust framework for understanding why texts with diverse forms are still perceived by native speakers as belonging to the same genre. This is primarily due to their shared underlying structural patterns, which contribute to genre identification. According to Hasan, the unity of a text at the micro level is maintained through its texture, which is shaped by Contextual Configurations (CC). These configurations consist of three key elements: field, which refers to the subject matter and purpose of the text; tenor, which denotes the relationship between participants (such as the writer and reader); and mode, which pertains to the channel of communication (spoken, written, or multimodal). Together, these factors ensure coherence and genre consistency across various textual forms.

### 3.3. Procedure

Following the approval from the Ethics Committee of Tabriz University of Medical Sciences, a corpus of 300 diagnostic medical reports was collected over a three-month period. This corpus included RCRs, MRI reports, and CT-scan reports, all considered as diagnostic medical reports. These reports exhibited variations in length and word count, with the total word count of the 300 reports amounting to 3567 words. Subsequent to data collection, the corpus underwent a rigorous analysis within the framework of generic structures.

The initial phase of the study involved an analysis of the generic structures employed within the corpus, guided by Hasan's<sup>22</sup> model of GSP. This phase entailed a manual analysis of the corpus by the researcher, utilizing the GSP framework to identify the optional and obligatory elements within the generic structures of each report. Furthermore, building upon Halliday's<sup>23</sup> SFL theory, the corpus was analyzed to understand the interplay of field, tenor, and mode. A comprehensive analysis of medical reports using the GSP framework and SFL necessitates a consideration of both the generic structural elements (obligatory, optional, and recursive) and the contextual configurations (field, tenor, and mode). In terms of GSP analysis, the researcher identified the essential components, namely the obligatory elements, which must invariably be present in a medical report, such as imaging findings. These elements are crucial for the classification of the document as a diagnostic medical text. Moreover, data saturation analysis revealed that these obligatory elements were consistently repeated across the majority of the reports.

Furthermore, the analysis extended to identify and code optional elements, which are components that, while not essential to the core function of the report, can enhance clarity, provide additional context, or offer supplementary clinical insights. These elements include sections such as further observations, differential diagnoses, cautionary notes, and follow-up recommendations. Unlike obligatory components, which ensure the fundamental communicative purpose of the report, optional elements vary depending on factors such as the complexity of the case, the reporting radiologist's style, institutional guidelines, and the referring clinician's specific needs. Their presence can contribute to a more nuanced interpretation of imaging findings, offering insights beyond the immediate diagnostic conclusion. By analyzing their frequency and distribution, this study highlights the extent to which optional elements influence report comprehensiveness, interpretability, and clinical decision-making. Additionally, the study investigated recursive elements, which refer to components that may be repeated within the report, such as detailed observations or multiple recommendations. Frequencies and percentages were used to quantify the occurrence of these elements, while qualitative analysis provided further insights. The

analysis also encompassed CC, including field, tenor, and mode. For field, the researcher examined the specific medical content or domain covered by the report (e.g., MRI findings, diagnostic imaging), including the technical aspects and terminology employed. Tenor analysis focused on the relationships and roles of the participants involved, as well as the level of formality and the use of specialized language. Finally, mode analysis examined the form and style of the report, including the written format and how information is conveyed. This involved analyzing the use of passive voice, nominalization, and assessing the overall clarity and structure of the report.

The analysis involved a systematic categorization of the obligatory, optional, and recursive elements observed within the reports. Furthermore, the study investigated how field, tenor, and mode influence the presentation and interpretation of information within these reports. By integrating an analysis of structural elements with contextual configurations, the study aimed to gain a comprehensive understanding of the underlying principles governing the construction and communicative effectiveness of medical reports. To ensure data reliability, a fifth of the data was independently re-analyzed by a second researcher (a PhD graduate in TEFL from Tabriz University) who was familiar with the analytical framework. Inter-rater reliability for the identification of generic structures was assessed using Cohen's kappa coefficient, resulting in a high level of agreement ( $\kappa = 0.94$ ). The findings were presented both qualitatively and quantitatively, utilizing frequencies and percentages to describe the observed patterns.

### 3.4. Statistical Analysis

Hasan's GSP was used to analyze the structural organization of the reports. The generic components, including sections such as "Findings", "Impressions", and "Recommendations" were systematically identified across the corpus. The analyses were done manually and the frequency and percentage analyses were employed to determine the occurrence of each section, highlighting the centrality of the "Findings" section as the core component of diagnostic communication. Since the analysis was conducted manually, each report was carefully examined to code and categorize its structural elements. Frequency and percentage analyses were applied to quantify the occurrence of each section, offering a data-driven perspective on their prominence. The results underscored the centrality of the "Findings" section, which serves as the core component of diagnostic communication by providing a detailed description of normal and abnormal structures. This section forms the foundation upon which subsequent interpretations and clinical recommendations are based.

## 4. Results

To analyze the GSP of the medical reports provided ( $N =$

300), the obligatory, optional, and recursive elements in each report were identified and categorized. The detailed analysis of the first three medical reports elaborated below along with the examples.

#### Report 1

Imaging of Brain was performed at 1.5 Tesla scanner using the Head Coil.

There are severe multiple hyper signal intensity foci on long TR images at periventricular and paraventricular white matter in favour of Microvascular Ischemic Changes (FAZEKAS change Type III), which one of them at the left frontal lobe shows restriction on DW images in favour of Acute Lacunar Infarct (ALI).

Low signal intensity is seen at the left basal ganglia (Hemosiderin Deposition), in favour of Old Hemorrhage (OH).

Triventricular hydrocephalus is noted.

White and gray matter signal, cerebral ventricles, major intracranial vascular structures, basal ganglia and brainstem are normal.

Both 7th and 8th nerve complexes, pituitary fossa, both orbits and optic nerves are normal in shape and signal intensity.

#### Obligatory Elements:

- Imaging Technique: "Imaging of Brain was performed at 1.5 Tesla scanner using Head Coil". (1 sentence)
- Findings (6 sentences), such as "There are severe multiple hypersignal intensity foci on long TR images at periventricular and paraventricular white matter in favour of Microvascular Ischemic Changes (FAZEKAS change Type III)".

#### Optional Elements (0 sentence):

#### Recursive Elements (0 sentence):

- Findings Description: The detailed observations of different findings (e.g., hypersignal intensity foci, hemosiderin deposition) could be described in detail and may involve multiple areas or aspects within the brain.

#### Report 2

Imaging of brain was performed at 1.5 Tesla scanner using Head Coil.

There is an intra-axial heterogeneous mass lesion (measured about 42×30×29 mm) at the right frontoparietal lobes.

The lesion has hemorrhagic components and peripheral central low signal component (Hemosiderin), and has mild ring-type enhancement with peripheral vasogenic edema and mass effect, causing left side midline shift about 2mm.

Both 7th and 8th nerve complexes, pituitary fossa, both orbits and optic nerves are normal in shape and signal intensity.

IMPRESSION: Vascular Malformation (Cavernous Hemangioma) with Hemorrhagic Component is probable. To rule out Hemorrhage SOL, control MRI (± contrast) after 2-4 weeks is recommended.

#### Obligatory Elements:

- Imaging Technique: "Imaging of Brain was performed at 1.5 Tesla scanner using Head Coil". (1 sentence)
- Findings (3 sentence): "There is an intra-axial heterogeneous mass lesion (measured about 42×30×29 mm) at the right frontoparietal lobes".

#### Optional Elements (2 sentence):

- Impression/Conclusion: "Vascular Malformation (Cavernous Hemangioma) with Hemorrhagic Component is probable".
- Recommendation: "To rule out Hemorrhage SOL, control MRI (± contrast) after 2-4 weeks is recommended".

#### Recursive Elements (0 sentence):

- Findings Description: Details of the mass lesion, including its dimensions, components, enhancement patterns, and associated effects (e.g., midline shift), could involve multiple descriptions.

#### Report 3

Imaging of shoulder was performed at 1.5 Tesla scanner using shoulder Coil.

There is some increased signal intensity in distal supraspinatus tendon on long TR images, suggesting Tendinosis.

Mild DJD is seen at acromioclavicular joint.

The humeral head has normal configuration and articulates properly with the normally developed glenoid. The articular surfaces are smooth and show normal cortical thickness.

The bone marrow displays homogeneous fat equivalent signal intensity.

The intact biceps tendon appears normal and occupies a normal position in the bicipital groove.

The other muscles that cover the shoulder joint appear normal.

#### Obligatory Elements:

- Imaging Technique: "Imaging of shoulder was performed at 1.5 Tesla scanner using shoulder Coil." (1 sentence)
- Findings (7 sentence): "There is some increased signal intensity in distal supraspinatus tendon on long TR images, suggesting Tendinosis."

#### Optional Elements (0 sentence):

- Additional Details: No explicitly mentioned, but additional notes on specific structures or comparisons could be included.

#### Recursive Elements (0 sentence):

Based on the findings, obligatory elements include the imaging technique, key findings, and observations of

normal structures. Optional elements include impressions or recommendations based on findings. Recursive elements were absent in all of the medical reports. Each report contained a standard set of obligatory elements but sometimes optional elements were involved based on the findings and context. The recursive elements were not observed in the medical reports. Following are some examples of the optional elements:

- Recommendation: "Dynamic enhanced contrast MRI is recommended for characterization."
- Impression/Recommendation: "Colonoscopy for rule out of Colon Malignant Lesion is recommended."
- Impression/Conclusion: "Meningioma of right middle fossa is in differential diagnosis."

In accordance to the results, a generalized pattern for the structure of the medical reports based on the analysis of the obligatory, optional, and recursive elements was provided:

1. Imaging Technique:
  - Description: Stating the type of imaging performed, the scanner's strength, and the coil used.
2. Findings:
  - Key Observations: Detail significant findings based on the imaging, categorized by affected structures or

conditions.

- Findings Description:
  - Description: Describing specific abnormalities or observed conditions.
  - Normal Structures: Mentioning any structures that appear normal to rule out other issues.
    - Description: "The [structure] is [description of normal appearance]."
  - Additional Observations: Including any additional observations.

3. Optional Elements:

- Impression/Conclusion: Providing a summary of the findings, potential diagnosis, or differential diagnosis.
- Recommendation: Suggest further diagnostic tests, follow-up imaging, or clinical evaluations.

4. Recursive elements were absent in the data.

By using this pattern, medical students can consistently structure medical imaging reports to ensure clarity and completeness, covering all essential aspects while allowing detailed descriptions where needed. Yes, it is possible to quantify the obligatory, optional, and recursive elements in the medical reports by systematically analyzing each report to count the occurrences of these elements (Table 1).

**Table 1.** Quantitative Results Summary

Element Type		Total Count (for 300 Reports)	Percentage of Total Elements
Obligatory Elements	Imaging Technique	300	11.8%
	Findings	1504	59.1%
	Normal Structures	597	23.4%
Optional Elements	Impressions/ Conclusion	127	4.8%
	Recommendations	23	.9%
Recursive Elements		0	0
Total		2551	100%

As it is indicated in Table 1, obligatory elements dominated the structure of medical diagnostic imaging reports (94.3%), with "Findings" being the most frequent element (59.1%), reflecting its central role in conveying diagnostic information. Normal structures are a significant but less frequent component (23.4%), indicating that while normal findings are essential, they are not as prevalent as pathological findings. Optional elements (5.7%) like impressions and recommendations are less common but provide additional context and guidance. Recursive elements were absent in the corpus.

The other phase of the study was exploring tenor, field, and mode based on the framework under the study. To analyze the medical reports in terms of field, tenor, and mode using Hasan’s GSP theory, there was a need to understand how these contextual configurations contribute to the unity of texture in medical diagnostic reports. Field refers to the subject matter and activities involved in the text. In medical diagnostic imaging reports, the field encompasses:

- Type of Imaging: Brain MRI, shoulder MRI, knee MRI, MRCP, cervical spine MRI, etc.
- Findings and Diagnoses: Observations of abnormalities

or normal conditions in various body parts, such as lesions, cysts, effusions, or normal structures.

- Procedures and Recommendations: Any follow-up procedures, additional imaging, or diagnostic suggestions.

The field includes the type of imaging performed and the detailed findings observed in various body parts. It encompasses both pathological and normal observations. Tenor refers to the participants and their roles in the communication process. In medical diagnostic imaging reports as detailed analysis showed, Author who is typically a radiologist or medical imaging specialist who writes the report. Audience (e.g., neurologists, orthopedic surgeons, gastroenterologists) who refers to the primary audience, which includes referring physicians, surgeons, and sometimes patients. Role Relationship: The radiologist provides expert interpretation and recommendations, while the referring physician uses these findings to guide further diagnosis or treatment.

Mode refers to the form and structure of the text, including the language used and how information is organized. In medical diagnostic imaging reports, text structure consists of sections like imaging technique, findings, normal structures, and sometimes impressions

or recommendations. Language style, is typically formal, precise, and technical. It uses medical terminology and standard phrases to describe findings, measurements, and recommendations. Presentation that often organized in a structured format with headings, bullet points, and systematic descriptions to facilitate clarity and consistency.

By analyzing these contextual configurations, we can understand how the unity of texture is achieved in medical diagnostic imaging reports, ensuring that they are effective in communicating complex medical information clearly and systematically. As the data analysis revealed, the generic structures in English medical diagnostic imaging reports in Iran follow a systematic pattern that starts with the imaging technique, followed by detailed findings (both abnormal and normal), and concludes with optional elements such as impressions and recommendations. This structure ensures that the reports are comprehensive, clear, and useful for guiding clinical decisions. By adhering to these structures, medical professionals in Iran can ensure that their diagnostic imaging reports are well-organized and effectively communicate the necessary information for patient care.

## 5. Discussion

This study examined the GSP of 300 medical imaging reports, identifying a well-defined structure dominated by obligatory elements, with the "Findings" section as the central component. This section provides detailed descriptions of both normal and abnormal structures, playing a crucial role in effectively communicating diagnostic information. The inclusion of normal structures (23.4%) reinforces a comprehensive diagnostic approach by facilitating the distinction between pathological and normal findings. While optional elements such as "Impressions" and "Recommendations" offer valuable clinical insights, their lower frequency highlights their supportive function rather than their primary function. Additionally, the absence of recursive elements across the reports indicates a streamlined and direct reporting style, emphasizing clarity and conciseness. Quantitative analysis revealed a consistent structure dominated by obligatory elements, with the "Findings" section accounting for 59.1% of all elements. This emphasis underscores the critical role of detailed observations and diagnostic information in clinical decision-making. The thorough documentation of both abnormalities and normal structures within the "Findings" section provides a comprehensive overview, crucial for accurate diagnosis and subsequent patient management. The comprehensive nature of the "Findings" section is particularly noteworthy, as it meticulously documents both abnormalities and normal structures. This dual focus is essential for ensuring a balanced and accurate diagnosis, enabling clinicians to distinguish pathological findings from normal anatomical variations. By systematically describing normal structures, radiologists

enhance diagnostic clarity and minimize the risk of misinterpretation, ensuring that subtle abnormalities are not overlooked.

The frequent documentation of normal structures serves a dual purpose: it contextualizes abnormal findings and provides reassurance regarding the absence of pathology in specific areas. This practice is crucial for differentiating between pathological and non-pathological observations, ensuring that no significant abnormalities are overlooked. By systematically noting normal findings, the radiologist creates a more complete diagnostic picture, facilitating the ruling out of differential diagnoses and providing clear, actionable information.

Optional elements, such as impressions and recommendations (Colonoscopy for rule out of Colon Malignant Lesion is recommended), while less frequent (5.7%), are integral to the report's clinical utility. These elements add value by summarizing key observations, suggesting potential diagnoses, and recommending further actions or follow-up studies. Although not universally included, their presence provides important clinical insights that can guide the referring physician's subsequent management of the patient.

The absence of recursive elements in the reports reflects a reporting style that prioritizes clarity, directness, and efficiency. Recursive elements, which might involve reiterating or elaborating on specific points, are typically unnecessary in these reports, as the primary objective is to present the diagnostic information in a straightforward and unambiguous manner. This approach aligns with the critical need for precision and clarity in medical communication, minimizing the risk of misinterpretation or information overload.

The exploration of field, tenor, and mode within the context of medical diagnostic imaging reports, based on Hasan's GSP theory, reveals the intricate interplay of these elements in creating a unified and coherent text. The field, encompassing the type of imaging, detailed findings, and procedural recommendations, defines the subject matter and ensures that all relevant clinical details are captured. The tenor, reflecting the roles of the radiologist as the expert author and the referring physicians as the primary audience, establishes the communicative purpose of the report—to provide expert analysis to guide further medical decisions. The mode, characterized by the structured organization and formal, precise language, ensures that the reports are clear, consistent, and accessible to the intended audience. This systematic approach to report writing, which begins with the imaging technique and progresses through findings to optional conclusions and recommendations, ensures that the reports are both comprehensive and practical for clinical use.

The analysis of field, tenor, and mode within the reports underscores the careful consideration given to the

context of communication in medical diagnostics. The field focuses on the specific subject matter, ensuring that all relevant clinical details are covered. The tenor, which delineates the roles of the radiologist and the referring physician, is essential in establishing the report's authority and purpose. The mode, characterized by its formal and structured presentation, is justified by the need for clarity, consistency, and accessibility in conveying complex medical information. This structured approach not only supports accurate diagnosis but also facilitates effective communication among healthcare professionals.

This study's findings, when compared to existing literature, reveal both alignments with and deviations from genre analysis trends observed across different fields of academic and professional communication. Valipour et al.<sup>25</sup> emphasized the importance of obligatory elements such as "Previous Study" and "Purpose of Study." While this study also emphasizes the significance of obligatory elements, it highlights a narrower focus, with the "Findings" section emerging as the predominant obligatory element. This difference underscores the highly specialized nature of medical diagnostic imaging reports, where detailed observations and diagnostic clarity are paramount, compared to the more exploratory and varied content found in academic research article introductions.

Chan et al.<sup>26</sup> analyzed pharmaceutical brochures in Malaysia, focusing on their role as persuasive texts organized around a consistent set of moves characteristic of the sales promotional genre. Unlike the medical imaging reports, which prioritize factual accuracy and diagnostic precision, Chan et al.'s findings highlight the importance of persuasion and consumer engagement. This study's emphasis on clarity and direct communication, devoid of recursive elements, contrasts with the more nuanced and strategic organization found in promotional genres. This comparison illustrates the influence of the communicative purpose on genre structure: medical reports aim to convey diagnostic information efficiently, while pharmaceutical brochures are designed to influence and persuade potential customers.

Cocchetta<sup>27</sup> examined the genre structure of Video Abstracts (VAs) in the medical field, noting that VAs often mimic the basic structure of Research Articles (RAs) but incorporate diverse subgenres to appeal to a broader audience. While this study focused on the linear and straightforward reporting style of medical imaging reports, Cocchetta's findings emphasize the multimodal and varied nature of VAs, which blend visual and auditory elements to enhance accessibility and engagement. This comparison highlights the rigid structure of medical reports, which is necessary for clinical precision, against the more flexible and creative structures found in multimodal genres like VAs.

Mijomanović et al.<sup>28</sup> investigated the communicative

purposes and move structure of Case Reports in Dental Medicine (CRDMs) and Medical Case Reports (MCRs), sharing some similarities with this study. Both studies focus on highly specialized medical genres and emphasize the importance of structured, systematic reporting. However, while Mijomanović et al. explored the move structure to compare different types of case reports, this study zeroes in on the GSP framework to analyze the obligatory, optional, and recursive elements within a single genre. The absence of recursive elements in this study contrasts with the potential for more narrative or iterative structures in case reports, where storytelling and contextual background may play a larger role.

Gong and Barlow<sup>29</sup> identified Macrostructure Patterns (MSPs) across a large corpus of RAs from various disciplines, noting the prevalence of the Introduction, Methods, Results, Discussion (I\_M\_R\_D) pattern in medical journals. This study's findings align with this structured approach, particularly in the consistent organization of the medical imaging reports, which start with the imaging technique and progress through findings to optional conclusions and recommendations. However, this study is more narrowly focused on the GSP within a single genre, whereas Gong and Barlow examined a broad range of disciplines, illustrating the broader applicability of structured reporting across academic fields.

Stosic<sup>30</sup> analyzed the linguistic construction of trial justification and scientific validity in RCT reports within clinical psychology, emphasizing the balance between objectivity and persuasion. The findings of this study, with an emphasis on clarity and the absence of recursive elements, reflect a similar need for objectivity, particularly in the medical field where diagnostic accuracy is critical. However, the focus on purely factual reporting in this study contrasts with Stosic's findings, where persuasive elements, albeit implicit, are present. This difference underscores the varying demands of different medical genres: while RCT reports may require justification and persuasion to establish scientific validity, diagnostic imaging reports prioritize unambiguous communication of findings.

Yu<sup>31</sup> explored the move structure of discussion sections in medical research articles, finding differences in rhetorical structures used by different groups of writers. While Yu's study highlights the variation in adherence to conventional rhetorical moves, this study found a high level of consistency in the GSP of medical imaging reports. This consistency reflects the standardized nature of diagnostic communication in medical settings, where deviation from established structures could potentially lead to misinterpretation or errors in patient care. Yu's findings, focusing on cross-cultural and linguistic variations, contrast with the uniformity observed in this study, which deals with a genre that is less subject to variation due to its technical and clinical focus.

### 5.1. Limitations

This study faced a few limitations. The findings may not be generalizable beyond the specific corpus of Iranian reports. The analysis focused solely on text, neglecting the impact of accompanying images. The influence of other linguistic and sociocultural factors was not fully explored. Future research should expand the corpus to other contexts, include a multimodal analysis, and investigate the influence of various factors on the structure and content of reports. Additionally, the study did not fully explore the influence of linguistic diversity and sociocultural factors that may shape the structure and language of medical reports. Variations in professional jargon, medical education, or cultural norms could lead to differences in how radiologists frame their findings and communicate diagnostic information. Finally, this research primarily focused on generic structures without considering the evolution of reporting practices over time, especially in light of technological advancements in imaging and digital record-keeping, which might alter the structure of reports.

### 6. Conclusion

The findings of the present study align with broader trends in genre analysis, particularly in the emphasis on obligatory elements and structured reporting. However, the study also highlights the unique characteristics of medical diagnostic imaging reports, such as the absence of recursive elements and the prioritization of factual clarity. When compared to other genres, such as academic research articles, pharmaceutical brochures, and video abstracts, the rigid and precise structure of medical reports stands out as a reflection of their critical role in clinical decision-making. This study underscores the importance of understanding genre-specific requirements and the contextual factors that shape the structure and language of specialized texts across various fields.

These findings have significant pedagogical implications. Educators should prioritize teaching accurate observation and description of both normal and abnormal structures in medical images. The structured format provides a valuable model for teaching report writing, emphasizing clarity and directness. Instructors should guide students to produce concise and contextually appropriate reports. Future studies could compare the structural organization of medical imaging reports across different languages and healthcare systems to identify cross-linguistic and cross-cultural variations in reporting conventions. Besides, it is recommended to explore how different structural and linguistic features of reports influence comprehension among healthcare professionals, including radiologists, physicians, and medical students.

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### Research Highlights

#### What Is Already Known?

- Recent advancements in medical technology, have significantly influenced social life through the advancement of scientific research.
- In medical communication, diagnostic imaging reports play a vital role as a primary medium of interaction between radiologists and referring clinicians.
- These reports, especially when written in English, not only document medical findings but also significantly impact clinical decision-making.

#### What Does This Study Add?

- The obligatory elements dominated medical diagnostic imaging reports (94.3%), with "Findings" being the most frequent (59.1%), underscoring their central diagnostic role.
- Normal structures appeared less frequent (23.4%), highlighting the emphasis on pathological findings over normal observations.
- Structured approach enhances the utility of diagnostic medical reports in supporting accurate diagnosis and patient care within the Iranian healthcare context.
- The findings suggest that this structured approach enhances the utility of diagnostic medical reports in supporting accurate diagnosis and patient care within the Iranian healthcare context.
- These findings have significant implications for researchers, emphasizing the crucial role of understanding and embracing the generic structure of medical reports as a fundamental aspect of scholarly writing within their respective domains.

### Author Contributions

MA contributed in conceptualization, data analysis, writing the original draft. NA contributed in methodology and Supervision. MZ contributed in investigation and data collection, review and editing.

### Conflict of Interest Disclosures

All authors declared that they have no conflict of interest.

### Ethical Approval

The current study was approved by the Tabriz University of Medical Sciences Ethics Committee with the code of IR.IAU.TABRIZ.REC.1402.219.

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