Vicent Montalt and Ana Muñoz-Miquel

Chapter 16
Translators in medical and health settings

Abstract: While health and illness are often perceived primarily in biomedical terms, they are situated in the realm of personal experience and embedded in specific languages, cultures and societies, making medical and health translation a complex and rich field, where ethnic, professional and disciplinary cultures converge and present myriad challenges. In this chapter we discuss a number of specific features that characterize medical and health translation, and make it a well-defined professional activity and academic speciality. We consider current trends in biomedical research, clinical practice, society and technology, such as personalized medicine, translational medicine, patient-centred care, global health, e-health, or the growth of machine translation and artificial intelligence. We argue that these drivers of change have the potential to transform radically the landscape of the professions and social practices involved and, consequently, of education and research. We look at some of the professional challenges, educational gaps and opportunities for research and innovation. Finally, we conclude that translation can contribute a great deal to the improvement of multilingual and multicultural communication in biomedical, healthcare and global health contexts. In the current era of increasing automation, humanizing such communication is undoubtedly more important than ever.

Keywords: education, health, medicine, profession, translation

1 Introduction

Medical and health translation is a vital professional activity in contemporary societies, as well as an academic specialty dedicated to the education and training of future professionals, and a fertile field of research (Montalt and González Davies 2007; Montalt, Zethsen and Karwacka 2018). It is essential to understand the specifics of medical and health translation as a professional activity in highly multidisciplinary contexts. Medical and health translation involves many aspects that can be summarized in two closely related dimensions (Montalt 2021). On the one hand, the biomedical dimension, that is to say, the expert discourses that shape specialized knowledge and through which it is conveyed. On the other hand, the health dimension, which is focused mainly on health care and public health. The first aim of this chapter is to explore the specifics of medical and health translation.

Medicine and healthcare are in a state of constant change due to fresh research and discoveries in biomedicine and novel ways of approaching the care of patients.

Technological developments, and in particular artificial intelligence (AI), are revolutionizing not only biomedical research and healthcare, but also the very professional activity of translators and interpreters. Telemedicine (eHealth) and the emergence of the digital patient are radically changing notions of information, knowledge and communication in clinical contexts. New machine translation (MT) tools are penetrating the work of translation professionals with great impetus. The second aim of this chapter is to explore these new drivers of change in medical and health translation. Finally, our third aim is an attempt to foresee the kinds of impacts these drivers may have on the profession, on education and on research.

2 Characterizing medical and health translation

2.1 A quick glance back

Historically, translation and medicine have gone hand in hand. In fact, science in general and medicine in particular began as translation (Montgomery 2000). At every milestone, "translation was the key to scientific progress as it unlocked for each successive inventor and discoverer the minds of predecessors who expressed their innovative thoughts in another language" (Fischbach 1993: 90). Translation has been –and continues to be – a driving force of advancement in all scientific disciplines. Over the centuries, the development of medical knowledge has depended on the transmission of discoveries and ideas through texts across languages and cultures, starting in Ancient Mesopotamia (Montalt 2021). In addition, translation has evolved in a mutually beneficial relationship with technological developments, from cuneiform tablets to the internet and AI. This symbiosis can be seen at multiple stages throughout the millennia.

Medical translation has existed since the oldest forms of cuneiform writing on clay tablets in Ancient Mesopotamia, conventionally dated to 3200 BCE (Montalt, Zethsen and Karwacka 2018). Also of importance are the lexical sources for anatomical and disease terminology. These "vocabularies" were often bilingual (Sumerian with an Akkadian translation). Archaeologists have found one of these vocabularies in Sumerian, Ugaritic, Akkadian and Hurrian, dating back to around 1300 BCE. It contains medical information in its pre-scientific, magical and religious form and might well be the first written hint of medical translation (Zethsen and Montalt 2021).

In 5th-century BCE Greece, we find the *Corpus Hippocraticum*, a body of texts that inspired further study and spread to other languages and cultures in subsequent centuries, such as in the work of Galen some 400 years later, whose work was translated into Arabic at the House of Wisdom. The Hippocratic tradition departs from the magical and religious, focuses on the physical in its understanding and explanation of disease, and abandons the possibility of curing by the word. *Physis*, the knowledge of

nature in classical Greece, takes centre stage and medicine gradually becomes a *muta ars* (Montalt 2021), and in subsequent centuries, a fully developed scientific discipline, generating an ever-increasing amount of information as well as compelling needs for knowledge transfer, international communication and translation (Montalt 2021).

Throughout the centuries, translation has always been entangled in the process of knowledge production, albeit in rather covert ways (Montalt 2021). In contrast with the so-called "diffusionist" models of knowledge production and distribution, Delisle and Woodsworth (1995: 101) point out that the "translators of history should not be regarded as passive conduits of specialised information, but rather as agents fully implicated in the works they reformulated in another language". The very process of circulation produces new knowledge (Delisle and Woodsworth 1995). Wisnovsky (2017) argues that even when translators declare themselves to be faithful interpreters, individual acts of recreation and transformation inevitably occur during the process of translating a philosophical work from one language to another. The interplay between translating, commentating/glossing and transcribing/copying has caused expansions, contractions and mutations in concepts and arguments that can explain some substantive developments of philosophy in general, and natural philosophy and medicine in particular (Montalt 2021).

Despite this long history, teaching and research in medical and health translation are a relatively recent phenomenon. In his bibliographical study, Franco Aixelá (2010: 159) points out that widespread systematic research in medical translation and interpreting only started at the beginning of the 21st century and has focused primarily on professional aspects, quality, pedagogy, documentation, tools and history. Much of the research done before then had a predominantly prescriptive orientation and focused mainly on the terminological issues related to highly specialized texts. In recent decades, medical translation has been redefined (Montalt and González Davies 2007) to encompass a great variety of texts, communicative situations, contexts, discursive practices and participants.

2.2 Medical specialties

Over the centuries, medical knowledge has evolved and grown exponentially, resulting in all the different specialties and subspecialties that translators deal with nowadays. They include allergy and immunology, anaesthesiology, dermatology, diagnostic radiology, emergency medicine, family medicine, internal medicine, medical genetics, neurology, nuclear medicine, obstetrics and gynaecology, ophthalmology, pathology, paediatrics, psychiatry, pharmacology, surgery, or urology, to mention just a few, together with other disciplines relevant to healthcare such as nursing, psychology, genetics, molecular biology, medical anthropology or even statistics and ethics (Vandaele 2001). At present, epidemiology, virology and immunology have become of critical importance due to the COVID-19 pandemic. Full comprehension of the content of the source text to be able to produce an

accurate, reliable target text involves having a basic understanding of the fundamentals of the subject matter or specialty at hand, being familiar with reliable information sources, and knowing how to search for and acquire the necessary knowledge as and when needed.

2.3 Medical terminologies

Medical knowledge is cumulative, resulting from the addition and interweaving of successive authors, concepts, vocabularies, texts, traditions, languages, cultures and civilizations, which means that any historical accomplishment owes its success to previous contributions (Zethsen and Montalt 2022). This cumulative nature of knowledge in medicine and health continues to characterize current advances and is clearly reflected in terminology (Quijada Diez 2021). Greek and, to a lesser extent, Latin, are the languages of formal medical terminology. Current medical terminology is a historical sediment of scientific medicine including terms from 25 centuries ago to those created much later (López Piñero and Terrada Ferrandis 2005). Each medical specialty has its own systems of concepts and terms, such as well-established classifications and nomenclatures of all kinds. Translators are required to be aware of them and to know how to use them adequately to produce target texts that are conceptually accurate and reliable. In addition to what has been termed "in vitro" terminology (Montalt and González Davies 2007: 234), translators also have to deal with neologisms, synonymous and polysemous terms, taxonomical changes or register mismatches between languages – that is, "in vivo" terminology (Montalt and González Davies 2007: 240). Lack of terminological precision can lead to "[putting] the well-being and lives of patients at risk as well as jeopardiz[ing] the behaviour of health professionals making use of those translations" (Zethsen and Montalt 2022: 364).

2.4 Information sources

In professional practice, translation problems are common and can be of many different kinds. They give rise to documentary and human consultation needs; and through consultation, they can be resolved in a satisfactory way. Professional translators in medical and health settings may be in need of documentary consultation for several reasons, including the fact that they lack prior knowledge of the subject of the text they are translating, especially in the case of highly specialized texts, or the exponential growth of medical-health information in all its specialties and, consequently, the enormous quantities of data, texts and sources that the translation professional has to handle (Montalt and Sánchez 2023). Medical and health information sources include a wide and rich range of possibilities, from specialized dictionaries or large collections

of abstracts – such as Pubmed[1] – to open-access research journals or multilingual in-
stitutional websites, such as that of the World Health Organization (WHO).

2.5 Contexts, situations and participants

In addition to how medical and health knowledge is structured in different specialties
and the terminological challenges they pose, professional translators and interpreters
also deal with a great variety of contexts, including: biomedical research teams and
the journals where they publish their findings; hospitals; national and international
health organizations; non-governmental health organizations, such as medical socie-
ties or patients associations; educational contexts in higher education where trans-
lated textbooks are used; manufacturers of medical devices; or the media, some of
which recontextualize and circulate relevant biomedical findings. Popularization of
medical knowledge – in the form of articles, books or TV documentaries – and the
promotion of health literacy among the general public are a relevant area to transla-
tors, as are fictionalized audiovisual products – such as TV series or films – that con-
tribute to the public understanding and democratization of specialized knowledge.
Within each of these contexts, translators and interpreters deal with specific commu-
nicative situations, such as a process of informed consent involving a patient and a
doctor for a specific surgical operation, a procedure of approval of a new drug, or the
promotion of health through campaigns, to mention just a few.

Participants in medical and health communication can be very varied and they in-
clude researchers, health professionals, technicians, managers, policy makers, journal-
ists, social workers, patients and their relatives, the general public, and, of course,
translators and interpreters in the case of multilingual and multicultural contexts. Tra-
ditionally, medical and health communication has been predominantly top-down – for
instance, from the professional to the patient. However, in recent times, many patients
have started to take a more active, empowered role as agents fully implicated in their
therapeutic process who wish to make themselves visible to other patients and to soci-
ety by publishing their personal experiences through patients' narratives.

2.6 Text genres

Traditionally, medical and health translation has been restricted to highly specialized
registers. However, in the last two decades or so, less specialized and more general-
ized contexts and situations are also included – for example, those involving patients
and the general public. Much of the communication that takes place in these contexts

---

1 See https://pubmed.ncbi.nlm.nih.gov/ (accessed 20 September 2023).

and situations, in which the participants create meaning, exchange knowledge and perform their tasks, is articulated through patterned, more or less standardized text forms that we call text genres. Medical and health translators deal with a great variety of them, from research articles or clinical guides for health professionals to university textbooks for medical students or patient information leaflets (PILs). Each of these genres has its own social function and formal conventions, which may vary not only between languages but within the same language and culture. These interlingual and intralingual variations are highly relevant to professional translators because the acceptability of the translation they produce depends to a great extent on the fulfilment of the functional and formal expectations in the target culture.

The notion of genre allows us to focus on differentiated approaches and whole communicative situations, rather than just on the text and the translator (Montalt 2022). Different genres embody different norms and values and have specific ethical priorities (Montalt and González Davies 2007). For instance, when we investigate, and, to a lesser extent, when we write or translate, genres used in scientific research, such as the original article, we can learn something about the scientific method and how it is reflected in the structure of the genre; or about the values that the scientists hold, such as social relevance, conceptual accuracy, methodological validity, or transparency and integrity in the communication and interpretation of results. All of them influence the composition and wording of texts in this genre. Likewise, when we study PILs, we may understand something about how health authorities try to make sure that patients take the medicine in a safe and effective way, though they might not necessarily succeed. We can also learn about how patients read, understand and retain the most relevant information, or indeed fail to do so when comprehensibility is not achieved. In PILs, comprehensibility is at the service of safety and efficacy, which are the two core values in the ethos of the genre. They shape the text as a whole and determine all sorts of choices at the microlevel. The same can be said about other genres, such as the informed consent form, as will be discussed in this chapter. Indeed, when studying genres from an ethical perspective, we can learn about their ethos and what really works as well as about what does not work, is unethical and should be improved. Thus, translators deal not only with the formal conventions of texts and their variations among genres, but also with the ethical priorities of each one of them, which influence the choices they face. This view of genres can raise awareness of the ethical, cultural and communicative complexities, and help translators to make reasoned decisions (Montalt 2022).

2.7 Pluralism and multiculturalism

Neither medicine nor healthcare exist in a vacuum. Both are always embedded in specific and changing cultural and social contexts. In contemporary democratic, open, cosmopolitan societies, not only do different worldviews, languages and cultures co-

exist, but also different views on illness, health and wellbeing. Scholars of medical pluralism (Khalikova 2021) use this concept to refer to the availability of different approaches, treatments and institutions that people use to maintain health or treat illness. Medical pluralism entails the use of western medicine (or biomedicine) and what is variously termed traditional medicine, alternative medicine or complementary medicine, such as traditional Chinese medicine, ayurvedic medicine, homeopathy or acupuncture. For example, cancer patients might complement chemotherapy with acupuncture and religious healing; or women who want to get pregnant might combine hormonal treatment with home remedies and yoga (Khalikova 2021). These non-biomedical practices are highly relevant to translators and interpreters not only in well-established multilingual and multicultural societies, but also in the context of crisis and disaster communication, where diversity of languages and health cultures must be catered for.

2.8 Two ethical perspectives

Two ethical dimensions define medical and health translation. The first dimension refers to the fact that translators and interpreters have their own professional and personal ethics. They have their deontological codes and can position themselves in a range of ethical roles, such as neutrality or advocacy, sometimes giving rise to dilemmas between the simplicity of those abstract codes and the complexity of specific situations (Montalt 2022).

The second dimension is that of the health professions, both in healthcare – that is, professionals in clinical practice devoted to maintaining or restoring the physical, mental or emotional health and well-being of individual patients – and in public health – that is, those working for the protection and improvement of community health in entire populations, including disease prevention, epidemiology and hygiene. Their ethical codes regulate their clinical and social activities, including the way they use information, language and communication with patients and the public. As a "caring" profession, medicine has a long tradition of ethics and social responsibility. Health professionals are expected to act with integrity, to be honest and transparent about the decisions they reach and how they reach them. The ethical principles that regulate the activities of health professionals also include respecting patients' dignity, treating them in a humane and compassionate way, maintaining confidentiality about information regarding their health, ensuring that patients are given the care and resources they need, or making sure that they receive the relevant information in a way that can enable them to participate in their therapeutic processes as well as in preventive actions (Montalt 2022).

2.9 Clients

The clients for which professional medical translators often work are varied. They include pharmaceutical laboratories, contract research organizations (CRO), publishing houses, universities, medical societies, research institutes, hospitals, clinics, scientific journals, health organizations, translation companies or medical software companies. These clients can be grouped in several distinct sectors (Muñoz-Miquel 2016): pharmaceutical, publishing, research, public health, healthcare and others.

2.9.1 Pharmaceutical sector

The translation needs in the pharmaceutical sector are related to the research, development and marketing of medicinal products. The predominant genres, addressed to specialists and health authorities as well as patients and the public, are varied: package leaflets, marketing authorization applications, leaflets for special campaigns, clinical trials protocols or informed consent forms. CROs play a key role, as they are usually hired by pharmaceutical companies to prepare and translate documents used in clinical trials.

2.9.2 Publishing sector

Publishing houses – as well as public health organizations and medical societies – regularly publish treatises, manuals or textbooks. They tend to be highly specialized genres and are aimed at practising professionals who need to keep updated or university students. Most of these texts in a number of non-English speaking countries need to be translated. For example, in Spain, according to the National Statistical Institute, the number of books about medical and health sciences translated from English is quite high and significantly outnumbers those about other scientific fields.[2] Translators involved in their translation usually work in interdisciplinary teams – terminologists, editors-in-chief, proofreaders or medical specialists – and must familiarize themselves with the protocols and quality standards of each publishing house.

---

2 According to the 2019 data of the Spanish Statistical Institute, which is the latest available at the time of writing this chapter, 295 books about medicine and health sciences were translated from English; 114 about natural sciences; 23 about engineering, technology, industries and trades; and 20 about mathematics (see https://www.ine.es/; accessed 20 September 2023).

2.9.3 Research sector

Biomedical research, which is conducted in universities, hospitals or health institutes, is published in scientific journals in the form of original articles, clinical cases, clinical guidelines, review articles or scientific letters. Both the journals and these institutions where research is originally produced often require translation, revision and editing services, or even language consultancy support.

While most research-derived genres tend to be aimed at experts in the field, an increasing number of specialized publications include information addressed to patients and the general public, usually in the form of summaries for patients. To reach this lay audience, intralingual translation strategies and determinologization procedures – that is, turning a technical term into a non-technical term or expression – must be utilized, as we shall see in Section 3.

2.9.4 Public health sector

United Nations (UN) agencies, such as the WHO and the Pan American Health Organization (PAHO), translate large volumes of documents annually. By way of example, 3 million words were translated in the 2016–2017 biennium at the WHO (WHO 2019). These documents deal with public health in a broad sense: human resources development, disasters, communicable diseases, epidemiology, health promotion, environmental health, vaccines or immunization. In the European context, other public organizations, such as the European Medicines Agency (EMA) generate great amounts of information which are then circulated in many different languages. The translators who work for these organizations are mostly freelancers, although a considerable number of them work as in-house translators.

2.9.5 Healthcare sector

In multilingual and multicultural clinical contexts, in addition to medical records, informative and instructional genres such as fact sheets for patients need to be translated. These texts are reformulations of more specialized genres that try to adapt to the patients' background knowledge, needs and expectations. The drafting of texts about a given disease or treatment that complement the oral explanations provided by healthcare professionals is also necessary (García-Izquierdo and Muñoz-Miquel 2015). Finally, there is a need for professional interpreters in oral interactions during medical consultations.

2.9.6 Other sectors

Translation companies and language service providers usually provide services to most of the sectors mentioned above. Other types of companies that require medical translations are biotechnology companies, manufacturers of medical devices or software, and medical insurance companies.

2.10 Professional tasks

Medical and health translation is a very active and varied field of professional development. The results of the European Language Industry Survey (ELIS Research 2023) place the healthcare sector in the first place (out of 17) in terms of growth prospects and shows that it is the most demanded domain by clients of language service companies.

There is a wide variety of tasks that are to be carried out. The results of a study aimed to obtain information about the profile and tasks of medical translators (Muñoz-Miquel, Montalt and García-Izquierdo 2020) show that the professionals surveyed are called upon to perform, to a greater or lesser extent, a wide variety of tasks within the medical domain, and do not limit themselves to the equifunctional translation between different languages. Examples of the tasks that they carry out include the following:

– Tasks traditionally associated with the role of the translator: translation in the "purest" sense, revision, copy-editing, proofreading, content editing, quality assurance, localization, project management, dubbing, subtitling, interpreting and mediation, recruitment of translators.
– Tasks related to terminology and documentary management, including creating glossaries, style guides, dictionaries; coining terms together with experts in the field; or harmonizing documents and translations, such as summaries of product characteristics or PILs.
– Tasks related to what has been called "user-centered translation" (Suojanen, Koskinen and Tuominen 2015), that is, adaptations, intralingual translations (Zethsen 2009), heterofunctional translations (Nord 2009) or genre shifts (Montalt and González Davies 2007) of all kinds: adapting specialized texts for patients; adapting texts to different varieties of the same language or to a more neutral one; adapting, from a cultural point of view, texts on products for a given market; or adapting medical material to different formats for the same receiver.
– Tasks in which the translator performs the role of a monolingual or bilingual content creator, including creation of content for websites, writing of original texts, or creating content on social media.
– Tasks related to the use of technological advances in translation, such as post-editing MT output.
– Tasks in educational contexts such as teaching languages and translation.

–   Other tasks in the areas of desktop publishing, transcription, linguistic validation (including cognitive interviews and assessment of translatability), organizing medical conferences, running a hospital translation and interpreting department, or assisting in the production of short videos on medical topics.

3 New drivers of change

3.1 Current trends in medicine and health care

Medical and health translators and interpreters, and perhaps more importantly, researchers and teachers in this field of specialization, need to be aware of current developments that may change the landscape of the professions and social practices involved, and consequently, of education and research.

3.1.1 Evolving paradigms

In the last two centuries or so, medicine has gradually resorted to scientific and empirical methods to obtain reliable knowledge. In recent decades, evidence-based medicine (EBM) has become the gold standard of medical practice. EBM aims for the ideal that healthcare professionals should make conscientious, explicit and judicious use of current best evidence in their everyday practice, rather than just following clinical experience or personal intuition. For that purpose, the practice of EBM uses systematic reviews of the medical literature available to assess the best evidence on specific clinical topics – something which is called "evidence synthesis". The evidence is then "translated" into practice by health professionals who select treatment options for specific cases based on the best research available. This process of transfer and application is referred to as "knowledge translation" (KT).

Recently, biomedical science has diversified into personalized medicine (PM) and translational medicine (TM). PM is a form of precision or stratified medicine which springs from the notion that, in biomedical and pharmacological terms, one size does not fit all – something that can also be said regarding communication and information. Different groups of patients as well as the individual patient have different characteristics and needs. Based on advances in genetics and genomics, PM uses characterization of individual phenotypes and genotypes for tailoring the most appropriate therapeutic strategy for the right patient at the right time. Personalizing therapeutic strategies and pharmacological treatments does not – yet – necessarily mean tailoring information and communication to the specific needs of the patient and reinforcing patient-centred care (PCC) and communication (Montalt 2021). In PM, patients are the individual recipients and beneficiaries of biomedical innovation, the silent physiological and biochemi-

cal bodies that passively receive the targeted cure based on the best possible biomedical evidence. Translators are also seen in passive terms as mere intermediaries in charge of making the top-down, impersonal, detached, and "neutral" flow of information that characterizes PM to happen (Montalt 2021).

TM goes one step further than EBM and PM, and aims to transform scientific discoveries arising from laboratory, clinical or population research into new clinical tools and applications (Montalt 2021). Thus, TM aims at bridging the gap between biomedical research and clinical practice. KT is also a fundamental concept in TM, only that in a more central way than in PM. Ensuring the translatability of knowledge involves encouraging a circular, two-way flow of information – from the laboratory to the clinic (what in TM is called "bench to bedside"), and from the clinic back to the laboratory ("bedside to bench"; Montalt 2021). Distributing knowledge from "bench to bedside" involves translational modifications and the development of adaptations to new audiences, mainly clinicians and patients, in the form of functional, applicable synthesis such as guideline recommendations for clinicians or genres addressed to patients. In these genre shifts from more to less specialized registers the overall aim is that the message becomes scientifically trustworthy. Translators can contribute a great deal to circulating the relevant knowledge through the interlingual and intralingual activation of several genres (such as research articles, summary of product characteristics, clinical guides and fact sheets for patients; see Montalt 2017; Brøgger and Zethsen 2021; Karwacka 2021).

In the context of these evolving paradigms, Engebretsen, Sandset and Ødemark (2017) argue that KT reflects a subordinate and mechanistic view of translation as no more than a conduit for knowledge dissemination, in which true scientific knowledge remains "uncorrupted" after crossing multiple social, cultural and linguistic barriers. In translational terms, the "target culture" (that of clinical practice and the sphere of the patient) is subordinated to the "source culture" (that of biomedical research). The aim of the translation is to be a hermetically sealed container and a safe carrier of the original message from the source to the target culture.

3.1.2 The human dimension

The doctor–patient relationship in clinical contexts has changed over the years. Doctor-centred consultation and communication styles were the norm for a long time and are still pervasive in many healthcare cultures. In doctor-centred communication, doctors' agendas, registers and discourses are prominent, and patients are given a passive role to play. Although the patient has gained prominence as the recipient of and justification for biomedical research in recent times, the fact is that the patient is still seen in mainly biomedical terms in EBM, PM and TM. The social, cultural, linguistic and psychological dimensions of care continue to be marginalized in these new developments.

In recent decades, however, more awareness of the patient's human perspective and the central role of factors other than the biomedical ones in his/her health and well-being have taken centre stage. Engel's integrative biopsychosocial model of medicine and health (Engel 1977) is a good example of this kind of development that can – and should – enhance our understanding of the active, far-reaching and consequential role of language, communication and translation. In many healthcare settings, PCC has started to emerge as a more humanized approach that rebalances the key factors in healthcare and redefines both the values and the roles of the various participants in the communication processes involved in healthcare. In PCC, an individual patient's specific needs and desired outcomes become the driving force of care and communication. The clinical perspective is counterbalanced with the social, cultural, linguistic, emotional and spiritual perspectives of the individual patient. In other words, the patient is a person with a voice.

In response to PM, TM and PCC, a new translation-oriented perspective is required in which the focus is on the target patient as a reader of translations and participant in oral interactions as well as a user and beneficiary of healthcare. Patient-centred translation (PCT) has been proposed (Montalt 2017) as a concept that refocuses the priorities in the translation process in genres and communication processes where the patient is the central player.

PCT is a type of user-centred translation (Suojanen, Koskinen and Tuominen 2015) in which the target patient's perspective takes centre stage. PCT is aimed at achieving full comprehensibility, empathy, empowerment and well-being of patients through grammatical, terminological, stylistic, textual and pragmatic means as well as by non-verbal resources. PCT takes into account both individual and well-defined subgroups of patients' characteristics regarding educational background, clinical situation, specific needs and preferences in the presentation of information. PCT is emotionally supportive, and culturally relevant and coherent. Intralingual translation (Zethsen 2009) and determinologization are fundamental components of PCT. PCT relies and depends on constant testing and feedback from real target patients.

This rebalancing of key factors in medicine and healthcare can also be seen in the academic field of Medical Humanities, also referred to as Health Humanities, where medical and health translation can play a crucial role (Montalt 2021). In Medical Humanities, "patients are not reduced to diseases and bodies but rather are seen as whole persons in contexts and in relations" (Cole, Carlin and Carson 2015: 8). The main driving force behind the emergence and consolidation of Medical Humanities is a move towards a more holistic, comprehensive and inclusive model of medicine and healthcare, together with a burgeoning interest in ethics, values, language and communication in multilingual and multicultural settings (Montalt 2021). In fact, patients are seen as fully active agents who can provide valuable information as well as personal experience in the form of narratives of all kinds. Within Medical Humanities or Health Humanities, Narrative Medicine provides the frames, tools and concepts to explore the perspectives of patients and give voice to them. In this drive to bring the

human back into health and communication, patients' narratives are becoming a valuable source of information to complement – and often challenge – expert knowledge and a way to make their experience and perceptions more visible in society (Montalt 2017). In the broader context of AI (see Section 3.2), both patients' narratives and PCT can contribute to counterbalancing the tendency of translation being increasingly performed by MT engines.

3.1.3 The social dimension

Public health focuses on the protection and improvement of community health in entire populations, including disease prevention, epidemiology and hygiene. In contrast with doctor–patient communication in clinical contexts, in which individuality plays a crucial role, public health communication aims to reach the whole of a given population. In recent times, we have seen the importance of public health communication in the context of the COVID-19 pandemic, where huge efforts had to be made to communicate relevant epidemiological information to national and international audiences. COVID-19 has shown the need to circulate scientific, biomedical information on epidemiology, virology and immunology. Social communication in the context of public and global health is definitely an area of rapid change and pressing needs for improvement.

Humanitarian crises of all kinds – from pandemics to wars to floods – have been acknowledged to pose communication challenges such as language diversity (Federici 2016) and language variation (Montalt 2022). Language diversity refers to the fact that information and communication need to be circulated and carried out in multiple languages so that everybody is included, and nobody is left behind because of linguistic barriers. Due to the transboundary nature of modern-day crises, crisis communication must be multilingual, and multilingual crisis communication is enabled through translation (Federici 2016).

Language variation refers to the fact that communication is complex, and it takes many different forms. For example, in the context of the COVID-19 pandemic, multiple genres have been deployed to improvise solutions in public health communication: press conferences, statements of health organizations, executive orders, lay summaries of original articles, scientific editorials containing recommendations for policy, technical reports, news articles, FAQs, infographics, visual narratives, patients' guides or health campaigns (Montalt 2022). KT is crucial not only in clinical communication but also in global public health communication (Montalt 2022).

An example of the importance of crisis communication and translation is the INTERACT project,[3] an EU-funded research project within the Horizon 2020 programme,

---

3 See https://cordis.europa.eu/project/id/734211 (accessed 19 September 2023).

whose primary focus is on health-related crisis content in the fields of crisis communication policy, comprehension in limited proficiency communities, crisis MT, citizen translator education, and ethics and through collaboration across academic, SME, NGO and multinational partners. The overall aim of INTERACT is to enable affected communities and responders to be prepared for crises, improve resilience and reduce the loss of lives.

3.1.4 The technological dimension

Technology and digitalization have had a major impact on medicine and healthcare. Electronic Health (eHealth) – the use of information and communication technologies for health (WHO 2022) – is on the rise. The use of telemedicine, a specific application of eHealth, has considerably increased during the COVID-19 pandemic. It allows medical practitioners to have consultations online, and in some cases even diagnose and treat patients without maintaining personal contact. Telemedicine can take different forms, including online consultations, telemonitoring, or the use of sensors and chatbots (Vidal-Alaball et al. 2020).

Another important innovation within eHealth is Mobile Health Technology (mHealth), which involves the use of smartphones, tablets and other mobile devices and wearables to improve healthcare access, delivery and research. These devices can be used to promote healthy habits for disease prevention, assist patients in the self-management and monitoring of chronic illnesses, enable a closer contact with health professionals, give access to clinical information, or offer real-time monitoring of patients. In addition, they may be used to feed big data technology and provide useful information to researchers and clinicians.

The rapid development of AI in recent years has led to its successful application in the medical field, where it is mainly used to diagnose diseases and to offer personalized medical solutions. Among technologies within AI, machine learning is being exploited for precision medicine to predict the development of a disease in a given patient. In the pharmaceutical industry, machine learning is being used, among others, to identify new drug candidates and to help to reduce a process that is generally lengthy and costly.

AI is also being used to create robotic systems that assist – and even replace – healthcare professionals in different clinical settings. For example, some systems help surgeons to perform complex micro-procedures in the operating theatre; others assist nurses in identifying, matching and distributing medicine to patients in hospitals.

3.2 Technology in medical and health translation

As we have pointed out, translation has evolved in continuous symbiosis with technological developments. In the last four decades, typewriters, personal computers, translation memories, CAT tools, electronic documentary resources, terminology management tools or voice recognition software have helped translators streamline most of their daily tasks in an efficient manner. Over time, some of these advances have been replaced (typewriters were substituted by personal computers), while others have evolved to more optimized and sophisticated versions of themselves (e.g., CAT tools). However, it is the internet and all that it has brought with it – online resources, forums and mailing lists, systems to receive and send information such as email and ftp, web 2.0, internet of things, cloud-based translation systems, social networks and so on – that have undoubtedly been a turning point transforming radically the way translators work.

Another central driver of change is AI, which is deeply reshaping the translation industry.[4] MT is one of the technological developments that AI has brought about. More and more language service providers and freelance translators are making use of MT in their workflows, generally accompanied by a post-editing process.[5] This has been fostered by the emergence of neural MT, whose output is of increasingly higher quality (Casacuberta and Peris 2017) than that offered by previously developed MT systems.

Increased productivity and the ability to respond to tight deadlines are some of the advantages of MT in combination with post-editing. In addition to translation companies and freelance translators, several international organizations with their own translation services are beginning to incorporate MT into their processes to cope with large translation volumes. The UN has recently adopted the eLUNa system,[6] which combines CAT and MT, and the European Patent Office translates with a fully customized neural MT system, Patent Translate,[7] which has been developed in collaboration with Google. In the medical and health context, the PAHO is an example of an international institution with extensive experience in the use of MT: since the 1980s, translators have been post-editing the output of its own MT tool, PAHOMTS®.[8] In 2020 they started to use eLUNa together with PAHOMTS®.

A growing volume of research aimed at exploring the usefulness of MT in multiple fields, including medicine and health, has been published recently. Studies that analyse

---

4 For a detailed discussion of the impact of AI and automation on the broader language industry, see Chapter 4 in the first part of this volume, by Joss Moorkens and Ana Guerberof Arenas.

5 Post-editing processes and practices are covered in detail in Chapter 9 of the present volume, by Félix do Carmo and Maarit Koponen.

6 See https://ls-ets.unog.ch/tools/untermeluna (accessed 18 September 2023).

7 See https://www.epo.org/searching-for-patents/helpful-resources/patent-translate.html (accessed 18 September 2023).

8 See https://www3.paho.org/hq/index.php?option=com_content&view=article&id=14762:machine-translation-at-the-pan-american-health-organization&Itemid=0&lang=es#gsc.tab=0 (accessed 18 September 2023).

the performance of different types of MT in specific text genres and contexts (Molina 2019; Rossetti and O'Brien 2019), the techniques that work best for training MT engines (Khan et al. 2018) or the use of MT to increase and disseminate the information available on health (Kirchhoff et al. 2011) are among the most researched topics. Haddow, Birch and Heafield (2021), whose research has focused on health and clinical settings, point out three scenarios in which the development of MT could be useful: translating specialized publications on health, such as scientific articles or disease reports; translating health information for the general public (including that derived from health crisis situations or pandemics) and contributing to its dissemination; and enabling communication between health professionals and patients who do not share the same language.

Large projects in which MT is used in clinical and public health settings are starting to be developed in different locations and with different languages. Two are worth mentioning in this chapter. The MeMaT (Medical Machine Translation) project, aiming to improve interactions between health professionals and patients in South Africa, where 11 official languages are used; and the European project HimL (Health in my language),[9] in collaboration with Cochrane and NHS 24, with the aim of contributing to a wider dissemination of health information. For more information on these and other projects, see Haddow, Birch and Heafield (2021).

The use of MT and post-editing is also being investigated in contexts of humanitarian crisis as tools to facilitate multilingual communication. One of the projects of the HAITrans research group[10] at the University of Vienna investigates the application of speech-enabled MT post-editing to support the work of professional and citizen translators in disasters and crisis contexts.

3.2.1 The professionals' perspective

In addition to reviewing current research in the use of MT in medical and health contexts, professional translators may provide useful qualitative insights from their real experience. To explore the professionals' views on technological developments, we selected two informants according to the following four criteria: working exclusively in the medical and health domain, having more than 30 years of experience, working in the English–Spanish context and, finally, having some experience in training and education. Due to availability constraints, one of the informants was interviewed online through Google Meet whereas the other was interviewed through e-mail using the same set of questions. Both interviews took place in February 2022. The first one was transcribed and then both of them were analysed thematically from a qualitative point of view.

---

9 See https://cordis.europa.eu/project/id/644402 (accessed 18 September 2023).

10 See https://haitrans.univie.ac.at/ (accessed 18 September 2023).

Our informants have witnessed, and used extensively, many of the technological advances mentioned above and conclude that the internet has been the most revolutionary of them and the one that has most improved the translators' work. Both think that most technologies have contributed to the improvement of the translation process to a greater or lesser extent. For them, these technologies are mere instruments, since the essence of translation remains the same: "What is truly essential is the human relationship between the participants involved in the translation process: the author, the client, the translator, the readers", said one of them. They also point out that many of the technological tools are only temporary solutions and eventually expire, only to be replaced by something else. The distribution list MedTrad is a case in point. It was a historical landmark for medical translation in Spanish in the 2000s, but it has long since disappeared.

Regarding MT and post-editing, they consider that this technology is substantially transforming the translation processes. In their opinion, working on the basis of a draft translation provided by the engine not only boosts productivity, but also reduces "the mental effort" (as one of the translators put it) a translator has to make, because "the first approach to the text is made by the machine". They think that MT works particularly well in text genres that are highly conventionalized, syntactically uncomplicated and thematically simple. Examples include instructions for use or package leaflets. However, in highly specialized texts full of technical terminology and dealing with very new topics – such as those found in the publishing sector – the output is of much lower quality. Neither does MT work well in informative texts – such as popular articles of the sort published by *Scientific American*, where metaphors or puns abound. They also mention highly sensitive texts addressed to patients as examples of language and register in which MT does not provide adequate and reliable results.

According to our informants, one of the main challenges of neural MT is that the output provided sounds correct and fluent, but often hides errors (which is often referred to as "deceptive fluency"), such as lack of terminological precision or alterations of meaning, making the target text unreliable, which often means putting the professional practice and the well-being of patients at risk. This coincides with the results of other works also focused on medical translation (Álvarez Vidal, Oliver and Badía 2020; Trujillos-Yébenes and Muñoz-Miquel 2022). Therefore, and despite the great advances of MT, the informants consider that the quality of MT is still poor in certain fields and genres. They think that both excellent linguistic skills and a sound knowledge of the subject matter are needed to be able to detect the machine's "hidden" errors. They conclude that human validation is essential, given the serious consequences that errors and mistakes can have in the medical and health domain, unlike other translation specialties where the impact of errors is less significant.

4 Looking forward and outward

Responding to the drivers of change we have identified requires looking forward and outward beyond the immediacy of both the marketplace and the academic discipline right now. In the following sections we will address professional challenges, gaps in education and opportunities for research.

4.1 Professional challenges

The new drivers of change described in previous sections show it is crucial that professional medical and health translators are versatile, that is, capable of changing their perspective to adapt to new professional situations and of developing skills in response to emerging needs and tasks (Muñoz-Miquel, Montalt and García-Izquierdo 2020). The first main challenge they must face is related to technological advances. The increasingly digitalized and automated medical and health scenarios pose many challenges for translators, who need to keep up to date with the latest technologies to be able to translate and localize them to many different languages and cultures. They must also deal with new genres and modes of multimodal communication – including medical apps, chatbots or online forums – and become familiarized with their conventions, as well as with the different profiles of patients that use them. Their new end-user is the "digital patient", who in a considerable number of cases is more empowered, makes more conscious decisions and plays a more active role in the management of his/her health. Interpreters are also seeing a change in the way they work due to the increasing demand of remote and telephone interpreting services in the context of telemedicine.

The technological factor that is most dramatically changing the way translators work is the rapid development of AI and MT, which is fostering the role of the translator as post-editor. This profile is more focused on the revision and correction than on the translation activity *per se*. This is especially evident when translating highly conventionalized and standardized genres that are neither very complex nor creative, such as package leaflets. In these types of genre, the potential of MT is very high: translators increase their productivity, can focus on texts that are socially and cognitively more relevant or demanding, or have a bigger impact, and use MT for texts that are simpler or more mechanical, such as administrative documents within the medical domain. However, according to the informants we interviewed (Section 3.2.1), in genres aimed at experts dealing with complex medical topics with plenty of terminology, MT seems to perform more poorly. Although MT has undergone a major revolution with the transition from statistical MT to neural MT that has greatly improved results, medical translation is a complex thematic domain in which accuracy, clarity and veracity are of vital relevance, and any translation error or inadequacy can have undesired and serious consequences. Thus, when dealing with highly specialized

texts, the work of the translator in the most conventional and "human" sense of the word continues to be paramount. To respond to this reality, a profile of an expert with a sound medical knowledge – but not necessarily a trained medical professional – and with excellent linguistic skills capable of detecting errors that hide behind apparent correctness and fluency should be pursued and developed. Standard competence frameworks such as that published by the European Master's in Translation (EMT Board 2022) can be useful as starting points that will need to be refined and prioritized according to medical and health translation.

Another professional profile that MT has the potential to foster is that focused on improving the quality of MT engines. This may involve two types of tasks: assessing the quality of MT output, and creating materials – corpora, glossaries, bi-texts, terminology records and so on – that can contribute to training MT engines and refining the results obtained. In this way, as Sánchez-Gijón (2016: 157) points out, translators as post-editors would not limit themselves to validating segments. They could participate in the entire workflow and not only in the final revision of a given document. This would empower translators, who would play a more active role in a translation process that is increasingly more automated.

Regarding the impact of MT on the profession, it is important to take into account the changes that it can bring – and is already bringing – to the working conditions and even to the status of translators and how they are perceived in society. As MT is becoming more and more widespread among users and customers, the added value a human translator can bring must be highlighted. In this scenario, all the agents involved – customers, employers, translators, final users and others – should understand both the benefits and disadvantages of MT in order to use it ethically.

The second great challenge facing medical and health translators has to do with situations in which the human factor is not only necessary, but also desirable: those related to doctor–patient communication in multilingual and multicultural clinical contexts. As was pointed out in Section 3, PCC ensures that patients' needs and expectations, as well as their social, cultural and emotional perspectives, are taken into account. This communication paradigm often requires adapted translation solutions to ensure that those needs and expectations – which will be different for children, chronic patients, patients in palliative care and so on – are really met, which Montalt (2017) has called PCT (see Section 3.1.2 above).

As seen in Section 3, PCC and PCT undoubtedly broaden the range of professional tasks that medical and health translators can perform – and are, in fact, performing. As linguistic and cultural experts who are familiar with a wide range of genres, registers, readers and communicative situations, translators can respond adequately to the challenges that PCC and PCT pose. Information sheets for patients, informed consents, patient's narratives, summaries for patients, medical manuals for the general public and so forth are all examples of genres that may require non-standardized, adapted, contextualized translation and/or writing solutions to help patients – with their different cultural, linguistic, educational and social backgrounds – comprehend medical in-

formation. This entails carrying out adaptations of highly specialized texts for lay audiences by using determinologization strategies, tenor adjustments or adding/omitting information (Muñoz-Miquel 2019); in short, "altering" the original text to achieve full comprehensibility, empathy, empowerment and well-being of patients (Montalt 2017). This scenario shows the centrality not only of interlingual, but also of intralingual and intergeneric translation and communication. This fact clearly influences translators' tasks and competences, as they not only have to help bridge linguistic and cultural barriers, but also to deal with emotional and cognitive asymmetries between different professional and non-professional discourse communities, such as biomedical researchers, clinicians, other health professionals, patients and the general public.

The third great challenge of medical and health translators regards public health and communication in crises and pandemics, where a combination of humanization and technology may be required. On the one hand, humanitarian crises, disaster events and pandemics create numerous multilingual and multicultural communication needs that must be addressed. Medical and health translators – and often also medical professionals and first responders – have to translate a huge volume of texts and their frequent updates sometimes in high-pressure situations, for national, international and even vulnerable audiences, and using different modes, channels, media and formats of communication in contexts where they are needed.

On the other hand, public health communication plays a key role in disease prevention, and efforts have to be made to communicate relevant medical and epidemiological information to wide audiences. The translation and writing of genres that address public health issues and help citizens adopt preventive measures and behaviours are also a market niche to be filled by medical and health translators. In these contexts, as we saw in Section 3, MT can be of great help to increase productivity, cope with high volumes of work, and disseminate multilingual health information. However, as information is often highly sensitive and needs to reach the public, adopting the adapted solutions that are often required in PCT may be also necessary. Thus, the human factor is, again, vital.

This versatility of tasks requires the professional profile of a language and communication advisor in a very broad sense, whose function goes beyond the mere equifunctional translation of a document. Medical and health translators need to act in a more proactive way and to acquire not only the practical skills, but also the knowledge and critical thinking that will allow them to understand complex problems and find the best solutions for every context and final user.

4.2 Gaps in education

Training, defined as the process of inculcating specific skills in a person for practical applications to improve performance and productivity in specific tasks, is without a doubt relevant in medical and health translation. In fact, the teaching and learning of

specialized translation has traditionally been job-centred and very much focused on training; that is, on acquiring a method of skill development based on doing pre-established tasks in an often-simulated job environment, sometimes at the expense of education. Now we would like to argue that there is plenty of room for education; indeed, we think there is an urgent need to re-balance the relationship between training and education in medical and health translation.

Unlike training, education aims to develop a sense of reasoning, critical thinking, judgement and intellect for future work with a long-term orientation. It offers a more theoretical approach than training and it is aimed to deliver knowledge about facts, events, values, general concepts and principles to students. We think it is important to think in terms of education because that way students can learn how to face future challenges and be prepared for future jobs in a world where the professions are changing very quickly – a considerable number of them will disappear or will be transformed radically, and many new ones will come into existence.

Translation is often seen as a skill, or rather, as a set of specific skills. In medical and health translation, understanding the source text fully and developing a predisposition for precision and clarity to avoid errors and misunderstandings is – often literally – of vital importance. In addition, grasping the real needs of the target users, discerning the contexts and circumstances in which they will use the target texts, anticipating potential or real barriers in communication and cognition they may experience, identifying and dealing with cultural differences or being able to produce texts in the language, mode, register and genre best suited for them are all fundamental aspects that go far beyond mere mechanical, skills-based training.

As has been argued above, the notion of genre allows us to focus on differentiated approaches and whole communicative situations, rather than just the text and the translator. Different genres embody different norms and values and have specific ethical priorities (Montalt and González Davies 2007). Similar arguments can be put forward regarding any other genre in medical and health communication.

A case worth highlighting is the translation or adaptation (through interlingual or intralingual translation) of genres addressed to patients, such as the PIL, the fact sheet for patients or the informed consent document. An educational approach to these and other genres would include the fact that not all source texts are comprehensible to their readers. This problem brings about the ethical dilemma of how to proceed – whether to keep the same degree of understanding found in the source text or improve the target text so that the target readers can understand the text fully and perform their tasks in an efficient and ethical way. Translating thus becomes a process of critical and creative thinking in which, in addition to register and terminology, other aspects may be explored and interrogated, such as the appropriate language – in other words, the national language of the user – to use in the target text or the mode, format or channel – oral, written, audio, video, multimodal and so on – that best satisfies the communication needs of the participants.

In multilingual and multicultural healthcare contexts, translators must often deal with a plurality of views on health, medicine, illness, disease, recovery, well-being and life in general. Any transaction of information and interaction between the different stakeholders in such contexts is not as straightforward as substituting the words in a language by the words in the other language. They often involve potential complexities beyond the content of the explicit message being shared. This is also the case in public health communication.

Ethical competence is another area in which education can play a crucial role. The translator and interpreter and their "text" have for a long time been, and still are, the "central ethical question" (Drugan and Tipton 2017: 122). However, in health communication, moral choices may arise that require a broader angle of vision. Washbourne (2013) defines the educational challenge of ethical dilemmas in communication and translation in terms of fostering ethical congruence, that is, the alignment of behaviour to values, and inclining translation students to take "imaginative actions not only towards expert translation but towards justice and human flourishing" (Washbourne 2013: 47).

In the field of technology students also need education, and not only training. Exploring and critically discussing the advantages and disadvantages of MT in specific genres require the acquisition of theories and concepts to define the problems as well as criteria, principles and values to analyse them and make informed and critical decisions. Problematic issues such as the right to privacy and confidentiality of personal information of patients, or the loss of visibility and professional prominence of post-editors of MT, also need to be given centre stage in the classroom.

Education is required to humanize texts and communication in multilingual and multicultural clinical and public health contexts. For example, students can be exposed to developing critical thinking to detect not only hidden translation errors in fluent MT target texts, but also inadequate solutions which are not sensitive and do not take into account the vulnerability of patients as readers and the emotional dimension of language.

4.3 Opportunities for research

The drivers of change identified in previous sections also have a significant impact on research. As we have previously seen, PCC and care: (1) recognizes that messages not only convey content, but also emotions, attitudes, interaction norms and expectations; (2) evidences the healing power of the "word"; and (3) places the emphasis on the patient as a person and not only on his/her disease. To make PCC possible, medical and health professionals – but also interpreters and translators – should acquire effective communication skills with patients in aspects such as empathy, the ability to explain technical terms, active listening and so forth. This fact is even more challenging when

doctors and patients do not share the same language/culture or when they use English (or another language) as a lingua franca.

Some of the projects carried out by the GENTT research group[11] in recent years have shown that the training of medical professionals in communication skills with patients from different cultures could benefit from the contributions of experts in medical and healthcare translation and interpreting. These projects, which focused on improving clinical communication in multilingual and multicultural settings, have explored the role of intralingual translation and role-play as methodological tools to help develop communicative competences in the context of the consultation and informed consent. Intralingual translation and the employment of determinologization strategies have helped medical professionals use layman terms whenever needed, both orally and in written form. Role-plays, which involve dramatizing a character in a given communicative situation, have allowed doctor and medical students to practice relevant communication strategies with patients to reach versions that have proved more effective from a communicative and cultural point of view.

In addition to the above-mentioned competences, research has shown that medical professionals could also benefit from the acquisition of skills that help them make a proper, efficient and ethical use of new technologies, especially MT, in situations where they do not share the language and culture of patients, and when access to a professional interpreter is not possible. This is a path that needs to be explored further.

Another area of inquiry for researchers is the comprehensibility and empathy of texts addressed to patients, given their importance in promoting health-conscious behaviour and fostering treatment adherence. Some GENTT projects have shown that translators, in collaboration with medical experts, are in an advantageous position to undertake the processes of improving the comprehensibility and empathy of texts. The use of legibility tests combined with more qualitative techniques such as focus groups and interviews with patients can help detect the information needs and comprehension difficulties of different groups of patients. The potential of intralingual translation strategies to enhance comprehension and empathy should also be further researched.

Communication of public and global health matters constitutes a further path of inquiry. Corpus linguistics might be used to better understand how written and multimodal communication reflect discourse practices that are relevant to the improvement of these complex communication processes in multilingual and multicultural settings.

Finally, as MT poses challenges and risks regarding the quality and reliability of texts, more research is needed to identify accuracy errors in fluent texts, to improve the education and training of post-editors and to contribute to a more critical assess-

---

11 See http://www.gentt.uji.es/ (accessed 20 September 2023).

ment of current MT systems. All these avenues place Translation Studies in a new interdisciplinary and interprofessional perspective which we should continue to explore through research.

5 Concluding remarks

Health and illness are often analysed and described clinically, but they are situated in the sphere of personal experience and embedded in specific cultures and societies. That is why medical and health translation offers such a rich field of enquiry and development in which ethnic, professional and disciplinary cultures merge and bring about myriad challenges.

In our view, Translation Studies can contribute a great deal not only to the process of improving multilingual and multicultural communication in a very broad sense, but also to a better understanding of the entanglements, interactions, synergies and frictions between the biomedical and the human perspectives that necessarily converge in medical and health translation. This requires more critical and creative thinking and a departure from a merely subservient view of translators and interpreters in particular, and of the humanities in general. It makes even more sense in the current era of increasing automation and technological change, and in the face of climate crisis and its interactions with public and global health, where multidisciplinary dialogue will be needed for the analysis of complex communication problems.

In the age of AI and MT, it should be stressed that any professional post-editor needs to develop the same skills as any human translation professional, including a full understanding of the source text and the ability to detect both visible and hidden errors and mistakes in MT output. Without it, it will be impossible to revise and edit them, and ensure that negative consequences are avoided. In addition to precision, accuracy and reliability, other equally relevant issues regarding the role of empathy, comprehensibility or ethics need to be considered and foregrounded in the professions, in education and in research. Starting from a broader, more inclusive, more humanistic and more interdisciplinary view of translation and interpreting, our task is to continue exploring what translation can contribute to society and social justice, and to fostering intercultural, interdisciplinary and interprofessional collaboration.

References

Alvarez Vidal, Sergi, Antoni Oliver & Toni Badia. 2020. Post-editing for professional translators: Cheer or fear? *Revista Tradumàtica: tecnologies de la traducció* 18. 49–69.

Brøgger, Matilde N. and Karen K. Zethsen. 2021. Inter- and intralingual translation of medical information. The importance of comprehensibility. In Susam-Saraeva Şebnem & Eva Spišiakov (eds.), *The Routledge handbook of translation and health*, 96–107. London: Routledge.

Casacuberta Nolla, Francisco & Álvaro Peris Abril. 2017. Neural machine translation. *Tradumàtica: tecnologies de la traducció* 15. 66–74.

Cole, Thomas R., Nathan S. Carlin & Ronald A Carson. 2015. *Medical humanities: An introduction*. Cambridge: Cambridge University Press.

Delisle, Jean & Judith Woodsworth (eds). 1995. *Translators through history*. Amsterdam: John Benjamins.

Drugan, Joanna & Rebecca Tipton. 2017. Translation, ethics and social responsibility. *The Translator* 23(2). 119–125.

ELIS Research. 2023. *European language industry survey 2023*. https://elis-survey.org/wp-content/uploads/2023/03/ELIS-2023-report.pdf (accessed 5 September 2023)

EMT Board. 2022. *European Master's in Translation competence framework 2022*. Directorate-General for Translation of the European Commission. https://commission.europa.eu/system/files/2022-11/emt_competence_fwk_2022_en.pdf

Engebretsen, Eivind, Tony Joakim Sandset & John Ødemark. 2017. Expanding the knowledge translation metaphor. *Health Research Policy and Systems* 15(1). 19.

Engel, George L. 1977. The need for a new medical model: A challenge for biomedicine. *Science* 196(4286). 129–136.

Federici, Federico. 2016. Introduction. A state of emergency for crisis communication. In Federico Federici (ed.), *Mediating emergencies and conflicts. Frontline translating and interpreting*, 1–29. London: Palgrave Macmillan.

Fischbach, Henry. 1993. Translation, the great pollinator of science: A brief flashback on medical translation. In Sue Ellen Wright & Leland D. Wright, Jr. (eds.), *Scientific and technical translation*, 89–100. Amsterdam: John Benjamins.

Franco Aixelá, Javier. 2010. Una revisión de la bibliografía sobre traducción e interpretación médica recogida en BITRA (Bibliografía de Interpretación y Traducción). *Panace@: Revista de Medicina, Lenguaje y Traducción* 11(32). 151–160.

García-Izquierdo, Isabel & Ana Muñoz-Miquel. 2015. Los folletos de información oncológica en contextos hospitalarios: la perspectiva de pacientes y profesionales sanitarios. *Panace@: Revista de Medicina, Lenguaje y Traducción* 16(42). 225–231.

Haddow, Barry, Alexandra Birch & Kenneth Heafield. 2021. Machine translation in healthcare. In Susam-Saraeva Şebnem & Eva Spišiakov (eds.), *The Routledge handbook of translation and health*, 108–129. London: Routledge.

Karwacka, Wioleta. 2021. Quality, accessibility and readability in medical translation. In Susam-Saraeva Şebnem & Eva Spišiakov (eds.), *The Routledge handbook of translation and health*, 80–95. London: Routledge.

Khalikova, Venera. 2021. Medical pluralism. In Felix Stein (ed.), *The open encyclopedia of anthropology*. https://www.anthroencyclopedia.com/entry/medical-pluralism (17 June 2021; accessed 20 September 2022)

Khan, Abdul, Subhadarshi Panda, Jia Xu & Lampros Flokas. 2018. Hunter NMT system for WMT18 biomedical translation task: Transfer learning in neural machine translation. In *Proceedings of the Third Conference on Machine Translation: Shared task papers*, 655–661. Brussels: Association for Computational Linguistics.

Kirchhoff, Katrin, Anne M. Turner, Amittai Axelrod & Francisco Saavedra. 2011. Application of statistical machine translation to public health information: A feasibility study. *Journal of the American Medical Informatics Association* 18(4). 473–478.

López Piñero, José María & María Luz Terrada Ferrandis. 2005. *Introducción a la terminología médica*. Barcelona: Masson.

Molina Baños, Alicia. 2019. *Creación de un motor de traducción automática estadístico (EN>ES) para textos del ámbito farmacéutico. Comparación con otros motores de traducción automática neuronal existentes*. Barcelona: Universitat Autònoma de Barcelona MA thesis.

Montalt, Vicent. 2017. Patient-centred translation and emerging trends in medicine and healthcare. *EST Newsletter Hot topics in translation studies: Medical translation and interpreting*. 10–11.

Montalt, Vicent. 2021. Medical humanities and translation. In Susam-Saraeva Şebnem & Eva Spišiakov (eds.), *The Routledge handbook of translation and health*, 130–148. London: Routledge.

Montalt, Vicent. 2022. Ethical considerations in the translation of health genres in crisis communication. In Sharon O'Brien & Federico Federici (eds.), *Translating crisis*, 17–30. London: Bloomsbury.

Montalt, Vicent & Maria González Davies. 2007. *Medical translation step by step. Learning by drafting*. London: Routledge.

Montalt, Vicent & Maite Sánchez. 2023. La consulta documental en el proceso de traducción de textos médico-sanitarios: problemas, estrategias y recursos. In Dora Sales (ed.), *Documentación aplicada a la traducción y a la interpretación: estrategias, fuentes y recursos documentales*, 215–264. Gijón: Trea.

Montalt, Vicent, Karen K. Zethsen & Wioleta Karwacka. 2018. Medical translation in the 21st century – challenges and trends. *MonTI* 10. 27–42.

Montgomery, Scott. L. 2000. *Science in translation: Movements of knowledge through cultures and time*. Chicago: University of Chicago Press.

Muñoz-Miquel, Ana. 2016. La traducción médica como especialidad académica: algunos rasgos definitorios. *Hermēneus* 18. 235–267.

Muñoz-Miquel, Ana. 2019. Empathy, emotions and patient-centredness: A case study on communication strategies. *HERMES – Journal of Language and Communication in Business* 59. 71–89.

Muñoz-Miquel, Ana, Vicent Montalt & Isabel García-Izquierdo. 2020. Fostering employability through versatility within specialisation in medical translation education. *HERMES – Journal of Language and Communication in Business* 60. 141–154.

Nord, Christiane. 2009. El funcionalismo en la enseñanza de traducción. *Mutatis Mutandis. Revista Latinoamericana de Traducción* 2(2). 209–243.

Quijada-Diez, Carmen. 2021. Dissemination of academic medical research through translation throughout history and in contemporary world. In Şebnem Susam-Saraeva & Eva Spišiaková (eds.), *The Routledge handbook of translation and health*, 45–62. London: Routledge.

Rossetti, Alessandra & Sharon O'Brien. 2019. Helping the helpers: Evaluating the impact of a controlled language checker on the intralingual and interlingual translation tasks involving volunteer health professionals. *Translation Studies* 12(2). 253–271.

Sánchez-Gijón, Pilar. 2016. La posedición: hacia una definición competencial del perfil y una descripción multidimensional del fenómeno. *Sendebar* 27. 151–162.

Suojanen, Tytti, Kasia Koskinen & Tina Tuominen. 2015. *User-centered translation*. London & New York: Routledge.

Trujillos-Yébenes, Lorena & Ana Muñoz-Miquel. 2022. La traducción automática y la posedición en el ámbito médico. *Revista Tradumàtica. Tecnologies de la Traducció* 20. 57–76.

Vandaele, Sylvie. 2001. Noyaux conceptuels et traduction médicale. *Meta* 46(1). 16–21.

Vidal-Alaball, Josep, Ruthy Acosta-Roja, Nuria Pastor Hernández, Unai Sanchez Luque, Danielle Morrison, Silvia Narejos Pérez, Jesús Perez-Llano, Angels Salvador Vèrges & Francesc López Seguí. 2020. Telemedicine in the face of the COVID-19 pandemic. *Atención Primaria* 52(6). 418–422.

Washbourne, Kelly. 2013. Ethical experts-in-training: Connected learners and the moral imagination. In Don Kiraly, Silvia Hansen-Schirra & Karin Maksymski (eds.), *New prospects and perspectives for educating language mediators*, 35–55. Tübingen: Narr Verlag.

Wisnovsky, Robert. 2017. Commentaries, translation and philosophical change: The case of Greek into Arabic. *Genealogies of knowledge I: Translating political and scientific thought across time and space conference*, University of Manchester, 7– 9 December 2017. https://genealogiesofknowledge.net/events/gok2017conference/video-recordings (accessed 15 December 2020)

WHO. 2019. Multilingüismo Informe del Director General. World Health Organization. https://apps.who.
    int/gb/ebwha/pdf_files/WHA72/A72_53-sp.pdf (28 March 2019; accessed 31 March 2023)

WHO. 2022. Global Observatory for eHealth. World Health Organization. https://www.who.int/observato
    ries/global-observatory-for-ehealth (accessed 15 September 2022)

Zethsen, Karen K. 2009. Intralingual translation: An attempt at description. *Meta* 54(4). 795–812.

Zethsen, Karen K. & Vicent Montalt. 2022. Translating medical texts. In Kirsten Malmkjær (ed.), *The
    Cambridge handbook of translation*, 363–378. Cambridge: Cambridge University Press.