Causal discourse structures in medical referral materials: a humanistic insight

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Abstract

Humanistic studies on medical causality from language studies have hardly explored how causality is constructed in medical referral materials, which is the research gap this study intends to fill. For data, forty completed National Health Insurance Authority (NHIA) medical referral forms, comprising 842 words and medical signs, were purposively selected from a healthcare provider in Abeokuta, Ogun State, Nigeria, and subjected to discourse analysis with insights from the causal coherence categories of Mann/Thompson's (1987) *Rhetorical Structure Theory*.

The paper identified two causal relations/structures – NONVOLITIONAL CAUSE and NONVOLITIONAL RESULT – in the data. Each structure reveals the primacy of diagnosis among the medical processes of diagnosing, investigating and treating or referring. The diagnosis proposition is primed as the consequence of pathophysiological causation in a diagnostic schema; while in the medical referral process, it is elevated as the causation for a medical referral, for instance for further specialist review and management, in a medical-referral schema. The construal of the semantic parameter of non-volition in the coherence relations is aided by the reality that illness is not intended, except caused by self-harm or suicide. The relations were signalled by four signal types, which are genre, semantic, syntactic, and semiotic; and six specific signals – mapping, lexical overlap, lexical chain, adverbials, semiotic overlap, and lexical-semiotic chain. These are implicit signals that complement the concise presentation of the medical processes. To conclude, this research provides the causal modeling of some medical processes, which highlights the prominence of diagnosis in medical referrals.

1   Introduction

This paper is an attempt to explore medical practice through humanistic methods, by examining the causal structures of certain medical processes in medical referral materials, in order to explain their discourse features, communicative goals, and signaling devices. This will afford relevant knowledge about physical actions in healthcare consultations and how medical practitioners organise these encounters in hospital materials. Perspectives in humanities offer unique interpretations and understanding of human social constructions in order to uncover meaning complexes in different social and cultural endeavours, and in the process deepen the impact of

the sciences in these social spheres. Such perspectives, particularly from language and discourse, to medical practice unbundle medical nuances that are frozen in health communication, whose therapeutic and medicinal potentials are untapped. In light of this, applying humanistic methods to medicine from the perspective of language bridges the communicative gap that obscures effective information exchange with the potential to impact patients' health outcomes. An aspect of this body of hybrid knowledge mirrors how medical communication articulates causal coherence and in effect enunciates information salience in the representation of medical processes during doctor-patient encounters.

Causality is a multidisciplinary phenomenon that has a status in language, as it does in medicine. It denotes an asymmetric relational situation between two events, whereby one (the cause) leads to the occurrence of the other (which is the effect) (cf. Bunge 2009: xxvi). It is further held that an effect can be a cause for another effect. Causality is expressed in diverse ways in language. In semantics; for instance, it is expressed in one or more different formal mechanisms, which Dixon (2000: 62) categorised into nine parameters: the parameters of state/action and transitivity relate to verbs; those that are concerned with control, volition and affectedness relate to the thing being caused; while the parameters of directness, intention, naturalness, and involvement relate to the causing agent.

Causality is conceived as one of the cornerstones of modern medicine (cf. Rizzi/Pedersen 1992: 233), and it stems from causal relations between lifestyle choices and diseases, diseases and symptoms, diagnosis and treatment/referral, among others. Medicine pursues the causes of illnesses in order to provide cure and save life. In this sense, medical causality has been categorised into two: general and singular. General causality in medicine is the same as disease aetiology, which caters to the common causes of diseases in medical research. Such causes have been classified into genetic and environmental causes or a combination of both. As validated by a medical expert, Dr. Oludayo Oduwole (oral communication 2023), and Mohan (2010: 27f.), the genetically caused diseases are inherited from parents, and grouped into four: morphogenetic disorder, chromosomal disorder, multifactorial disorder, and single gene diseases with non-classic patterns of inheritance. Under environmental/acquired causes there are hypoxia and ischemia, physical agents, chemical agents and drugs, nutritional deficiencies and excesses, microbial agents, immunological factors, psychogenic factors, Iatrogenic factors and idiopathic diseases.

On the other hand, singular causality references the causes of diseases in specific doctor-patient interactions. During this contact, some medical processes are undertaken: one is the diagnostic process that involves information gathering and clinical reasoning with the aim of determining the health condition of a patient (cf. National Academies of Sciences, Engineering, and Medicine 2015). The next one is the diagnostic investigation to confirm or refute the diagnosis, or the direct commencement of treatment. In place of the latter, another likely medical process is the referral to a higher-level caregiver from a primary provider, for instance, to a secondary facility. In the course of diagnosing a patient, doctors examine them while taking their clinical history in order to trace events that may have triggered given ailments. Besides following causal patterns, physicians can match these pathological conditions with related diseases, by correlation, to identify a possible nexus before coming up with a diagnosis. However, this paper is only concerned with how diagnostic and treatment/referral decisions are expressed in language

through causal relations, paying attention to the typology, the disseminated communicative goals, and the signaling devices in use.

1.1   Applying humanistic methods to medicine through discourse analysis

The practice of medicine is supposed to be an art, while its study is based on science. It is more precisely an imprecise science that frequently relies on trial-and-error methods for excluding factors in order to circle in on a medical condition. Science is needed to investigate diseases, but it takes consummate art to achieve a cure (cf. Rogers 2015). Physicians tend to the sick, which means they have to comfort and care for patients, listen to them, empathise with them, and understand them as individuals – their interests, welfare and concerns. These humanistic qualities are attributed by Goldman/Dennis (2004, as cited in Panda 2006: 129) as the corner-stone, without which medical practice will be regarded as ineffective, irrelevant or even perni-cious. As expatiated by Odebunmi (2022), what this means is being contextually sensitive by integrating the ethics of medical practice to what is (locally) contextually appropriate. This is why Hedge (1999) believes that physicians have succeeded in their practice of medicine be-cause of their sensitivity and beneficence towards their patients.

These human characteristics in clinical encounters are explored in humanistic studies to provide a unique interpretation and understanding of the embedded social constructions and deepen their scientific impact. As the study of language use in different contexts, discourse analysis is applied as an interdisciplinary approach to the analysis of communication in medical encoun-ters. It describes how social actors like doctors and patients construct shared aspects of the world through text and talk. This is exemplified in the abundant literature on medical discourse and doctor-patient interaction, which adopted different discourse analytical approaches, like narrative and conversational analysis (cf. Sharf 2003; Wodak 1997; Adegbite/Odebunmi 2006; Heritage/Maynard 2006; Odebunmi 2022).

Discourse is a derivative of the Latin word *discursus*, which implies speech or conversation. The emphasis is on the spoken form, but it has evolved to also include the written form. So, discourse has come to be linked to speech or text, or even both. Emphasising speech, Crystal (1992: 25) defines discourse as "a continuous stretch of (especially spoken) language larger than the sentence, often constituting a coherent unit such as a sermon, argument, joke or narra-tive". With particular reference to text, van Dijk (1977: 3) describes discourse to be "a text in context", and he has frequently referred to it as "text and talk". In that light, discourse comprises both the spoken and written form. Generally, discourse is "language in use" above the gram-matical level of a sentence (cf. Brown/Yule 1983: 1).

Hence, the study of language in texts and conversation, language in use or language above the sentence level is the focus of discourse analysis (cf. Yule 2010: 142; Gee/Hanford 2012). Thus, discourse analysis (DA) studies larger linguistic units, like conversational exchanges and texts (cf. Stubbs 1983). There have been attempts to separate the spoken and written forms in DA: while studies on the spoken forms have moved towards conversational analysis, those on the written forms have been tagged text linguistics. As an intersection of disciplines, DA describes the interactions between many academic fields, such as sociolinguistics, computational linguis-tics, and psycholinguistics (cf. Yule 1983). It is employed in numerous fields, including history,

medicine, anthropology, sociology, political science, and education, due to its applicability to a wide range of social and cultural challenges (cf. Gee/Hanford 2012).

The contribution of DA to knowledge has been vast, enhancing medical practice. For instance, the discourse tact of medical encounters has been indicated to be predominantly doctor-initiated to elicit information about the patient's health state and give directives for the patient's health management (cf. Adegbite/Odebunmi 2006). In spite of the nature of this interaction, doctors do not unilaterally impose diagnoses or therapies on patients as they co-construct meanings in medical encounters (cf. Maynard/Frankel 2002. Instead, this is negotiated as the physician provides grounds for a given diagnosis. The negotiation organises the acts, turns and sequences of the doctor-patient encounter, which is conducted in three phases: clinical history-taking phase, medical examination phase and problem-discussion phase (cf. Burke 1980; Drass 1982). Some of the negotiation strategies are identified by Hernandez-Lopez (2011) as giving options, expanding explanations, showing empathy and depicting explicit or implicit (dis)agreement on the side of the doctor; and showing (dis)agreement and initiating self-diagnosis on the part of the patient.

Other discourse analytical insights in physician-patient interaction have been derived through studies that explored speech acts in the locutions. Using speech acts, some studies have observed medical communication trends and assessed the efficacy of doctors' interventions (cf. Wallace et al. 2013), which have been pedagogically deployed for foreign language learning (cf. Martínez-Flor 2005; Liu/Zhang/Zhu 2015). The dominant speech acts in these encounters are representatives and directives, which are respectively engaged to explain health problems, and give patients directions to receive medical treatment (cf. Sejati et. al. 2021). As expatiated in a related study, the representatives are marked in the medical utterance moves by the acts of elicitation, confirmation, comment, information, enquiry and conclusion; while the perlocution of the interaction shows that it is beneficial to both the doctor and the patient, who make a joint effort to find a solution to a medical problem (cf. Adegbite/Odebunmi 2006).

DA has further contributed to the field of medicine through narrative analysis, which has deepened knowledge in narrative medicine and established the significance of narratives in health communication. Narrative medicine considers how patients' and their caregivers' experiences with illness and recovery are fundamentally shaped by their stories. It requires narrative skills, as it embodies a physician's capacity to listen, understand, and accurately describe in medical terms the patient's story (cf. Avrahami/Reis 2009). Charon (2006) identifies five narrative features in narrative medicine: temporality, singularity, causality/contingency, intersubjectivity and ethicality. Temporality in narrative medicine incorporates time, chronology and temporal order in illness narrative; the singularity indexes the specificity of narratives of given patients' encounters; causality/contiguity of medical narratives describes the storyline of the independent events and the causal relations that exist between them; the feature of intersubjectivity in the narrative represents.

Wilce (2009) adds that insights from medical discourse analysis have been introduced to medical practice, citing training and certification of new doctors as an example, which has seen physician groups, like the Royal College of General Practitioners, collaborating with language and communication scholar – Srikant Sarangi – in an interdisciplinary project with a biomedical

researcher, Celia Roberts. The project's goal was to improve doctor-patient communication. DA has further highlighted the public health implications of misinformation about a pandemic, as demonstrated with the case of COVID-19 (cf. Chinaguh/Adeosun/Adejumobi 2022).

Meanwhile, the current approach to medical discourse analysis examines how information is managed in clinical consultative materials, focusing on causal coherence. This is considered within the context of a discipline where conciseness is seen as an expedient principle for good time management, especially in developing countries where there is a low doctor-to-patient ratio. As physicians juggle with medical consultative processes – such as clinical history taking, diagnosis, prognosis, treatment, and, where necessary, referral – they consciously or unconsciously deploy discourse causality to project the information value that is embedded in the causal associations of these medical processes.

1.2 Problem statement

Medicine saves life, and causality constitutes a fundamental phenomenon in realising its essence. From the general activity of disease aetiology to the singular acts in consulting rooms to diagnose, treat and palliate illnesses, causal relations are integrated with clinical reasoning to improve human conditions. These activities, especially the consultative encounters, are discursively managed, and the causal associations are linguistically expressed through text and talk with some information value. This is manifested in the discourse structuring of the medical processes in hospital records, like case notes and medical referral forms. It is, thus, important to examine these structures, their communicative functions and signaling potentials.

Studies on medical causality have largely been from the medical and biological sciences, which have investigated etiological and therapeutic causes and (evidence-based) mechanistic causal models (cf. Glennan 2011; Mohan 2010; Kincaid 2011; Broadbent 2011). There have also been substantial research efforts by computer science scholars that produced diagnostic computational models and used pathophysiological knowledge in deploying artificial intelligence for medical diagnosis (cf. Richens/Buchard 2022). Similar scholarly attention to the phenomenon of medical causality seems traceable to only one discipline in humanities – philosophy – which establishes causal claims in medicine and explores the importance of causal reasoning for accurate diagnosis (cf. Rizzi 1994; Williamson 2019). However, a comparable focus on medical causality from linguistic studies is hard to come by; so, this has created a knowledge gap on discourse as a causal mechanism for deepening the understanding of medical processes. Therefore, this study was designed to examine the discourse structures of causality in medical diagnosis and referrals with a view to identifying the causal relations of the medical information, the communicative goal, and signaling devices.

2 Theoretical/analytical framework

This segment presents the theoretical and grammatical constructs that will guide the analysis. The adopted theoretical construct for the study is causal coherence relation (CCR), which derived from Rhetorical Structure Theory (RST); while the grammatical construct is the signaling device system for indicating the causal relations in discourse. These constructs are traced in the data, while their salience is discussed in relation to medical practice.

2.1 Causal coherence relation (Rhetorical Structure Theory, RST)

William Mann and Sandra Thompson developed RST to serve as a theory of text coherence and structure. Coherence is a semantic property of discourse that represents textual unity and is perceived in RST as the absence of non-sequiturs. The theory is used to describe texts by their structural possibilities, and to highlight salient text units. Discourse units (which are elementarily clauses) can be equal in importance to produce a paratactic structure, or one may be more salient to form a hypotactic structure. In a hypotactic construction, the more salient unit is labelled as the nucleus; while the one with supporting role is the satellite. In contrast, each unit in a paratactic structure is a nucleus. This explains why these constructions are called mononuclear and multinuclear structures, respectively.

According to RST, texts are clausally structured and enter into RST relations with each other recursively (cf. Das/Taboada 2017). The text coherence is assumed to emanate from four parameters: constraint on the nucleus span; constraint on the satellite clause; constraint on the combination of nucleus and satellite; and the effect derived from each relation. The effect field (which the effect achieved on the text receiver) disseminates the communicative goal. RST has twenty-five relations, but only five are causal coherence relations (CCR). CCRs are also regarded as "cause cluster", drawing on their tendency to point to cause, effect and purpose. The expression of cause and effect/result is distinguished by the nuclearity of the causing situation in a given structure.

CCR	Volitional category	Nonvolitional category
Cause	Volitional Cause	Nonvolitional Cause
Result	Volitional Result	NONVOLITIONAL RESULT

Table 1: Classification of CCR by volition

Cause in CCR is construed when the causing situation is the satellite; while **result** is assigned to textual spans that have the nucleus as the causing situation.

VOLITIONAL CAUSE/RESULT: reflects a chosen action or outcome by an agent, as exemplified below:

> The patient presented with persistent thoughts of self-harm and suicide. (She is diagnosed with) Major depressive disorder. (She is being referred) for specialist review and management.
>
> (Culled from the data)

The first and second units construe a VOLITIONAL CAUSE relation, which identifies the first unit as the satellite and causing situation for the doctor's diagnosis in the second unit (the nucleus). The text span is interpreted as volitional since suicide is considered to be a volitional act. Although the mental health condition of the patient could have contributed to her vulnerability to suicidal thoughts, the act is ultimately a result of her choice. On the other hand, the second and third units jointly represent a VOLITIONAL RESULT relation, where the causing situation is the diagnosis "Major depressive disorder", which stands as the nucleus leading to a referral for specialist care in the third unit (the satellite).

NONVOLITIONAL CAUSE/RESULT: shows consequentiality or a deductive process, as illustrated with the following text from the data:

Above named patient presented with a year history of difficulty with seeing the board in class. (He is therefore diagnosed with) refractive error. (He is being referred for) Visual assessment and corrective lens.

(Culled from the data)

The first two discourse units in this text combine to construe a **NONVOLITIONAL CAUSE** relation, with two hypotactic information units indexing consequentiality. The first unit is the satellite which highlights a symptom, while the second unit is the diagnosis in a nucleus span. The former is a clinical case that causes the latter, which contains the diagnostic information of "refractive error". Additionally, it is nonvolitional given that a diagnosis is prompted by symptoms, which no person would wish on themselves except for suicide case.

The second and third discourse units combine to construe **NONVOLITIONAL RESULT,** where the causing situation is the diagnosis necessitating a referral by the general practitioner (GP) to an eye and vision care specialist (precisely, an ophthalmologist). The GP identifies the diagnosis as one that requires expert assessment and care, in compliance with the operational guidelines of the National Health Insurance Authority (NHIA), that details referable diagnoses for higher care management – from primary to secondary healthcare provider, in this case. The text in parenthesis is **ellipted** from the actual data in the referral form but included here for emphasis.

Notably, all Cause and Result relations are factive, as they are concerned about real events, while Purpose relation is definitionally neutral and it is concerned with a hypothetical, future or unrealised situation.

2.2 The signalling/cohesive devices

These are discourse cues that link textual units and signal the construal of relations. Some relations are signalled and some are unsignalled, which leads to such representation as explicit or marked relations, and implicit or unmarked relations (Das/Taboada 2017). Taxonomy of signals, as used in this study, is adapted from Das/Taboada (2017) and adapted to suit the specific context of presenting medical referral information.
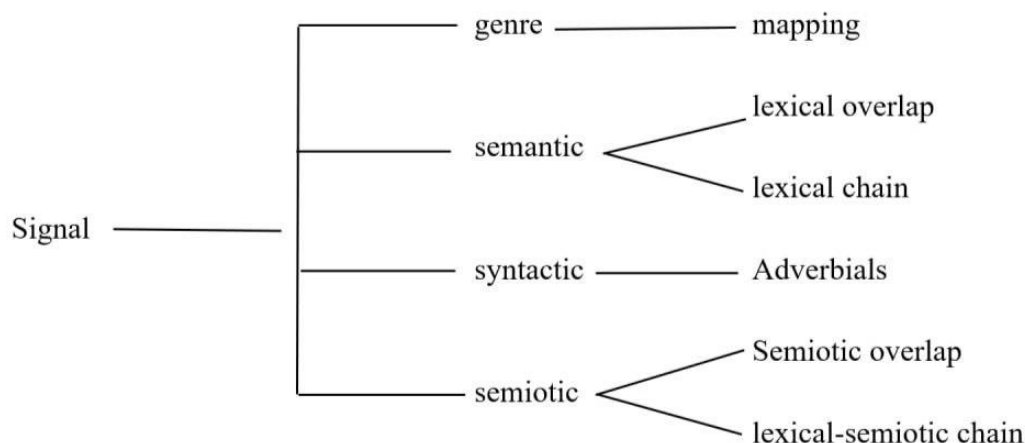

Figure 1: Taxonomy of Causal Signals (prepared based on this study)

The Taxonomy of Causal Signals is hierarchically organised into two levels: the signal types and specific signals. The signal types are at the top level of taxonomy, while the specific signals

are the second level of the hierarchy: in other words, each specific signal category is an offshoot of each signal type. In Figure 1, the top level constitutes the signal types, which are genre, semantic, syntactic and semiotic. At the second level, the signal type "genre" has one signal type mapping, which is conceived in this paper to align with the diagnostic practice undertaken by physicians. For instance, the clinical information "difficulty in seeing from afar" and "eye aches" are mapped to the diagnosis of refractive error.

The **semantic** signal type has two specific signals: **lexical overlap or repetition and lexical chain/synonym. Lexical chain** shows semantic relatedness, and it includes words that have similar meaning like synonyms. There is only one causal signal under the **syntactic** signal type – which is the adverbial group that can also include the prepositional phrase. In the context of this study, prepositional phrases occur as adverbials with ellipted verbs that they modify. For example, the text (The patient is referred) "for specialist assessment" shows the ellipted form in the parenthesis which has the verbal form "is referred" that is modified by the prepositional phrase "for specialist review". In that sense, it is an adverbial.

The semiotic signals are semiotic overlap and lexical-semiotic chain; and they are also generated by this study to represent semiotic preferences in some medical information. **Semiotic overlap** is the repetitive use of an abbreviation in separate textual units. For instance, the abbreviation PUD appeared in the data in both the clinical information and diagnosis sections, indicating a repetition of a medical condition – PUD stands for "peptic ulcer disease". Another semiotic signal combines the use of abbreviation with lexical items to produce causal signals. One of such signals is lexical-semiotic chain. These cohesive devices were used where they signal the construal of causal coherence relations.

These signals overlap in medical text processing. In the case genre and semantic signal types, there is an intersection between mapping and lexical overlap. For instance, similar terms can be repeated in clinical information (or CI) and diagnosis (or Dx) sections, viz: CI – *known hypertensive patient;* Dx: *hypertensive heart disease*. There is lexical overlap of *hypertensive* in both CI and Dx sections; in the same vein both sections can be causally mapped by the physician, providing ease of diagnosis. The overlap between the specific signals under both genre and semantic signal types further extend to the lexical chain when mapped terms are not necessarily the same words but synonyms. In that sense, "breaking" and "fracture" are semantically mapped in "breaking of the tooth2 (CI), and "tooth fracture" (Dx). There is also an overlap between genre and semiotic signal types, where the mapped terms are abbreviations – like GERD occurring both in CI and Dx – which precisely represents an intersection of specific signals of mapping and semiotic overlap.

The intermix of these signals further indicates their multifunctionality as demonstrated with mapping, which primarily serves the genre function but further fulfils the semiotic function. It serves the genre function by aligning genre-specific (medical) procedures, CI and Dx. In addition, the semiotic signal type serves semiotic, semantic and syntactic functions. This is demonstrated with lexical-semiotic chain which combines both semiotic and semantic devices, like the sign *c/o* (meaning, 'complained of') signaling that a diagnosis should follow after a patient's complaint. The positioning of this sign in initial position represents a syntactic function. The

classification of the **taxonomy of causal signals** in figure 1 will guide the analysis of cohesive elements in the selected medical referral forms.

3   Methodology

The study adopted a corpus-assisted qualitative approach. Forty English-medium medical referral forms filled out by nine GPs, sourced from a primary healthcare provider in Ogun State, Nigeria under the National Health Insurance Authority (NHIA), were purposively selected. The form indicates a referral from a primary to a secondary healthcare institution. The form has eleven columns to be filled out, which are hospital referred from, hospital referred to, patient's identification, clinical information, provisional diagnosis, reason for referral, past medical history, current and recent medication, clinical warnings, additional relevant information and referring doctor's name and signature (refer to Appendix I). The aspects of clinical information, provisional diagnosis and referral were extracted and manually annotated, comprising 842 words, with an average of 21 words, and with 7 and 40 as the least and highest words in the distribution. The CCR, communicative goals and relations' signals of the text units were construed and presented in schemas for discussion. For anonymity, pseudonyms, where necessary, are applied to the names of patients and the hospital for ethical reasons. Ethical approval was granted by the Federal University of Agriculture Abeokuta Ethics Committee under the auspices of the institution's Directorate of Research and International Partnership.

4   Data Analysis

The analysis is undertaken under three sub-headings: Discourse Structure of Medical Diagnosis (DSoMD), Discourse Structure of Medical Referrals (DSoMR), and Signalling of Causal Coherence Relations of Medical Processes.

4.1   Discourse structure of medical diagnosis and communicative goal

DSoMD is presented in a table form and explained with the aid of Diagnostic Schemas. The table presents the actual data in the second and third columns (the clinical information and diagnosis), while the fourth and fifth columns show their analytical presentation.

S/N	Satellite (Causation) – Clinical History	Nucleus (Caused Situation) – Diagnosis	Definition of Relation (DoR)	Communicative Goal
1.	Above named presented with 3 months breaking of tooth and associated pain. On and off.	Tooth fraction	S presents a unintended clinical situation that caused the situation in N.	For the specialist to recognise S as the cause of N.
2.	c/o recurrent retrosternal chest pain; pain radiates to throat/jaw; associated hx of cough.	? Angina pectoris in a known asthmatic px	S presents a sequence of clinical situations that that by means other than being motivated caused the situation in N.	For the specialist to recognise S as the cause of N.

Table 2: Discourse Structure of Medical Diagnosis (DSoMD)

The table presents the positioning of relational information about the medical processes that are undertaken during medical consultation and documented in NHIA referral forms. The infor-

mation elements contained in Table 2 represent **NONVOLITIONAL CAUSE** relation, which has the nucleus (N) as the caused situation and satellite (S) as the causing situation. It is non-volitional because no information is presented in S to show the patient wished N to happen like in a suicide case; the relation, thus, shows consequentiality. In S/N. 1, the clinical history is "Above named presented with 3 months breaking of tooth and associated pain"; which is also the satellite and the causing situation of the relation. In the definition of relation (DoR), this S presents a clinical situation that caused the situation in N to occur. N is the diagnosis, which is "tooth fraction". The communicative goal is for the specialist to recognise S as the definitive cause of N.

Similarly, S/N. 2 can be construed as NONVOLITIONAL CAUSE, given that the clinical history does not indicate the illness as self-harm. S is also the causation, which has a sequence of causing situations: "c/o recurrent retrosternal chest pain; pain radiates to throat/jaw; associated hx of cough" – c/o stands for "complains of", hx means "history". N is the caused situation by consequence, and the diagnosis: "? Angina pectoris in a known asthmatic px" – "?" stands for "query", and px for "patient". The DoR in Table 2 shows S as presenting a sequence of clinical situations that *would have* caused N by consequence. The insertion of the modal *would have* is occasioned by the probabilistic diagnosis – which is not confirmed yet, queried or suspected. The causation is also a sequence of causes; to affirm that the ailment has more than a single cause. The communicative goal derived from the effect field (which indicates the effect achieved on the text receiver) is for the specialist doctor to recognise S as the cause of a suspected ailment in N.

4.1.1 Diagnostic schemas

The DoR of each item in Table 2 is presented in a schema, called the **diagnostic schema**. The diagnostic schema is expected to illustrate the DSoMD that is presented in Table 2. Two types of diagnostic schema can be obtained: single-factor causation schema and multiple-factor causation schema.
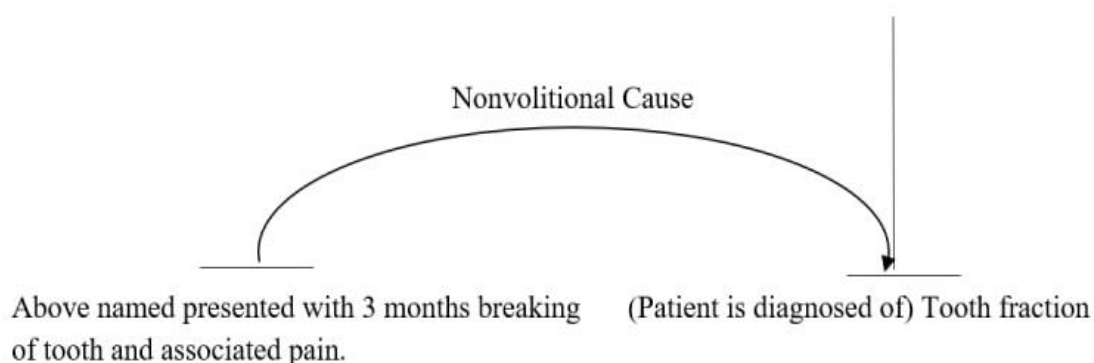

Nonvolitional Cause

Above named presented with 3 months breaking of tooth and associated pain.

(Patient is diagnosed of) Tooth fraction

Figure 2: Single-Factor Causation Schema

Figure 2 is an example of a single-factor causation schema, which presents one event, 3 months (history of) breaking of tooth and associated pain, as the causing situation for the diagnosis of tooth fraction. The schema is represented by a curve that sits on two lines. The curve bears the relation, nonvolitional cause, and it glides from the line on the left, which is the satellite, to the one on the right, which is the nucleus, connecting with an arrowhead to mark the importance of the line and salience of the information underneath – (patient is diagnosed of) tooth fraction. The horizontal line on the nucleus further marks it out as prominent.
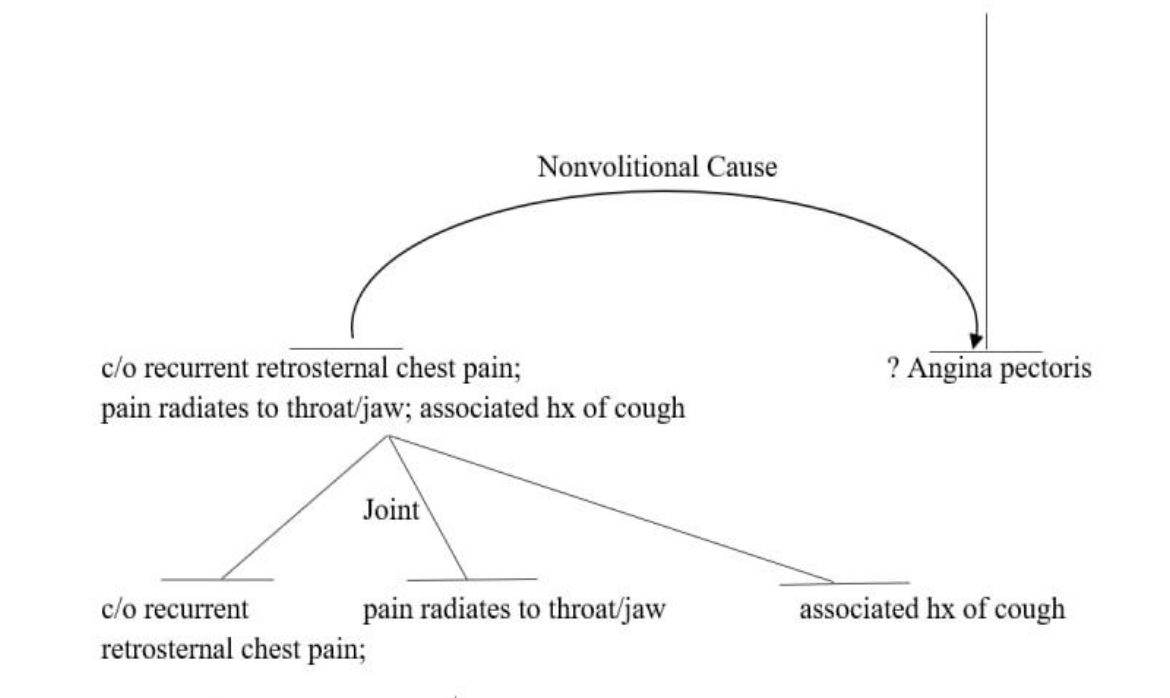

Figure 3: Multi-factor causation schema

Figure 3 is a multi-factor causation schema, which comprises many causes as combining to trigger the potential diagnosis *? Angina pectoris*. The schema has the macro structure at the upper level with NONVOLITIONAL CAUSEas coherence relation, with S containing the multi-factor causation and N bearing the diagnosis. Notably, the diagnosis is primed as more salient, being the nucleus, and this marks its significance in medical consultation. The micro structure at the base is a **joint** relation that is added to all the clinical causes as a sequence of symptoms that triggers the illness. "Joint" is a multinuclear or paratactic structure, so each of the lines at its base is a nucleus. These schemas, like in many RST analyses, illustrate through tree diagrams the connectedness of relational spans in texts, as minimal units or constituents of each macro-structure; the adjacency of contiguous text spans; and the uniqueness of each schema application. One unique feature of DSoMD's schema is the inclusion of a multinuclear schema, "joint", indicating that many causal factors are responsible for the diagnosis.

4.2 Discourse structure of medical referral and communicative goal

DSoMR is presented in Table 3 and explained with the aid of Medical Referral Schemas.

S/N.	Nucleus (Causation) – Diagnosis	Satellite (Caused Situation) – Referral	Definition of Relation	Communicative Goal
3.	Acute abdomen (abdominal colic r/o intestinal obstruction	For specialist review/management	N presents a situation (diagnosis) that necessitated S (a referral)	For the specialist to recognise N as the cause of the situation in S.
4.	Pyelonephritis r/o PID	For abdominopelvic USS	N presents a situation (diagnosis) that necessitated S (a referral)	For the specialist to recognise N as the cause of the situation in S.

Table 3: Discourse structure of medical referral

Table 3 highlights the DSoMR, which constitutes the necessary information in the medical processes of diagnosis and referral. A referral is undertaken from a primary to a secondary, or from a secondary to a tertiary provider, in a vertical pattern. Sometimes, it can be done horizontally, from one secondary facility to another. In the health insurance practised in Nigeria, such referral is guided by the policy of the Scheme that profiles all medical procedures within each healthcare level. So, a primary healthcare is not expected to have medical consultants to render specialised medical care; rather where the general practitioner (GP) confirms or suspects a patient to have a health condition that should be given higher care, a referral process is initiated, accordingly. Two such instances are presented in Table 3.

Item 3 is construed as NONVOLITIONAL RESULT, which places the causing situation in N and the caused situation in S. The diagnosis of "acute abdomen" (abdominal colic r/o intestinal obstruction) is identified, and it shows the GP has examined the patient to present with the ailment. The abbreviation *r/o* means *to be explored*, which indicates that the GP has provided an extra piece of information based on prior medical examination. This is N, as it is central to the entire process in DSoMR. It then becomes the causation for the referral – "for specialist review/management". The relation is nonvolitional since it is occasioned by the diagnosed illness, as guided by the NHIA referral policy. The communicative goal is for the patient to recognise N as the cause of the situation in S.

Item 4 is another instance of NONVOLITIONAL RESULT with "Pyelonephritis r/o PID" as the diagnosis and causation. As in Item 3, the diagnosis affirms that the medical case is referable. The main business in the doctor-patient meeting is examining the patient and confirming the health condition before deciding on requisite treatment or referral judgment, so the diagnostic process is N – which is the causation for the situation in S – and the referral is "for abdominopelvic USS r/o PID", where PID stand for "pelvic inflammatory disease". In this case, the referral is not for a specialist review but a further diagnostic laboratory investigation – this type

of investigation falls under secondary care level. It is important to note the role reversal of diagnosis from the caused situation in NONVOLITIONAL CAUSEto the causing situation in NON-VOLITIONAL RESULT. The DoR states that N presents a situation that caused the situation in S. Therefore, the communicated goal is for the specialist to recognise the diagnosis presented in N, being above a primary care level, as the reason for the referral done in S.

4.2.1 Medical referral schemas

Medical referral schemas are mostly a single-causation type, given that a single diagnosis would usually be stated for a medical condition. There may be occasions where the physician may rule out (r/o) a few supporting health conditions, but they are only embedded, structurally, to the main diagnosis and not presented as stand-alone diagnoses.
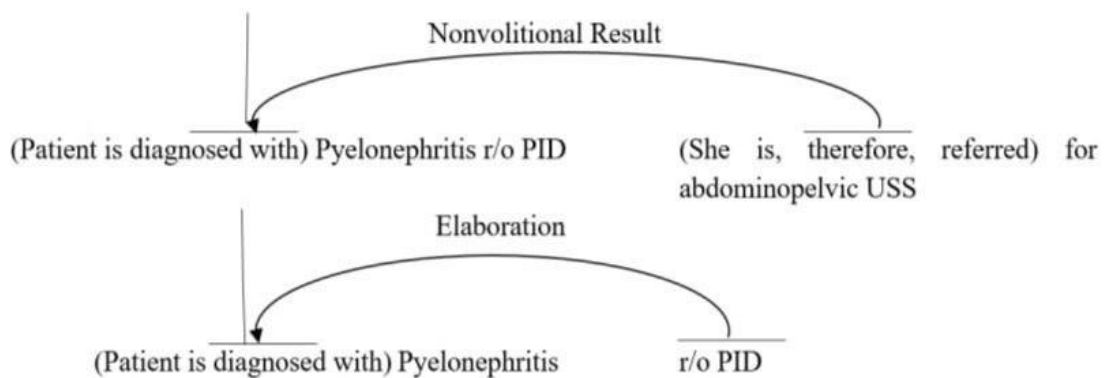

Figure 4: Single-factor causation medical referral schema

The macro-structure bears the main relation, NONVOLITIONAL RESULT, in a single-factor causation schema. The role reversal of diagnosis is demonstrated in the schema, which sees the nucleus lines – the horizontal and vertical lines – intersecting with the arrowhead of the relation's curve moving to the left side of the schema. Nevertheless, the nucleus status remains unchanged: the diagnostic information is still the nucleus. This **triages** diagnosis as the key communicative event in medical processes. Meanwhile, "r/o PID" is added to the diagnosis to engender a microstructure that decomposes from the macro type. The micro schema marks the added information as an elaboration of the parent diagnosis; and even in the base structure the main diagnosis "pyelonephritis" remains the nucleus keeper, which reinforces its informative salience.

4.3   Signalling of causal coherence relations of medical processes

This part of the paper examines the linguistic devices that signal the two relations construed for DSoMD and DSoMR. This paper identifies the concise nature of information presented in the data, which seems to be a reflection of work pressure on health workers and usually crowded hospitals that also appear to affect physicians' penmanship. Thus, this is further evaluated to provide a background for the findings on CCR signals in the selected referral forms.

4.3.1 Conciseness in medical presentations

Medical information is often compressed to reduce waiting time for patients. These forms are usually written by the GPs while the patients wait to take them to the specialists they are asked to see. The brevity of information is assessed by comparing the density of content and function words. Content words carry information, and they include word classes like noun, verb, adjectives and adverbs; while function words, which comprise pronouns, auxiliary verbs, determiner, preposition and conjunction, are used to mark grammatical relationship.

S/N	Content Words (CW)/ Function Words (FW)	Clinical History (%)	Diagnosis (%)	Referral (%)
1	Noun	37	51	46
2	Verb	10	13	4
3	Adjective	18	23	30
4	Adverb	2	-	-
	Total CW	67	87	80
5.	Preposition	20	10	11
6	Determiner	8	2	2
7	Conjunction	2	1	7
8	Auxiliary	2	-	-
9	Pronoun	1	-	-
	Total FW	**33**	**13**	**20**
	Total CW and FW	**100**	**100**	**100**
	Ratio of CW to FW	**2:1**	**6:1**	**4:1**

Table 4: Lexical density in medical referral forms

The table shows the ratio of content words to function words to be 2:1, 6:1, and 4:1 in clinical history, diagnosis, and referral segments, respectively. Function words by their structural role tend to exceed content words in typical continuous writing, but the conciseness of the medical presentations has minimised their use. The ratio shows that clinical history is the only column that has high density of FW, and this can be linked to its narrative form. In diagnosis and referral sections, CW is densely used as emphasis is placed on the need to be informative rather than complying with grammatical forms. Among the content words, nouns are predominantly used with a percentage score as high as 51 in diagnosis proposition, 46 in referral, and 37 in clinical history. This means record-taking in medical consultation is invested in the naming process. Adjectives are also highly distributed for specificity, especially in the referral and diagnostic processes. Notably, verbs are less used, perhaps to depict that the information given is not to pass instructions to the patient or receiving specialist. Meanwhile, a word-class under function words, preposition, has a fairly high percentage (20%), higher than most content words in clini-

cal history. This shows prepositions as important structural props that cannot be sacrificed for brevity in medical presentations. Thus, medical preciseness obeys the quantity maxim in Grice's (1975) cooperative principle by being informative as required.

4.3.2 Signaling causal relations in medical presentation

The concise style of the presentation makes the documentation an elliptical construction that leaves out discourse markers. So, common causal DMs like *because, so, therefore* are absent in the data. However, other signals can be found as presented in the table below.

Signal Type	Specific Signal	Instances
Genre	Mapping	i. "Difficulty reading tiny prints" are mapped to "presbyopia".
Semantic	Lexical overlap/ repetition	ii. "Hypertensive" and "hypertensive": used in clinical history, and repeated in diagnosis (NONVOLITIONAL CAUSE (NVC)) iii. "Skull fracture" and "skull x-ray": appeared both in the diagnosis and referral (NONVOLITIONAL RESULT (NVR))
	Lexical chain/ synonymy	iv. "Breaking" and "fracture": both are synonyms and occurred in the clinical history and diagnosis, respectively (NVC) v. "Refractive error" and "ophthalmology": they are semantically related (lexical chain) and used in the diagnosis and referral sections, respectively
Syntactic	Adverbials	(The patient is being referred) *For (specialist management)* as marked construction in the referral column.
semiotic	Semiotic overlap	*?* and *?*: two question marks indicate that question mark was used in the clinical history as well as in the diagnosis information (NVC) "GERD": GERD was used while diagnosing as well as while referring (NVR).
	Lexical-semiotic chain	"c/o" and "diagnosis": when c/o is used in medical history, a diagnosis should follow (NVC). "r/o" and "referral": when *r/o* is used in used in diagnosing, while filling a referral form, a referral is enacted.

Table 5: Signals for causal coherence relations

The above table summarises the cohesive elements that signal causal coherence relations in medical presentation, especially as it concerns referral forms. Notably, there are no discourse markers because of the concise style of presentation, but there are other signal types, which are further discussed, subsequently.

4.3.2.1 Genre as a signal of causal coherence relation

Genre as CCR signal derives from doctors' clinical activity of attributing a diagnosis to certain clinical information, either by causality or correlation – but the focus of this paper is on the former. This has been standardised in the United Nations International Classification of Diseases and Related Health Problems (ICD) and WHO Family of International Classifications (WHO-FIC). The process of diagnosing is perceived as the specific signal of mapping. For instance, the symptom "Difficulty reading tiny prints" is mapped as the causing situation for the diagnosis, presbyopia. The same can be said of the pathophysiological conditions "recurrent tooth ache", "decayed tooth" mapped to "dental caries". Notably, the genre signal sets the superstructure for the functioning of other signals.

4.3.2.2 Semantic signal for causal coherence relations

Semantic signal types have lexical overlap/repetition and lexical chain/synonymy as specific signals. Some instances from the referral forms are provided for illustration with the excerpts below. Extracts 1 and 2 aid the discussion for lexical overlap/repetition, while Extracts 3 and 4 are used for lexical chain/synonyms.

Extract 1

Clinical Information:	known hypertensive patient with elevated BP.
Diagnosis:	Hypertensive heart dx

For NONVOLITIONAL CAUSE(NVC), the word *hypertensive* is first used in the clinical history segment, and repeated during diagnosis. Fitting to the genre frame of diagnosing in medicine and the classifications done to guide the process, the lexical overlap signals a causal link between the medical conditions taken and the diagnosis to follow – meanwhile, lexical overlap incorporates the lexical cohesive element of repetition. In other words, the hypertensive symptom in the patient's complaint points to the diagnosis – related to the cause and incidentally included among possible diagnosis.

Extract 2

Information:	Depressed skull fracture
Referral:	For skull x-ray

This provides an instance for NONVOLITIONAL RESULT (NVR). The word *skull* appears in the diagnostic information, and in the process of providing appropriate treatment, a relevant x-ray has to be done first to assess damage done to that part of the body. So, *skull* re-appears in the referral segment of the form, as presented in Extract 2. Lexical chain/synonym is another specific semantic signal of CCR. Lexical chain shows semantic relatedness, and it includes words that have similar meaning like synonyms.

Extract 3

Clinical Information:	Above named presented with 3 months history "breaking" of part of the tooth and associated pain. On and off.
Provisional Diagnosis:	Tooth **fracture**

Extract 3 shows the signaling of NVC by synonyms. The clinical information contains the word *breaking* that is synonymous to the word *fracture* used in the provisional diagnosis. In addition, both synonyms are similarly associated with the same word *tooth* in their separate texts: while

tooth is placed after *breaking* in the patient's history, it precedes *fracture* in the diagnostic proposition. Such association could facilitate the causal relation between both spans, and expedite clinical decision. The next extract (4) instances the signaling of NVR by a lexical chain.

Extract 4

Provisional Diagnosis:	**Refractive** error
Referral:	For **ophthalmologist** review and management

The word r*efractive* chosen as part of the diagnosis is semantically related to the specialist/ophthalmologist named in the referral information. The use of the former as a diagnostic component signal that the patient has to be referred to the appropriate medical consultant to continue the treatment. In effect, the diagnosis is signalled by a lexical chain to be the causation for the referral done.

4.3.3 Syntactic signal for causal coherence relations

The syntactic signal for CCR in the referral column of the data shows a marked construction that tends to start with the preposition, *for,* to function as an adverbial (of reason). This typical usage is manifested in the following excerpts.

Extract 5
a. For follow up and surgery
b. For gynaecologist review and management
c. For investigation and cardiology review
d. For ophthalmologist review and management
e. Specialist management
f. Visual assessment and correction lens
g. See general surgeon

These marked constructions are clearly seen in Excerpts 5a-d. So, *For* is accompanied by the phrase *follow up and surgery* in 5a*,* and *gynaecologist review and management* in 5b, among others. As this usage becomes common, the examples in 5e-f could then be seen as omitting *for* in line with the concise style for the presentation of medical information. In that case, 5g that uses the verb *see* to give directive to the patient on the specialist to visit, could be seen as an unmarked form.

4.3.4 Semiotic signal of causal coherence relations

Semiotic signals of CCR in NHIA-styled medical referrals are in abbreviations that are used as causal signals. These are signals represented as semiotic overlap, which entails the repetitive use of an abbreviation in separate textual units. Another semiotic signal combines the use of abbreviation with lexical items to produce causal signals. One of such signals is lexical-semiotic chain.

Extract 6

Clinical Information:	The above named patient is currently being managed as a case of ? GERD with obesity.
Provisional Diagnosis:	? GERD with obesity

Semiotic overlap is doubly engaged in Extract 6, one as a punctuation and another an acronym, to signal Nonvolitional Cause. The punctuation "?" is a question mark that stands for "query" and can be found both in the clinical information and provisional diagnosis. Its usage to signify that a given health condition is suspected in the history can easily signal that the derivable diagnosis would be suspected too. NVC is further signalled by the abbreviation GERD, which means "gastro-oesophageal reflux disease", and it is used both as part of the information in the patient's history and as an element in the diagnosis. The replicability of this abbreviation both as part of clinical information and diagnosis strengthens its causal relationality, as its propensity to facilitate diagnostic reasoning and decision.

Extract 7

Clinical Information:	c/o recurrent chest pain; recurrent palpitation; elevated BP
Provisional Diagnosis:	r/o cardiomyopathy
Referral:	For investigation and cardiology review

Lexical-semiotic chain is used in Extract 7 as a semiotic signal type for NVC and NVR. NVC is construed as a relation when relating clinical information and diagnosis. The use of the semiotic symbol *c/o* in the clinical history presumes that certain symptoms would be identified, which should attract a diagnosis that would be lexically presented, either fully or partially. In the extract above, *c/o* is followed by the symptoms of "recurrent chest pain", "recurrent palpitation" and an *elevated BP,* so it invites the diagnosis partially lexically represented as "r/o cardiomyopathy". In addition, NVR is identified when diagnosis and referral are involved. The semiotic sign *r/o* which stands for "rule out" is used to remark that the item in the diagnosis should be explored, while reviewing the patient's health condition. Such semiotic usage implies that a referral is being undertaken; so it elicits the lexical elements in the referral "for investigation and cardiology review". This lexical-semiotic chain instantiates a causal connection that aids the inference of NVR.

5   Summary of findings and implication for medical practice

Causality is constructed in medicine as a life-saving practice to realise its purpose. This study has examined how this is discursively managed, especially during medical consultation. It deployed CCR and signaling devices to add to existing causal model in medicine. It highlights how the presentation of doctor-patient interaction underscores information salience, like the triaging of care delivery to patients based on urgency. This is scanned through the discourse phenomenon of causality as a principle of coherence. The paper worked on clinical consultation processes like taking of patients' clinical history, the diagnosis and the referral, as documented in hospital records, like referral leaflets. The information contained in the referral form, which is the scope of this paper, is uniquely structured to describe certain patterns and style of use, which themselves provide deeper meaning about the effect of causal coherence in medical practice.

The first objective of this paper was to examine the discourse structures of causality in the diagnostic process and the communicative goal articulated as a result. The paper construes that the relational structure of the diagnostic exercise is NONVOLITIONAL CAUSE. It was noted that illnesses do not occur as intended or self-harm, except for a suicide attempt, so the parameter

of non-volition constrains the interpretation and choice of relation. The study identifies that a patient's clinical information presents with symptoms that are identified as the causing situation for a given diagnosis, and through CCR, the diagnostic information is primed as more salient than the clinical information. This explains that the diagnostic process is the central act and sits atop the clinician's mind when taking patients' health history. This finding echoes the preoccupation of the ill that are unsure of their diagnosis and the anxiety to see a doctor to identify their medical condition for possible treatment. Thus, the expressed communicative goal, in the medical information, is for the patient to tie his symptoms to a given diagnosis.

Further to the first objective, diagnostic schemas were developed from the causal relation of diagnostic structure, and illustrate how the constituents interact to actualise the communicative goal. The paper identifies two types of schemas, single-causation and multiple-factor causation. With respect to the single-factor causation schema, a single symptom is presented as triggering a disease; while in the case of a multiple-factor causation schema, a sequence of factors or symptoms is observed to be the causation for a medical condition.

The second objective was to examine the causal discourse structures in the presentation of information during referral. This is undertaken through two medical processes: diagnosis and referral. The informational elements in both texts were causally structured for salience, and found to construe NONVOLITIONAL RESULT, such that the diagnostic information becomes the causation for the referral to be enacted. The paper observes a reversal of role in the causal positioning of diagnosis. In NVC, it is placed as the caused situation, but it changes to the causing situation in NVR. Regardless of this discourse feature, diagnostic proposition retains its superior informative role in medical consultation discourse. As disseminated in the communicative goal, the information written as the diagnosis is what determines if a referral will be done and the specialist it will be directed to. Thus, this study provides an evidence in discourse that reinforces the primacy of diagnosis during medical consultative encounter; and by inference, observes the need for clinicians to ensure there is due diligence when taking diagnostic decision.

The next objective was to investigate the cohesive elements that signalled causal relations in the data. There is a tendency in the literature on cohesion to divide cohesive relations into explicit and implicit by the presence of DMs. In that sense, DM signals are classified as explicit, while other textual signals are explicit. The study reveals that medical information in medical referrals are presented in precise terms, which sees content words used more than function words as opposed what seems to generally obtain in a typical continuous writing. This concise style leaves little or indeed no room for the insertion of DMs, as no DM was found in the data. In essence, the CCR signals identified in the study are not explicit, nevertheless, they are sufficiently informative to serve its purpose.

The study identified the taxonomy of signals of CCR in medical presentation. The classification has two hierarchical structures: the signal type and specific signals. The identified signal types are genre, semantic, syntactic and semiotic. These types have their specific signals: genre has mapping as a signal; semantic has lexical overlap/repetition and lexical chain/synonyms; syntactic signals are adverbials; while semiotic signal type includes semiotic overlap and lexical-semiotic chain. This classification was adapted from Das/Taboada (2017), while there are some

novel signals conceived by this paper to align with the contextual specificity of medical practice. One of these novel signals is mapping, which was conceived under genre with the knowledge that diagnosing is not done arbitrarily but in a systematic way – and possibly guided by existing classifications like ICD and WHO-FIC. So, physicians are able to map symptoms to diseases based on a patient's clinical information. Another novel signal is the semiotic type that classifies all attempts to use medical abbreviations to signal causal relations. The paper also conceived the specific signals under the semiotic type. These signals are semiotic overlap that constitutes repeated medical symbols; and lexical-semiotic chain that combines these symbols and words like an adjacency pair structure, which naturalises the causal linking of medical information.

6   Conclusion

The study set out to examine an attempt at applying humanistic insights to the understanding of medicine through perspectives from the linguistic discipline of discourse analysis. Acknowledging the fundamental role of causality in medical practice, it evaluated how this phenomenon is discursively managed in clinical consultative encounters as documented in NHIA medical referral forms. The focus was on the coherence expressed in the causal discourse structures, the communicative goals conveyed, and the signaling of causal relations. The study has affirmed the importance of language as part of an all-inclusive epistemic approach in managing the diagnosis, prognosis, prevention, treatment, and palliation of disease or injury; and offering eclectic methods that can facilitate the medical goal of improving human health conditions and saving lives.

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Annex

NATIONAL HEALTH INSURANCE SCHEME
REFERRAL FORM

A. **REFERRING FROM**

DATE:_____

HEALTH FACILITY:_____

NHIS CODE_____

B. **REFERRED TO:**

HEALTH FACILITY:_____

NHIS CODE_____

RECEIVING DOCTOR_____

MDCN NO:_____

C. **PATIENT'S IDENTIFICATION**

NAME:_____

NHIS ID NO:_____

DOB:_____

SEX:_____

HMO:_____

HMO CODE:_____

D. **CLINICAL INFORMATION:**

History of presenting complaint / examination findings/ investigation results

Provision diagnosis

Reason for referral)including expectation of referral Outcome

Past Medical History

Current and recent medication

Clinical warnings (e.g. Allergies)

Additional relevant information

REFERRING DOCTOR:_____ MDCN NO:_____

SIGNATURE & STAMP:_____ DATE:_____

■ WHITE COPY TO PHCP/HMO FOR CLAIMS ■ PINK COPY TO BE RETAINED BY PHARMACY ■ GREEN COPY TO BE RETAINED BY PROVIDER FOR NHIS