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# Existential indicators in medical research papers

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## ABSTRACT

This study investigates the role of existentials in the construction of medical knowledge and how they manoeuvre argumentation in scientific research papers. Corpus analysis reveals that some grammatical environments appear to be chosen on epistemological grounds since they are frequently employed in medical writing to encode and disseminate evidence-based information. Thanks to their semantics, existentials form a privileged environment in which to tackle medical discourse from a quantitative angle, especially as quantification represents one of the techniques of objectification characteristic of scientific writing. On the strength of their quantificational import, existentials, as they present themselves throughout a medical paper, can bring inherently argumentative intentions to the surface since they are used to justify the validity of the claims made by the authors of a clinical study.

Keywords : existentials, argumentation, quantification, medical discourse, EBM.

## 1. Introduction

This study aims at investigating the role of existentials in the construction of medical knowledge and how they manoeuvre argumentation in scientific research papers. Halliday and Matthiessen (1999: 3) claim that:

All knowledge is constituted in semiotic systems, with language as the most central; and all such representations of knowledge are constructed from language in the first place. (Hence when we consider the knowledge enshrined in a particular discipline, we understand this by examining the language of the discipline – the particular ways of meaning that it has evolved [...]).

Along these lines, if we want to inquire into the representation and diffusion of the knowledge “enshrined” in this textual genre, we need to turn to the linguistic semiotic system medical researchers employ to construe their collective and individual experience as evidence used to answer clinical questions.

Corpus analysis (Leon – Divasson 2006; Mungra 2006; Maci 2012; Mocini 2015) reveals that some grammatical environments appear to be chosen on epistemological grounds since they are frequently used in medical writing to encode and disseminate healthcare information. A case in point is the extensive use of existential constructions whose investigation may shed light on the specific way medical doctors present and communicate their findings.

Rejecting the traditional locative interpretation, claiming that existential constructions serve “to introduce the NP referent into the discourse world of the interlocutors by asserting its PRESENCE in a given location” (Lambrecht 1994: 179),<sup>1</sup> in this analysis I shall take on board Davidse’s (2000: 203) insight when she holds that “the conceptual import of existential constructions is not, as has traditionally been held, to locate entities somewhere, but to quantify instances of a general type”. Indeed, the quantificational import of existentials<sup>2</sup> accounts for their widespread use in scientific medical texts which are known to concern quantitative data charged with the task of providing information based on evidence.

The aim of this paper is therefore twofold: firstly, to shed light on the linguistic realization of existentials and on their discourse-semantic function in the construction and dissemination of medical knowledge and, secondly, to show how existentials are exploited by medical writers to build up an evidentiary argument to defend the validity of their claims.

## 2. Corpus, methodology and analytical framework

The theoretical framework chosen for the investigation illustrated in this paper lies at the interface between functional, cognitive and corpus linguistics. The systemic functional paradigm, in particular the functional linguistic depiction of the nominal group (Halliday 1994; Halliday – Matthiessen 2004),

<sup>1</sup> The capitalization in Lambrecht’s NP stands for Noun Phrase. In this paper, Nominal Group (suggested by Halliday) will be used as a synonym for Noun Phrase.

<sup>2</sup> In the present study “existential clauses”, “existential constructions” and “existentials” are considered synonyms.

was integrated with Langacker's (1991) cognitive approach to nominals.<sup>3</sup> Corpus linguistics provided a number of devices useful for the identification, quantification, and discussion of synchronic corpus samples.

## 2.1 Corpus construction and exploration

The reference corpus used in this study is a collection of medical research papers covering the span of a decade, from 2010 to 2019. It is a work-in-progress compilation used by the author of the present paper to teach medical ESP to student doctors. Papers dealing with a variety of medical topics are included in the corpus, chosen both by the teacher to inform his different teaching activities and by the students to perform tasks aimed at learning how to analyse and write medical reports and articles. All of the texts selected are informed by a relatively new paradigm of clinical research called Evidence-based Medicine (hereinafter EBM), that is used very frequently by contemporary doctors and medical researchers. The main tenet of EBM is to seek and find solutions to clinical problems, provide patients with the best possible therapeutic intervention, and transfer the results of research published in the medical literature to clinical practice. The mainstay of EBM is, in fact, the hierarchical system used to classify evidence according to the methodological rigour applied to research studies, their scientific validity, and applicability to patient care. The texts contained in the corpus are based on the study designs associated with the highest levels of evidence: systematic reviews, meta-analyses, randomized clinical trials, case-control and cohort studies.

All the texts were retrieved online using the PubMed search engine, and only those providing a full-text version retrievable from PubMed Central were chosen.<sup>4</sup> Of each paper, a version in *.txt* was obtained so that this format could be subjected to quantitative analysis using dedicated software. The details of the corpus are displayed in Table 1.

Table 1. Corpus in detail

Number of files	573
Tokens	2,162,157
Types	49,119
Type/token ratio	2.48

<sup>3</sup> Langacker employs the term "nominal" to refer to the Noun Phrase (Langacker 1991: 550).

<sup>4</sup> While PubMed (<https://www.ncbi.nlm.nih.gov/pubmed/>) is a database of citations and abstracts from MEDLINE, life science journals, and online books, PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/>) is a free digital archive of full-text journal articles.

Table 2. Frequency of the existential *there*

Word	Frequency	%	Texts	%
<i>there</i>	3,123	0.14	494	86.21

During our didactic activities in the lecture hall, the students drew my attention to the recurrent use of existential clauses. This was the event which triggered my interest in the topic at hand and prompted me to write the present report. To carry out this work, I conducted an analysis using *WordSmith Tools 6* (Scott 2012), making use, in particular, of the *Wordlist* and *Concordance* functions of this software. With the former function I obtained the number of occurrences for the word *there*, while the latter provided me with the examples I chose for the discourse-semantic analysis conducted further on. It also enabled me to retrieve the co-text of *there*, so that only occurrences of *there* used existentially were selected, and those conveying other non-existential meanings were discarded, as for example when used as an adverb meaning “in, at, or to that place”, or when it conveys the concept of “attracting or drawing someone’s attention to someone or something”. Table 2 illustrates the frequency of the existential *there*, which accounted for 0.14% of all the running words and, more importantly, appeared in more than 86% of the texts included in the corpus.

## 2.2 The systemic functional paradigm

One of the hallmarks of Hallidayan linguistics is the system of transitivity. Writers (or speakers) represent their experience and the reality around them by selecting from among a wide range of linguistic options. This system of choices manifests itself at the level of the clause which can be structured in various ways by manipulating its constituents. As Halliday and Matthiessen posit (2004: 181), “Transitivity is a system of the clause, affecting not only the verb serving as Process but also participants and circumstances”. Every clause can be categorised according to the type of process it comprises: material, relational, existential, behavioural, mental, and verbal. The focus here is on existential clauses which revolve around Processes<sup>5</sup> realized through verbs designating the existence or occurrence of something. As Halliday and Matthiessen point out, although these clauses “are not, overall, very common in discourse [...] they make an important, specialized

<sup>5</sup> In keeping with Systemic-Functional Linguistics, functional categories are capitalized.

contribution to various kinds of texts” (2004: 257). As Table 2 above shows, in the medical discourse instantiated in the texts analysed here, the word *there* employed “existentially” appears very frequently, totalling 3,123 occurrences in a remarkable percentage of texts present in the corpus. This is a figure that draws our attention to the semantics and discursive functions of this type of clause.

Existential clauses have one obligatory Participant, the Existent, that is a nominal group representing a phenomenon, an entity or an event of any kind. As regards the Process, the study of the corpus concordances for the word *there* showed that the verb *be* is by far the preferred option (Table 3), even though other verbs may be chosen: *exist*, *seem*, *arise*, *appear*, *emerge*). The existential Process can also be located in space or time by inserting circumstantial elements.

Table 3. Occurrences of verbs used as existential processes

Verbs used as existential processes	Occurrences
<i>be</i>	3,087
<i>appear</i>	21
<i>exist</i>	6
<i>seem</i>	5
<i>arise</i>	3
<i>emerge</i>	1

Semantically, existential clauses state that a given entity exists or that something happens. From the point of view of transitivity, the word *there* has no experiential meaning, because it is neither a Participant nor a Circumstance. However, the existential *there* performs its function at a discourse-pragmatic level, since it is used to create an attentional frame exploited interpersonally by announcing that a new referent is being introduced into the discourse and brought to the reader’s attention. This focusing function is further emphasised by the thematic structure of existential clauses, which “typically take as their starting point the simple fact that some entity exists” (Thompson 2004: 161). As a result, the word *there* acts as theme and points cataphorically to what occupies the rhematic position, namely the Existent and a number of additional circumstances. By way of illustration, let us analyse the transitivity of the following example:

- (1) In this analysis, there were 200 pancreatic cancer cases and 673 controls.<sup>6</sup>

<sup>6</sup> All the examples taken from the corpus are numbered in order of appearance. Details of the sources are provided in the journal-reference section at the end of the study.

Table 4. Transitivity analysis of example (1)

In this analysis	there	were	200	pan-creatic	cancer	cases	×
×	×	×	673	×	×	controls	and
Circum-stance	×	Process	Existent				×
×	×	×	Nume-rative	Classi-fier	Classi-fier	Thing	×
×		Pre-modifiers			Head	×	

Given the focusing function of existential clauses, their selection among the other possible lexicogrammatical realizations having the same experiential meaning encoded into the system of transitivity appears to be functionally motivated. Accordingly, if we refer to example (1) above, the authors might have opted for a different construction agnate to the existential clause, such as the following:

This analysis included 200 pancreatic cancer cases and 673 controls.

Table 5. Transitivity analysis of the agnate of example (1)

This analysis	com-prised	200	pan-creatic	cancer	cases	×
×	×	673	×	×	controls	and
Token/Identi-fied <sup>a</sup>	Process: pos-ses-sion	Value/Identifier				×
×	×	Nume-rative	Classifier	Classifier	Thing	×

<sup>a</sup> Token and Value are used to label the two participants in identifying relational clauses. A Token is the participant being defined (Identified), while a Value is the participant which defines (Identifier). See Halliday and Matthiessen, 2004.

Here the circumstantial element of the initial clause is unpacked into a Participant plus a Process designating an abstract relationship of containment which includes a feature of possession (Halliday – Matthiessen 2004: 246). Had the author opted for this type of construal, a very similar experiential meaning would have been conveyed, but it is likely that the attentional frame would have been downplayed. The existential construction serves therefore to draw the reader's attention to discourse-new entities by

foregrounding their quantificational import which, as will be shown in the analysis carried out below, plays a crucial role in the construction of medical knowledge based on evidence.

### 2.3 Insights from cognitive linguistics

The basic idea behind the notion of different linguistic construals is, therefore, that writers can select different lexicogrammatical patterns to allocate the reader's attention to certain aspects of a situation. Indeed, with existential clauses a cognitive process occurs within an "event-frame", where a portion of the referent situation is foregrounded through "the selective distribution of attention with respect to a conceptual concept" (Talmy 2000: 304).

Besides their focusing function, existential clauses typically encode a quantificational meaning, specifying "whether or not a general category is instantiated in a specific search domain, and if so in what cardinal measure" (Davidse 2000: 14). The phrase "search domain" designates the region to which the semantic target of a construal is restricted (Langacker 1999: 53). As Table 4 above shows, the head noun embodies what Halliday and Matthiessen (2004) call the "Thing", or "the semantic core of the nominal group" (2004: 325). In the light of Langacker's (1991) insightful description of nominal groups, the head noun *cases* in (1), represents a "thing type", conceptualized as a category which has the potential to manifest itself within a certain domain of instantiation. In his view, every nominal group, including plural nominal groups, profiles only one instance of the instantiated type and the basic difference between a noun and a nominal lies in the fact that the former constitutes a "thing type" whereas the latter singles out an instance of that type. On this account, also in the case of plural nominal groups incorporating a quantifier, the "size of the instance will be given by the number of its component entities, but collectively these entities constitute just one instance of the plural-noun type" (Langacker 1991: 81). In (1), the actualization of the type category *cases* as an "instance" occurs by means of its modifiers and its instantiation within a search domain. In actual fact, pre-modifying elements like *200*, acting as Quantifier, and *pancreatic/cancer*, acting as Classifiers, not only single out an instance of the general type category *cases* but also provide its specification in terms of quantity, profiling the cardinal quantification of its occurrences in a specific search domain realized by the Circumstance *In this analysis*. The exact value of the quantity designated corresponds to a specific point on a numerical scale indicated as *200*.



Existential clauses express, therefore, quantification conjointly through the word *there* and the Existent. More specifically, the word *there* announces “that instantiation of a type in a cardinal quantity will be involved” (Davidse 2000: 239), while the Existent provides the quantificational measure.

Type specification may occur in a less “iconic” way, with different semantic functions failing to correlate with separate component parts of the same nominal group. For instance, in the above-cited excerpt, *673 controls* does not actually express type specification which is, however, presupposed or implied by the immediate context. By virtue of its strong collocation with the neighbouring word *cases*, the type concept *controls* instances a specific type of people sharing with the *cases* as many features as possible, except the disease. The quantifier *673* provides the cardinal quantification of the instance within the search domain delimited by the same circumstantial *In this analysis*. The type is therefore turned into a specific instance thanks to what Langacker calls the “current discourse space”, consisting in those elements and knowledge relations shared by the writer and the reader, basic for successful communication at any given time:

As discourse unfolds, at each step the current expression is constructed and interpreted against the background of those that have gone before. The prior discourse is a major determinant (along with context, background knowledge, etc.) of what I call current discourse space (CDS). The CDS is a mental space comprising everything presumed to be shared by the speaker and hearer as the basis for discourse at a given moment. Starting from that basis, each successive utterance updates the CDS in some fashion (Langacker 2008: 59).

### 3. Existential realizations in EBM texts

This section draws on a number of excerpts taken from the corpus with a view to illustrating the semantics and lexicogrammatical realizations of existentials in EBM texts. This qualitative analysis seeks to show how medical writers can exploit this type of clause for the construction and transfer of evidentiary knowledge.

#### 3.1 The realization of the search domain

In the texts analysed here, the search domain of instantiation can be realized in various ways. It can occur either through a discourse-oriented spatial

circumstantial (*In this analysis*) as shown in example (1) above or through a more concrete spatial reference (2):

- (2) *In the analysis* of all-cause mortality, there were 25 459 deaths in the intervention group vs 28 306 deaths in the control group (RR, 0.99 [95% CI, 0.94 to 1.03]; P = .49).

Very often the search domain consists in a temporal circumstantial:

- (3) *During a mean follow-up of 3.0 years*, there were 2343 recurrent VTE events.

Here the authors explore the search domain, which, in this case, is delimited by the temporal circumstantial *During a mean follow-up of 3.0 years*, for the size of *recurrent venous thromboembolism events*. They count the component entities of the instance to discover that they amount to 2,343.

The search domain can also consist in a spatio-temporal combination of two circumstantials:

- (4) *In the same year*, there were approximately 11 300 prostate cancer deaths *in the UK*, making prostate cancer the second most common cause of cancer death in men.

When the search domain is not explicitly mentioned, it is easily retrievable by implication, and may coincide, for example, with the overall space of all the relevant knowledge available to the authors:

- (5) *To our knowledge*, there are two other studies that have considered prescribing trends, and these were focused mainly on the impact of the National Dementia Strategy.

Instead of being realized by a prepositional phrase, the search domain can be embodied in adjectives (6) or adverbs expressing time (7), or space (8), or both (9):

- (6) There have been two *recent* high impact, well designed studies, examining the role of HMV in COPD).
- (7) There are *currently* three indicators for dementia included in the framework.

- (8) *Worldwide*, there are at least 230 million invasive procedures performed annually and most of us will undergo several in our lifetime.
- (9) *Globally*, the overall pooled annual incidence of ALS is  $\sim 1.9/100,000$  population, and it is estimated that there are *presently*  $\sim 228,000$  prevalent cases.

The realization of the search domain can also occur outside the existential clause, in a contiguous subordinate temporal clause:

- (10) We will argue that it is important to take information about financial COIs into account when assessing research and that there are at least five factors that one should consider *when making judgments on how financial relationships affect the credibility of research*.

### 3.2 Uniform and homogenous masses

There are also existentials that have no specific quantifier. Nonetheless, these contain a specification of quantity not by designating discrete instances, but rather “the kind as such” (Davidse 2000: 221). This is the case with Existents realized by bare plural nominal groups:

- (11) M. tuberculosis strains resistant to four or more of the front-line treatments (i.e., extremely drug-resistant [XDR] strains) have appeared and spread rapidly in the last decade or so (124, 130). And now there are *TDR strains*, which are totally drug resistant!

Here, though referring to an unspecified amount of entities, the mass nominal group realizing the Existent designates just one instance of the kind *strains* identified within the temporal search domain expressed by *now*. Unlike explicit quantification conveyed by an Existent pre-modified by a cardinal quantifier which profiles the magnitude of a mass consisting of a certain number of discrete entities of the same type, as shown in (1) to (10), and where “considerable prominence is accorded to the discrete entities out of which the mass is constituted” (Langacker 1991: 78), Existents realized by bare plurals designate a qualitatively uniform mass composed of entities of the same kind. Reference to the amount of the instance is still present, though implicitly, while the emphasis is placed on the kind as such.

Existents realized by mass nouns exhibits a semantic make up similar to those realized by bare plural nominal groups:

- (12) Two studies were identified involving 1843 participants. There is *evidence* that walking groups have wide-ranging health benefits.
- (13) When blood pressure is tightly controlled with an average systolic reading of < 140 mmHg at three years post-transplant, there is improved allograft *survival* and reduced CV *mortality* at 10 years.

The Existent in (12) refers to one instance of the body of evidence obtained within a spatial search domain (*studies*). The word *evidence* designates a homogenous mass consisting of uniform elements corroborating the claim about the health benefits of the walking groups, the quantity of which remains implicit. Similarly, example (13) designates an implicit amount of *survival* and *mortality* within a search domain construed by a circumstance of contingency operating at clause-complex level, and specifying that the actualization of the instance of the Existent depends on certain circumstance: one instance of *improved allograft survival and reduced CV mortality* occurs when blood pressure is tightly controlled. In both examples the heads of the nominal groups realizing the Existent designate a mass which is internally continuous and undifferentiated: the measure of the intrinsic magnitude of the mass in question remains implicit.

In some cases, the magnitude may be conveyed more explicitly through the insertion of an epithet:

- (14) Since there were consistent findings in multiple high-quality RCTs (as well as in low-quality RCTs), there is *strong* evidence to conclude that early DMARD initiation results in better radiographic outcomes.

Here the adjective *strong* emphasizes the quantificational import of the existential clause by adding the meaning of “great in number” (Hornby 2005: 1521).

Medical writers may also signal no attestation of a given instance, or a *zero* attestation, either in a given search domain or in a domain which is not lexicalised but implied:

- (15) *Currently*, there is no bedside test available for ZIKV.
- (16) To our knowledge there are no publications that have evaluated physical activities in relation to the etiopatho-genesis of AIS other than sports scolioses and trunk asymmetries with swimming.

In example (15) the quantifier *no* profiles an instantiation with zero magnitude of the type *bedside test available for ZIKV* attested in the temporal search domain indicated by the mood Adjunct *currently*. In (16) the zero quantification relates to the instance of etiopathogenetic evaluation of AIS. The specification of the instance is here realised by a post-modifying embedded clause, whereas the search domain is not explicitly mentioned but easily retrievable by implication, and coincident with the overall space of the relevant literature available to and perused by the authors.

### 3.3 Degenerate replicate mass

Cardinal quantification may conflate with an indefinite determiner:

- (17) All patients randomized to sequence 2 receive treatment B in the first period, and then treatment A in the second period. Often there is *a washout period* between two periods during which they receive no treatment.

Here the indefinite article *a* profiles a discrete entity, which corresponds to one instance of the type category *washout period*. The indefinite article designates what Langacker calls a “degenerate replicate” mass, comprising only one component entity. This kind of one-entity quantification is notably typical of medical discourse when it comes to describing the outcomes of a medical research project or an experiment. The existent is often realized by head nouns profiling co-occurrence, referring to two or more things taking place simultaneously, like *association, link, relationship*, or to some form of variation in amount or number like *increase, fall, difference, change*. The specific nature of this relational configuration is expressed through post-modifying elements acting as Qualifier. The instance is often evaluated from the point of view of relevance, either by means of an epithet qualifying the instance (18), or in a less direct fashion, through counter-expectancy (19):

- (18) Compared with the intended stent strategy at the end of the first procedure, there was a *significant* increase in maximal stent diameter (in millimeters) (3.0 [IQR: 3.0 to 3.5] versus 3.5 [IQR: 3.0 to 4.0]).
- (19) *Following the first stage of the trial*, the primary outcome measures of cardiac death, non-fatal MI and coronary intervention failed to reveal statistically significant results. There was *however*, a 32% reduction of LDL-cholesterol and risk of MI was decreased by 35%.

It is interesting to note that in (19) the search domain is indicated not within the existential clause but by a non-finite clause (*Following the first stage of the trial*) contained in the previous sentence. Furthermore, the conjunctive Adjunct *however* binds the two sentences and enhances “the window of attention”, opened by the existential *there*, signalling counterevidence and counter-expectancy vis-à-vis a previous statement. The evaluation (*failed to reveal statistically significant results*) provided in the first sentence is counterbalanced by the entity profiled in the existential clause (*a 32% reduction of...*) which, by retrospective contrast with the insignificance of the primary outcome measures mentioned above, emerges as relevant and thus worthy of attention.

The Qualifier specifying the nature of the instance may be realized by highly complex structures which expand the head noun, delineating its specific nature and adding a temporal circumstance to the spatial indication designating the search domain:

- (20) *Within the deferred stenting group, there was a significant reduction in the proportion of patients with angiographic evidence of thrombus at the start of the second versus the first procedure (98.1% vs. 62.7%; p < 0.0001).*

### 3.4 Schematic quantification of magnitude

Unlike the above-cited examples which contain an explicit cardinal value, the following excerpts offer a less direct description of the magnitude of the instances in question:

- (21) In literature, there are *many reports* on the correction results of AIS, while there are *a few studies* focused on the difference of the correction results between MSS and AIS.
- (22) However, to date, there is *little evidence* about the effects of daily sleep duration on human health outcomes for older adults.

Existential constructions of this type convey “schematic expressions of the magnitude” (Langacker 1991: 84) and present Existents realized by head nouns pre-modified by indefinite quantifiers such as *many, little, (a) few, (a) little* that provide an approximate indication as to the quantity of the entities involved. On this account, the exact value of the quantity is not expressed by

a specific number on a scale but placed instead “within a vaguely-delimited range” (Langacker 1991: 84) and conceptualized by reference to an implicit norm. The quantity of the *reports* profiled by *many* in (21), for example, is conceptualized as being above the implicit reference norm and can be translated into a value higher than the expected quantity of the *reports* at issue. Conversely, the quantity profiled by *a few* implies a zero baseline with respect to which the quantity value of the *studies on the difference of ...* is situated a little higher. By the same token, the Existent in (22) profiles a “quantity” of evidence that falls below expectation. In both examples, *many*, *a few* and *little* contrast the asserted quantity with an expected quantity. Therefore, the semantic indeterminacy characterising “schematic” existentials is overridden by resorting to the common ground shared by the whole scientific community to which the two “interlocutors” belong and thanks to which they share a similar expectancy line and “arrive at roughly similar conceptions of the objective content” (Langacker 2008: 466). It is, in fact, the knowledge repertoire of discourse participants, whether construed locally or at a global level, that determines the reference point for the successful interpretation of quantifiers.

As a result, “schematic” existentials are used as evaluative tools since authors not only provide quantificational information, but also convey a kind of assessment according to the expectancy parameter whose value is discourse-and discipline-bound.

### 3.5 Relative expression of magnitude

All the examples analysed so far provide a measure of the intrinsic magnitude of the mass in question to a varying degree of ex/implicitness. The magnitude is determined either by reference to a quantized scale or a tacit norm.

By way of contrast, there are instances of existential constructions that “make a quantitative assessment relative to a reference mass” (Langacker 1991: 83), which may be openly stated or contextually determined. These are existential constructions which include forms of comparison:

- (23) In addition, there were *more* patients with cirrhosis among the genotype 3-infected group.
- (24) There were *more* patients with high-grade tumours in the elderly group *as compared with* the non-elderly group.

- (25) Difficulties were compounded by inadequate backfill and study staff attrition. There were *fewer* participants completing the maximum four sessions among the second half of participants recruited, and this was more pronounced in the MI group, suggesting that staff attrition may have impacted on the dose received by participants.

In (23) the relative quantifier *more* involves a comparative relationship with the reference mass *genotype 3-infected group*. Here the magnitude of the patients with cirrhosis is determined as a proportion of the reference mass represented by the *genotype 3-infected group*. The predicated mass (*patients with cirrhosis*) has a magnitude smaller than the mass represented by the whole *genotype 3-infected group* but greater than the mass of patients without cirrhosis belonging to the same group. This type of existential clause serves an indexical function since reference to the ground is fundamental for the identification of its meaning. While in (23) the size of the instance is obtained by comparing two masses belonging to the same search domain, the measure of the instance profiled by the existential in (24) is obtainable by explicitly (*more...as compared with*) comparing two values referring to two different search domains (*elderly vs. non-elderly group*). Interestingly, the true quantificational measure of the instance conveyed by *fewer* in example (25) is obtained by correlating three hierarchical orders of magnitude expressed, respectively, through the masses *the second half of participants recruited*, *participants completing the maximum four sessions*, *MI group*, all of them search domains.

There are other existential constructions which enumerate and quantify the instances of a more general category mentioned in the discourse:

- (26) Regarding *complications*, in 7 procedures (3.7%) the plasma filter was replaced due to increased transmembrane pressure, and in 2 procedures (1%) the filter clotted and the procedure was restarted. There were 5 (2.6%) cases of *hypotension* and one case of *severe gastrointestinal bleeding after PE with heparin anticoagulation*. During 139 PEs with citrate anticoagulation, there were 5 episodes (3.6%) of *significant hypocalcemia* during PE.

Here the existent noun groups *cases of hypotension/severe gastrointestinal bleeding/significant hypocalcemia* evoke a contextually specified “type”, namely *complications*, of which they enumerate the instances in relation to a quantitative scale. They are tokens of a superordinate “type” mentioned



in the preceding discourse. The word *complications* creates an expectancy in the readers about the types of complications involved. The existential clause enumerates a number of instances “as a response to an (implied) request for entities of a certain type” (Abbott 1993: 43).

#### 4. Existential tokens of evidence

The analysis conducted so far aimed at describing existential constructions and their discourse-semantic implications. The epistemological assumption underlying their widespread use in EBM texts is that they construe and convey information from a quantitative angle. On the strength of their quantificational import, existential construals, as they present themselves throughout EBM papers, can also bring inherently argumentative intentions to the surface because they can be used strategically to justify choices made by physicians and underpin the validity of the claims made by the authors of a clinical study. Indeed, the texts analysed here reveal a type of argumentation informed by some ideal model of critical discussion which, when examined at close quarters, may disclose traits and strategies typically used to defend a position or hypothesis. The examples selected in this section are intended to show how existentials may be exploited to build an evidentiary argument which runs through and frames the fundamental moments characterising the organizational structure of an EBM paper.

According to the pragma-dialectical theory developed by van Eemeren and Grootendorst (1992, 2004), argumentation is defined as “a verbal, social, and rational activity aimed at convincing a reasonable critic of the acceptability of a standpoint by putting forward a constellation of propositions justifying or refuting what is expressed in the standpoint” (van Eemeren – Grootendorst 2004: 1). Despite the apparent monological nature of the medical texts examined here, it is possible to detect a kind of cryptic discussion in progress, between those who, data in hand, endeavour to support a claim and those who, as interlocutors, as implicit potential antagonists, are called upon to accept the writer’s argument:

The pragma-dialectical argumentation theory assumes that, in principle, argumentative language use is always part of an exchange of views between two parties that do not hold the same opinion, even when the exchange of views takes place by way of a monologue. The monologue is then taken to be a specific kind of critical discussion

where the protagonist is speaking (or writing) and the role of the antagonist remains implicit (van Eemeren – Grootendorst 2004: 59).

In medical research papers it is not so much a matter of accepting and defending a point of view as that of providing convincing answers to specific questions about the biomedical or behavioural interventions from which clinical studies depart and which are normally embodied in the authors' premises. These can assume the status of evidence if they obtain the recognition and consensus of that invisible, amorphous mega-interlocutor known as the scientific community at large. Since acceptability rests upon data of a quantitative kind, and given the quantificational import of existentials discussed above, the word *there* acts as a discursive argumentative signal, marking some stages of the evidence-building process.

The response to a clinical question posed by medical investigators makes use of an argumentative process which goes through the four main stages of a critical discussion, "argumentation at a distance" in the case of a published article: the "confrontation", "opening", "argumentation" and "concluding" stages (van Eemeren – Grootendorst 2004).

The terms of the discussion are established during the "confrontation" stage where the authors address the present state of knowledge and know-how regarding a particular aspect of research in their field and seek solutions to the issue at hand. By comparing the latest literature and the state-of-the-art information actually available, the authors prepare the terrain for a reasoned, documented discussion of their claim. In (27), even though the experience of the scientific community is that *mesothelioma* recurs even after successful *first-line therapy* also because there are, to date, no second-level therapies available, the arguer, the authors of the study, intends to demonstrate the potential benefits of a chemotherapeutic drug called *nivolumab*:

(27) Unfortunately, even following successful first-line therapy, all patients with mesothelioma will subsequently relapse. There is currently no standard second-line therapy [...]. The outcome of this trial will provide evidence of the potential benefit of the use of nivolumab in the treatment of relapsed mesothelioma.

As we can see, the discussion is launched by a given, though numerically unquantifiable datum, introduced by the quantifier *all*, which in this context and by way of contrast summons up its polar opposite the zero quantity "none". If all the patients who successfully followed first-line therapy have

suffered a relapse, then the logical conclusion is that none are cured. The existential clause emphasises here both quantity and the urgency of finding a clinical solution. By suggesting that the quantitative vacuum conjured up by *all* and *no* may be filled, the arguer foregrounds the intervention gap that will be exploited to construe proof of the potential benefits of treatment based on *nivolumab*. The argument enters then its “opening” stage where the authors signal their intention to advance the progress of medical science in some way by providing solid, factual evidence supporting their achievement.

In (28) below, the “confrontational” stage is expressed by the existential clause which draws the reader’s attention to a quantitative datum regarding existing studies, *a few*, which are, as things stand, in need of further specific systematic investigation:

- (28) To date, there have been a few placebo-controlled studies using osmotic therapies in meningitis published in different settings in children and adults. A systematic review and meta-analysis would help to decide if these studies have demonstrated clinical benefit either by improvement in mortality or long-term neurological disabilities from the use of these treatments. This review aimed to encompass all types of osmotic therapies to investigate whether the principle of osmotic pressure change in the CNS is of benefit in people with meningitis [...].

The need for further systematic study is the node which, in this case, like (27), leads into the “opening” stage which makes the aim of the authors’ study perfectly clear: to conduct a systematic review aimed to encompass all types of osmotic therapies.

Following these two stages the discussion in medical papers typically enters the “argumentation” stage *strictu sensu* which begins when the authors start building up their evidence by presenting a series of informative data collected both at the baseline and at the end of the study. To achieve its argumentative purpose, the text has to mention all the fundamental data relating to the population examined, those comparing the arms of a clinical trial, and, finally, those regarding the final results obtained. In short, the argument will follow the PICO model (an acronym which stands for Patients (or Problems) / Intervention / Comparator / Outcome) used by medical researchers to help formulate clinical questions. It is here that the argumentative function of existentials more openly reveals itself, when describing, for example, the characteristics of sample groups:

- (29) The majority of patients ( $n = 389$ ; 89.5%) had pleural mesothelioma; there were 53 cases that were classified as non-pleural mesothelioma.
- (30) There were 573 eligible practices (73%) that agreed to participate and there were 195912 men eligible for the intervention group and 219445 men eligible for the control group. Among these 415357 randomized men (mean [SD] age, 59.0 [5.6] years), there were 189386 in the intervention group and 219439 in the control group after exclusions who were included in the analysis ( $n = 408825$ ; 98%).

To be credibly argued the answer to the clinical question underlying a research study will have to convey similarities and differences between the groups enrolled in the study:

- (31) There was no clear evidence of a difference between the two groups for thrombocytopaenia (OR 1.05; 95% CI 0.64 to 1.74;  $P = 0.85$ ).
- (32) There were 184 deaths in the combination group and 262 in the ADT-alone group. There was strong evidence of a survival advantage in the combination group, with a 3-year survival of 83% as compared with 76% in the ADT-alone group (hazard ratio for death, 0.63; 95% confidence interval [CI], 0.52 to 0.76;  $P < 0.001$ ) (Fig. 1A). There was no evidence of nonproportional hazards ( $P = 0.31$ ) or of heterogeneity of the treatment effect according to metastatic status at randomization.

Existentials typically occur in the presentation of the results to prove that the outcome(s) envisaged at the beginning of the study has (have) been achieved. The information provided will refer both to the data collected at the end of the study and to those collected during or after follow-up:

- (33) Among practices randomized to a single PSA screening intervention vs standard practice without screening, there was no significant difference in prostate cancer mortality after a median follow-up of 10 years but the detection of low-risk prostate cancer cases increased.
- (34) There was no difference between groups in relation to secondary outcomes (online supplementary table S1). For the overall cohort, there were three cases of early-onset pre-eclampsia  $< 34$  weeks (0.55%),  $n = 22$  (4.03%) any pre-eclampsia,  $n = 57$  (10.44%) SGA infants and 15.02% ( $n = 82$ ) placental disease. Secondary outcomes for groups 3A (screen-positive aspirin) and 3B (screen-negative no

aspirin) are demonstrated in online supplementary table S2. Despite taking aspirin, there remained a greater number with pre-eclampsia at < 37 weeks in the screen-positive versus the screen-negative group, although numbers were small ( $n = 2$  (15.4%) vs  $n = 2$  (1.2%)).

Crucially, all the data provided are functional to corroborating the initial claim. Each single datum provided during the “argumentation” stage represents a token of evidence bearing witness to the achievement of the goal established at the beginning of the project and leading, hopefully, to acknowledgment of the outcome as evidence recognized by the scientific community.

The following excerpts, instead, exemplify the concluding stage where the author asserts the overall success of the research carried out though it may still be in need of further investigation:

- (35) There is growing evidence supporting that early brain injury in aSAH may be related to significant morbidity and mortality. This needs to be explored further.
- (36) The authors suggested that there was potential to reduce the intensity of treatment based on successful surgical control of disease in good prognosis HPV-positive patients. However, further validation through RCTs, like PATHOS, is needed prior to widespread shifts in practice.

Here the authors re-assert their initial position, while conveying the final outcome of their research. At the same time, they set the scene for fresh discussions (*explored further, further validation*), also suggesting the context in which the new argument might take place.

The constellation of existentials which occur at each discourse phase suggests that the notion of argumentative style, as “a particular way in which an argumentative discourse is conducted to be helpful in achieving the difference of opinion at issue aimed for by the arguer”, is particularly pertinent in this context.

## 5. Conclusion

EBM has been viewed by some scholars (Marks 1997; Porter 1995) as a continuous effort to render medicine as scientifically meaningful as possible

through quantification. Therefore, thanks to their semantics, existentials form a privileged environment in which to investigate medical discourse from a quantitative angle, especially because quantification represents one of the techniques of objectification characteristic of scientific writing. On this account, they are employed extensively in the medical texts analysed here because they activate a type-instantiation mechanism from a quantitative perspective which EBM writers can employ to describe the fundamental steps of their observational and experimental studies.

Far from functioning as a locational deictic, existential *there* acts as a strategic discourse signal pointing at entities designated by the Existent, inducing the expectation that a new entity profiled for its quantity be introduced into the discourse. Although quantification is crucial to the semantics of existentials, these clauses also serve other functions at a discourse level. They not only trigger the awareness of the readership as the discourse unfolds, by opening “windows of attention” whose content is quantitative, but also convey evaluative meanings in terms of either relevance or expectation.

Existential clauses can underpin some of the subtle argumentative strategies employed by scholars seeking to construct and disseminate information that will enhance the medical community’s knowledge, mainly because they are employed to introduce new and relevant quantitative information into the discourse. They also signpost a set of strategic manoeuvres “instrumental to realizing the arguer’s strategic scenario” (van Eemeren 2019: 163) by “legitimizing the transfer of acceptance” (van Eemeren 2019: 156) from the data, reported gradually, to the final outcome of clinical studies.

This study makes a contribution to the diffusion of specialist knowledge regarding the use of English. The combined theoretical framework applied here may pave the way for further research on the diffusion of specialist knowledge in English undertaken from a cross-disciplinary angle and aimed at comparing the frequency and role of existential clauses in medicine and other scientific domains of scientific discourse particularly concerned with the notion of evidence.

Furthermore, the linguistic analysis carried out here may prove useful to medical students and professionals when seeking to textualize their clinical findings and contribute effectively to the dissemination of the findings of medical research and the ultimate improvement of healthcare intervention.

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