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**THE ROLE OF PATIENT-PHYSICIAN RELATIONSHIP
IN CARE PROCESSES AND IN THE TECHNOLOGICAL
TRANSITION OF HEALTHCARE**

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PREFACE

This thesis is submitted for the degree of Doctor of Philosophy at the University of Palermo (Italy). The supervisor of this work is Professor Manfredi Bruccoleri of the same university.

This thesis builds upon the findings presented in three research papers that I conducted throughout my Ph.D. studies. The papers are as follows:

- Riotta, S., Bruccoleri, M., (2021), “Revisiting the Patient-Physician Relationship under the lens of Value Co-creation and Defensive Medicine”, *Journal of Service Theory and Practice*.
- Riotta, S., Bruccoleri, M., (under review), “Defensive behaviour in healthcare: the role of organizational factors”, *Medical Care Research and Review*.
- Riotta, S., Bruccoleri, M., (under review), “The role of patient–physician relationship in the switch to telemedicine”, *Journal of Service Theory and Practice*.

The previous versions of these articles have been submitted for participation in Italian and international conferences:

- Riotta, S., Mattaliano, A., and Bruccoleri, M. (2022). Telemedicine the role of the patient-doctor relationship. EurOMA2022 – European Operations Management Association Conference, 3rd - 5th July 2022, Berlino, Germania.
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Chapter 1

INTRODUCTION

1.1 Introduction

The healthcare industry has experienced significant transformations in recent years due to the adoption of technology and changes in patient expectations (Brem *et al.*, 2021; Kraus *et al.*, 2021). These changes have had a profound effect on the relationship between physicians and patients, as well as on healthcare delivery and management (Osei-Frimpong *et al.*, 2018).

One of the most notable shifts in healthcare is the growing emphasis on defensive medicine. Defensive medicine refers to the practice of ordering medical tests, procedures, or interventions that may not be necessary, solely to protect the physician or healthcare organization from potential litigation (Studdert *et al.*, 2005). This approach has become increasingly prevalent in recent years, in part due to rising malpractice premiums and the fear of legal action (Tinica *et al.*, 2017).

In addition to defensive medicine, organizational factors also play a critical role in healthcare delivery (Berberoglu, 2018; Khanijahani *et al.*, 2022). The culture and structure of healthcare organizations can have a significant impact on the quality of care provided to patients. For example, the use of electronic health records and other technology can improve efficiency and reduce errors, but it can also lead to burnout among healthcare providers if not properly implemented (Tajirian *et al.*, 2020).

Furthermore, the impact of technology on healthcare cannot be overstated. From telemedicine to wearable devices and artificial intelligence, technology has the potential to transform healthcare delivery and management. However, these technological advancements raise ethical and privacy concerns that must be addressed to ensure the safety and security of patients' data and information (Gerke *et al.*, 2020).

Despite the significant role of technology in healthcare, the relationship between patients and physicians remains central to the success of healthcare delivery. This relationship is built on trust, communication, and mutual respect, and is vital to the provision of high-quality care (Riotta and Bruccoleri, 2021; Tan and Goonawardene, 2017). To maintain and enhance this relationship, healthcare providers must adapt to new modes of communication and learn to manage remote consultations.

In conclusion, as the healthcare industry continues to evolve, healthcare providers must address the challenges posed by defensive medicine, organizational factors, and technological advancements. By maintaining a focus on patient safety and improving the relationship between patients and physicians, healthcare providers can ensure that patients receive the highest quality care possible.

1.2 Literature review, gap, and research questions of the thesis

The literature review starts with the main concept of this thesis, which is the patient-physician relationship. This aspect of the healthcare service is pivotal for achieving good patient health outcomes and it has been demonstrated widely in literature (Damali *et al.*, 2016; Hardyman *et al.*, 2015; Osei-Frimpong *et al.*, 2015). Given the importance of this relationship, many scholars have been interested in it trying to adopt different points of view. For example, it has been considered the ethical aspects (Veatch, 1972), the degrees of control of the care process and responsibility of both patient and physician (Roter, 1987), patient values and autonomy in relation to physician's obligation (Emanuel and Emanuel, 1992), and decision making taking into consideration different informative models (Ishikawa *et al.*, 2013; Thompson, 2007). A first research gap has been found in the inclusion of the newest phenomena and practices that alter the patient-physician relationship in terms of decision-making and behavioural approach. In particular, for the first part of this thesis, the value co-creation perspective (Vargo and Lusch, 2004a) and the phenomenon of defensive medicine (Studdert *et al.*, 2005) have been taken into account to enrich the literature on the patient-physician relationship and finding managerial insights that could be useful to leverage the positive outcomes and reduce the negative aspects.

The following step in the research was to include organizational factors as possible moderators of physicians' defensive attitudes which alter the patient-physician relationship and, more in general, the flow of healthcare operations. This was another literature gap since most scientific studies on defensive medicine are focused only on legal and insurance aspects (Asher *et al.*, 2012; Steurer *et al.*, 2009; Studdert *et al.*, 2005) given the direct link between litigation risk and this phenomenon. In order to fill this gap, behavioural operations management literature could be useful to explain the connection between organizational factors and physicians' behaviours (Bendoly *et al.*, 2010) together with the conservation of the resources theory (Marx-Fleck *et al.*, 2021). For this reason, two factors considered major stressors in hospitals have been

investigated in this thesis: job overtime and hospital overcrowding (Ganster and Rosen, 2013; Lavelle *et al.*, 2021).

At last, the patient-physician relationship is also at the base of the healthcare digital transition which success strongly depends on the users' (physicians and patients) propensity to change and the level of acceptance of such technology (Yarbrough and Smith, 2007). In this case, the COVID-19 pandemic fosters the literature in this research area which is still in its infancy (Hollander and Carr, 2020), so much could be still done to explore the role of the patient-physician relationship in the digitalization process.

In sum, the main goal of this thesis can be operationalized in the following research questions:

1. How the phenomenon of defensive medicine and the value co-creation activities are related to each other and what are the typologies of patient-physician relationships that emerge?
2. Do organizational factors have an effect on the patient-physician relationship in terms of reducing or exacerbating physicians' defensive behaviour?
3. Does the patient-physician relationship have an effect on the patients' propensity to switch to a telemedicine service?

These questions are discussed in the three research streams presented in this thesis.

1.3 Purpose and relevance of the thesis

The patient-physician relationship is a critical aspect of healthcare delivery that has been shown to impact patient outcomes and satisfaction (Osei-Frimpong *et al.*, 2018). As healthcare continues to evolve and transition towards a more technology-driven approach, understanding the role of the patient-physician relationship in this process is essential (Daniel and Sulmasy, 2015; Orrange *et al.*, 2021). The purpose of this thesis is to explore the role of the patient-physician relationship in care processes and the technological transition of healthcare, taking into consideration organizational factors as mediators of the phenomenon of defensive medicine, and the patient-physician relationship as an antecedent of the propensity to a patient's switch to telemedicine.

This thesis evaluates the impact of the patient-physician relationship on care processes and on the integration of technology into healthcare delivery. The patient-physician relationship is a key determinant in shaping how care processes are carried out and can significantly impact the effectiveness of the care provided. As healthcare

continues to transition towards a more technology-driven approach, it is critical to understand how the patient-physician relationship can affect the adoption and effectiveness of these technologies, such as telemedicine (Kulkova *et al.*, 2023; Ray Dorsey and Topol, 2016). Additionally, the thesis explores the role of organizational factors in mediating the litigation risk of defensive medicine.

Defensive medicine is a prevalent phenomenon in which physicians may order unnecessary medical procedures to avoid potential malpractice claims (Studdert *et al.*, 2005). This practice can result in increased healthcare costs and decreased patient satisfaction (Damali *et al.*, 2016; Vento *et al.*, 2018). The thesis will investigate how organizational factors can impact defensive medicine and thus give alternative solutions to mitigate the negative effects of this phenomenon. Moreover, by understanding the role of the patient-physician relationship in defensive medicine, healthcare providers can develop strategies to reduce the occurrence of unnecessary medical procedures, decrease healthcare costs, and improve patient outcomes.

Telemedicine has gained significant attention in recent years as a means of increasing access to healthcare services and reducing healthcare costs (Ray Dorsey and Topol, 2016). The effectiveness of telemedicine, however, depends on the strength of the patient-physician relationship (Kamal *et al.*, 2020). Patients are more likely to trust their physicians and use telemedicine if they have a positive relationship with them. Understanding the impact of the patient-physician relationship on a patient's propensity to switch to telemedicine can help healthcare providers develop strategies to improve patient engagement and satisfaction.

In conclusion, the purpose of the thesis is to evaluate the role of the patient-physician relationship in care processes and the technological transition of healthcare. The thesis will explore how organizational factors influence physicians' defensive behaviour and how the patient-physician relationship is an antecedent of a patient's propensity to switch to telemedicine. The findings from this thesis will provide insights into how healthcare providers can improve the patient-physician relationship, reduce defensive medicine, and improve the adoption and effectiveness of technology in healthcare delivery. Ultimately, this thesis will contribute to the development of strategies that enhance patient outcomes and satisfaction in healthcare delivery.

1.4 Methodologies

In this thesis, both qualitative and quantitative research methodologies have been implemented. The empirical analyses are based on primary data collection, which was collected and analysed through the usage of different methodologies.

In the research article presented in Chapter 2, it was conducted a study to analyse and define patient-physician relationship archetypes using a qualitative approach with three levels of coding activity (Corbin and Strauss, 2008). The study was conducted between January and March 2020 at three Italian hospitals and private medical offices. The data collection included semi-structured interviews with 5 physicians and 15 patients, field observations, and personal notes. The physicians were selected based on their job experience ranging from 10-25 years and representing different medical areas. The patients were chosen randomly from the adults in the waiting rooms of the key informant physicians, with three patients selected from each speciality.

During the interviews, the authors did not focus on just one relationship but asked patients and physicians about their entire experience of relationships with physicians and patients. The questions were open-ended, asking for examples or direct experiences related to value in healthcare, co-creation activities, cognitive and behavioural aspects in patient-physician relationships, defensive medicine practices, and possible triggering conditions. The interviews were recorded and transcribed, and the transcriptions were analyzed using the text analysis software ATLAS.ti. Through the labelling of row data by quotes, these were organised into a pattern of aspects and characteristics with the first level of coding. The second level of coding involved assigning a degree of risk of defensive medicine behaviour and the likelihood of value co-creation emerging from the interviews. The authors focused on the assurance behaviour of defensive medicine and used the classification of activities provided by (McColl-Kennedy *et al.*, 2012) to attribute a degree of value co-creation. The third and final level of coding was focused on the systematic selection of the characteristics that emerged as the most frequent and relevant for both patient and physician perspectives.

For the paper presented in Chapter 3, a quantitative approach concerning a scenario-based experiment for investigating the impact of organizational factors on defensive medicine has been used. This research methodology is recognized as a robust approach in BOM literature (Bendoly *et al.*, 2010; Bendoly and Swink, 2007; Rungtusanatham *et al.*, 2011). Clinical scenarios, which are detailed narratives that describe medical problems experienced by patients, were developed for this study, as

this methodology is ideal for understanding healthcare operations managers' altered decision-making phenomena. This quantitative study is unique, as defensive medicine has primarily been investigated qualitatively in the past (He, 2014). The research is designed as a within-subjects study, where each sample element experiences all experimental conditions, providing internal validity that is not dependent on random assignment, greater statistical power, and a more natural fit for most theories (Charness *et al.*, 2012). In the end, the data collected have been analyzed through an ordinal logistic regression to test the hypotheses.

The last paper, presented in Chapter 4, is about a survey study to test the hypotheses on perceived efficacy, patient-physician relationship, the propensity to telemedicine, and technological competencies in the liver unit of a large Italian hospital. Afterwards, a questionnaire with two sections has been developed, the first section screening socio-personal aspects, and the second section including 22 items from the four dimensions. The survey was refined with three physicians and then a pilot test was conducted with 100 patients of the hospital. The data were checked for reliability and validity using SPSS software and used an EFA and a CFA to confirm the factorial structure of the questionnaire, which ultimately consisted of 17 items. Ultimately, the data collected were from 236 patients and they were analyzed with regression models.

1.5 Thesis outline

This work is structured in five chapters as follows.

Chapter 1 provides an outline of the different literature streams object of this thesis, such as the patient-physician relationship, defensive medicine, and telemedicine. Literature gaps and research questions are presented, together with the relevance of the arguments, the research methodologies used and a short summary of the structure of the thesis.

Chapter 2 presents the first research stream which is based on the research article by Riotta and Bruccoleri (2021), “Revisiting the Patient-Physician Relationship under the lens of Value Co-creation and Defensive Medicine”. This study proposes a new model to describe the patient-physician relationship through value co-creation and a defensive medicine lens. The authors identified four archetypes of patient-physician relationships and their consequences related to value co-creation and defensive medicine.

Chapter 3 presents the second research stream which is based on the research article by Riotta and Bruccoleri (under review), “Defensive behaviour in healthcare: the role of organizational factors”. Defensive medicine negatively affects patient care, healthcare operations, and cost. While previous efforts to address this phenomenon have focused on jurisprudence and insurance contracts, this study investigates the influence of organizational factors on doctors' defensive behaviour, such as hospital overcrowding. Through a scenario-based experiment, the study explores how overcrowding affects doctors' behaviour. The findings suggest that caregivers can address organizational factors to mitigate defensive medicine, thereby improving patient care.

Chapter 4 presents the third research stream which is based on the research article by Riotta and Bruccoleri (under review), “The role of patient–physician relationship in the switch to telemedicine”. This study examines the relationship between patient-physician interaction and the patient's willingness to use telemedicine. A conceptual model is developed and tested in a liver unit of a large hospital in Italy. Results suggest that the patient-physician relationship has a direct and indirect effect on the patient's propensity to use telemedicine, emphasizing the importance of this relationship in facilitating telemedicine use and improving use and improving healthcare efficacy.

Chapter 5 is the final chapter of this thesis where the conclusions are drawn, and the theoretical contributions and managerial implications are explained in detail. Finally, directions for future research are provided.

Chapter 2

RESEARCH STREAM 1:

“Revisiting the patient–physician relationship under the lens of value co-creation and defensive medicine”

2.1 Introduction

Healthcare is a highly complex service that significantly affects both economies and the quality of life worldwide (Berry and Bendapudi, 2007). The recent transformations in this sector have modified how service delivery is carried out by focusing more attention on patients' values, needs and preferences during clinical decisions in order to achieve better health outcomes (Osei-Frimpong *et al.*, 2015). Traditionally, customers have been viewed as passive recipients, separate and outside the firm (Payne *et al.*, 2008). The customers, in this specific case the patients, do not merely play a passive role; instead, they assume a fundamental role as co-creators of value (McColl-Kennedy *et al.*, 2012) as they are active participants and collaborative partners in relational exchanges (Vargo *et al.*, 2008; Yi and Gong, 2013), which brings mutual benefits to the involved actors (Elg *et al.*, 2012).

A key element for value co-creation is the interaction between the service provider and customer (Grönroos and Voima, 2013a), i.e. the patient–physician relationship in healthcare (Osei-Frimpong *et al.*, 2015). This relationship, however, which is strongly influenced by the personal traits of both the physician and the patient, other than by other situational conditions, has been demonstrated to be at the base of the phenomenon called “defensive medicine” (Hershey, 1972). This happens when, for example, the physician tends to give a lot of information to a very demanding patient; on the other side, the physician is aware that, when the patient is highly informed, the risk of a medical lawsuit in case of medical error may increase. The consequence is that the physician will likely behave in a defensive way when curing this patient, for example by prescribing more diagnostic tests than those recommended for that specific clinical case (Studdert *et al.*, 2005). This deviation from natural medical practice is mainly driven by the risk of lawsuits and can be fomented according to the type of relationship that has been established between doctor and patient.

Although it is an old practice, in the last two decades, defensive medicine behaviour has been growing and spreading due to the introduction of legislative regulations which increase medical professionals' exposure to greater legal liabilities

(Vento *et al.*, 2018). The rise in the risk of medical lawsuits has been so tremendous that the former President of the United States, Donald Trump, very recently signed a new law that provides additional federal liability protections for volunteer healthcare professionals during the COVID-19 emergency response¹.

The healthcare management literature is united in recognizing the crucial role of the patient–physician relationship for achieving the best results in medical service (Damali *et al.*, 2016; Gummesson, 2007; Hardyman *et al.*, 2015; Osei-Frimpong *et al.*, 2015; Ouschan *et al.*, 2006). Each relationship is unique because it depends on the purpose, context, and specific expectations of all the involved parties (Hui EC., 2005). For these reasons, different patient–physician models have been identified in the literature to reflect the wide spectrum of clinical encounters (Brody Howard, 1987; Emanuel and Emanuel, 1992; Entwistle and Watt, 2006; Ishikawa *et al.*, 2013; McColl-Kennedy *et al.*, 2012; Osei-Frimpong *et al.*, 2015; Roter, 1987; Thompson, 2007; Veatch, 1972).

In this paper, we look at the patient–physician relationship from a different lens than in past studies. In particular, we identify and analyse the characteristics of this relationship that refer to the phenomenon of defensive medicine and which enable value co-creation activities in order to understand how these two are related to each other. The theoretical argumentation we offer and our empirical results lead to the development of four archetypical patient–physician relationships. This empirically informed model for the patient–physician relationship archotyping contributes to enriching the three streams of literature on value co-creation in healthcare, defensive medicine, and patient–physician relationships. Also, this paper offers new suggestions for managers and healthcare providers about how to focus on the patient–physician relationship in order to increase the likelihood of patients’ participation in the healthcare process and to decrease the risk of defensive medicine behaviour.

This paper is structured as follows: In the next section, we present the theoretical background related to the three main elements of our study: value co-creation, defensive medicine, and patient–physician relationships. Subsequently, we describe the research methodology we used and present the main findings of the empirical analysis. The last sections report our discussion and conclusion.

¹Liability protections for health care professionals during COVID-19, America Medical Association AMA, January 28, 2023. <https://www.ama-assn.org/practice-management/sustainability/liability-protections-health-care-professionals-during-covid-19>, accessed on March 17, 2021.

2.2 Literature Review

2.2.1 Value Co-Creation

Value co-creation and, more generally, the concept of value have been widely studied and discussed in various contexts in literature, in particular by service and marketing academics (Helkkula *et al.*, 2012; Vargo and Lusch, 2004b).

Since the 1990s, the consumer's role has changed from isolated to connected, from unaware to informed, and from passive to active (Prahalad and Ramaswamy, 2004). In services, which require significant customer participation to create value, such as in healthcare, customers who lack the knowledge, skills, and motivation necessary to participate effectively can negatively affect service quality and cost outcomes. Scholars have found that patients who are taught why they have to perform tasks have higher levels of motivation to perform them effectively, and, as a consequence, they have improved health outcomes and lower healthcare costs (Damali *et al.*, 2016).

An important theoretical contribution regarding the concept of value co-creation was given by the shift to the service-dominant (S-D) logic from the more traditional goods-dominant (G-D) logic (Vargo and Lusch, 2004b). In healthcare, G-D logic is manifested in the proliferation of more specialized and sophisticated providers, delivery systems, pharmaceuticals, medical devices, facilities, procedures, and more (Joiner and Lusch, 2016). On the other side, the S-D logic, which has been the object of much elaboration over the years (Vargo and Lusch, 2004a, 2006, 2008, 2012, 2016), represents the logic of a healthcare provider and a patient mutually applying knowledge and skills in order to actualise value for themselves and others, based on relationships with win-win exchanges (Joiner and Lusch, 2016). Both the healthcare provider and the patient integrate resources, learn from each other, and experience the service.

An important point stated as one of the fundamental premises of the S-D logic (Vargo and Lusch, 2008) is that 'value is always uniquely and phenomenologically determined by the beneficiary'. What is the role of the service provider, then, in the value co-creation process? (Gummesson, 2007) states that the service provider is not only responsible for offering a value proposition, the actualization of which occurs during the customer's usage, but also for how important the customer-supplier interactions are in co-creating value. Other studies pointed out that co-created value can bring mutual benefits for the actors involved (Ramaswamy, 2011) by, for example, improving service quality by taking into account patient feedback (Zhang *et al.*, 2015),

developing tools that enable the co-execution of healthcare services (Batalden *et al.*, 2016), and obtaining new ideas and learning from customers in healthcare service development (Elg *et al.*, 2012).

What do patients do when they co-create value? This question has been discussed by (McColl-Kennedy *et al.*, 2012), who divided patients' value co-creation activities into 'low-level' activities, such as compliance with physician indications and collating information, and 'high-level' activities, such as co-learning, actively searching for information, and providing feedback. In Table 1, the eight themes of activities identified by McColl-Kennedy *et al.* (2012) are presented.

Table 1. Patient value co-creation activities

Activity	Description
Cerebral activities	– Mental preparation, positive attitude, active hoping, acceptance of own condition, emotional labour
Changing ways of doing things	– Managing long-term adaptive life changes, targeting activities to take the mind off of the health condition
Co-learning	– Actively seeking and sharing information from several sources, such as the internet, books, other professionals, or people with the same condition
Co-operating	– Accepting the physician's response and being in compliance
Co-production	– Assisting with the design of treatment programs, choosing healthcare providers and/or medic professionals
Collating information	– Sorting and assorting information
Combining complementary therapies	– Using complementary medicine (i.e. Chinese medicine), yoga, diet, exercises
Connecting	– Building and maintaining relationships

We grounded our research in the framework provided by (McColl-Kennedy *et al.*, 2012) in order to identify the patient–physician relationship characteristics and clinical conditions and contexts that encourage value co-creation.

2.2.2 Defensive Medicine

As already discussed, a key element for value co-creation is the interaction between the patient and the medical doctor. This relationship, however, is strongly influenced by the personal traits of the physician and the patient, in addition to other situational conditions, and has been demonstrated to be at the crux of the phenomenon called ‘defensive medicine’ (Hershey, 1972).

Defensive medicine is a deviation from the usual medical practice that is induced primarily by the threat of lawsuits (Hershey, 1972). This phenomenon was born in the 1970s in the United States due to the introduction of legislative regulations which increased the exposure of medical professionals to greater legal liabilities, and it has presently become a practice diffused worldwide. In literature, two kinds of defensive medicine have been defined: ‘assurance behaviour’ and ‘avoidance behaviour’. The former occurs when, for example, the doctor prescribes more diagnostic tests than those strictly needed for that specific case, just to avoid the risk of incurring lawsuits. The latter occurs when, in high-risk medical situations, the physician delays and/or refuses treatments that require great responsibility (Studdert *et al.*, 2005).

The likelihood of adopting a defensive behaviour is directly proportional to the specific risk related to medical liability (Tinica *et al.*, 2017). Previous studies identified six medical specialities in which defensive practices occur in more than 50% of cases, even reaching 93% in some specialities. In specific, these specialities are emergency medicine, general surgery, neurosurgery, obstetrics/gynaecology, orthopaedic surgery, and radiology (Plebani, 2014; Studdert *et al.*, 2005).

Defensive medicine is the cause of unnecessary tests, hospitalizations, drug prescriptions and the avoidance of high-risk patients (Vento *et al.*, 2018). This can lead to not only a negative impact on the operations of healthcare providers but also negative effects, both directly and indirectly, on the patients. For example, a patient in critical condition could be penalized by a congested healthcare system due to long waiting times for either a medical visit or a diagnostic test. Moreover, the abuse of diagnostic tests can also lead to an increase in the rate of false-positive and false-negative results (Plebani, 2014).

Some antecedents of defensive behaviours have been identified in the literature, such as the distrust of patients in physicians who do not pay them enough attention, family doctors who have been playing a progressively less central role, and the replacement of clinical reasoning with guidelines and algorithms. Healthcare providers

should not just focus on examining patients, ordering tests, and prescribing drugs but should also understand how important it is to spend time with patients, express a sincere interest in their health condition, and address their concerns. Otherwise, defensive medicine will be the logical consequence of a ‘poor’ patient–physician relationship (Baungaard *et al.*, 2020; He, 2014; Vento *et al.*, 2018). Patients have become increasingly demanding in their requests for care and may even pressure physicians to provide specific forms of care. This perceived pressure is associated with an increased likelihood of examining patients and over-prescribing drugs (Renkema *et al.*, 2019). Hence, the patient–physician relationship represents a critical aspect of defensive medicine. Moreover, with the diffusion and use of many smart devices connected to the internet, patients are more likely to search for information about their health status on the web rather than directly asking the doctor (Tinica *et al.*, 2017; Vento *et al.*, 2018). The problem is that the information that is collected by the patients is unreliable most of the time and, in addition to this, patients are not able to contextualize this information with their own clinical status. For this reason, there are conflicts between what the doctor suggests and what an ‘informed patient’ expects, leading to a disruptive relationship and, thus, to defensive behaviours (Toraldó *et al.*, 2015).

Finally, but importantly, defensive medicine has a strong negative economic impact. In the United States, healthcare cost increases due to defensive medicine ranging between 5% and 9%. In Italy, the increase is about 10.5% and 14% of the annual healthcare spending for the public and the private sectors, respectively (Tinica *et al.*, 2017). This phenomenon is influenced by the domestic legal culture. For this reason, it is possible to find several empirical studies based on surveys and focus groups about the rate of its diffusion. Just to cite some of them, defensive medicine attitudes have been found with a percentage of 73% in the USA, 60% in Italy, 54–62% in Israel, 98% in Japan, 72% in Turkey, and, less frequently, in the UK, China, Australia, Romania, Canada, South Africa, France, Switzerland, Belgium, and Scandinavian countries (Assing Hvidt *et al.*, 2019; Baungaard *et al.*, 2020; Calikoglu and Aras, 2020; Chen, 2007; Garattini and Padula, 2020).

2.2.3 Patient–Physician Relationship

The value co-creation and defensive medicine phenomena are both strongly influenced by the ways in which the patient and the physician interact with each other. The patient–physician relationship has been studied for many years, and a variety of archetypes,

models, and theories have been developed by scholars and have evolved along with societies.

Many writings on medical ethics in the decade of approximately 1967–1977 can be seen as critiques of the paternalistic view, which could be considered the oldest archetype of the patient–physician relationship, but it is still common in many cultures. It assumes that the physician has the expertise necessary to unilaterally determine and manage the care process in the best interests of the patient (Deber, 1994). To argue that both the physician's and the patient's perspectives should be considered with equal weight in approaching an ethically appropriate relationship, (Veatch, 1972) proposed the contractual model. This archetype was widely discussed in the literature at that time, and some refinements were proposed (Brody Howard, 1987). According to this model, the physician took responsibility for all purely technical decisions and the patient retained control over decisions made according to their personal moral values or lifestyle preferences. Thanks to this alternative way of considering the relationship between the doctor and the patient, the conception of healthcare as a service became much stronger. In fact, (Roter, 1987) speaks about clients and providers, referring to patients and doctors/hospitals, and she classified four typologies of patient–physician relationships: authoritarian guidance (high physician control), partnership, and independent decision-making (high patient control).

Since patients started reporting higher levels of satisfaction in cases of partnership or, more generally, when their needs and preferences were taken into consideration (Anderson and Zimmerman, 1993), a new medical practice called patient-centred care was conceptualized. This was discussed in the literature, and three core values of patient-centeredness have been identified: (1) considering patients' needs, wants, perspectives, and individual experiences; (2) offering patients opportunities to provide inputs and participate in their care; and (3) enhancing partnerships and understanding in the patient–physician relationship (Epstein *et al.*, 2005).

The advent of so-called evidence-based medicine (Evidence-Based Medicine Working Group, 1992), which asks physicians to ground their clinical practices and medical decisions in the critical evaluation of empirical evidence from clinical cases, somehow represented a milestone in the evolution of the patient–physician relationship (Glass, 1996). In fact, it has been demonstrated by (Panella *et al.*, 2017) that one of the best strategies to dampen the phenomenon of defensive medicine is through the systematic use of evidence-based medicine, together with better communication with

patients and their families. This is because, by anchoring medical choices to previous scientific studies (and communicating this to patients), physicians' self-confidence about their conduct increases, making them more relaxed in the relationship with the patient, and the tranquillity of the patient increases, making them more likely to have faith in the physician (Hiyama *et al.*, 2006).

Referring back to empathy, physicians associate it with benevolent emotions and developing a shared understanding with patients. Many articles discuss the difference between cognitive and emotional empathy in medical practices (Halpern, 2007; Larson and Yao, 2005). For a deontological reason, medicine should not be affected by emotions since the health of the patient holds priority, but empathy can have positive effects on the patient–physician relationship in some cases and, consequently, on the medical practices as well. Managing ‘problematic’ people represents an example. Conflicts can occur between physicians and their patients, especially when both parties are angry, and yet empathy is needed (Halpern, 2007).

Another important aspect that strongly influences the patient–physician relationship is trust (Thom and Campbell, 1997). Trust is enhanced when physicians make an effort to communicate clearly with their patients, understanding their problems and needs with the aim to establish a sort of partnership (Fiscella *et al.*, 2004). Engaged physicians communicate more effectively, decreasing patient anxiety and improving patients' compliance, leading to better outcomes (Beck *et al.*, 2002; Halpern, 2007).

Patient participation, even in medical decision-making, generally has positive effects on health outcomes, but this is not always possible or desirable because there are patients that prefer to let the physician decide freely according to their major expertise. A previous study has shown how, in cases where both physicians and patients share the same preference in terms of patient participation in the care process and decision-making, the latter's satisfaction, adherence to the treatment, and health outcomes tend to be more positive (Jahng *et al.*, 2005).

In conclusion, the literature focusing on the patient–physician relationship offers a variety of archetypes, constructs (empathy, trust, patient engagement, etc.), and theories (patient-centred care, evidence-based medicine, etc.) that are useful for comprehending the different facets of this relationship. However, in the same literature, we did not find any study that analyses the patient–physician relationship by taking into account the two phenomena of defensive medicine and value co-creation. Conversely, many studies on either defensive medicine or value co-creation clearly indicate that these two

phenomena are strongly linked to the nature of this relationship (Barile *et al.*, 2014; Entwistle and Watt, 2006; Ouschan *et al.*, 2006; Renkema *et al.*, 2019; Studdert *et al.*, 2005; Tinica *et al.*, 2017; Vento *et al.*, 2018; World Health Organization, 2013). Therefore, the research presented in this paper is positioned within and wishes to contribute to the literature on patient–physician relationships by adding considerations for the phenomena already mentioned. In this way, we will be able to study specific relationship characteristics which are relevant in terms of value generation and defensive medicine behaviour.

2.3 Methodology

To analyse and define patient–physician relationship archetypes, we opted for the revised qualitative approach adopted by (Corbin and Strauss, 2008) involving a three-level coding activity. The data was collected between January and March 2020 at three different Italian hospitals and a private medical office. They include semi-structured interviews with 5 physicians and 15 patients which lasted, on average, 1 hour (with the physicians) and 20 minutes (with the patients) as well as field observations and personal notes.

Concerning the physicians, our sampling logic was built around choosing key informants from different medical areas. The specific medical areas involved in this study are general medicine, emergency surgery, radiology, internal medicine, and gastroenterology. In the literature, many studies on defensive medicine are focused only on medical specialities with a high risk of lawsuits, but since our study is about a generalization of patient–physician relationship typologies, we opted for specialities in which the risk of defensive behaviours vary from rare (general medicine) to frequent (emergency surgery). For our purposes, a key informant is a physician with a range of 10–25 years of job experience. We wanted to eliminate both those who were too ‘old school’ and newer physicians, who may alter the solidity of this study due to either being outdated or practising “acerb” medical practices. Another aspect we have taken into account is that almost all of the physicians who were interviewed had experiences in both the private and the public sectors. In this way, we could include both perspectives. On the other side, the patients were chosen randomly from the adults in the waiting rooms of the key informant physicians. We selected three patients from each speciality.

It is important to clarify that during the interviews, both with patients and physicians, we did not focus on just one relationship, i.e. we did not ask patient A to tell us only about their relationship with doctor B and vice versa, and we did not match their answers about a specific relationship (A with B). Contrarily, we interviewed patients (and physicians) about their entire experience of relationships with physicians (and patients). We asked them to tell us about the multiple relationships they had in order to get as many insights as we could. The questions (see Appendix 1 and 2) were quite general and open-ended, asking for, when possible, examples or direct experiences. The discussed topics referred to the concept of value in healthcare, co-creation activities, cognitive and behavioural aspects in patient–physician relationships, defensive medicine practices, and possible triggering conditions. We recorded the interviews and transcribed them within two days in order to recall those moments in an optimal way and to re-order field observations and personal notes.

Our transcriptions have been analysed by two researchers with the support of the text analysis software ATLAS.ti. In specific, the data were coded separately, and then the results were matched only at the end of the process in order to confirm and discuss the differences obtained. Through the labelling of row data by quotes, these were organised into a pattern of aspects and characteristics with the first level of coding.

Once we had identified all the characteristics present in the data, the second level of coding consisted of assigning a degree (low or high) to both the risk of defensive medicine (DM) behaviour and the likelihood of value co-creation (VCC) emerging from the interviews. During the interviews, we found several occurrences of assurance behaviour but only one occurrence of avoidance behaviour. For this reason, in the empirical analysis, we did not consider the latter, and we focused only on the assurance behaviour of defensive medicine.

In particular, in order to attribute a degree of value co-creation, we used the classification of the activities provided by (McColl-Kennedy *et al.*, 2012), as described in the literature review section, and considered the potential margin of value contribution of the patients. For example, for a dental extraction, the patient cannot do a lot to ‘co-produce’ value, other than taking antibiotics and following correct oral hygiene practices. In contrast, when the patient had more responsibility for the success of the care process, such as in the case of metabolism-related illnesses, the potential for value co-creation (but also value destruction if they do not follow the medical indications) is much higher.

The third and final level of coding was focused on the systematic selection of the characteristics that emerged as the most frequent and relevant for both patient and physician perspectives.

Some examples of the coding process are reported in Appendix 3. Just to cite one of them, an internist declared: ‘...*I think that is fundamental, that the therapy has to be adapted to the patient’s needs, otherwise they will not be compliant. ... When a patient complies with the therapy and pays attention to the diet, they immediately see the positive results in their quality of life. ... When you give attention to the patients, they feel more satisfied, and as a consequence, we feel less pressure from the risk of lawsuits.*’ At the first level of coding, we identified ‘attention to patients needs’ and ‘service personalization’, and then we attributed a coding of ‘VCC HIGH’ according to the two value co-creation themes proposed by (McColl-Kennedy *et al.*, 2012): ‘co-production’ and ‘changing ways of doing things’. We also attributed ‘DM LOW’, since the low risk of lawsuits disables defensive behaviours. At last, the third level of coding defines the archetypes according to the two dimensions under evaluation.

2.4 Analysis and findings

A preliminary result from the first coding analysis is that the identified characteristics refer to different relationship dimensions: patient, physician, patient and physician, or situational. These are presented below in Table 2.

Table 2. Dimensions of the patient–physician relationship characteristics

Patient	Physician	Patient and Physician	Situational
Demanding patient	Attention to patients’ needs	Attention to dialogue	Relationship length
Patient control	Physician control	Information asymmetry	Risk of lawsuits
Patient curiosity	Physician empathy	Patient engagement	Service personalization
		Trust	

This classification shows how different aspects coalesce in characterizing the patient–physician relationship: Some of them refer only to patients or only to physicians, while others are valid for both or are circumstantial.

The coding activity allowed us to associate the identified characteristics with a degree of value co-creation according to the notions of (McColl-Kennedy *et al.*, 2012) and the risk of defensive medicine. We then clustered the characteristics into four categories: Archetype 1 (low VCC, low DM); Archetype 2 (high VCC, low DM), Archetype 3 (high VCC, high DM), Archetype 4 (low VCC, high DM). These characteristics are listed in Table 3, where we marked the characteristic results relevant to the specific archetype with an “X” if it is present or with a “-” if it is not. We also added a short comment to clarify in what way the characteristic is relevant when it is not obvious.

Table 3. Archetypes characteristics

Characteristics	Patient–Physician Relationships			
	Archetype 1 Low VCC Low DM	Archetype 2 High VCC Low DM	Archetype 3 High VCC High DM	Archetype 4 Low VCC High DM
Attention to dialogue	-	X	X	-
Attention to patients’ needs	-	X	X	X (Inattention)
Demanding patient	-	-	X	X
Information asymmetry	X	X (Symmetry)	X (Symmetry)	X
Patient engagement	-	X	-	X (Disengagement)
Patient control	-	-	X	-
Patient curiosity	-	-	X	-
Physician control	X	-	-	-
Physician empathy	X	X	-	X (Insensitivity)

Relationship length	X (Medium-Long)	X (Medium-Long)	X (Short-Medium)	X (Short-Medium)
Risk of lawsuits	X (Low)	-	-	X (High)
Service personalization	-	X	-	X (Standardization)
Trust	X (Patient)	X (Mutual)	-	X (Mistrust)

After that, for each archetype, we were able to identify and select the resulting aspects that were simultaneously relevant for both the physician and patient perspectives. In other words, when interviewing both parties, common aspects emerged, and we set those aspects as the most relevant for each archetype. By the end of this process, we had obtained the empirically informed model presented in Figure 1.

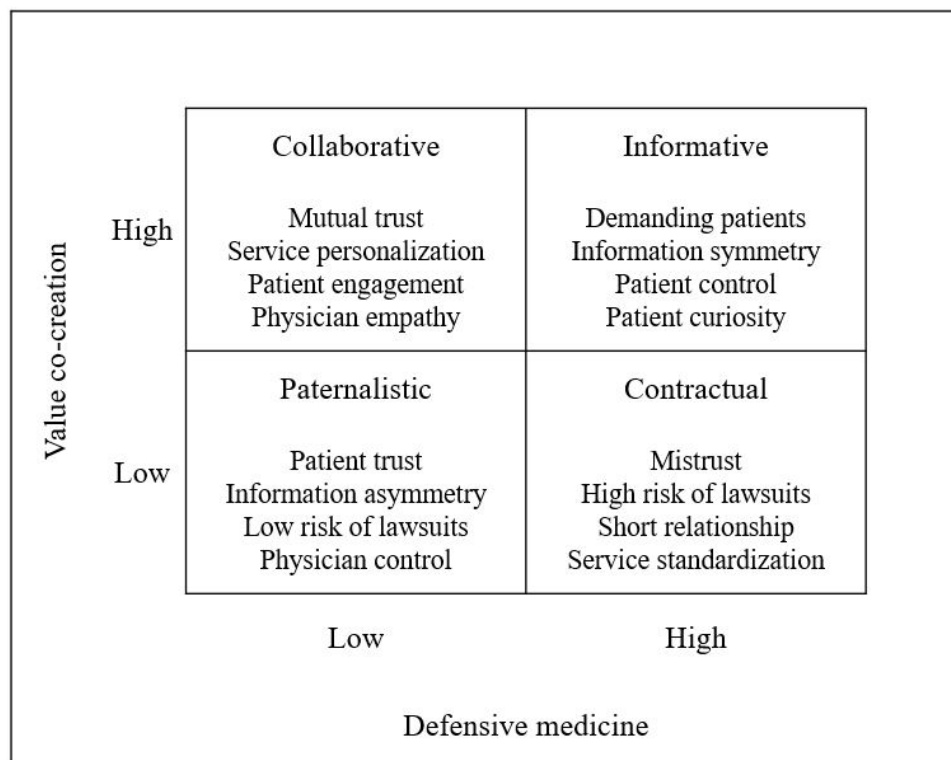


Figure 1. Empirically Informed Model for Patient–Physician Relationship Archetyping

Archetype 1 was named “paternalistic” since, in this archetype, the physician undertakes to supply the needs and regulate the conduct of the patient, who is under their control. This archetype includes aspects such as information asymmetry, high physician control, and patient trust in the physician. The first two features denote a low level of contribution by the patient in terms of value co-creation, and the latter combined with a low risk of lawsuits dismantles defensive behaviours.

Archetype 2 was defined as “collaborative” because service personalization, physician empathy, ability to engage the patient, and mutual trust are its predominant characteristics. In this archetype, patients and doctors collaborate as they work together in a team. In this context, the patient’s active participation in the care process is a natural consequence, as are their interactions with the physician. More value is co-created with this archetype, and the risk of defensive medicine practices is quite low due to reciprocal trust.

Archetype 3 was termed “informative” because the relationship is more focused on sharing information in this archetype due to the patient’s curiosity or, in the case of hypochondriacs, their need to have every possible aspect of their health conditions under control. Generally, the patient in this type of relationship tends to ask for a lot of information and is sometimes also repetitive; this may lead to a stressful situation for the physician who tries to provide what is demanded. The likelihood that value co-creation happens is high, as is the risk of incurring defensive behaviours.

Finally, Archetype 4 was defined as “contractual” because aspects that bring contexts with a high risk of lawsuits, such as the absence of trust and spot and short-term relationships, heavily influence this kind of interaction by making it more formal and interpersonally disengaged. This results in few value co-creation opportunities and a major risk of defensive medicine practices.

A detailed description of each patient–physician relationship archetype has been provided in the following sub-sections.

2.4.1 Paternalistic

The paternalistic interaction is an older model, and it has been defined as outdated very often in literature. Today, however, it is still a common practice. Generally, paternalism is seen as an undesirable practice due to moral and social issues (Brody Howard, 1987), but here we want to rethink this type of relationship by viewing it from the perspectives of value co-creation and defensive medicine outcomes. Most of all, we observed a

beneficial effect from this type of relationship in terms of the risk of defensive medicine behaviour.

The paternalistic approach is considered to be the traditional consultation model whereby patient involvement is limited to reporting symptoms and not engaging as an active participant in the consultation. Both parties attribute their position to the fact that the physician is an expert and has the right to exercise their specialised knowledge to make informed decisions regarding the management of the patient's health condition in their best interest. However, this knowledge asymmetry poses a problem in enabling the value co-creation process (Osei-Frimpong *et al.*, 2015). In some cases, patients may prefer a more passive role, thus favouring a more paternalistic physician style, for example in cases of serious illness or specific medical needs coupled with a patient's incapacities (Thompson, 2007).

The patient, in a paternalistic interaction, tends to refuse active participation in the decision-making process because they believe more in the expertise and medical competences of the physician rather than their own limited knowledge. For this reason, trust is an essential aspect of this relationship archetype; otherwise, the patient would not comply with the medical indications.

"I think that it is important to me to follow the physician's prescription because she has studied a lot. Thus, she is an expert, and she knows my disease well."

Patient #13

Usually, in cases where the physician is the family doctor or a friend or where the patient-physician relationship has been long-lasting, the interactions tend to follow a more paternalistic style because of the solid trust built over time.

"Family doctors should be the most trustworthy person among physicians because they follow their patients, ideally, for their entire life."

Family doctor

2.4.2 Collaborative

Collaborative relationships can be seen as being co-determined by patients and medical professionals and occurring only through reciprocal relationships with the use of dialogues and shared decision-making. Collaboration between the parties enables the co-creation of value, which implies not only benefits for the patients but also the service provider (Joiner and Lusch, 2016). However, collaborative practices are not easily applicable and depend on factors such as the cognitive and behavioural aspects of both parties, their personal traits, the patient's medical conditions, and general socio-cultural

contexts. Our empirical analysis clearly showed some key enablers for collaboration between patients and physicians.

One of the key elements that emerged from the interviews is the factor of time. In order to have a strong collaboration, time is required in order to build up and strengthen the relationship. For this reason, some studies show how the results are far more relevant, in terms of value co-created, for chronic conditions, such as hypertension, diabetes, and other diseases linked to metabolism dysfunctions (Damali *et al.*, 2016; Elf *et al.*, 2017; Elg *et al.*, 2012; Entwistle and Watt, 2006; Guadagnoli and Ward, 1998; Joiner and Lusch, 2016; McColl-Kennedy *et al.*, 2012; Porter, 2010; Sweeney *et al.*, 2015; Thompson, 2007). This is because the greatest effort in the healing process, or in maintaining good health in these situations, must be accomplished by the patient.

“NAFLD (Non-Alcoholic Fatty Liver Disease) is an example in which the patient is the only active part of the healing process because they have to change their lifestyle. There is no pharmacological treatment, so the only way is following a diet, doing sport, and being responsible.”

Gastroenterologist

“My participation is not limited to following the medical indications, such as the diet or taking medicines, but also involves being responsible by avoiding a cold. Otherwise, I could not take the usual pills. In this way, I try to anticipate some issues with my behaviours.”

Patient #14

Two other important aspects of a successful collaborative interaction are the attention to the patients' needs and the flexibility of the medical indications. These are very important in chronic diseases that are, by definition, long-lasting; in these situations, any therapeutic path or diet choice has a great impact on the patient's daily life. Quite often, overcoming the resistance to change habits and lifestyle is the most difficult step, but it is necessary in order to achieve a better health condition. Empathy provides a great boon to physicians in understanding their patients' perspectives in order to find the best way to engage them.

“Empathy is important, but it depends on the situation and the patient. However, it is professional empathy, not like friendship. Even though emotions are part of us as human beings, we should try to not be influenced by them or we could make mistakes.”

Radiologist

“I think that a physician should be empathic in order to take care of the patient as a human being and not only pay attention to the pathology.”

Patient #5

Disease awareness and medical accountability aspects were cited by all interviewees, both physicians and patients. These two characteristics are the fundamental requirements for the patient in order to comply with the therapy and be pro-active with regard to value co-creation. That is why physician plays an important role as a motivator, and they should push patient toward practising more value awareness in their own health.

“I try to explain to my patients that, for a disease that is linked to lifestyle, the only way to get better is by changing their own habits. I try to provide soft targets and personalised indications in order to motivate them and make the objectives reachable.”

Internist

The primary purpose of a collaborative patient–physician relationship is to improve the patient’s quality of life since, quite often, chronic conditions cannot be healed but only kept under control. It is important to have awareness of one’s own illness and learn how to live with it.

“My disease cannot be healed, but now I have a better quality of life. I feel better, and I try to avoid stressful situations, even though my job is hard, in addition to following medical indications.”

Patient #6

Thus, the role of the physician goes beyond prescribing drugs or therapies. They represent the main support for the patient and take care of them in a holistic manner to achieve a better quality of life.

2.4.3 Informative

In an informative interaction, the physician provides the patient with all relevant information, letting the latter select the medical intervention that best realizes their values. Thus, the patient holds control in the decision-making process, in contrast to a paternalistic interaction.

The relevant information includes the patient’s disease status, the possible diagnostic and therapeutic interventions, the nature and the probability of risks and benefits associated with the options provided, and the answers to the patient’s uncertainties (Emanuel and Emanuel, 1992). Physicians have an important obligation to

provide truthful information; for this reason, consulting colleagues is a common practice.

“In case of any doubts on a diagnostic test, in a hospital, it is easy to contact a colleague for help in order to clarify the situation.”

Radiologist

In this relationship archetype, core activities that co-create value are represented by the seeking, selection, and sharing of information by both parties, either for the patient’s need for awareness or for the physician’s desire to provide a comprehensive clinical view (Barile *et al.*, 2014). Information technologies allow patients to collect a lot of information and educate themselves through the internet, not only on the scientific and clinical aspects of their health conditions but also on the range of therapeutic options experienced by other people (Vento *et al.*, 2018).

“I follow the indications that the physician provides me, but I also seek information on the internet. This is because I am scared, so I also look for news on scientific research about my illness. Thus, I am always on alert.”

Patient #9

Being highly informed is not always synonymous with having good or correct information. It often happens that patients have a lot of prejudices based on the incorrect or misleading information they have found. These can pertain to not just diseases, alternative therapies, and diets but also feedback and opinions about physicians and healthcare providers. These contribute to altering their relationship with the medical professionals, thus leading to more defensive medicine practice by the latter. The patient’s active role during the interaction with the physician and the physician’s effort to satisfy the patient both lead to defensive behaviours because the doctor may likely prescribe unnecessary diagnostic tests to address the pressure from the patient.

“People have strange behaviours. It happened that a patient came for a diagnostic test, but he did not say that the week before he did the same test in another hospital. So, he repeated the test just to know what my opinion was. Thus, how it is possible to trust in patients?”

Radiologist

For the reasons above, informative relationships are common when a patient engages a medical specialist, often following the advice of their family doctor for a

further diagnostic investigation or desiring another medical opinion about a specific medical situation.

2.4.4 Contractual

A contractual patient–physician interaction refers to cases in which the physician focuses more on the rules and clinical guidelines rather than on the specificities of the clinical case and the active involvement of the patient while designing the therapeutic path. This is more seen as a provider–customer relationship from a functionalist perspective (Ishikawa *et al.*, 2013). Thus, it is quite far from the collaborative archetype.

It is recognised in the literature that defensive medicine practices are directly proportional to the specific risk of failure related to the applicable treatment or therapy (Tinica *et al.*, 2017). In particular, the high-risk medical areas in which defensive behaviours are more common are emergency medicine, general surgery, neurosurgery, obstetrics/gynaecology, orthopaedic surgery, and radiology (Plebani, 2014; Studdert *et al.*, 2005), which are typical of the hospital’s emergency rooms.

One common characteristic among the above medical specialities, apart from the high level of risk, is that they are used to address occasional or short-term situations. The patient–physician relationship is surely not based on long-term trust because, in most cases, both parties would not have met before. In fact, in an emergency or acute illness situation, the patient does not have the time or the possibility to choose a physician.

“In an emergency, trust from both parties does not exist.”

Emergency surgeon

Another aspect that is undervalued most of the time is that, in emergency rooms, the physicians are in danger quite often due to problematic patients. In fact, it is common to see police or security staff patrolling in order to avoid disruptions (Maguire *et al.*, 2018; Zafar *et al.*, 2013). This also provides evidence of the interpersonal absence of trust, and also the threat to one’s own safety, that physicians and the medical staff can suffer.

“One day I had to perform emergency surgery on an old woman, and her son came in the surgical room in shorts and slippers to threaten me in case something went wrong. Then the policemen took him out of the room. [...] Two other times, armed people came into the hospital searching for a medical professional.”

Emergency surgeon

These contexts are also characterized by a wide socio-cultural variety of people. Thus, it would be possible to think that the healthcare services provided in these situations are the most personalized, but that is not the truth. This is because hospital emergency rooms take care of a very high volume of people every day (Eitel *et al.*, 2010; Miró *et al.*, 1999; Richards and Derlet, 2000), so the standardization of the practices and processes, even therapies and diagnostic tests, is useful for handling the high demand. Moreover, since one of the risks of standardization is that the therapies and tests could have no efficacy because every person is different from one another, broader medical guidelines are provided in order to keep the service quality high. In these uncertain contexts, overtreatment and overordering of diagnostic tests, even beyond recommended guidelines, are common practices in an effort to avoid lawsuits by patients.

In the situations mentioned, the priority for the physician is in preserving the patient's health, so not much attention is given to the patient's experience or satisfaction. In the case of an emergency, the only important thing is to save the patient's life.

"In emergencies, the only important thing is saving the patient's life."

Emergency surgeon

2.5 Conclusions

We defined four archetypes of patient–physician relationships based on their effects on the likelihood of value co-creation and the risk of defensive medicine behaviours, as these two phenomena are very relevant in healthcare management today (Damali *et al.*, 2016; Joiner and Lusch, 2016; Vento *et al.*, 2018). Thanks to this approach, we are able to provide insights and reflections on patient–physician relationship archetypes and, in particular, on their differences and commonalities. For example, in the literature, the informative relationship is commonly considered to be in contrast with the paternalistic one (Emanuel and Emanuel, 1992; Ishikawa *et al.*, 2013). However, our study shows that, although both the paternalistic and informative archetypes have, in fact, opposite effects in terms of defensive medicine and value co-creation, neither is necessarily better or worse in terms of a desired healthcare outcome; as such, they cannot be considered to contrast with each other. In fact, one is preferable in terms of value co-creation, and the other is preferable in terms of defensive medicine. Clearly, however, these evaluations depend on context. If the context is that of dental extraction, then

value co-creation is not a problem, so a paternalistic relationship is fine. Contrarily, if the context is that of long-term liver disease, where the patient's contribution to value co-creation is relevant, then a paternalistic relationship is not the proper solution (Osei-Frimpong *et al.*, 2015).

Contrarily, collaborative and contractual archetypes, which, again, have opposite effects in terms of defensive medicine and value co-creation, are definitively in contrast with each other, even in terms of desired healthcare outcome, with the collaborative archetype being much better than the contractual one in terms of both defensive medicine and value co-creation.

On the other hand, when comparing the contractual archetype with the paternalistic one, or informative with collaborative, one can conclude that, if the level of value co-creation remains the same within a pairing, the paternalistic and collaborative archetypes are preferred to the other two because they decrease the risk of defensive behaviour. The same line of reasoning can be applied when comparing the collaborative archetype with the paternalistic one or informative with the contractual one. The formers, of course, are preferred.

Although our premise and our findings tell us that each archetype is defined by a combination of relevant characteristics that influence the risk of defensive medicine, or the likelihood of value co-creation, in one direction or the other, we can also make some considerations related to the relevance of every single characteristic in this model. When looking at specific characteristics of the patient–physician relationship, the results presented in Table 3 show that there exist some different patterns in the way each characteristic may be relevant for one or more archetypes. In fact, if we look at these characteristics in a visual way (such as in the two-by-two matrix in Figure 1), we see that some of them appear along a column, others along a row, and others along a diagonal. What does this mean? If we look at trust, for example, it is an element in both the paternalistic and collaborative archetypes; that is, trust appears along the column 'low risk of defensive medicine'. Thus, we can conclude that the collaborative and paternalistic archetypes are both good in terms of reducing the risk of defensive medicine, probably because they are both based on trust. So, by looking at the characteristics that each couple of archetypes have in common, we can identify which, among the others, is the most relevant characteristic of those archetypes in affecting either defensive medicine or value co-creation. With the same line of reasoning, we observe that trust appears as a disabling factor for defensive medicine but, at the same

time, has no particular relevance for value co-creation activities (note that the paternalistic and contractual archetypes both lead to a low level of value co-creation, but the former is characterized by high trust and the latter by mistrust).

In a collaborative relationship, mutual trust is a fundamental aspect in order to make the patient compliant with the therapy, change their lifestyle, and be more responsible and more amenable to the care process, but the doctor also needs to know that their medical indications are respected. In this way, it is possible to achieve better health outcomes as confirmed by previous studies (Entwistle and Watt, 2006; Osei-Frimpong *et al.*, 2015; Vargo and Lusch, 2006). However, the results show that trust, in some cases, is not as relevant as other characteristics.

As an example, an informative clinical consultation has the goal to clarify and deepen understanding of some aspects of the patient's health condition, but in this case, the relationship cannot be based on trust because, in almost all cases, the medical specialist meets the patient for the first time. Thus, the important thing is to pay a lot of attention to communication, explaining all the viable therapies, trying to be clear, and providing all necessary information to satisfy the patient's need to know. This will foster the patient's willingness to be engaged in the care process, and they can contribute through feedback, ideas, and thoughts in order to have a better health outcome, thus co-creating value (Entwistle and Watt, 2006; Osei-Frimpong *et al.*, 2015; Ouschan *et al.*, 2006). Moreover, trust could even be an enemy of value co-creation because it may lead to a paternalistic archetype. In fact, in this kind of relationship, the patient tends to blindly follow the medical instructions, without making any contribution to the process. For these reasons, trust has a different weight in terms of value co-creation, even being an obstacle in some cases, as we discussed. It is worth mentioning that, in this study, we refer to the sentiment of trust as it is built over time between individuals. Thus, the patient has to know the doctor, and the patient's trust in the doctor is due to their past professional contacts and relationship. We are not considering the sentiment of trust as that of a patient respecting the general figure of the medical doctor, regardless of whether they have ever met.

Another important finding relates to the distinction between the person-specific and non-person-specific characteristics which make an archetype. Person-specific aspects are linked to personality traits; for example, physician empathy and patient curiosity, and their mixture of course influence the kind of relationship that exists between the doctor and the patient. However, some combinations of these

characteristics can also influence the decision-making process, which may lead to different outcomes of a therapeutic path in terms of value co-created (or disrupted) or defensive behaviours. Instead, non-person-specific characteristics depend on the patient's clinical situation and context. For example, in an emergency situation or in a critical health condition, the risk of lawsuits is higher than normal, or again, things could depend on the relationship length between the patient and the doctor. In this sense, the archetypes we described could be more frequent in particular clinical scenarios and, thus, are not dependent only on the personalities of the actors involved. For example, long-term illnesses like chronic diseases require constant interaction between the parties involved; consequently, collaborative relationships are likely more frequent in this type of clinical condition. On the other hand, contractual relationships are most frequent in cases with strict protocols, such as in emergency conditions, surgery, and work-related injuries. The paternalistic archetype is more adopted by general practitioners or family doctors for common diseases, but it is also present in cases of terminal conditions because the patient tends to prefer to be fully guided. Finally, informative relationships are typical for a specialist consultancy, especially in the first approach, where communication between the parties plays a key role.

In Figure 2 we provide a recap of typical clinical scenarios in which the discussed patient–physician archetypes are more likely to occur.

VCC	High	Collaborative Chronic illnesses Metabolism-related illnesses	Informative Specialist consultancy
	Low	Paternalistic Common diseases Terminal conditions	Contractual Emergency conditions Surgery Work-related injuries
		DM Low	DM High

Figure 2. Most Common Clinical Scenarios for Patient–Physician Archetypes

One limitation of this study is its small sample size. Although the interviewees were all key informants, it would have been preferable to interview more people in order to further validate the data obtained and eventually find divergences among internal aspects. However, thanks to this, we were able to grasp the relevance of the healthcare context when studying phenomena like defensive medicine and value co-creation.

Another limitation is that qualitative interviews rely on human interpretation and are subject to the biases and subjectivities of both the interviewer and the interviewee. The researcher's personal beliefs, experiences, and preconceptions may influence the interview process, potentially leading to biased findings. From the interviewees' point of view, they may provide responses that they perceive as socially desirable or acceptable, rather than expressing their true thoughts or behaviours. This bias can arise due to the interviewee's desire to please the interviewer, conform to social norms, or avoid judgment.

Finally, although we interviewed physicians belonging to different medical specialities and contexts, we were not able to conduct a cross-case analysis to confirm the specific roles and contributions of each specific medical speciality and context.

Chapter 3

RESEARCH STREAM 2:

“Defensive behaviour in healthcare: the role of organizational factors”

3.1 Introduction

In healthcare, during the patient care process, most of the medical decisions are taken during the planning of the therapeutic path, whose main result is the elaboration of optimal and personalized treatment. This is a very delicate step, as any mistakes could have a significant impact on either the patient's life or the hospital's finances. Unfortunately, during the planning of the therapeutic path, the risk of inefficient and ineffective treatments is quite high, due to the phenomenon of the so-called defensive medicine (Studdert *et al.*, 2005).

Defensive medicine, defined as the provision of care services that are not strictly necessary for patients, but are intended to avoid lawsuits, or the non-application of risky procedures to patients who could benefit from them, is a phenomenon observed worldwide. The doctor's need to reduce the risk of legal repercussions represents a strong element of interference during the patient care decision-making process (Charles *et al.*, 1997). Many negative consequences are associated with the phenomenon of defensive medicine, such as the deleterious economic impact on annual healthcare expenditures (Brilla *et al.*, 2006; Chen, 2007; Nakajima *et al.*, 2001; Steurer *et al.*, 2009; Summerton, 1995; Veldhuis, 1994), undesired impact on operations of healthcare providers, and unwanted direct and indirect effects on patients (Vento *et al.*, 2018). In other words, healthcare systems face a broad variety of challenges due to defensive medicine: clinical, service, financial, and legal (Berry and Bendapudi, 2007; Ramanujam and Rousseau, 2006).

While most of the literature on defensive medicine is devoted to the legal and insurance aspects that may reduce the phenomenon (Asher *et al.*, 2012; Nakajima *et al.*, 2001; Steurer *et al.*, 2009; Studdert *et al.*, 2005), very few studies have focused on investigating whether and how organizational and operational aspects could dampen or exacerbate such a phenomenon. Before starting this research, we had a few preliminary interactions and discussions with some medical doctors about defensive medicine. Doctors are usually quite interested and inclined to discuss defensive medicine because of many reasons, including the dramatic impact a lawsuit could have on their career. During these chats with the doctors, when we tried to understand possible actions from

a managerial point of view to avoid this problem, it emerged how different organizational factors could be the causes or could also dampen such a phenomenon. Some of the doctors told us that the way the ward is organized, the size of the hospital, the organizational climate, the level of overcrowding, the medical *equipe* composition, and other organizational factors may influence the defensive behaviour of the doctors. Specifically, the doctors agreed that such an attitude is usually exacerbated when crowds and stress are frequent or even considered “usual”, as in emergency departments (Blum *et al.*, 1996; Burke, 1993; Ganster and Rosen, 2013; Grove *et al.*, 2012; Yue *et al.*, 2021).

Prompted by our initial understanding of such a phenomenon, several more specific questions arose. Will a doctor working in an overcrowded emergency room be more inclined to hospitalize the patient - for instance, to quickly cope with pressure from the patient's family - and then quickly move on to the next patient? Or will the excessive use of overtime make the doctor less sensitive to the risk of litigation because of tiredness and fatigue, thus reducing the risk of defensive medicine?

In operations management literature, queue network models, infrastructural operations strategy frameworks, and discrete-event simulations have been used to study the influence of healthcare organizational decisions on operational performance, by considering dimensions like patients' waiting time, length of stay, demand patterns, and hospital capacity (Drupsteen *et al.*, 2013, 2016; Fottler, 1987; Hendijani and Bischak, 2016; McDermott and Stock, 2007; Venkat *et al.*, 2015). Investigating defensive medicine through an organizational lens raises critical questions regarding how caregivers operate and organize their practices, and the resultant consequences for both patients and healthcare operations (Blatt *et al.*, 2006; Broekhuis and Pieter van Donk, 2011; Ramanujam and Rousseau, 2006). Answering the research question “which organizational factors may reduce or exacerbate defensive medicine?” could be of great importance for healthcare managers to reduce the numerous negative consequences associated with the phenomenon. From a more theoretical viewpoint, this study contributes to the Behavioral Operations Management (BOM) literature. BOM is an operations management branch that explicitly considers the effects of human behaviour on the dynamics of processes and systems, influenced by prejudices, cognitive limitations, social preferences, and perceptions of cultural norms (Bendoly, 2013). Despite that, till now, BOM studies have not considered the phenomenon of defensive medicine, though it is strictly related to the doctors' behaviour, is potentially influenced

by organizational variables and, importantly, critically impacts healthcare service performance.

This study investigates whether and how organizational factors have an effect on the patient-physician relationship in terms of reducing or exacerbating physicians' defensive behaviour. In order to do that, we developed a set of hypotheses based on the literature on defensive medicine; to test them, we designed a scenario-based experiment with nine different clinical scenarios using the Clinical Practice Guidelines and then validated by a team of three doctors. The theoretical argumentations, the experiment, and the results obtained can be considered new contributions to this research field.

3.2 Literature review

3.2.1 The phenomenon of defensive medicine

Defensive medicine represents doctors' tendency to change their professional behaviour mainly to protect themselves from potential legal disputes. This can lead to two scenarios (Studdert *et al.*, 2005):

- a) the doctor carries out or prescribes extra tests or procedures (overtreatment) leading to *positive defensive medicine*;
- b) the doctor avoids certain procedures or patients considered to be excessively at risk (undertreatment), leading to *negative defensive medicine*.

Defensive medicine is linked to the doctor's behaviour of minimizing the risk of lawsuits (Studdert *et al.*, 2005): the objective of protecting the patient's health seems to be becoming, therefore, secondary to the legal risk. Some examples are: hospitalizing a patient otherwise manageable as an outpatient, requiring unnecessary hospitalization just to cope with pressure from the patient's family (Lavelle *et al.*, 2021), emphasizing certain clinical-anamnestic aspects to justify the correctness of own diagnosis, prescribing more diagnostic tests than necessary, requiring unnecessary consultations with other specialists and excluding at-risk patients from certain treatments (Studdert *et al.*, 2005; Tinica *et al.*, 2017).

3.2.2 Consequences of defensive medicine

In the U.S.A., according to the Jackson Healthcare (2010) report, the cost of defensive medicine is between 26% and 34% of annual healthcare cost, a significant increase vis-à-vis the 5-9% estimated only 8 years earlier by the U.S. Department of Health and

Human Services (2003). Similar estimations can also be found for other countries, such as China (Chen, 2007), Japan (Nakajima *et al.*, 2001), the United Kingdom (Summerton, 1995), Netherlands (Veldhuis, 1994), Germany (Brilla *et al.*, 2006) and Switzerland (Steurer *et al.*, 2009).

According to estimates of the *Parliamentary Commission of Inquiry on Health Errors* (Palagiano *et al.*, 2013), in Italy, expenditures related to defensive medicine are around 10 billion euros per year, with an average of 10-10.5% of the total healthcare cost. In particular, the most significant economic charge for defensive medicine is unnecessary hospitalizations (4.60%), followed by drugs (1.90%), visits (1.70%), and, finally, unnecessary instrumental examinations (0.80%).

Beyond economic aspects, overtreatment due to positive defensive medicine can create inefficiencies in the patient care process, such as long waiting lists, greater difficulty in accessing services, and undesired effects of unnecessary procedures (Vento *et al.*, 2018). Such effects impact both aspects of medical care: the clinical quality and the service level represented by “what” the patient receives (Berry and Bendapudi, 2007), and the process quality, which is “how” the service is provided (Marley *et al.*, 2004).

3.2.3 Causes of defensive medicine

From a theoretical perspective, the defensive medicine attitude belongs to the more general concept of defensive decision-making, which has been recently studied by Marx-Fleck *et al.* (2021) in the field of psychology. A defensive decision results when the decision-maker chooses not in the best interests of the organization or client, but to protect herself/himself against the risk of negative consequences. In particular, Marx-Fleck *et al.* (2021) analyse the relevance of psychological safety (when an employee does not suffer the stress from the possible negative consequences) (Nembhard and Edmondson, 2006; Roussin *et al.*, 2016) and job insecurity (the fear of losing the job) in approaching or avoiding the decision-making process, under the lens of the theory of conservation of resources (Hobfoll, 1989).

In cognitive psychology, the concept of loss aversion derived from the prospect theory (Kahneman and Tversky, 1979; Tamura, 2005) is also very useful to understand defensive medicine behaviour. When the decision-maker (the medical doctor)’s value perception of losing is greater than that of winning, she/he will act to contrast this value asymmetry, leading to defensive behaviour.

Since defensive behaviour is strictly context-related (Ashforth and Lee, 1990), we would like to contribute by analysing some organizational factors in the context of healthcare, where negative consequences involve not only economic or psychological aspects but also patients' health outcomes. Given the psychological nature of defensive medicine and its operational causes and consequences, we positioned the present research along the BOM literature, specifically along the stream of literature that considers how Behavioral attitude can influence the decision-making process in operations (Bendoly *et al.*, 2010). This BOM research stream usually refers to the body of knowledge of cognitive psychology, where the unit of analysis is the individual, whose decisions are deviated either in outcomes or in the process of decision-making.

3.2.4 The role of medical guidelines

For several decades, legislators and state courts have struggled with the liability issue related to medical malpractice. To counter malpractice cases, the Institute of Medicine of the USA has defined the Clinical Practice Guidelines (CPG) as statements systematically developed to assist doctors' and patients' decisions about the appropriate therapeutic path for given clinical circumstances (Field and Lohr, 1993).

According to the definition of the Agency for Health Care Policy and Research (AHCPR), however, the guidelines are mainly indications of methodologies and procedures to adopt and not a criterion to attribute or exempt measures of prudence, expertise, and diligence that the legal system requires the doctor to comply with (Fonteyn, 1998). Clearly, the guidelines may not be suitable for all clinical situations and, therefore, doctors' decisions must consider the specific condition of the patient. Indeed, although CPGs can promote and standardize the use of efficient evidence-based clinical treatments, they can also limit the doctor's autonomy by imposing inflexible or unrealistic standards on clinical practice (De Regge *et al.*, 2019; Samanta *et al.*, 2006). Nevertheless, guidelines are of increasing potential legal value, representing a tool in the hands of state legislators to regulate medicolegal activities (LeCraw, 2007).

The role of the guidelines is, therefore, of fundamental importance in health-related legal disputes and has been the subject of research (Samanta *et al.*, 2006); however, their legal value depends mainly on the regulations in force from country to

country. Since our scenario-based experiments have been conducted in Italy, we referred to the Italian CPGs².

3.3 Conceptual model and hypothesis development

Defensive behaviour is a reactive and protective action to reduce or avoid a perceived threat (Ashforth and Lee, 1990). Defensive decision-making in organizational routines (Argyris, 1986) implies not only avoidance of decision-making but can also generate an active behaviour for faster decision-making by taking the “safest” (egoistically speaking) option to limit the potential threat. To understand the type of threat a doctor could perceive and, consequently, why she/he acts defensively, we ground our theoretical elaboration on the theory of conservation of resources, as in Marx-Fleck *et al.* (2021). This theory is based on two main concepts: resource conservation and resource acquisition, where the term “resource” includes personal aspects, energies, economic conditions, and the job reputation of an individual. Thus, the theory of conservation of resources explains why people are motivated to protect themselves from the depletion of their resources or why they acquire new ones (Hobfoll, 1989).

In healthcare, one of the major threats to a doctor’s life and career is the risk of a lawsuit, which may lead not only to the doctor’s career disruption but also negative repercussions in terms of mental and physical stress (Burke, 1993; Yue *et al.*, 2021), other than economic, due to the harrowing legal procedures. Medical malpractices entail both civil and criminal liability. In this context, where doctors have huge responsibilities, they are inclined to protect their “resources” by assuming defensive behaviours during their work practice, leading to the defensive medicine phenomenon.

Hence, based on the theory of conservation of resources, the premise of our conceptual model is that part of the causes of overtreatment can be associated with the doctor’s perception of litigation risk (Kessler *et al.*, 2006). An increase in the perceived risk of legal repercussions would induce the doctor to prescribe or provide unnecessary medication, treatments, or specialist visits exclusively to protect her/himself against possible accusations of negligence. The first hypothesis, therefore, is formulated as follows:

Hypothesis 1. Litigation risk is positively related to overtreatment, which therefore increases.

² <https://www.iss.it/web/iss-en/clinical-governance-national-guidelines-system-snlg-and-hta1> (last access on 28/01/2023)

3.3.1 Organizational causes of defensive medicine

The majority of the defensive medicine literature focuses on identifying purely juridical-legal or economic-related aspects, while a few studies investigate the causes in the clinical-organizational context (He, 2014). On the other hand, more general defensive decision-making literature mainly focuses on cognitive psychology factors, such as psychological safety and job insecurity, as the causes of defensive decisions (Marx-Fleck *et al.*, 2021).

Our conceptual model shown in Figure 3, positioned in the BOM literature, considers how managerial and organizational support facilitate employees' psychological safety (Edmondson, 1999; Nembhard and Edmondson, 2006; Roussin *et al.*, 2016; Tucker *et al.*, 2007), which, in turn, influences their behaviours and outcomes as a consequence of feeling more capable and secure in their job. In our elaboration, we narrowed the research in the healthcare context, focusing on two organizational aspects that have been commonly studied in this sector, but never as drivers for defensive medicine, viz., overcrowding and overtime.

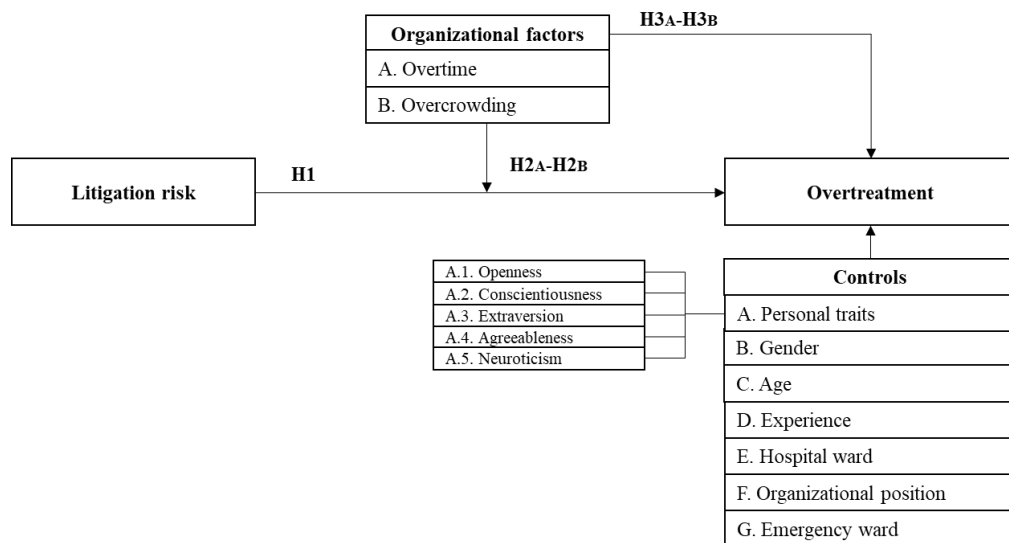


Figure 3. Overtreatment and organizational factors model

Overtime consists of working hours exceeding those expected for a single shift and/or working week. In healthcare, overtime is often used to meet the need for staff due to employee shortages, patient inflows, or both. With the shortage of nurses and healthcare professionals having been documented for over a decade, overtime has been an important management tool to ensure that patient needs are met (Olds and Clarke,

2010). The extra working hours have been demonstrated to have a negative impact on doctors; in fact, increased waking time and acute deprivation of continuous sleep reduce both the doctor's readiness and the quality of execution of the activities (Berry and Bendapudi, 2007; Ganster and Rosen, 2013; Mitler *et al.*, 1997). Sleep deprivation has a cumulative negative effect on doctors' performance, particularly chronically long working hours without adequate rest between shifts.

Overtime increases the doctor's fatigue and consequently, in the presence of litigation risk, the fear that he/she may miss something due to reduced mental lucidity; hence he/she tends to adopt positive defensive medicine (overtreatment) to protect him/herself from potential accusations of negligence and to conserve her/his "resources" (mainly the job position or reputation). Therefore, our hypothesis is as follows:

Hypothesis 2A. Overtime exacerbates the effect of litigation risk on overtreatment, which therefore increases.

When not considered in interaction with the level of litigation risk, however, common sense prompts us to believe that overtime can lead to a reduction in overtreatment: the doctor tends to do the essential and avoids unnecessary further exams/verifications if he/she is tired. However, this can also lead to an increase in the probability of making mistakes (Ganster and Rosen, 2013; Olds and Clarke, 2010).

Hypothesis 3A. Overtime reduces the likelihood of overtreatment, which therefore decreases.

Overcrowding has been defined as a condition in which patients, despite having completed the assessment phase and initial treatment, have to wait due to a lack of space or staff (Espinosa *et al.*, 2002). One of the most important causes of overcrowding is the unavailability of a sufficient number of hospital beds. However, overcrowding in healthcare also refers to:

- factors related to the emergency ward, such as waiting for a doctor or the results of a test (Brenner *et al.*, 2010);
- factors related to interactions between the emergency ward and the hospital, such as patients waiting for special diagnostic tests performed outside the emergency ward (e.g. echocardiography, CT scan, or specialist consultation) (Richardson, 2006);

- factors not directly related to the emergency ward or hospital, such as the presence of patients' family members in the ward (Gordon *et al.*, 2010).

When the capacity is exceeded, regular work conditions are difficult to maintain. Overcrowding, in fact, leads to an increase in intervention times with related complications, especially in emergencies requiring prompt action. This can lead to medical errors and lower accuracy due to the attempt to speed up the operations to reduce patient flow (Cho *et al.*, 2019; Dai and Shi, 2019; Jaeker and Tucker, 2017; Waring and Alexander, 2015). Consequently, there is an increase in legal actions and complaints, as well as serious staff turnover, burnout problems (Lavelle *et al.*, 2021), and patient dissatisfaction (Dai and Shi, 2019). Moreover, overcrowding induces the doctor to reduce the time dedicated to each patient. The doctor becomes worried that this may create in the patient the perception of the doctor's superficiality. Consequently, he/she prescribes additional treatments, believing that this will reduce the risk of complaints and legal repercussions, and will thus protect her/his "resources". Our hypothesis is, therefore:

Hypothesis 2B. Overcrowding exacerbates the effect of litigation risk on overtreatment, which therefore increases.

When not considered in interaction with the level of litigation risk, however, overcrowding could lead to a reduction in overtreatment since it is reasonable for the doctor to avoid prescribing unnecessary treatments that would further overload the system.

Hypothesis 3B. Overcrowding reduces the likelihood of overtreatment, which therefore decreases.

3.4 Methodology

3.4.1 Research approach

In this paper, we decided to adopt the scenario-based experiment because the BOM literature recognizes it as one of the most robust methodologies to capture the impact of behavioural attitudes, such as defensive medicine (Bendoly *et al.*, 2006, 2010; Bendoly and Swink, 2007; Polyviou *et al.*, 2018; Rungtusanatham *et al.*, 2011).

A clinical scenario is a detailed narrative that describes, for medical, scientific, or educational purposes, a medical problem experienced by one or several patients

(Gagnier *et al.*, 2013). The clinical scenarios have been developed for this experiment since this methodology is well suited for research seeking to understand how and why healthcare operations managers deal with such altered decision-making phenomena, such as defensive medicine (Rungtusanatham *et al.*, 2011). The use of the scenario-based experiment for a quantitative study of defensive medicine is entirely new, given that this phenomenon has been investigated mainly from a qualitative viewpoint till now (He, 2014).

This study is designed as a research within-subjects, where each element of the sample is subjected to all the experimental conditions or, in other words, to all the possible combinations of the levels of each independent variable, in consecutive moments. Compared to a between-subjects analysis, it has three major advantages (Charness *et al.*, 2012): internal validity is not dependent on random assignment; it has greater statistical power; it fits most of the theories more naturally.

3.4.2 Experimental procedure and measures

Initially, the experiment was designed to involve doctors together within a hospital, to reproduce a realistic environment. However, due to the SARS-CoV-2 pandemic, it was necessary to modify the experimental procedure by using digital instruments that allow remote execution of the experiment. This led to a reduction in interactions with the doctors, as well as greater difficulty in finding a large pool of subjects. To conduct our study, we created a web portal where the necessary set of instructions is provided for the execution of the experiment. In the instructions, we ensured the privacy and anonymity of the doctor's personal information and experiment choices by providing a unique random identification code to access the four sections of the website (corresponding to the four phases described below).

The scenario-based experiment was conducted in two rounds, involving 60 Italian doctors, 30 for each round. The first data collection was between March and May 2020, and the second was between August and September 2020.

In the absence of economic or other incentives for participation in the experiment, and due to the difficulties posed by the COVID-19 pandemic, we adopted a mix of:

- *convenience sampling* (Etikan, 2016), based on a selection of individuals among the authors' personal contacts who were willing to be part of the experiment;

- *snowball sampling* (Biernacki and Waldorf, 1981), in which the members of the initial sample referred to other individuals in the population who are qualified to participate in the research.

For the realization of the experiment, we adopted the procedure of Bendoly and Swink (2007), which consists of four phases, as shown in Figure 4 below.

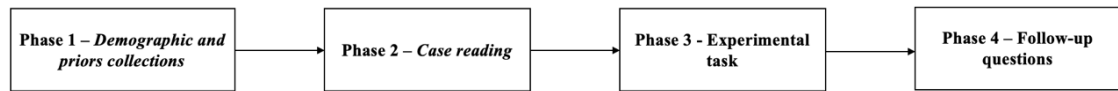


Figure 4. The general flow of the experimental procedure

Phase 1. The first phase consists of the collection of demographic data, which will be used as control variables. Information has been collected about the doctor's age, gender, job experience, previous experience in the emergency ward, specialization, current department, and job role.

Phase 2. During the second phase, the doctor is asked to carefully read the clinical scenario and is informed that he/she will be asked in the next phase to make a decision related to the treatment of the patient. We followed the approach of Jenicek (2001) and designed 9 clinical scenarios corresponding to the 9 experimental conditions. In fact, since we opted for multivariate statistical analysis, the design of the experiment uses a 3 x 3 complete factorial plan, as presented in Table 4.

Table 4. Factorial plan

EXPERIMENTAL CONDITION	Litigation Risk	Organizational Factors
1	0	0
2	0	1
3	0	2
4	1	0
5	1	1
6	1	2
7	2	0
8	2	1
9	2	2

The two independent variables are *litigation risk* and *organizational factor*. Litigation risk can take three values:

- 0 corresponds to a low level of risk of legal repercussions;
- 1 corresponds to a medium level of risk of legal repercussions;
- 2 corresponds to a high level of risk of legal repercussions.

Three levels have been used for organizational factors too:

- 0 corresponds to no overtime, no overcrowding;
- 1 corresponds to overtime;
- 2 corresponds to overcrowding.

We excluded from the experiment the situation in which overtime and overcrowding coexist, as this would have increased the number of tests needed, requiring too much time for the doctors to perform the experiment.

For each of the 9 experimental conditions, a clinical scenario has been developed. A complete design of the experiment with the corresponding clinical scenarios is reported in Table 5.

Table 5. Experimental plan

N	Litigation Risk	Organizational Factors	Clinical Scenarios
1	Low	None	Appendicitis
2	Low	Overtime	Linear brain fracture
3	Low	Overcrowding	Gastroenteritis
4	Medium	None	Dysphagia
5	Medium	Overtime	Bronchial asthma
6	Medium	Overcrowding	Throttling
7	High	None	Head injury
8	High	Overtime	Abdominal pain
9	High	Overcrowding	Watery diarrhoea

The first experimental condition (N = 1), for example, is characterized by a low litigation risk associated with neither overtime nor overcrowding; to this first experimental condition, in a completely randomized way, a clinical scenario concerning a suspected appendicitis case has been associated. For the design of the clinical scenarios, the guidelines accredited by the Italian National System of Guidelines and

others from the cited literature have been used. Furthermore, a team of three doctors was involved to validate the scenarios in terms of clarity, the terminology used, realistic cases, and avoiding ambiguity in the choices.

Each of the doctors involved in the experiment was required to carefully read each of the nine clinical scenarios. They were proposed to the doctors in a random order to avoid the order of presentation of the experimental conditions compromising the validity of the results obtained.

In the first part of the narration of the clinical scenarios, a detailed anamnesis of the patient is provided together with his health condition upon arrival at the hospital; finally, the results of the objective examination and further investigations are presented. The second part is dedicated to the description of the level of risk of legal repercussions and the absence of any organizational factors that may influence the doctor's decisions.

To delineate the level of litigation risk and the presence of the organizational factors, in a preliminary version of the narration, simple sentences were added to describe the experimental conditions, such as "The level of litigation risk is high" (Gagnier *et al.*, 2013). However, after a pilot analysis aimed at testing the goodness and effectiveness of what we designed, it emerged that we needed to stress the presence of these variables to make the doctors empathize with the narrated context more.

Phase 3. The third phase of the experiment starts at the end of each clinical scenario presentation, where the doctor is asked to decide by selecting one of three different treatment options.

For each clinical scenario, three different options have been provided to the doctor, each of which has a different impact either in economic terms due to an unnecessary prescription, or in terms of the patient's health. According to what we described in the legislative background section, we decided to evaluate the phenomenon of defensive medicine, and in particular overtreatment, as a deviation from the medical guidelines. One of the three treatment options has therefore been designed with respect to the local country's medical guidelines and does not presuppose defensive behaviour. The other two options have been designed to have a *quid in plus* compared to the previous one and, therefore, to the guidelines. For our analysis, for each of the three options we provided, we assigned three different levels of overtreatment: none, medium, and high. The *level of overtreatment* represents the dependent variable of our experiment.

Phase 4. The follow-up questions are meant to investigate the distortion that the decision-making process may suffer, due to the doctor's personality. In fact, the study of Lauriola et al. (2014) shows how personality differences have a strong relationship with decision-making activities; more specifically, Riccobono et al. (2016) demonstrate how personality traits may influence operations management-related decisions. Hence, the Big Five model which identifies five dimensions (openness to experience, conscientiousness, extroversion, agreeableness, and neuroticism), was used to represent an exhaustive description of the doctor's personality (Costa and McCrae, 2008). The personal traits arising from the Big Five model, similar to the data collected in the first phase, will be used as control variables of the model. Finally, doctors were asked by phone for feedback to capture their impressions about the validity of the clinical scenarios to test the effectiveness of the experiment.

3.5 Analysis and findings

3.5.1 Data Overview

The two rounds of the scenario-based experiment sessions involved 60 Italian real practising doctors with several years of job experience and belonging to medical specialities. Forty-three per cent of them also had experience in emergency wards. Since four of them were removed due to the incomplete test experiment, we had a total of 56 doctors involved and 504 experiments executed correctly. Demographic data are shown in Table 6.

Table 6. Demographic information

Gender		Age			Years of job experience					Emergency ward	
<i>M</i>	<i>F</i>	<i>Mean</i>	<i>Max</i>	<i>Min</i>	<i>1-5</i>	<i>6-15</i>	<i>16-25</i>	<i>26-35</i>	<i>>35</i>	<i>Yes</i>	<i>No</i>
57%	43%	37.6	70	25	54%	20%	7%	11%	9%	43%	57%

Table 7 reports the distribution of the medical specialities of the sample.

Table 7. Medical specialities distribution

Medical specialities	%
General medicine	19.6
Radiology	12.5
Anaesthesia	7.1
Gastroenterology	12.5
Pneumology	7.1
Internal medicine	5.4
Pathological anatomy	3.6
Gynaecology & obstetrics	3.6
Surgery	10.7
Cardiology	10.7
Paediatrics	5.4
Neurology	1.8

Before proceeding with the regression model, the descriptive statistics of the variables identified in the study have been calculated and are shown below in Table 8.

Table 8. Descriptive statistics

	Variables	Mean	SD
1	Overtreatment	0.86	0.71
2	Litigation risk	1.00	0.82
3	Overtime	0.33	0.47
4	Overcrowding	0.33	0.47
5	Extroversion	25.95	6.18
6	Agreeableness	28.79	5.59
7	Conscientiousness	23.59	5.70
8	Neuroticism	23.54	6.27
9	Openness to experience	12.61	13.54
10	Gender	0.57	0.50
11	Age	37.57	13.02
12	Emergency ward	0.43	0.50
13	Medical specialities	5.21	3.52

To provide discriminating validity, we analysed the correlation coefficients between the variables in Table 9. All the coefficients remain below 0.7 in absolute value.

Table 9. Correlation coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Overtreatment	1												
(2) Overtime	0.014	1											
(3) Overcrowding	0.090*	-0.500*	1										
(4) Litigation risk	0.446*	0	0	1									
(5) Extroversion	-0.013	0	0	0	1								
(6) Agreeableness	0.178*	0	0	0	-0.082	1							
(7) Conscientiousness	0.093*	0	0	0	-0.251*	0.412*	1						
(8) Neuroticism	0.076	0	0	0	0.359*	-0.193*	-0.185*	1					
(9) Openness to experience	0.052	0.002	-0.002	0	-0.355*	0.425*	0.468*	-0.495*	1				
(10) Gender	0.096*	0	0	0	0.209*	0.122*	-0.246*	0.351*	-0.135*	1			
(11) Age	0.092*	-0.001	0.001	-0.001	0.088*	-0.039	-0.082	0.082	-0.352*	0.074	1		
(12) Emergency ward	-0.123*	-0.003	0.005	-0.005	0.148*	-0.230*	-0.088*	-0.019	-0.020	-0.049	0.083	1	
(13) Medical specialties	0.011	0	0	0	0.256*	-0.194*	-0.358*	0.137*	-0.393*	0.186*	0.138*	0.06	1

3.5.2 Ordinal logistic regression and experimental findings

We run an Ordinal Logistic Regression (OLR) with the same three-step procedure as in Song *et al.* (2014), because of the ordinal nature of our dependent variables (i.e. litigation risk). This consists of introducing the control variables initially (Model 1), then the main independent variables (Model 2), and finally the interactions between the main independent variables (Model 3). The results of the analysis are shown in Table 10.

The results support the H1 hypothesis, which represents our premise based on the literature and the definition of defensive medicine: the litigation risk has a positive impact on overtreatment (coef. = 0.719, $p < 0.001$).

The experimental results also provide statistical support for hypotheses H2_B and H3_B. In fact, the significant positive interaction of the level of litigation risk with overcrowding (coef. = 1.356, $p < 0.001$) indicates that the presence of this organizational factor moderates positively the relationship between the level of litigation risk and overtreatment (H2_B), while a significant negative term of overcrowding (coef. = -0.754, $p < 0.05$) shows a reduction in overtreatment (H3_B). Assumptions H2_A and H3_A, on the other hand, are not confirmed by the statistical results.

Finally, agreeableness (coef. = 0.0572, $p < 0.01$), neuroticism (coef. = 0.0529, $p < 0.01$), age of the doctor (coef. = 0.0228, $p < 0.01$) and previous experience in emergency ward (coef. = -0.464, $p < 0.05$) have a strong significant effect on overtreatment. On the contrary, extroversion, conscientiousness, openness to experience, gender and department seem not to affect overtreatment.

Table 10. OLR results

	Overtreatment		
	Model 1	Model 2	Model 3
Extroversion	-0.0085 (0.0156)	-0.0105 (0.0163)	-0.0109 (0.0165)
Agreeableness	0.0490* (0.0192)	0.0559** (0.0200)	0.0572** (0.0203)
Conscientiousness	0.0154 (0.0188)	0.0197 (0.0196)	0.0199 (0.0199)
Neuroticism	0.0446* (0.0175)	0.0517** (0.0182)	0.0529** (0.0185)
Openness to experience	0.0159+ (0.0095)	0.0177+ (0.0100)	0.0180+ (0.0102)
Gender	0.166 (0.200)	0.209 (0.209)	0.189 (0.212)
Age	0.0191** (0.0071)	0.0220** (0.0074)	0.0228** (0.0071)
Emergency ward	-0.389* (0.182)	-0.432* (0.191)	-0.464* (0.194)
Medical specialities	0.0356 (0.0274)	0.0378 (0.0288)	0.0406 (0.0293)
Overtime		0.384+ (0.217)	0.0536 (0.343)
Overcrowding		0.632** (0.222)	-0.754* (0.367)
Litigation risk		1.226*** (0.122)	0.719*** (0.191)
Litigation risk X Overtime			0.327 (0.265)
Litigation risk X Overcrowding			1.356*** (0.283)
N	504	504	504
LR chi2(14)	40.20	162.80	188.55
Prob > chi2	0	0	0
Pseudo R2	0.04	0.15	0.18
Log-likelihood	-503.53	-442.22	-429.35

Standard errors in parentheses

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To sum up, experimental results show the following.

1. To avoid any legal, economic, and/or career repercussions, doctors tend to prescribe more medical tests and treatments, even if not strictly necessary, when they perceive a certain risk of litigation.
2. Overcrowding has a two-fold effect:
 - a. when considered alone, it leads to a reduction in overtreatment because the doctor recognizes that prescribing not strictly necessary treatments would increase congestion even more;
 - b. when combined with the doctor's perception of litigation risk, overcrowding exacerbates the doctor's instinct to adopt a defensive behaviour, because she/he knows that overwhelming conditions ask for a speedup of intervention times that will often turn into medical errors and related complications; this happens especially in emergencies calling for prompt action.

On the other hand, the results do not confirm H2A and H3A that consider the overtime factor. Although we offered a few theoretical arguments in the development section of our hypotheses positing that overtime may exacerbate the effect of litigation risk on defensive behaviour, results from our experiments do not confirm such an effect. After all, while one can believe that overtime leads to an increase in the likelihood of operational errors, some previous studies did not confirm such a negative effect (Olds and Clarke, 2010).

The lack of statistical significance of the overtime effect in our results could be attributed to the way the experimental scenarios have been designed. We were hardly able to make the subjects really experience fatigue, but just to imagine it, given the presence or absence of overtime. Then, the doctor's sentiment of self-blaming denial could have influenced the result; that is, given that the subject was not really experiencing fatigue, she/he did not change the treatment decision.

Another finding relates to the effect of doctors' age on defensive medicine. Contrary to some other studies (Renkema *et al.*, 2019; Summerton, 1995), we found evidence of increased use of overtreatment, as the doctor's age increases. Once again, the theory of resource conservation can help us to read these results: the fear of being involved in a trial, of losing a job (Beale and Nethercott, 1986) or reputation (Toraldó *et al.*, 2015) is greater in mature doctors who have been able to build a strong reputation throughout their careers, as opposed to young doctors.

3.6 Conclusions

The phenomenon of defensive medicine is present in daily healthcare practice and negatively affects performance in many ways: to cite the most obvious, it increases costs and operational congestion due to the abuse of service requests (i.e., diagnostic tests, laboratory analysis, specialist consults, etc.) that are not strictly necessary for the specific clinical case (Vento *et al.*, 2018). This is the first study that explores how organizational factors influence such a phenomenon, other than legislative or insurance aspects.

This research has several limitations. From the methodological viewpoint, we use a scenario-based experiment and no monetary incentive was given to the doctors who participated. We only offered to send them the results of the study when finished. From the conceptual model perspective, given all the variables involved in the experiment, to contain the factorial plan dimension, we had to renounce some clinical scenarios that would have allowed us to analyse the simultaneous presence of overtime and overcrowding, to explore whether any interaction effects were statistically significant. Future studies should consider these organizational factors simultaneously.

Another limitation concerns the extent to which experiments based on reading clinical scenarios can capture fatigue and stress. Our experiments may not be adequate because the doctor may not be able to recognize the effects of fatigue on her/his capability to make decisions, which, on the other hand, could be influenced by her/his sentiment of self-blaming denial. We hence suggest considering other research methodologies that could be more appropriate for analysing specific organizational aspects, such as overtime, given that our study was unable to capture its effect on defensive medicine.

One more limitation is related to the generalizability of the findings. We conducted the experiment in Italy and know that other countries have different normative regulations about medical liability and different cultures which influence the doctors' behaviour. However, the generalizability concern is related mainly to the findings and not to the methodology used, which is supported by the BOM literature. Finally, although we used the factorial plan to build different clinical scenarios to obtain more observations by the same doctors, more participants would increase the reliability of this study.

This study offers some ideas for future research. First of all, it would be useful to replicate our approach in different healthcare contexts, and also extend the research to

medical professionals from other countries. Moreover, we argued and demonstrated that there are organizational causes of, and also remedies to, defensive medicine; so, it is essential to continue the research in this direction by investigating other organizational factors as requested by (Asher *et al.*, 2012). Finally, this study is focused mainly on the phenomenon of positive defensive medicine (overtreatment). Similar studies should be extended to investigate the phenomenon of negative defensive medicine (undertreatment).

Chapter 4

RESEARCH STREAM 3:

“The role of patient–physician relationship in the switch to telemedicine”

4.1 Introduction

The present work has been developed around telemedicine, a new approach to patient care. Its development and spread over the world have accelerated in the past two years due to the COVID-19 pandemic (Armstrong *et al.*, 2021; Lindenfeld *et al.*, 2023). Telemedicine includes the timely transmission and remote interpretation of patient data for follow-ups and preventive interventions, and its main purpose is to facilitate productive interaction between the patient and the physician in order to achieve better health outcomes and lower costs (Lindenfeld *et al.*, 2023). Therefore, telemedicine is the integration, monitoring and management of patients, as well as the education of patients and staff, using systems that allow quick access to expert advice and patient information (Ray Dorsey and Topol, 2016).

Healthcare management literature recognizes the important role of the patient–physician relationship to achieve the best results in patient care (Bjarnadottir *et al.*, 2018; Damali *et al.*, 2016), both in terms of effectiveness and patient satisfaction, but also in terms of engagement of the patient in the process of value co-creation. The quality and intensity of the relationship between patient and physician could be reasonably altered when they start interacting remotely via telemedicine instead of face-to-face. A few patients we interviewed during the initial stages of this research at the liver unit of an Italian hospital told us that they were worried and concerned about a future switch to telemedicine because they liked their physician and did not want to change the way they interacted.

Others claimed to be happy about the evolution towards telemedicine because the outcome of the televisit was as effective as the in-person visit, but thanks to the former, they were saving a lot of time for travelling.

Each patient may have an opinion about telemedicine depending on many factors, including the frequency of visits for pathology requirements, the level of technological education, the ease of use of the adopted telemedicine system, the distance to the hospital from home, employment and free time and so on.

The success of a telemedicine implementation project strongly depends on the users' (physicians and patients) propensity to change and the level of acceptance of such

technology (Yarbrough and Smith, 2007). It is well known that digital transformation encounters resistance from users, both providers and customers (Chau and Hu, 2002). For this reason, Technology Acceptance Models (TAMs) have been developed and used to study the concepts of acceptance and propensity towards the implementation of these new technologies (Brandon-Jones and Kauppi, 2018; Kamal *et al.*, 2020; Yarbrough and Smith, 2007). However, when we consider telemedicine's digital transformation, the patient-physician relationship characteristics have not been considered in previous literature.

To achieve our purpose, we developed a conceptual model that hypothesizes a direct and indirect effect of the patient-physician relationship on the propensity to telemedicine, with the perceived efficacy of healthcare as the mediator. We build our conceptual model based on previous literature (Chahal and Kumari, 2012; Chau and Hu, 2002; da Luz, 2019; Wootton and Darkins, 1997), and we tested our conceptual model in the liver unit of a large hospital in Italy.

In this paper, our theoretical argumentations and empirical analysis answer the research question: does the patient-physician relationship have an effect on the patients' propensity to switch to a telemedicine service? The results we get lead us to provide a few contributions to the literature on telemedicine, patient-physician relationship, and healthcare service delivery. While these are debated in detail in the Discussion section of this paper, we synthetically highlight them here.

1. In the evaluation of the patient propensity to switch to telemedicine, this research differs from the previous studies that use TAM, because our focus is not on technology needs or specific characteristics that the new technology; we look at the characteristics of the service that is the subject of the digitalization, the healthcare service itself. We argue that the propensity to switch to telemedicine depends on the characteristics of the way the current services are delivered: understanding whether and how the as-is situation can influence the propensity to telemedicine is the main contribution of this research.
2. The literature offers studies about the impact of telemedicine on the patient-physician relationship; our research analyses the opposite effect: whether and how this relationship influences the propensity to switch to telemedicine. In healthcare, the service encounter is a fundamental aspect to create and co-create value, not only to obtain positive health outcomes for the patients, but it can also be the base to guide the patient to the next level of service innovation.

3. Minor contributions of this study to the literature are the empirical confirmation of: A) having good technological competencies allows the patients to be more favourable to use technological means to interact with the physicians; B) a positive patient–physician relationship is linked to positive health outcomes.

4.2 Literature review

4.2.1 Patient–physician relationship

Healthcare management literature recognizes the important role of the patient–physician relationship to achieve the best results in health service delivery (Damali *et al.*, 2016; Hardyman *et al.*, 2015; Riotta and Bruccoleri, 2021).

It is well known to psychologists that about 80% of the communication between two or more people is not verbal. The physician evaluates the patient and the patient evaluates the physician during the medical encounter thus, it is questionable whether a video or an image could replace that personal contact with the same precision (da Luz, 2019). From a value co-creation perspective, since patient involvement is essential for the success of the therapy, telemedicine could be a threat to the success of the care if the patient and the physician are unable to establish a good relationship (Hardyman *et al.*, 2015).

In order to study the aspects of patient–physician relationship, we used the study of Van der Feltz-Cornelis *et al.* (2004), who developed a Patient–Physician Relationship Questionnaire (PDRQ-9) that is based on the Revised Helping Alliance Questionnaire (HAq-II) (Luborsky *et al.*, 1996). The PDRQ-9 aims to quantify how well the patients regard their physicians as effective and helpful health professionals in primary care and public health research, and it has been considered a valuable tool for scientific and practical purposes (Van der Feltz-Cornelis *et al.*, 2004).

4.2.2 Technological competencies

Healthcare providers are adopting more and more information and communication technologies (ICTs) to enhance their services (Almathami *et al.*, 2020). Telemedicine is one of the services that use a variety of telecommunication tools, including smartphones, mobile wireless devices, and computers with or without a video connection (Ray Dorsey and Topol, 2016).

These ICT tools enable patients to communicate remotely with healthcare professionals, both in synchronous and asynchronous ways, for a follow-up or for a consultation about their health condition. However, the use of these technologies is positively or negatively influenced by different factors (Almathami *et al.*, 2020; Yarbrough and Smith, 2007). Among these, we want to refer to one in particular, which is reported in almost every article about behavioural aspects and motivation towards the use of a specific technology, which is one of the pillars of the Technology Acceptance Model (TAM) and their evolutions (Davis, 1989; Venkatesh and Bala, 2008; Venkatesh and Davis, 2000): the user's technological competences. This kind of competency may alter the propensity to use a telemedicine system, since the patients may not be comfortable using ICT in general, hence, also telemedicine in particular (Viers *et al.*, 2015).

4.2.3 Perceived value – Efficacy

In literature, consumer value refers to the overall consumer's evaluation of the product or service based on the trade-off between benefits and costs. In healthcare, benefits are mainly linked to the patient's health outcomes; costs can be divided into monetary and non-monetary, such as physical and mental stress and waiting time (Chahal and Kumari, 2011).

The measurement of Consumer Perceived Value (CPV) is recognized in literature both as unidimensional and multidimensional. For the purpose of this study, we use the multidimensional definition of CPV given by Chahal and Kumari (2012), and more specifically, we are interested in what they define as *efficiency value*. Since patients do not generally have a medical background, they judge the service delivery process based on interactions with the service provider to determine the value of efficiency; referring to both efficacy and efficiency, in a strict sense (Chahal and Kumari, 2012). But since we are interested more in efficacy rather than efficiency, which may be related more to how operations are managed, we will refer to this dimension with the former term.

4.2.4 Propensity to telemedicine

The acceptance of telemedicine can be defined as the psychological state of an individual with respect to his voluntary or intentional use of the aforementioned technology (Hu *et al.*, 1999). Existing studies show that information technology (IT) in general, and telemedicine in particular, have a recognized potential in health systems to

improve the quality of medical care and patient safety (Hu *et al.*, 1999; Kamal *et al.*, 2020). However, most IT-based health systems still encounter resistance from users, both providers and customers. In fact, due to the preconceived aversion to change, there is a general tendency to show resistance whenever a new innovative technology is implemented (Chau and Hu, 2002; Landaeta *et al.*, 2008; Shahbaz *et al.*, 2019).

Physicians and patients are the main users of telemedicine services and their propensity to adopt telemedicine services has a considerable impact on the possibility of its successful implementation. In fact, the real benefits of telemedicine can only be manifested if patients are inclined to use it proactively.

Previous investigations of user acceptance of telemedicine typically tested hypotheses formulated idiosyncratically without a theoretically valid basis, or considering just the physicians' perspective (Yarbrough and Smith, 2007). Therefore, studying the propensity of patients to accept telemedicine is an opportunity to complement or validate existing literature.

4.3 Conceptual model and hypothesis development

Based on the analysis of the literature, we developed the conceptual model graphically shown in Figure 5.

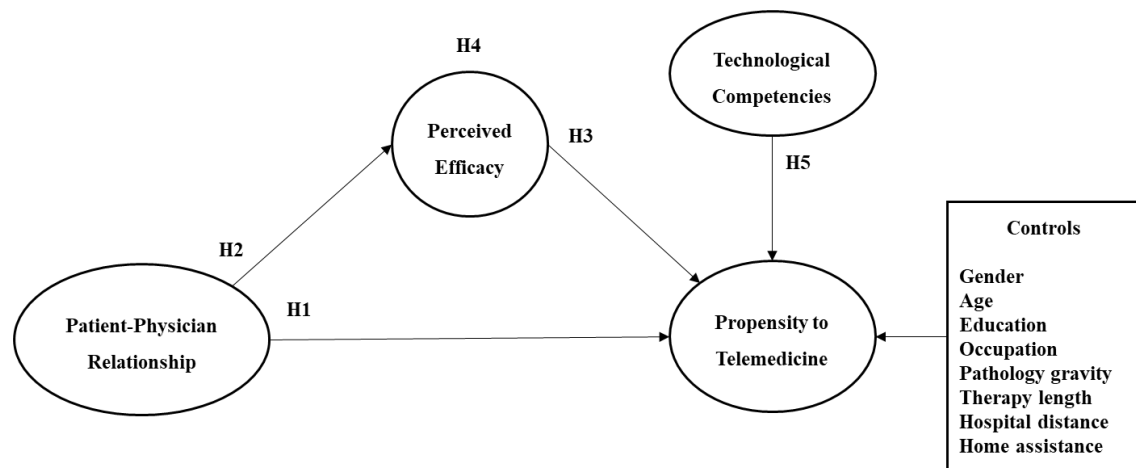


Figure 5. Telemedicine conceptual model

Telemedicine regards the remote provision of healthcare services by a variety of telecommunication tools (Ray Dorsey and Topol, 2016). With the pandemic outbreak of COVID-19, health centres rapidly developed and deployed telemedicine practices

(Armstrong *et al.*, 2021; Lindenfeld *et al.*, 2023), from the simplest form (remove visits via phone calls) to the more complex online platform for synchronous video-visits and files/images sharing in order to guarantee the healthcare service provision during lockdowns. Afterwards, some studies collected data to catch the effect of telemedicine on many aspects; above all, patient satisfaction. One of the main findings was that trust between physicians and their patients was a key element to reach a higher level of patient satisfaction during telemedicine (Orrange *et al.*, 2021). Moreover, the American College of Physicians (ACP) developed pragmatic recommendations on the use of telemedicine in the primary care setting and offered suggestions for physicians who use telemedicine in their practices (Daniel and Sulmasy, 2015). Among others, the recommendations clearly confirmed how important is to have a good patient–physician relationship to achieve better results with telemedicine in terms of patient satisfaction and health outcomes.

Therefore, given the importance of the relationship between physicians and their patients for telemedicine, we imagine that the propensity of a patient to switch is positively related to a good relationship with the physician. Thus, we pose the following:

H1. The patient–physician relationship has a direct and positive effect on the patient’s propensity to telemedicine.

In healthcare research, the patient–physician relationship is a crucial aspect of service delivery and represents the core of the value creation and co-creation process (Riotta and Bruccoleri, 2021). In fact, difficulties in the patient–physician relationship can adversely affect the desired results from the care. These difficulties may arise due to the characteristics of the patient or the characteristics of the physician and can be modified by the environment in which the care is given. There may be difficult patients who are problematic for the physicians, and there may be difficult physicians who are problematic for the patients. It has been found that the physician’s emotional reaction to difficult patients may be strong enough to preclude the ability to understand the patient’s behaviour and treat it in a caring, analytical, or compassionate manner (Hahn *et al.*, 1994). Empathic understanding in relationships with professionals is postulated as necessary for adherence to therapeutic regimens. It is considered one of the most important relational skills of the profession that ultimately leads to benefits for the patient’s health (Halpern, 2007). In fact, among physicians who provide more

information and those who engage patients in more positive behaviour, the latter will show greater satisfaction and therapy compliance, which also leads to more favourable clinical outcomes (Miller, 2001). Based on these considerations, we formulate the following hypothesis:

H2. The patient–physician relationship has a direct and positive effect on the patient’s perceived efficacy of the healthcare service.

Analysing the existing literature, the effect of telemedicine on the efficacy of care has been quite extensively investigated (Allen and Hayes, 1995; DeBakey, 1995; Lindenfeld *et al.*, 2023). In this study, however, we are interested in the opposite effect; we want to understand if a patient’s perception of the current in-person care efficacy can somehow influence their willingness to switch to telemedicine. In particular, the difficulty for individuals to accept something different to what is habitual is largely recognized. In general, the acceptance of new technology, such as telemedicine, is a personal decision-making process, and it takes place in various stages (Jansen-Kosterink *et al.*, 2019), where many factors are considered. These factors are more specific than the general determinants, such as ease of use and usefulness, and focus primarily on contextual factors, such as the adaptation between service configuration and daily life, personal motivation, and the associated psychological load. Considering the acceptance of a telemedicine service, end users must first familiarize themselves with the service in order to form an opinion about it, as their immediate assessment is strongly influenced by the traditional method of health service delivery. It is likely that if the provided health service (that in-person) is satisfactory, then the patient will be more reluctant to change her/his habits and accept a new way of receiving the service. For these reasons, we formulate the following hypothesis:

H3. The patient’s perceived efficacy of the health service has a direct and negative effect on the patient’s propensity to telemedicine.

Since we hypothesized that the patient–physician relationship has a direct effect on the patient’s propensity to use a telemedicine system, and also that this kind of relationship is a key element in order to increase the patient’s perceived efficacy of the healthcare service provided, we also assume that there could be an indirect effect of the patient–physician relationship on our response variable, mediated by the patient’s

perceived efficacy, following the causal step approach proposed by Baron and Kenny (1986). Thus, we posit the following:

H4. The patient's perceived efficacy mediates the effects of the patient–physician relationship on the propensity to telemedicine.

Technical challenges are cited as one of the most common reasons for the failure of providers to implement telemedicine (Lindenfeld *et al.*, 2023). These barriers are aggravated by the possible discomforts that the patient experiences, by the possible technological illiteracy and by the stress associated with adapting to a new environment or system. As science and technology progress, it becomes critical to explore and understand users' willingness to adopt new technologies. Technological anxiety, stemming from the level of one's technological skills, can be described as the fear or apprehension that people feel when they begin to consider using a computer-based technology (or other means) that they have never used before (Lustig, 2012). In general, the starting point for the use of telemedicine refers to a set of fundamental technical skills to be able to perform actions involving information or communication via the web (van Deursen *et al.*, 2016). This is the basis for being inclined to accept the telemedicine service, since those who cannot manage to share files (photos, videos, documents), send/receive e-mails or independently make a video call, automatically will not be able to easily access the telemedicine service as they would not be able to use it.

We formulate the following hypothesis:

H5. The technological skills of the patient have a direct and positive influence on her/his propensity to accept telemedicine.

4.4 Methodology

We use the survey methodology to test our hypotheses. Through the literature, we researched those latent variables (dimensions), with the respective manifest variables (items), able to represent the constructs we are interested in. For our study, we selected the liver unit of one of the biggest Italian hospitals (500 beds and 370,000 annual visits) since this belongs to an important regional healthcare network for hepatoviral diseases and, moreover, this department was going to implement a telemedicine system when this research was being conducted. For this reason, the physicians were happy to collaborate on this research project and give us the opportunity to collect all the necessary data from their patients, obviously, in an anonymous way.

4.4.1 Survey development

Our conceptual model includes four main dimensions: perceived efficacy, patient–physician relationship, propensity to telemedicine, and technological competencies.

Specifically, for perceived efficacy, we adapted the correspondent items from Chahal and Kumari (2012); for the patient–physician relationship, we used the PDRQ-9 (Van der Feltz-Cornelis *et al.*, 2004), for technological competencies, we mainly referred to Thompson (2013), van Deursen *et al.* (2016), and Viers *et al.* (2015). Finally, regarding the propensity to telemedicine, we adapted the telemedicine satisfaction questionnaire used by Yip *et al.* (2003); this kind of service is not fully implemented yet, so we wanted to capture the patients' expectations related to its future implementation. Afterwards, we built the first draft of the questionnaire by structuring it into two sections.

1. In the first section, we include 8 items, which describe the socio-personal aspects of the various respondents such as gender, age, education, occupation, pathology gravity (chronic asymptomatic carrier, chronic hepatitis, and liver cirrhosis), how long (months) they have been patients of the liver unit, how far they live from the hospital (Kms), and if they live with someone that can support them. Through this section, the goal is to be able to carry out a screening of the sample so as to be able to identify the different clusters that describe it. In this section, the different items will present different methods of response.
2. In the second section, there are 22 items from the previously described four dimensions. The items have been formulated ensuring simplicity of language, a neutral formulation, and avoiding ambiguous formulations; moreover, each respondent was asked to indicate how much she/he agreed with what was expressed for each item on a Likert scale from 1 to 7.

After the first draft of the questionnaire, we had a meeting with three physicians to refine the questions, adapt them to the context, and make them more easily understandable by the patients. At this point, we proceeded with the pilot test of the questionnaire.

4.4.2 Pilot analysis

Regarding the data collection, we decided to administer this questionnaire in person at the liver unit of the hospital. In particular, we used different versions of the

questionnaire where the differences relied simply on the different positions of the items to evaluate; this way, we assure that the answers are not biased by the tiredness of the respondents. Moreover, we assured that they were anonymous, by putting a box in the waiting room of the hospital, where the patient was able to insert their filled questionnaire without the possibility of being recognized afterwards. This method allowed us also to have a great number of respondents since patients in waiting rooms would prefer filling out a short questionnaire since they usually have nothing to do but wait. The data were collected in June 2021, and the patients were not selected by any criteria; simply every patient present in the waiting room in that month was involved in this research.

Once we reached a total of 100 filled questionnaires, we decided to proceed with the analysis of the pilot with SPSS software in order to test its reliability and validity. We checked for the univariate normality, multivariate normality, outliers, and the reliability of the questionnaire by calculating Cronbach's alpha index for each dimension and the inter-item correlation matrices.

Finally, we proceeded with the Exploratory Factor Analysis (EFA), followed by a Confirmatory Factor Analysis (CFA) to confirm the factorial structure of the dataset. At the end of this statistical analysis, the structure of the questionnaire consists of 17 items as shown in Table 11 below.

Table 11. Telemedicine final questionnaire

PATIENT-PHYSICIAN RELATIONSHIP	
PDR1	My physician understands me
PDR2	My physician has enough time for me
PDR3	I am happy with how my physician relates to me
PDR4	I find my physician easily accessible
PERCEIVED EFFICACY	
EFF1	My physician explains clearly the reasons for the therapy
EFF2	My physician always diagnoses the medical problem accurately
EFF3	Technical supporting staff are very careful while making tests, administering injections, etc.
TECHNOLOGICAL COMPETENCIES	
TEC1	How practical you are in sharing files (photos, documents, etc.)
TEC2	How practical you are in sending/receiving emails
TEC3	How practical you are in making video calls yourself
PROPENSITY TO TELEMEDICINE	
TEL1	I would get better access to health services with remote visits
TEL2	I find remote visits an acceptable means of receiving health services
TEL3	Overall, I would be satisfied with the quality of the remote visits
TEL4	During remote visits, I could easily talk to my physician
TEL5	I would receive adequate attention during remote visits
TEL6	Remote visits would save me time because I would avoid going to the hospital
TEL7	During remote visits, I would feel comfortable communicating with the physician

4.5 Analysis and findings

After the refinement of the pilot questionnaire, another round of data collection was conducted in July 2021. Ultimately, 236 questionnaires were received. The descriptive data of the sample are resumed in Table 12.

Table 12. Socio-demographic data

Age (years)	Average	57
Gender	M	52%
	F	48%
Occupation	Full-time worker	46,2%
	Part-time worker	3,8%
	Family working	11,4%
	Retired or disabled	26,3%
	Unemployed	9,3%
	Student	3,0%
Educational qualification	Elementary and Middle school	37,7%
	High school diploma	44,5%
	Bachelor's degree	5,1%
	Master's degree	12,7%
Pathology	Liver cirrhosis	20,8%
	Chronic hepatitis	37,7%
	Asymptomatic chronic carrier	41,5%
Do you live with someone?	No, I live alone	16,1%
	Yes, I live with my family	83,9%

In order to test our conceptual model (Figure 5), after the same statistical preliminary analysis we did for the pilot test, we opted for the linear regression analysis. We considered it important to add some control variables to the dataset, such as age, education, and distance from the hospital considered and the patient's home.

The correlation (Table 13) between the different variables was tested, and none of them is above the threshold of 0.8.

Table 13. Correlations matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
openness to telemedicine	1																
patient-physician relationship	0.420***	1															
received efficacy	0.281***	0.491***	1														
technological competencies	0.698***	0.370***	0.193**	1													
gender	-0.099	0.015	-0.006	-0.593***	1												
age	-0.448***	-0.128	0.025	0.452***	-0.019	1											
education	0.449***	0.156*	0.053	0.440***	0.003	-0.426***	1										
full-time employee	0.381***	0.131	0.065	0.440***	-0.220***	-0.455***	0.562***	1									
part-time employee	0.014	0.058	0.135*	0.134*	0.100	-0.022	-0.036	-0.176***	1								
family working	-0.074	-0.008	-0.021	-0.106	0.378**	0.039	-0.173**	-0.339**	-0.071	1							
retired or disabled	-0.341***	-0.159*	-0.078	-0.451***	-0.170*	0.620***	-0.317***	-0.541***	-0.113	-0.218***	1						
unemployed	-0.159*	-0.047	-0.006	-0.149*	0.097	0.055	-0.287***	-0.302***	-0.063	-0.122	-0.194**	1					
student	0.164*	0.059	-0.086	0.184**	0.081	-0.398***	0.039	-0.165*	-0.034	-0.066	-0.106	-0.059	1				
athology gravity	-0.319***	-0.266***	-0.128	-0.328***	-0.142*	0.312***	-0.148*	-0.124	-0.170*	-0.061	0.285***	0.072	-0.189**	1			
therapeutic length	-0.364***	-0.068	0.024	-0.477***	0.010	0.547***	-0.288***	-0.305***	-0.059	0.018	0.334***	0.136*	-0.167*	0.250***	1		
hospital distance	0.012	0.185**	0.135*	0.033	-0.029	0.044	0.113	0.0241	0.041	0.047	0.019	-0.125	-0.037	0.035	0.138*	1	
home assistance	0.110	0.032	0.016	0.103	0.098	0.009	0.056	-0.050	0.085	0.090	-0.013	-0.096	0.079	-0.043	-0.226***	-0.012	1

Correlation analysis acts as a preliminary analysis to linear regression models, as it allows to confirm whether there is significant independence between variables; therefore, no definitive consideration has been formulated in this step.

Afterwards, we proceeded with the linear regressions divided into three phases. The first phase was conducted to test H1, H3, and H5, the second to test H2, and the third to test the mediation effect of perceived efficacy for H4.

For each regression, we followed the three-step procedure as in Combs et al. (2007). This consists of introducing the control variables initially (Model 1) and then the main independent variables (Model 2). For each regression, the VIF value is < 10 , and heteroskedasticity is not present.

4.5.1 Phase 1

The dependent variable is the propensity of patients to use telemedicine, while the independent variables are the standardized values for the dimensions of the patient–physician relationship, perceived efficacy, and the patient’s technological competencies level. Including the control variables, the results of the regression analysis are shown in Table 14.

Table 14. Phase 1 – Regression models

	Propensity to telemedicine	
	Model 1	Model 2
Gender (M = 0, F = 1)	-0.216 [*] (0.0923)	-0.130 ⁺ (0.0764)
Age	-0.0908 (0.0689)	-0.00232 (0.0585)
Education	0.204 ^{***} (0.0526)	0.131 ^{**} (0.0439)
Full-time employee	-0.166 (0.270)	-0.202 (0.222)
Part-time employee	-0.267 (0.341)	-0.497 ⁺ (0.283)
Family working	-0.201 (0.297)	-0.124 (0.244)
Retired or disabled	-0.377 (0.321)	-0.220 (0.264)
Unemployed	-0.289 (0.307)	-0.235 (0.252)
Pathology gravity	-0.187 ^{**} (0.0589)	-0.0765 (0.0498)
Therapeutic length	-0.0715 (0.0518)	-0.0169 (0.0433)
Hospital distance	0.00147 (0.0419)	-0.0449 (0.0350)
Home assistance	0.145 (0.116)	0.0784 (0.0953)
Patient-physician relationship		0.128 [*] (0.0522)
Perceived efficacy		0.108 [*] (0.0478)
Technological competencies		0.392 ^{***} (0.0529)
N	225	225
R²	0.357	0.574
adj. R²	0.321	0.544
F	9.819	18.78

Standard errors in parentheses

⁺ $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$

It was found that the patient–physician relationship dimension positively and directly impacts the propensity to telemedicine, as demonstrated by the significance and by the sign of the coefficient; therefore, the H1 hypothesis is verified (coef. = 0.128, $p <$

0.1). This means that a successful patient–physician relationship makes patients more comfortable and less scared of using technological tools to have remote consultations.

The results disconfirm H3; they show that the patient’s perceived efficacy of the healthcare service positively impacts their propensity to switch to telemedicine (coef. = 0.108, $p < 0.1$). In fact, if the patients perceive that the efficacy of the health service provided is more favourable try another delivery strategy – telemedicine – that could bring some further benefits, such as zero time and costs related to the travel to the hospital.

The technological competencies dimension has a very strong positive and direct impact on the propensity to telemedicine (coef. = 0.392, $p < 0.001$), as expected. H5, in fact, is also supported by literature since technological skills can be considered an enabling factor for the technological transition in healthcare (Yarbrough and Smith, 2007).

4.5.2 Phase 2

In this case, the dependent variable is represented by the perceived efficacy, while the independent variable is represented by the patient–physician relationship, other than the above-mentioned control variables; the results are presented in Table 15.

Table 15. Phase 2 - Regression models

	Perceived efficacy	
	Model 1	Model 2
Gender (M = 0, F = 1)	-0.0432 (0.123)	-0.0272 (0.109)
Age	0.0912 (0.0919)	0.0729 (0.0815)
Education	0.0239 (0.0702)	-0.00485 (0.0623)
Full-time employee	0.340 (0.360)	0.389 (0.319)
Part-time employee	0.744 (0.454)	0.799* (0.403)
Family working	0.206 (0.396)	0.305 (0.351)
Retired or disabled	0.105 (0.429)	0.258 (0.381)
Unemployed	0.320 (0.409)	0.384 (0.363)
Pathology gravity	-0.150 ⁺ (0.0786)	-0.0213 (0.0716)
Therapeutic length	0.0253 (0.0691)	0.0199 (0.0613)
Hospital distance	0.102 ⁺ (0.0559)	0.0292 (0.0505)
Home assistance	0.0423 (0.155)	0.0168 (0.137)
Patient-physician relationship		0.492*** (0.0642)
N	225	225
R²	0.070	0.272
adj. R²	0.017	0.227
F	1.326	6.073

Standard errors in parentheses

⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It was found that the dimension patient–physician relationship strongly positively and directly impacts the perceived efficacy (coef. = 0.492, $p < 0.001$), thus, H2 is verified. This is also widely recognized in the literature, since the positive health outcomes of a good patient–physician relationship have been demonstrated in many studies (Chahal and Kumari, 2012; Halpern, 2007; Miller, 2001; Moliner, 2009; Riotta and Bruccoleri, 2021). This result adds construct validity and reliability to the methodology approach we opted for in this research.

4.5.3 Phase 3

Lastly, in order to test the indirect effect of the patient–physician relationship on the propensity to use a telemedicine system, mediated by the patient’s perceived efficacy of the healthcare service, we employed the casual step approach proposed by Baron and Kenny (1986). Accordingly, mediation involves estimating three regressions: first, we regressed the mediator perceived efficacy (SEFF) on the predictor patient–physician relationship (SPDR) (as in phase 2 – Model 1); second, we regressed the propensity to telemedicine (STEL) on the predictor (Model 2); third, we regressed STEL on both the predictor and the mediator (as in the phase 1 – Model 3). The results are presented in Table 16.

If the above conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the second (Baron and Kenny, 1986), which is our case. Baron and Kenny (1986), in this case, recommended examining not only the significance of the coefficient but also their absolute values. In Model 3, in the presence of the mediator (SEFF), the statistical significance of our main independent variable (SPDR) is less than in Model 2 ($0.001 < 0.05$), and the same is true for the coefficient values ($0.128 < 0.179$). Thus, we can confirm H4, which implies that the patient–physician relationship has an indirect effect on the patient’s propensity to use a telemedicine system, mediated by the patient’s perceived efficacy.

Table 16. Phase 3 - Regression models

	SEFF	STEL	
	Model 1	Model 2	Model 3
Gender (M = 0, F = 1)	-0.0272 (0.109)	-0.131 ⁺ (0.0771)	-0.130 ⁺ (0.0764)
Age	0.0729 (0.0815)	0.00778 (0.0589)	-0.00232 (0.0585)
Education	-0.00485 (0.0623)	0.129 ^{**} (0.0443)	0.131 ^{**} (0.0439)
Full-time employee	0.389 (0.319)	-0.160 (0.223)	-0.202 (0.222)
Part-time employee	0.799 [*] (0.403)	-0.415 (0.283)	-0.497 ⁺ (0.283)
Family working	0.305 (0.351)	-0.0897 (0.246)	-0.124 (0.244)
Retired or disabled	0.258 (0.381)	-0.190 (0.267)	-0.220 (0.264)
Unemployed	0.384 (0.363)	-0.193 (0.254)	-0.235 (0.252)
Pathology gravity	-0.0213 (0.0716)	-0.0781 (0.0503)	-0.0765 (0.0498)
Therapeutic length	0.0199 (0.0613)	-0.0135 (0.0437)	-0.0169 (0.0433)
Hospital distance	0.0292 (0.0505)	-0.0417 (0.0353)	-0.0449 (0.0350)
Home assistance	0.0168 (0.137)	0.0792 (0.0962)	0.0784 (0.0953)
Patient-physician relationship	0.492 ^{***} (0.0642)	0.179 ^{***} (0.0475)	0.128 [*] (0.0522)
Perceived efficacy			0.108 [*] (0.0478)
Technological competencies		0.400 ^{***} (0.0533)	0.392 ^{***} (0.0529)
<i>N</i>	225	225	225
<i>R</i> ²	0.272	0.564	0.574
adj. <i>R</i> ²	0.227	0.535	0.544
<i>F</i>	6.073	19.38	18.78

Standard errors in parentheses

⁺ $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$

4.6 Conclusions

Telemedicine has the potential to transform global healthcare delivery, but this has to be seen as an evolution of the traditional way (da Luz, 2019); moreover, telemedicine is not feasible in any circumstances.

The purpose of this work was to study the impact of some aspects of the actual healthcare service on the patient's propensity to use a telemedicine system instead of the traditional medical consultation in person. The results showed that both the patient–physician relationship and the perceived efficacy of the service have a positive impact on the patient's propensity in accepting this technology. These two aspects could be leveraged, especially to counterbalance the lack of technological competencies, which represents the most important barrier to climb over.

Although we performed many statistical tests to improve the validity of our results, for future research, it is recommended to increase the sample size to consider different departments (medical specialities) and to include multiple countries to have a completer and more representative sample of the population.

Second, although most of the relationships resulting from the regression models were confirmed, it is necessary to highlight the low levels of R^2 obtained (0.574, 0.272, and 0.564). These levels show that there are other variables that can influence our results and, therefore, the dimensions we consider do not explain the studied relationships in a complete way. However, the final version of our questionnaire has 25 questions, and we know that adding other dimensions would imply an overloading of items; thus, the respondents would not be very happy to contribute by answering with the right concentration to the questions. For this reason, we opted not to add further variables.

Chapter 5

CONCLUSIONS

5.1 Introduction

The aim of this final chapter is to discuss the contributions that stem from the presented research activity. Furthermore, theoretical contributions, managerial implications and further research directions are highlighted.

The chapter is organized as follows. First, the summary and conclusion of this work are shown. Secondly, the theoretical contributions and managerial implications are presented. At the end of the chapter, future research directions are indicated.

5.2 Summary

This thesis discusses the importance of the patient-physician relationship in healthcare and its impact on patient outcomes and satisfaction. The text highlights the need to understand the role of the patient-physician relationship in the transition towards a more technology-driven approach in healthcare.

In literature are present research gaps related to organizational factors as possible mediators of physicians' defensive attitudes, and patients' propensity to switch to telemedicine. Thus, the thesis aims to evaluate the impact of the patient-physician relationship on care processes and the integration of technology into healthcare delivery, by investigating the role of organizational factors in mediating litigation risk on defensive medicine and exploring the impact of the patient-physician relationship on a patient's propensity to switch to telemedicine. The thesis will offer insights into mitigating the negative effects of defensive medicine and improving patient engagement and satisfaction.

The goals of this work concern answering the following research questions:

1. How the phenomenon of defensive medicine and the value co-creation activities are related to each other and what are the typologies of patient-physician relationships that emerge?
2. Do organizational factors have an effect on the patient-physician relationship in terms of reducing or exacerbating physicians' defensive behaviour?
3. does the patient-physician relationship have an effect on the patient's propensity to switch to a telemedicine service?

Chapter 2, based on the research article entitled “Revisiting the patient–physician relationship under the lens of value co-creation and defensive medicine” presents a new archetypical model that describes and re-interprets the patient–physician relationship from the perspective of two widespread phenomena in the healthcare delivery process: value co-creation and defensive medicine. In this study, four archetypes of patient–physician relationships are identified and each of them is described along with its representing characteristics. This paper suggests that being aware of patient–physician relationship mechanics, building long-term relations with patients and investing in service personalization and patient-centred care can effectively mitigate the risks of defensive medicine behaviours on one side while increasing the likelihood of value co-creation actualization on the other.

Chapter 3, based on the research article under review entitled “Defensive behaviour in healthcare: the role of organizational factors”, deepens a topic already discussed in the previous chapter, the phenomenon of defensive medicine, and explores the effect that organizational factors can have on it. The aim of the research was to demonstrate that not only legal and insurance aspects can influence defensive medicine, but organizational factors, such as hospital overcrowding and overtime work, can influence this phenomenon. For the purposes of this study, a scenario-based experiment was designed, and the main results of the trial show that, if on the one hand hospital overcrowding leads to a reduction in overtreatment (an aspect of defensive medicine), since the doctor recognizes that the prescription of treatments that are not strictly necessary would further increase congestion, on the other, if combined with the doctor's perception of the risk of litigation, overcrowding pushes him to adopt defensive behaviours.

In Chapter 4, based on the research article under review entitled “The role of patient–physician relationship in the switch to telemedicine”, deepens the issues concerning the patient–physician relationship that act as a context to a technological and innovative practice called telemedicine, which allows the provision of the health care service in a remote way. Although, at first glance, it may seem that it only has benefits, in reality, there are various difficulties. For example, think of the difficulties of access to this service for all those elderly people who are little familiar with the IT means, or even the impact on the quality of the service offered, or even the effect that the patient–physician relationship can have on adopting this new practice. It has turned out that the

patient-physician relationship plays a key role both in the acceptance of this new service provision and in the perceived quality.

The findings of this thesis not only contribute to the work of various strands of literature, such as healthcare operation management, behavioural operations management, organizational behaviour, patient-physician relationship, defensive medicine, and telemedicine but provide a plethora of different managerial insights for practitioners. In the following sections, they are extended and described.

5.3 Contributions from the research stream 1

5.3.1 Theoretical contributions

The theoretical contributions of this research can be described along the three streams of literature discussed in this paper. First of all, this work contributes to the literature on the patient–physician relationship. Since the seminal works from (Veatch, 1972) and (Emanuel and Emanuel, 1992), the patient–physician relationship has been a topic studied largely because it is culturally sensitive and influenced not only by the development of ethical and normative standards (Hui EC., 2005) but also by the development of technology and medical practices, such as evidence-based medicine (Evidence-Based Medicine Working Group, 1992), patient-centred care (Laine and Davidoff, 1996) and others. In order to capture this dynamic nature of the patient–physician relationship, academics used different perspectives and concepts to develop new patient–physician models (Entwistle and Watt, 2006; Ishikawa *et al.*, 2013; McColl-Kennedy *et al.*, 2012; Osei-Frimpong *et al.*, 2015; Thompson, 2007). We position our work within this literature, but we look at this relationship from a different perspective. We defined four archetypes of patient–physician relationships from the point of view of their effects on the likelihood of value co-creation and the risk of defensive medicine phenomena, as these two aspects are very relevant in healthcare management today (Damali *et al.*, 2016; Joiner and Lusch, 2016; Vento *et al.*, 2018). Thanks to these two points of view, we were able to provide new insights into and reflections on patient–physician relationship archetypes and, in particular, their differences and an order of preference. Furthermore, we provided not only a list of characterizing aspects for each relationship archetype but also empirically showed how they do not depend only on the personal behaviours of the parties involved. In fact, a

specific medical condition or context, as shown in Figure 2, can strongly influence which patient–physician relationship is more likely to emerge.

This paper also contributes to the value co-creation literature in more than one way. We answer the call for exploring both situational and personal factors as enablers of value co-creation practices in healthcare (McColl-Kennedy *et al.*, 2012), e.g. in which situation the patient needs control, cognition, or trust. We describe the main characteristics and the most likely situational circumstances of the archetypes presented. For example, if physicians pay attention to dialogues and patients' needs and are flexible on medical indications, they facilitate the value co-creation process. On the other hand, in emergency situations in which interactions are minimal due to time restrictions, the likelihood of co-creating value is very low. More generally speaking, we answer the call for further developmental work concerning the application of S-D logic to healthcare, specifically in understanding the barriers, facilitators, and supports required for value co-creation ((Hardyman *et al.*, 2015). Furthermore, most major studies on value co-creation in healthcare are about chronic diseases because patients and physicians can have more chances to create value together due to the time factor (Damali *et al.*, 2016; Sweeney *et al.*, 2015). Instead, our work is not limited to this focus. We have also included in the study medical specialities that can be occasional, such as a medical specialist consultancy, with the aim to provide a more comprehensive and empirically informed model. In this way, we have demonstrated that it is also possible to co-create value in occasional encounters. Finally, as highlighted by (Grönroos and Voima, 2013a), wrong or ineffective interactions may lead to value destruction during service delivery processes. In this paper, we were able to identify not only the combination of patient–physician characteristics that enable value co-creation and inhibit defensive medicine but also those that, in the opposite direction, lead to value destruction and defensive behaviour.

The studies on defensive medicine agree on the difficulty to measure and prove defensive behaviours since they are defined by a physician's subjective factors rather than objective ones (Hermer and Brody, 2010; Panella *et al.*, 2017; Pellino and Pellino, 2015; Tinica *et al.*, 2017). In fact, clinical decisions are influenced not only by liability-related motivators but also by physicians' general desire to meet patients' expectations and avoid conflict (Studdert *et al.*, 2005). It is important to have a clear understanding of why, for example, overtreatment is adopted and what the underlying factors that influence it are (Ramella *et al.*, 2015). Despite physicians being the main actors in

defensive behaviours, a study based only on their perspective has previously been noted as a limitation of such research (Bismark *et al.*, 2013). In this sense, our work provides a contribution in terms of a different research methodology by including patients' perspectives in order to have a more complete understanding of this phenomenon. Furthermore, a very recent work (Renkema *et al.*, 2019) has encouraged future researchers to use longitudinal studies to further investigate defensive medical behaviour through the lens of the patient–physician relationship. Although our work cannot be considered a longitudinal study, we have highlighted the dynamic nature of these relationships over time and in unexpected clinical situations.

“One day, during my job for an ambulance shift, I reanimated an old man that had a heart attack, saving his life. By coincidence, that man was the father of a patient of mine, and from that moment, the relationship between me and his son changed a lot. He started to be 100% compliant with all my prescriptions.”

Family doctor

5.3.2 Managerial implications

Three important managerial insights can be extracted from the empirical evidence of this study. Firstly, as value is co-created and embedded in personal relationships, it is important for managers to know how the potential value from different resources can be actualised through the patient–physician dual approach (Best *et al.*, 2018). With this study, it is possible to understand how the concept of value for the patient does not have a fixed output. But instead, it differs depending on clinical condition, expectation, and context, and it is strongly influenced by their interaction with the doctor. It is important to understand and predict which of these archetypes is more likely to occur in order to anticipate the outcomes of a given clinical situation in terms of value co-creation and defensive medicine. In this sense, Figure 2 provides the potential outcomes of particular situations. So, in the case of chronic disease, the potential for value co-creation is high; thus, the physician should opt to collaborate with the patient in order to maximize value co-creation and avoid defensive attitudes. Instead, for a medical specialist consultancy, the patient's need is more focused on information exchange, and the risk of defensive behaviours is much higher. Being aware of these mechanics, practitioners can choose the best strategy in order to maximize value co-creation and minimize defensive medicine depending on the situation.

Secondly, the increasing pressure to examine more and more patients in a short period of time, in order to dismiss the patients from the hospital promptly, can negatively impact patient–physician relationships (Vento *et al.*, 2018). Managers should avoid seeing healthcare processes just in terms of productivity. The standardization of medical practices should not always be encouraged, and service personalization should be preferred. Medicine is not an exact science, and, by definition, it should be the most personalized of services. Some can argue that the guidelines can help address the phenomenon of defensive medicine (Panella *et al.*, 2017; Tinica *et al.*, 2017). This is partially true because sometimes even protocols are defensive. In fact, they have been devised and studied to be appropriate for the majority of the population; thus, they could be considered defensive in some cases. For these reasons, managers should not focus on pushing doctors to strictly follow medical guidelines to avoid legal problems but instead focus on pushing service personalization according to the archetypes developed here, which prove that there are behaviours that, in some cases, bring positive outputs. For example, in serious illness cases, patients tend to prefer to be guided more by the doctor, leaving more autonomy to them in the decision-making process. In informative cases, there is an opposite trend, and the patient prefers to have more control over the therapeutic path.

Finally, service providers need to find access to customers' value sphere. In particular, firms should make use of existing direct interactions with customers and, when appropriate, strive to create additional interactions. By actively managing the patient–physician relationship, the healthcare provider can influence their patients' perceptions of the care process, also influencing their future engagement in it (Grönroos and Voima, 2013a). From the results of this study, the longer the patient–physician relationship, the lower the risk of defensive behaviours. This means that, in the case of patients with chronic diseases that go to the healthcare centre for periodic check-ins and care activities, it is recommended to schedule the patient's visit in such a way that they always see the same doctor and mutual trust can be achieved more easily. This will develop into a better patient–physician relationship over time. For this reason, in contexts where the margin of value co-creation is high, collaborative relationships are preferable to paternalistic ones, even though they both ensure a low risk of defensive medicine since enhancing the patient's awareness and engagement in the care process will result in better health outcomes.

5.4 Contributions from the research stream 2

5.4.1 Theoretical contributions

This study contributes to the BOM in healthcare literature, the decision-making literature, and the defensive medicine literature. From a theoretical viewpoint, we also contribute to the conservation of resources theory.

Firstly, this paper theoretically argues and experimentally explains the impact of the doctor's personal traits on the patient-care process through the mechanism of defensive medicine behaviour. Further, we show that this phenomenon influences the way a healthcare system performs and should then be managed. Hence, defensive medicine would deserve the particular attention of BOM scholars, for instance, those who investigated operations management problems through the lens of cognitive psychology theories (Bendoly *et al.*, 2010). In fact, in the context of medical liability, the doctor can be a victim of a lawsuit by the patient, which has negative consequences for the doctor's economic status and professional reputation, even when the patient is wrong. For a doctor, in fact, a lawsuit about medical malpractice can compromise an entire well-established career, entailing a serious loss. In this case, there is no asymmetry in the perceived value of gain/loss, as theorized by the loss aversion theory, but instead, a real unbalanced possible outcome. Since the defensive behaviour affects not the doctor directly, but the healthcare system in general and, consequently, the patient, between two choices, one more defensive and one more "risky" in terms of potential legal repercussions, the doctor will be inclined more towards the former. Therefore, organizational factors can be used to mitigate this defensive behaviour since they influence the decision-making process (as demonstrated by this study) both directly and indirectly.

Secondly, this research demonstrates how the doctor's perception of litigation risk significantly influences the decision-making of the therapeutic path, which represents the core of the patient care process (Haines *et al.*, 2017). The present work enriches the literature about defensive decision-making (Marx-Fleck *et al.*, 2021) by providing evidence from the healthcare sector which has contextual characteristics that differ from the usual organizational work environment (Ashforth and Lee, 1990). The concept of loss, from the conservation of resources theory (Hobfoll, 1989) and the correlated stress generation (Ganster and Rosen, 2013), finds a valid application in healthcare. The doctor can feel pressure from several sources: the fear of hurting the patient, the fear of

making mistakes in diagnosis or therapeutic path planning, the fear of potential lawsuits, and the fear of reputation loss. In fact, the reputation of a doctor who has notched up several years of success in the medical environment could be ruined by just one malpractice episode, contrary to other work environments where an error could lead to a mere warning letter or loss of employment in the worst case. With our study, we contribute by analysing some stressors such as work overtime and hospital/ward overcrowding, which lead doctors to alter their usual decision-making process and how organizational factors impact them.

Thirdly, this study contributes to the literature on defensive medicine. The conceptual model developed for the first time introduces organizational factors into the discourse of defensive medicine causes and contrasting mechanisms. This, in fact, opens a new discussion about possible solutions to mitigate the phenomenon of defensive medicine. Literature exploring strategies against defensive medicine is poor, as stated by (Asher *et al.*, 2012), with the sole exceptions of studies aimed at investigating juridical-legal aspects, with proposals to reform the regulatory system relating to medical liability. The research presented in this paper identifies and analyses some organizational factors as modifiers of the litigation risk's effect on overtreatment; this provides insights into new ways to mitigate the risk of defensive medicine behaviours.

This study contributes to the literature on defensive medicine also because it proposes a scenario-based experiment that can evaluate this phenomenon quantitatively, going beyond the current approach based mainly on qualitative, or economic analysis. Some quantitative approaches are also present in the literature, but they mainly refer to the survey-based approach considering the self-reported defensive practices by doctors, which is recognized as a limitation (Ries and Jansen, 2021).

Finally, we used the Big Five model of (Costa and McCrae, 2008) to find a relationship between doctors' personality traits and defensive medicine attitude. More specifically, we found that both agreeableness and neuroticism strongly correlated with overtreatment. Doctors and physicians who are characterized by a high value of agreeableness, usually experience a great interest in other people by caring for and assisting them. This leads to the doctor empathizing with the patient, trying to solve her/his malaise even by prescribing treatments that are not strictly necessary, to alleviate the patient's condition. On the other hand, those who are characterized by a high value of neuroticism tend to experience mood changes, stress, anxiety, and worries, since they are particularly marked by previous experiences that play a crucial role (Barlow *et al.*,

2014). From what has been said so far, the accusatory approach of the blame culture, the strong media attention on malpractice, and the past negative experiences of colleagues push the neuroticism-oriented doctors to increase prescriptions/treatments/cures to avoid stressful situations that can lead to complaints (Burke, 1993; Miles, 2020).

5.4.2 Managerial implications

The increased healthcare demand stretches the ability of healthcare systems to provide efficient and cost-effective care while at the same time attempting to keep patients satisfied by acting on clinical and process quality (Marley *et al.*, 2004), and avoiding malpractice risk (Eitel *et al.*, 2010).

The negative effects of overcrowding on healthcare service effectiveness and quality, other than patient satisfaction, are well known (Helm *et al.*, 2011; Jaeker and Tucker, 2017; Russell *et al.*, 2015). The results of our study demonstrate that overcrowding may also increase the likelihood of the manifestation of defensive medicine. We hence suggest that when designing solutions to combat overcrowding, doctors' perspectives should be considered, apart from those of patients (Blum *et al.*, 1996). For example, it would be crucial to adopt strategies that relieve doctors from the crowd pressure (Lavelle *et al.*, 2021), such as designing the hospital ward layout in such a way that the doctors will not feel the pressure of overcrowding (*out of sight, out of mind*) or designing access protocols for patients' relatives to reduce the doctor's stress in being watched and observed by people (the relatives) who could be potential plaintiffs in future lawsuits (Neuman and Baron, 1998). By taking into account these aspects related to the hospital ward, the result will be more positive workplace behaviour (Danna and Griffin, 1999; Hanna *et al.*, 2000).

We found that previous job experience in the emergency department diminishes the likelihood of overtreatment. On the other hand, overtreatment is more likely to occur in emergency departments themselves. Moreover, older doctors seem to have a greater propensity for overtreatment. All these results clearly indicate that in emergency departments, as also as general surgery, obstetrics/gynaecology, and radiology (i.e., departments more affected by defensive medicine), medical *equipes* should be composed of both young doctors and those experienced in emergency medicine. In fact, a group-level perspective can provide new insights and collective learnings that help respond to external pressures (Edmondson, 2002; Gifford *et al.*, 2022; Yue *et al.*, 2021) which is a characterizing aspect of an emergency department. The importance of cross-

disciplinary teams in healthcare has already been documented in the literature (Uitdewilligen and Waller, 2018), as it may help to develop psychological safety which is an important factor in helping people to learn new behaviours and overcome defensive routines (Edmondson *et al.*, 2016; Nembhard and Edmondson, 2006; Roussin *et al.*, 2016). We then suggest building cross-disciplinary, cross-age, cross-experienced (in emergency medicine) medical *equipes*.

Finally, we found that agreeableness and neuroticism traits influence defensive medicine behaviour. The relationship between personality traits and job performance has already been studied in the literature (Hurtz and Donovan, 2000; Neal *et al.*, 2012) and from these studies, many managerial implications can be derived, e.g., for recruiting criteria or resource scheduling. Our study provides evidence that two specific personal characteristics, agreeableness, and neuroticism, are connected with doctors' defensive behaviour. We believe that when selecting a doctor for an emergency department or maybe when allocating personnel in the wards of a hospital, healthcare managers and recruiters should consider the personal traits of the candidates depending on the position to be covered. If in a specific context, the healthcare manager knows that litigation risk is high, then she/he should at least be aware that, for instance, an "agreeable" front-line operator is more likely to behave defensively than others (*ceteris paribus*, of course). This could imply considering possible shift changes or, in recruiting cases, adding personality analysis in the selection process.

5.5 Contributions from the research stream 3

5.5.1 Theoretical contributions

From a theoretical point of view, this study contributes to the literature on telemedicine, patient–physician relationship, and healthcare service delivery.

This study differs from the previous study about the adoption of telemedicine using TAM (Brandon-Jones and Kauppi, 2018; Chau and Hu, 2002; Kamal *et al.*, 2020; Yarbrough and Smith, 2007). In fact, TAM is more focused on the acceptance of telemedicine with respect to different aspects, also linked to some technology needs or specific characteristics that the new technology should have. Our study, instead, is more focused on the propensity to use this technology by focusing on the service that is the subject of digitalization; i.e., the healthcare service itself. More specifically, we consider the perceived efficacy and the patient–physician relationship, which in fact, are not

specifics of a telemedicine system, but to the service itself. Other studies looked for the enabling factors for telemedicine (Almathami *et al.*, 2020; Viers *et al.*, 2015) which still need further research (Lindenfeld *et al.*, 2023), or for the technical aspects that it should have in order to satisfy the patient, but the threat is the deviation of the attention from the main purpose that pushed its adoption in recent time: receiving assistance in a remote way. Technology is not the core element of the healthcare service but is just a “tool” to improve service delivery. The core element, instead, is health assistance, which does not simply mean receiving a therapeutic plan, but also having a relationship with a medical professional for increasing the physical and mental well-being of the patient besides solving a specific healthcare problem. For this reason, in this study, we wanted to keep attention to the fact that the propensity to switch to telemedicine depends on the characteristics of the way the current services are delivered, such as the patient’s perceived efficacy of the current in-person care (H3), understanding whether and how the as-is situation can influence the propensity to telemedicine.

Another contribution to the literature is a different point of view on studying telemedicine. It is more common in the literature to see studies about the impact of telemedicine on the patient–physician relationship (da Luz, 2019; Wootton and Darkins, 1997), but our research wants to study the opposite effect: whether the relationships influence the propensity to move to telemedicine. The service encounter is a fundamental aspect to create and co-create value (Grönroos and Voima, 2013b; Riotta and Bruccoleri, 2021), not only to obtain positive health outcomes for the patients, but it can also be the base to guide the patient to the next level of service innovation (H1). Thus, with a successful relationship between provider and consumer, it will be easier to fight the resistance to change with both actors involved (Landaeta *et al.*, 2008; Shahbaz *et al.*, 2019).

Lastly, this study confirms that having good technological competencies allows the patients to be more favourable to using technological means to interact with the physicians (H5). We also confirm that a positive patient–physician relationship is linked to positive health outcomes (H2). Both these results, already confirmed in previous studies, support the validity of the present work.

5.5.2 Managerial implications

This study provides some insights that could be useful to practitioners. First, the unexpected result for H3 supports the idea that perceived efficacy positively influences

the patient's propensity to telemedicine. This means that before implementing a telemedicine system, healthcare providers should assure a good level of service; otherwise, they can even obtain a worse effect. In fact, telemedicine should be seen as a tool that enhances the traditional healthcare service and not replaces it (da Luz, 2019). In accordance with this consideration, the three physicians who were involved in this research all agree that the first medical consultation is preferred to be in person in order to start building a solid patient–physician relationship. Caregivers should then focus on improving the current quality of the traditional service as a priority, and only then is it appropriate to implement a telemedicine system (Thirumalai *et al.*, 2022).

One of the most important aspects to focus on regarding healthcare service delivery, as mentioned before, is the patient–physician relationship, not only because it is related to the patient's health outcomes, but also because it supports the technology transition as demonstrated by this work (H1 and H4). For example, one of the results of this research is that it is important for the patient that the physician dedicates enough time to listen to her/him and that they are easily accessible. This way, the patients have the possibility to speak freely with their physicians and, as a consequence, they will be more satisfied with the service received, also in terms of health outcomes. For this reason, we encourage healthcare systems and hospitals to design healthcare services (e.g., the visit) in such a way the physicians have fewer patients per day to have more time to spend with each patient. Quality should be always preferred to productivity, especially in the health sector, so increasing demand for health services should be faced not only by improving the efficiency but mainly by increasing the offer. Telemedicine can help in achieving this result.

Lastly, the results of this work suggest paying a lot of attention to the service encounter aspect (Grönroos and Voima, 2013b; Smith *et al.*, 2017), even for the development of a telemedicine system. Before doing that, it is recommended to conduct an accurate analysis of the project variables that could enhance the medical consultations. The system should be lean in order to prioritize the video and audio quality being intuitive, and this allows to put the patient in touch with her/his physician easily. Plug-ins and other technicalities should be avoided, because, if on one hand, someone who has a lot of technological competencies can extract a lot of benefits (Brandon-Jones and Kauppi, 2018), on the other hand, the vast majority of people, both patients and physicians, would struggle with a complex telemedicine system. Therefore, a good strategy would be providing patients with short tutorials that help them step by

step to approach the digital platforms and the different tools dedicated to telemedicine. This way, it is possible to reduce technological anxiety and help the patient to embrace and properly use this alternative way of experiencing healthcare service. For these reasons, in developing a telemedicine system, everything should focus on the most important aspect of healthcare delivery: the patient–physician relationship.

5.6 Directions for future research

Patient-physician relationships, organizational factors and telemedicine offer a variety of options for future research.

At first, since relationships are not static and a patient–physician relationship can evolve over time, future research should use more longitudinal studies to better capture the different dynamics that can emerge. For example, an initially informative relationship, due to the necessity of further clinical investigations, can turn collaborative or paternalistic if cancer or chronic disease is found. This is because frequent interactions with the physician lead to the development of the relationship.

Another hint for future studies is about organizational factors that can prompt defensive behaviours. It is essential to continue the research in this direction by investigating other organizational factors that have not been considered yet, given the fact that not only legal and juridical aspects influence the defensive behaviours of the physicians, but also organizational ones, as demonstrated by this research. Furthermore, previous studies focused mainly on the phenomenon of positive defensive medicine (overtreatment), so a good advance in research could be done by investigating the phenomenon of negative defensive medicine (undertreatment). This could give new solutions to reduce this negative phenomenon and will consequently increase the quality of the healthcare service, also in terms of operations performance.

Finally, we have observed a tremendous increase in the adoption of telemedicine in the last few years, with a massive spike in its use due to the COVID-19 pandemic. Telemedicine is obviously changing the premises and bases of the patient–physician relationship, which is becoming increasingly virtual. As an example, the integration of sensors and wearables into healthcare operations has the potential to revolutionize the patient-physician relationship by providing real-time, in-depth data and insights.

There are several possible future research directions in this field. One area of research could focus on long-term monitoring and analysis. By using sensors and wearables, healthcare providers can monitor patients' physiological parameters

continuously over extended periods. This can help identify health trends and potential issues before they become severe. Another research direction is the objective assessment of symptoms. Sensors and wearables can provide objective data on patients' symptoms such as pain levels, sleep quality, and stress levels. This information can help physicians make better-informed decisions about treatment plans. Researchers can also explore the integration of sensors and wearables with machine learning and artificial intelligence to perform contextual analysis and predictive modelling. By analysing data from multiple sources, researchers can develop models that predict health outcomes, disease progression, and response to treatment. This information can help physicians tailor personalized interventions and improve patient outcomes. Efforts can be made to integrate data from wearable devices directly into electronic health records. This integration would provide a comprehensive view of patients' health status and facilitate seamless communication and collaboration between patients and healthcare providers. Research can focus on developing interoperability standards and systems that enable efficient data exchange between wearables and electronic health records.

Overall, future research on sensors and wearables in healthcare should evaluate their clinical utility, feasibility, and impact on patient care. By addressing these research areas, we can better understand how to integrate new technologies into healthcare operations and improve patient outcomes.

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