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ADVERBIAL REPRESENTATION IN MEDICAL TEXTS: A CORPUS-BASED ANALYSIS

In the field of medical communication, the accurate transmission of information is not only essential for effective treatment but also vital for patient safety and professional credibility. While previous research has extensively examined medical terminology, nominal structures, and syntactic complexity, comparatively little attention has been devoted to adverbials – linguistic units that modify verbs, adjectives, or entire clauses. Despite their secondary grammatical status, adverbials serve a range of pragmatic functions, including indicating time, manner, degree, and stance. They can frame statements as tentative, emphasize certainty, or provide contextual cues that guide interpretation. Medical texts – ranging from peer-reviewed journal articles to patient-oriented informational materials – rely on varying types of adverbial constructions to structure arguments, signal evidential status, and mediate between clinical detachment and human empathy. As such, adverbials play a critical yet often overlooked role in shaping the tone, clarity, and epistemic stance of medical discourse. The aim of this study is to examine how adverbials are employed in written medical texts and to propose a classification framework based on their syntactic form and communicative function. Using a corpus-based approach, the analysis seeks to uncover patterns of usage that characterize the adverbial profile of medical writing, and to contribute to a more nuanced understanding of its stylistic and rhetorical conventions.

Key words: adverbials, classification, medical texts, corpus analysis, discourse, linguistics.

Ольга Сіваєва, Ангеліна Залізник. ПРИСЛІВНИКИ В МЕДИЧНОМУ ДИСКУРСІ: КОРПУСНИЙ АНАЛІЗ

У сфері медичної комунікації точна передача інформації є не тільки важливою для ефективного лікування, але й життєво необхідною для безпеки пацієнтів та професійної довіри. Хоча попередні дослідження детально вивчали медичну термінологію, номінальні структури та синтаксичну складність, порівняно мало уваги приділялося прислівникам – мовним одиницям, що модифікують дієслова, прикметники або цілі речення. Попри їхній вторинний граматичний статус, адвербіали виконують низку прагматичних функцій, включаючи зазначення часу, способу дії, ступеня та ставлення. Вони можуть робити твердження нечіткими, підкреслювати впевненість або надавати контекстні підказки, що спрямовують інтерпретацію. Медичні тексти – від рецензованих журнальних статей до інформаційних матеріалів для пацієнтів – покладаються на різні типи адвербіальних конструкцій для структурування аргументів, сигналізування про доказовий статус та посередництва між клінічною відстороненістю та людською емпатією. Таким чином, адвербіали відіграють критичну, але часто недооцінену роль у формуванні тону, ясності та епістемічної позиції медичного дискурсу. Метою цього дослідження є вивчення того, як адвербіали використовуються в письмових медичних текстах, та пропонування класифікаційної рамки, заснованої на їхній синтаксичній формі та комунікативній функції. Використовуючи корпусний підхід, аналіз прагне виявити закономірності вживання, що характеризують адвербіальний профіль медичного письма, та зробити внесок у більш нюансоване розуміння його стилістичних та риторичних конвенцій.

Ключові слова: прислівники, класифікація, медичні тексти, корпусний аналіз, дискурс, лінгвістика.

Accurate communication is crucial in medicine, impacting everything from treatment effectiveness to patient safety and professional trust. While much research has focused on

medical terms, noun phrases, and sentence structure, adverbials – words or phrases that modify verbs, adjectives, or entire clauses – have received little attention. Despite their seemingly

secondary role, adverbials are vital for conveying meaning. They can indicate time, manner, degree, or attitude, making statements tentative, emphasizing certainty, or providing important context.

Medical texts, from research papers to patient information, use various adverbial constructions to build arguments, show evidence, and balance clinical objectivity with human empathy. This means adverbials are key, though often overlooked, in shaping the tone, clarity, and certainty of medical language.

This study aims to investigate how adverbials are used in written medical texts and to propose a classification system based on their form and function. By analyzing a collection of medical texts, we hope to uncover common patterns in adverbial usage, leading to a more detailed understanding of the stylistic and persuasive aspects of medical writing.

Adverbials are flexible linguistic units that can be realized as single words (e.g., *clearly*, *probably*), phrases (e.g., *with great precision*), or clauses (e.g., *as shown in previous studies*). They typically modify verbs, adjectives, or whole propositions, and contribute to meaning by expressing circumstances such as time, manner, place, degree, cause, and stance. In the context of systemic-functional linguistics, adverbials are often aligned with the circumstantial elements of a clause, playing a central role in interpersonal and textual metafunctions [4, c. 345].

Several classifications of adverbials have been proposed in linguistic literature. Biber et al. distinguish between adjuncts, disjuncts, and conjuncts, each serving distinct discourse functions. Adjuncts provide core information about action (e.g., *quickly*, *on Tuesday*), disjuncts express the speaker's attitude or stance (e.g., *frankly*, *unfortunately*), while conjuncts link clauses and signal discourse relationships (e.g., *therefore*, *however*) [1, 38]. In addition, adverbials can be categorized semantically into such groups as temporal, locative, manner, degree / extent, stance.

In scientific discourse, and especially in medical writing, epistemic adverbials (e.g., *likely*, *possibly*, *clearly*) are particularly significant, as they communicate the writer's confidence in the presented information. Hyland notes that such markers function as hedges or boosters, regulating the strength of claims and maintaining an appropriate level of tentativeness [5, c. 98].

Furthermore, medical texts often aim to balance objectivity and authority. This is frequently achieved through the strategic use of adverbials that either soften statements (e.g., *may contribute to*, *is potentially linked to*) or

reinforce them (e.g., *undoubtedly*, *clearly*). The rhetorical function of adverbials is therefore inseparable from their linguistic form, making them a key element of authorial voice and textual persuasion.

This study draws on the typological distinctions outlined above to analyze how adverbials function in medical texts, with the aim of developing a more refined classification system adapted to the needs of medical discourse.

The research adopts a qualitative corpus-based approach to analyze the use of adverbials in medical texts [7]. To ensure genre diversity and authenticity, a mini-corpus of 30 texts was manually compiled from publicly available, open-access sources. The texts were selected to represent three primary types of written medical communication:

1) Academic research articles ($n = 10$) were extracted from the PubMed Central Open Access Subset (PMC-OA), a freely accessible repository of peer-reviewed biomedical literature [8];

2) Patient-oriented informational texts ($n = 10$) were sourced from the reputable medical websites Mayo Clinic [6] and WebMD [9], which offer evidence-based information written in accessible language for a general audience;

3) Pharmaceutical leaflets ($n = 10$) were obtained from official drug information portals such as Drugs.com [2] and the European Medicines Agency (EMA) [3]. These texts follow a standardized format and are designed to provide clear, legally regulated instructions and risk information for patients.

This genre-balanced subcorpus provides a controlled yet representative basis for analyzing adverbial usage in authentic contemporary medical discourse. All texts were written in English and published between 2020 and 2024. The average length of each text is approximately 800 – 1200 words, yielding a total corpus size of roughly 30,000 words.

The analysis of adverbials across the corpus revealed both structural regularities and genre-specific functional patterns. This paper presents two interrelated levels of classification: first, a traditional semantic-syntactic typology widely used in linguistic analysis; and second, a functional-pragmatic framework developed to better capture the communicative roles of adverbials in medical discourse.

Following Biber et al. and Halliday & Matthiessen, adverbials were first categorized based on their semantic content and syntactic form [1; 4]. Six main types were observed:

– Temporal adverbials: indicating time, sequence, or frequency (e.g., *recently*, *after administration*, *in 2020*).

For instance, the sentence «*The fever started two days before admission.*» specifies the temporal onset of symptoms, while «*The patient was monitored hourly.*» highlights the frequency of a clinical procedure.

– Locative adverbials: indicating place or spatial reference (e.g., *at the injection site, in the lungs*).

Typical examples include «*Pain was reported in the lower abdomen*» and «*The injection was administered at the deltoid site*», both of which anchor clinical actions in specific anatomical locations.

– Manner adverbials: describing how an action is performed (e.g., *carefully, with precision*).

Manner is illustrated by sentences such as «*The surgeon operated with great precision.*» or «*The medication should be taken slowly to prevent nausea.*», where adverbials describe the quality or style of medical intervention.

– Degree / Extent adverbials: indicating intensity or scope (e.g., *significantly, mildly*).

Adverbials in the sentences like «*The symptoms were extremely severe.*» and «*The patient was fully aware of the risks.*» reflect how intensity and scope are modulated in clinical descriptions and patient communication.

– Epistemic / Stance adverbials: expressing confidence or evaluative position (e.g., *likely, clearly, in some cases*).

For example, «*The condition is likely to improve with treatment.*» expresses probabilistic confidence, while «*The diagnosis is clearly supported by the test results.*» conveys a high degree of certainty.

– Discourse / Linking adverbials: marking logical relations between clauses (e.g., *therefore, however, in contrast*).

Sentences such as «*Therefore, the treatment plan was adjusted accordingly.*» and «*However, further studies are needed to confirm these findings.*» demonstrate how adverbials structure argumentation and contrast in medical texts.

Across the full corpus the following overall distribution was observed:

While temporal and epistemic / stance adverbials were the most frequent overall, the genre-specific patterns reveal more nuanced tendencies. Academic articles exhibited a strong preference for epistemic adverbials (e.g., *likely, possibly, clearly*), which accounted for nearly 35% of all adverbials in this corpus [11]. These expressions allow authors to modulate claims and present evidence with the necessary caution typical of scientific discourse.

Patient-oriented texts favored temporal (e.g., *before use, after meals*) and manner adverbials (e.g., *gently, with care*) – together comprising over 50% of adverbials in this genre. These help guide patient behavior with clarity and empathy, emphasizing both when and how to perform certain health-related actions.

Pharmaceutical leaflets demonstrated a high frequency of temporal and degree/extent adverbials (e.g., *rarely, severely, in exceptional cases*), reflecting the legal and clinical need for precision and precaution in patient instructions. Notably, risk-oriented phrasing often involved adverbial modifiers that served both epistemic and ethical functions (e.g., *if necessary, only occasionally*).

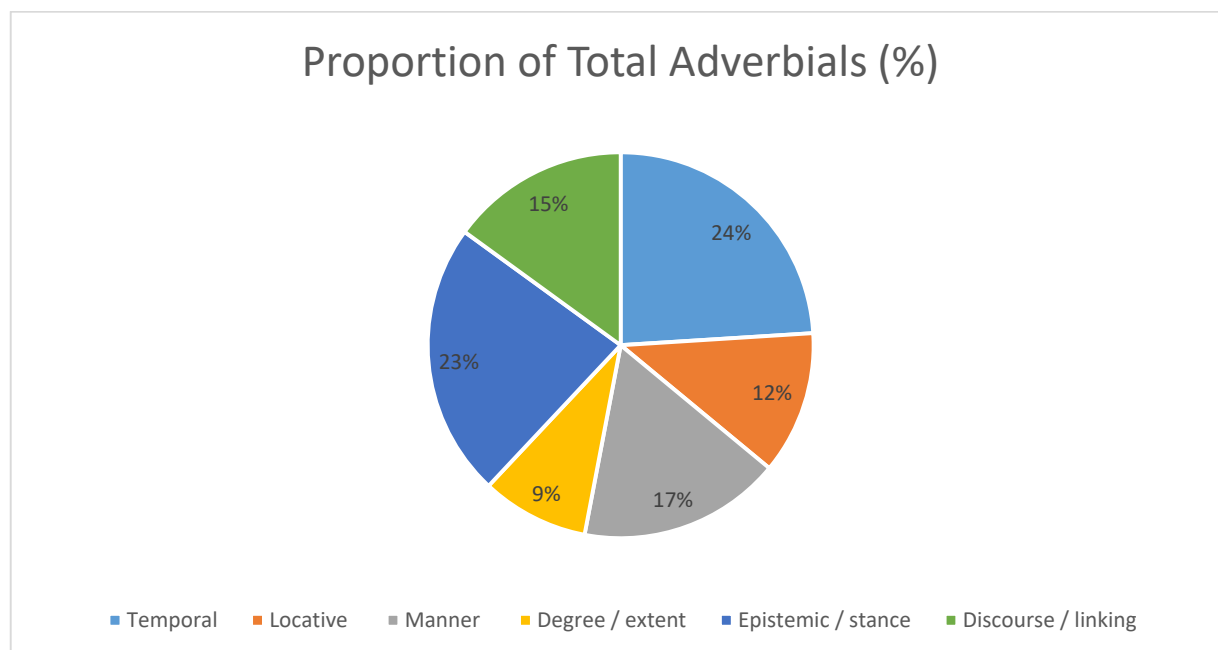


Fig. 1. Distribution of Adverbial Types across Medical Texts

These findings provide a foundational understanding of the linguistic diversity of adverbials and establish a useful baseline for further interpretation.

To better reflect the communicative aims of medical texts, a second level of classification was developed. This framework emphasizes the pragmatic function of adverbials in shaping reader perception, managing risk, structuring information, and reinforcing professional stance. The proposed categories are as follows:

1. Epistemic Modulators regulate the degree of certainty or authorial distance in a claim. Common in academic texts, they allow writers to present information tentatively or assertively. For example: *likely, possibly, undoubtedly, in some cases*.

2. Procedural Clarifiers specify conditions, timing, or steps related to medical procedures or instructions. They are especially prevalent in patient-facing texts and pharmaceutical leaflets. For example: *before use, during treatment, with water, after meals*.

3. Risk and Safety Markers express the frequency or severity of possible outcomes, these adverbials signal precaution and align with legal and ethical requirements in medical communication. For example: *rarely, severely, mildly, in exceptional cases*.

4. Reader Orientation Markers help the reader navigate complex information and maintain logical flow. They are important for coherence, particularly in academic texts. For example: *moreover, however, for instance, consequently*.

5. Ethical and Empathetic Modulators soften imperatives, express care, or signal optionality. They help maintain a patient-centered tone and are frequent in instructional and informational texts. For example: *as needed, with caution, if necessary, gently*.

Many adverbials serve more than one function and can be classified under both typologies. For example, *in some cases* is semantically temporal but pragmatically epistemic and risk-oriented. Likewise, *carefully* is a manner adverbial that also functions as an ethical softener when addressing patients.

The distribution of adverbials across these categories reveals important genre-based tendencies. Epistemic Modulators (27%) were most prevalent, particularly in academic research articles, where writers are expected to express degrees of certainty and maintain objectivity through hedging and booster expressions (e.g., *likely, undoubtedly*).

Procedural Clarifiers (24%) dominated in patient information texts and pharmaceutical leaflets, reflecting the need for clear, stepwise instructions (e.g., *before use, during treatment*) [10]. These adverbials are crucial for ensuring safe application of therapies and medications.

Risk and Safety Markers (18%) were especially common in pharmaceutical texts, often employed to convey legal and clinical warnings (e.g., *rarely, severely, in exceptional cases*).

Reader Orientation Markers (16%) such as *however* or *for instance* were more frequent in academic texts, guiding readers through complex argumentation.

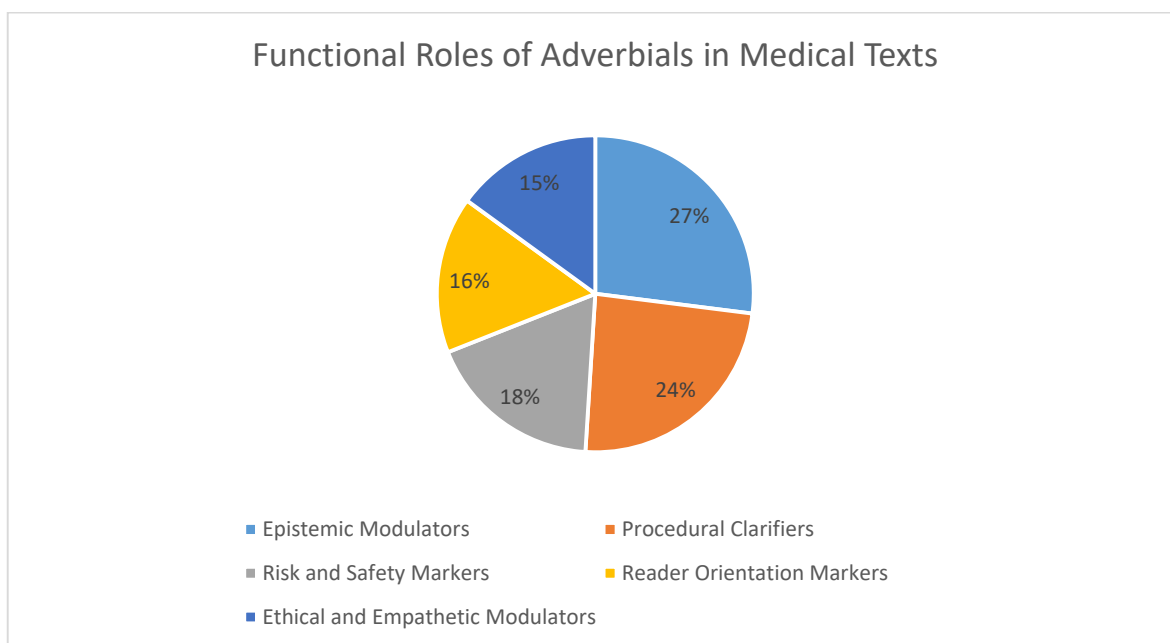


Fig. 2. Functional Roles of Adverbials in Medical Texts

Finally, Ethical and Empathetic Modulators (15%) appeared primarily in patient-facing texts. Adverbials like *gently*, *if necessary*, and *with caution* contribute to a tone of respect, care, and shared responsibility, softening imperatives and supporting patient trust.

This distribution supports the view that adverbials play a significant rhetorical and interpersonal role in medical communication. Their usage is shaped not only by grammatical or informational needs, but also by ethical considerations, genre conventions, and audience expectations.

By integrating structural and pragmatic perspectives, this dual classification provides a more nuanced understanding of how adverbials operate in medical discourse. It reveals that beyond grammatical function, adverbials in medical texts are powerful discursive tools that balance clarity, caution, authority, and empathy.

Table 1 shows clear genre-based preferences in the use of adverbials. Academic articles display a strong tendency toward epistemic modulation, with 47 instances reflecting the rhetorical need to hedge claims and indicate authorial stance. In contrast, procedural clarifiers dominate in patient information texts and pharmaceutical leaflets (44 and 38 respectively), underscoring the instructional function of these genres. Risk and safety markers, often tied to legal or ethical caution, are especially prevalent in pharmaceutical materials. Ethical and empathetic expressions are most common in patient-oriented content, where tone and trust are vital.

Table 2 presents the semantic dimensions of adverbial usage across genres. Stance and epistemic adverbials are most common in academic writing, affirming their role in expressing uncertainty and logical positioning. Temporal and frequency-based adverbials appear regularly in patient and pharmaceutical texts, where sequencing and dosage are crucial. Interestingly, manner/modal adverbials, such as ‘with caution’ or ‘as needed’, reflect tone management and are especially frequent in patient education materials and drug leaflets, further emphasizing the interplay of instruction and empathy.

The analysis of adverbials in this study demonstrates that these seemingly peripheral linguistic units serve essential functions in medical writing. Beyond their syntactic role, adverbials contribute significantly to how information is structured, interpreted, and emotionally received by different audiences. The dual-level classification – semantic-syntactic and functional-pragmatic – allows for a deeper appreciation of the communicative strategies employed in medical discourse.

One of the most salient findings is the genre sensitivity of adverbial usage. Academic research articles favor epistemic modulators and discourse markers that help build arguments and express cautious interpretation of findings. This reflects the inherently tentative nature of scientific knowledge and the importance of preserving professional credibility through hedging and precise attribution of certainty.

In contrast, patient-oriented texts and pharmaceutical leaflets prioritize clarity and

Table 1

Distribution of Adverbials by Functional-Pragmatic Role and Genre

Genre	Epistemic Modulator	Ethical / Empathetic Modulator	Procedural Clarifier	Reader Orientation Marker	Risk and Safety Marker
Academic Article	47	2	5	31	6
Patient Information Text	12	22	44	7	10
Pharmaceutical Leaflet	6	15	38	4	27

Table 2

Distribution of Adverbials by Semantic Type and Genre

Genre	Degree / Extent	Locative	Manner	Manner / Modal	Stance / Epistemic	Temporal	Frequency
Academic Article	18	4	8	3	42	21	6
Patient Information Text	6	6	16	9	10	22	19
Pharmaceutical Leaflet	10	11	15	13	9	17	24

safety. Here, procedural clarifiers and risk markers dominate. The consistent use of temporal adverbials (*after meals, before use*) and safety-related expressions (*rarely, in severe cases*) indicates a shift from persuasive or exploratory language to instructive and regulatory functions. These adverbials not only instruct the patient but also protect the provider by maintaining legal precision.

The emergence of a distinct category labeled ethical and empathetic modulators is particularly noteworthy. This category, while underrepresented in traditional typologies, is crucial in fostering patient trust and demonstrating sensitivity in healthcare communication. Adverbials such as *gently* or *if necessary* play a dual role – softening directives while also signaling professional care and flexibility. This pragmatic function becomes especially important in instructional texts, where

imperatives must be balanced with respect and understanding.

The analysis revealed that adverbials are not merely syntactic modifiers but serve as key communicative tools that shape the tone, clarity, and rhetorical stance of medical discourse. The proposed classifications may serve not only descriptive and analytical purposes but also practical applications in medical writing training, translation, and health literacy improvement. The dual-layered classification highlights how different types of adverbials – temporal, epistemic, procedural, and empathetic – fulfill distinct functions depending on genre and audience.

Future research may expand on these findings by analyzing larger corpora, exploring multimodal contexts, or comparing cross-linguistic patterns in medical communication.

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