I. Introduction

In health services worldwide, from the most advanced to the most rudimentary, issues of access are a common topic of discussion and critique. Challenges in securing consultations are often cited, compelling many individuals in need of healthcare to resort to emergency services.

At the core of the interaction between users and health services, whether public or private, lies the issue of bureaucracy. Often perceived as a challenge, the concept of bureaucracy cannot be fully grasped without referencing Max Weber [1]. For Weber, bureaucracy was linked to a series of rules that needed to be followed to foster a more rational society [1]. If in ancient times bureaucracy was synonymous with the use of paper documents, often confusing and cumbersome, today we are witnessing the transition of these procedures to
the digital medium. For health systems to operate legally and comply with government-established rules, a series of steps must be enforced before accessing healthcare. This means interacting with the administrative “machine,” which is increasingly electronic. Thus, understanding the implications of using technology in healthcare access has become fundamental.

Recently, the use of emergency services in several countries has surged beyond what is typically deemed adequate [2]. For instance, in Portugal, this trend incurs substantial financial and health costs [2] and has escalated to nearly 6 million episodes annually [3], attracting significant media attention. Various factors have been identified as contributing to this, including a lack of user literacy and a health model in Portugal that is heavily centered on hospital care. To address this problem, the government has introduced the pilot project “Call First, Save Lives” [4], which will allow users to directly book appointments online.

This article reviews recent publications on the use of technology for accessing medical consultations. In Portugal, users can schedule consultations in different ways: in person at the health center’s secretariat counter, by telephone, or, more recently, through the National Health Service portal (Figure 1). However, the option to make an appointment online is not universally available; many health centers do not provide this service. When users access the portal to attempt to schedule an appointment, Figure 2 appears [5].

Hospital consultations can be initiated by a user’s family doctor through an online platform named “Consultations On Time.” This system simply forwards the consultation request along with a brief clinical summary to the appropriate hospital department. Upon receiving the request, a hospital doctor conducts a preliminary screening, after which the department’s secretariat schedules the appointment. Additionally, consultations may be requested by other hospital specialists using internal computer systems; however, these requests are always processed either by the secretariat or by a specialist doctor. It is important to note that patients are not allowed to directly approach a medical service to request a hospital consultation without a prior referral from another doctor, whether submitted online or in paper form.

To address these issues, the government has introduced the pilot project “Call First, Save Lives,” which was previously mentioned. This initiative enables users to secure an appointment with their family doctor or another physician at a specific date and time, rather than merely requesting an appointment. Appointments can be arranged by calling the hotline emergency telephone service, thereby preventing unnecessary trips to the hospital emergency room (Figure 3).

Given this new solution, it is crucial to examine the recent history of online consultation booking systems and learn from the experiences of other public health services. Under-
standing the main challenges, obstacles, and problems that may arise is essential. As will be discussed in the following sections, numerous health systems worldwide are attempting to leverage the technical capabilities of the internet and electronic devices to simplify communication with patients. However, unexpected consequences can occur, depending on the observed variables.

II. Methods

The methods used in the present work were based on the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA-ScR) [6]. Searches were conducted in two databases, Scopus and Web of Science. To explore this issue, articles published in the last 5 years were searched using the keywords “online scheduling,” “online booking,” and “consultations.” For the articles to be eligible, they had to be in English, peer-reviewed, and available online.

The search was conducted in the last week of December 2023.

The inclusion criteria for the article screening process were as follows: (1) studies focusing on the use of medical informatics to schedule consultations; (2) articles addressing health information technology or medical informatics interventions designed to enhance health access; (3) randomized clinical trials, quasi-experimental studies, observational studies, reviews, and meta-analyses; (4) articles published after 2018; (5) studies conducted in English; and (6) articles published in journals indexed with a peer-review system.

The exclusion criteria included: (1) articles with titles, abstracts, or full texts unrelated to online consultation scheduling; (2) theses, book chapters, letters to editors, editorials, short briefs, case studies, conference papers, and study protocols; and (3) studies for which the full text was unavailable.

From Scopus, 55 articles were obtained, and from Web of Science, 9. After reviewing the titles and abstracts, and checking for access and duplicates, 23 articles were retained as original and relevant to this work. The author of this study conducted the entire process.

III. Results

At the end of the selection process, 23 out of the 64 articles obtained were included in the final assessment (Table 1) [7—29]. The articles that were excluded primarily addressed topics unrelated to the aim of this work, such as consultations conducted online rather than scheduled online, or were published in non-indexed journals. A review of these articles was conducted, followed by a discussion of their main findings and those of other relevant sources.

IV. Discussion

Based on the 23 articles selected, the key factors to consider when contemplating the use of online scheduling for health purposes—ranging from its advantages to the primary risks involved—are reviewed. It is important to recognize from the outset that technology cannot compensate for deficiencies in the actual provision of healthcare. In other words, if doctors, nurses, and other health professionals lack the capacity to deliver care, technology alone cannot rectify this shortfall [7]. However, technology can facilitate communication among various stakeholders in health services.

This review included only articles published in academic journals post-2018, written in English, and indexed in Scopus and Web of Science. As such, it did not incorporate the findings from all articles on the subject. Additionally, not all existing online consultation booking systems were examined, and certain studies focus exclusively on the private sector.

First, the communication between Portuguese hospitals and health centers, specifically between general and family medicine and hospital specialties, was never fully established, except under specific circumstances that typically relied on the proactive efforts of doctors and nurses through meetings or localized projects [30]. One of the most recent initiatives designed to address this issue was introduced in Vila do Conde and Póvoa de Varzim [4].

In navigating the complex relationship between users and health services, it is crucial to differentiate between two scenarios: scheduling a follow-up consultation for a patient already under observation for a condition, such as a chronic illness, and arranging a first-time consultation in any specialty following a referral from a healthcare professional. In
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Journal title</th>
<th>Methods</th>
<th>Results</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kucuk et al. [7]</td>
<td>2021</td>
<td><em>Health Policy and Technology</em></td>
<td>Data obtained from the Health Ministry of Turkey for 2013 to 2018 were analyzed to measure patients’ use of the Central Physician Appointment System using several indicators.</td>
<td>From 2013 to 2018 the percentage of patients using the appointment system rose from 22.1% to 34.6%. The Hello 182 call center was used for 60.8% of appointments has opposed to the 39.2% of appointments booked with other systems. Female participants accounted for 62.2%</td>
<td>Over time, both the waiting time before consultation and the total time at the hospital decreased.</td>
</tr>
<tr>
<td>Woodcock [8]</td>
<td>2022</td>
<td><em>Journal of Medical Internet Research</em></td>
<td>A scoping review was conducted by searching 4 databases and systematically reviewing peer-reviewed studies.</td>
<td>30 Full-text articles were included. Self-scheduling initiatives have increased over time. Self-scheduling, compared with using the telephone to schedule an appointment, was most often cited as a relative advantage.</td>
<td>This scoping review cataloged evidence of the existence, advantages, and intervention characteristics of patient self-scheduling. Gaps in knowledge regarding the uptake of self-scheduling by healthcare organizations were identified.</td>
</tr>
<tr>
<td>Qabajeh et al. [9]</td>
<td>2021</td>
<td><em>ICCTA 2021 Proceedings</em></td>
<td>To evaluate an Android-based mobile application to create appointments and store the patient’s health records.</td>
<td>This mobile app and software demonstrated efficacy in reducing the time to schedule and communicate with health services.</td>
<td>Developing an effective patient appointment scheduling system is very important to ensure effective and efficient service delivery in medical centers and hospitals.</td>
</tr>
<tr>
<td>Motulsky et al. [10]</td>
<td>2023</td>
<td><em>Health Policy (New York)</em></td>
<td>A mixed-method evaluation was conducted involving interviews with key stakeholders (n = 40), audit logs of the system in 2019, and a population-based survey (n = 2,003).</td>
<td>The Rendez-vous Santé Québec (RVSQ) e-booking system had a low adoption across the province mainly because it was poorly aligned with the diversity of organizational and professional practices. The other commercial e-booking systems already used by clinics seemed better adapted.</td>
<td>The booking system was appreciated by patients but had implications for the performance of primary care organization that go beyond scheduling management issues.</td>
</tr>
<tr>
<td>Garaix et al. [11]</td>
<td>2020</td>
<td><em>Flexible Services and Manufacturing Journal</em></td>
<td>To compute a common priority list of patients for consultation and injection phases. A unique list of patients is a simple tool used by nurses to manage the flow of patients and to react to uncertain events.</td>
<td>The concept of “Targeted Sequences” was proposed. It was shown that, based on some reasonable characteristics of the high-quality solutions, it is possible to find some target sequences that perform sufficiently well for any instance of this problem.</td>
<td>Sorting the patients in decreasing order of their processing time (LPT) and expected processing time (LEPT) are good target sequences.</td>
</tr>
</tbody>
</table>

Continued on the next page.
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Journal title</th>
<th>Methods</th>
<th>Results</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodcock et al.</td>
<td>2022</td>
<td><em>Journal of the American Medical Informatics Association</em></td>
<td>This case study assesses the uptake, user characteristics, and outcomes of automated self-scheduling in a community-based physician group affiliated with an academic health system.</td>
<td>In total, of the 1,839,824 appointments booked through an agent, 68.3% were kept, 4.6% were missed, 27.0% were canceled, and 0.1% left without being seen.</td>
<td>Users were younger and more likely to be commercially insured. There was evidence of digital inequity based on lower usage rates by Medicaid patients. A higher rate of cancellations was observed for patients who self-scheduled.</td>
</tr>
<tr>
<td>Kunonga et al.</td>
<td>2021</td>
<td><em>Journal of Medical Internet Research</em></td>
<td>We conducted an umbrella review of systematic reviews published from January 2000 to October 2019 using comprehensive searches of 6 databases.</td>
<td>A total of 7 systematic reviews met the inclusion criteria, providing data from 77 randomized controlled trials and 50 observational studies.</td>
<td>The impact of digital technologies on equitable access to services for older people is unclear. Research is urgently needed in order to understand the positive and negative consequences of digital technologies on healthcare access and to identify the groups most vulnerable to exclusion.</td>
</tr>
<tr>
<td>Yang et al.</td>
<td>2019</td>
<td><em>International Journal of Environmental Research and Public Health</em></td>
<td>All hospitals’ online appointment systems were surveyed in October 2018. Features of first-visit registrations were analyzed and stratified according to the hospitals’ accreditation levels.</td>
<td>Of the 417 hospitals, 59.7% (249) had public online appointment systems. For first-visit patients, only 199 hospitals offered the option of making appointments online from 7 to 98 (mean 38.9) days prior to the appointment itself.</td>
<td>More than half of the hospitals in Taiwan have public online appointment systems. However, most of these systems simply fulfill the function of registration, and rarely take the opportunity to improve efficiency.</td>
</tr>
<tr>
<td>Kevat et al.</td>
<td>2019</td>
<td><em>Journal of Paediatrics and Child Health</em></td>
<td>For 3-month periods before and after the implementation of CORIAS, data were collected regarding all new referrals received and initial appointments scheduled.</td>
<td>The proportion of referrals reported lost was 6% following the implementation of the combined online system in comparison to 17% pre-implementation.</td>
<td>Appropriately designed and implemented novel online systems may improve timely and equitable access to healthcare by providing secure, reliable pathways for referrers and by empowering and improving communication with patients.</td>
</tr>
<tr>
<td>Soliman</td>
<td>2020</td>
<td><em>Methodist DeBakey Cardiovascular Journal</em></td>
<td>This is a review about the use of telemedicine in cardiology.</td>
<td>This article provides an overview of telemedicine development and explains what it is.</td>
<td></td>
</tr>
</tbody>
</table>

Continued on the next page.
<table>
<thead>
<tr>
<th>Author et al.</th>
<th>Year</th>
<th>Journal title</th>
<th>Methods</th>
<th>Results</th>
<th>Main conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li et al. [17]</td>
<td>2022</td>
<td>Complex and Intelligent Systems</td>
<td>A resource scheduling problem with a multi-station queueing network is studied in this paper.</td>
<td>Numerical experimental results show that this Q-learning-based scheduling algorithm outperforms two traditional scheduling algorithms significantly.</td>
<td>The developed model and the proposed algorithm can provide a good tool for the managers to improve the medical service efficiency in a cloud health service.</td>
</tr>
<tr>
<td>Noma et al. [18]</td>
<td>2022</td>
<td>NIGERCON 2022 Proceedings</td>
<td>This article is a description of a project to build a roadmap to digitizing the healthcare delivery system in Nigeria.</td>
<td>Design of an intelligent and secured appointment scheduling system.</td>
<td>When implemented as specified, the system should be both secure and intelligent, as well as a source of data for effective managerial decisions in the healthcare sector.</td>
</tr>
<tr>
<td>Eslami and Ganjali [19]</td>
<td>2021</td>
<td>Frontiers in Health Informatics</td>
<td>The proposed systematic review aims to examine and summarize evidence related to medical informatics applications in COVID-19 crisis.</td>
<td>After removing duplicates, 2,716 articles remained and underwent a title and abstract screening process.</td>
<td>This study highlights applications of medical informatics in a pandemic situation and will help future researchers to take the most advantage of using MI in the health system.</td>
</tr>
<tr>
<td>Hannemann et al. [20]</td>
<td>2021</td>
<td>BMC Medical Informatics and Decision Making</td>
<td>The paper explores how the use of digital health technologies, which connect patients with healthcare providers and health insurers, has changed during the COVID-19 pandemic.</td>
<td>The highest level of education (OR 1.806) and the presence of a chronic illness (OR 1.706) particularly increased the likelihood of using online booking.</td>
<td>Socially determined differences can be identified for the likelihood of using digital technologies in healthcare.</td>
</tr>
<tr>
<td>Johnson et al. [21]</td>
<td>2021</td>
<td>PLoS One</td>
<td>This was a comparative study on the use of tele-health technology before and during the COVID-19 pandemic.</td>
<td>The findings illustrated an increase in the use of tele-health technologies.</td>
<td>The observed increase in the use of tele-health technologies may be sustainable, but it has not significantly improved timely access to primary care.</td>
</tr>
<tr>
<td>Murphy et al. [22]</td>
<td>2021</td>
<td>British Journal of General Practice</td>
<td>A longitudinal observational quantitative analysis compared the volume and the type of consultations in April to July 2020 with April to July 2019.</td>
<td>GPs were concerned about increased clinical risk and some had difficulties setting thresholds for seeing patients face-to-face as lockdown eased.</td>
<td>The shift to remote consulting was successful and a focus maintained on vulnerable patients</td>
</tr>
<tr>
<td>Deepa and Pandiaraja [23]</td>
<td>2020</td>
<td>Soft Computing</td>
<td>This article explains the development of a software to match patients and doctors and evaluate each other preserving privacy.</td>
<td>The proposed Hybrid Context Aware Recommendation System for E-Health Care (HCARS-EHC) was implemented.</td>
<td>The implementation results of HCARS-EHC illustrate that the protocol is efficient based on privacy preservation, recommendation, and ranking, with less computation and communication complexity.</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>Journal title</td>
<td>Methods</td>
<td>Results</td>
<td>Main conclusions</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>---------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pisirgen and Peker</td>
<td>2021</td>
<td>UBMK 2021 Proceedings</td>
<td>To provide a unified modeling language for appointment booking systems.</td>
<td>With this study, using the proposed generic model acting like a bridge between developers and coding, appointment booking application can be easily develope.</td>
<td>This appointment model is simple and generic, but it has some limitations and needs future development.</td>
</tr>
<tr>
<td>Fan et al.</td>
<td>2021</td>
<td>Data Science and Management</td>
<td>382,004 original online outpatient appointment records were used and the data set was divided into a training set (N1 . 286,503) and a validation set (N2 . 95,501).</td>
<td>The patient no-show rate of online outpatient appointment was 11.1% (N ¼ 42,224).</td>
<td>This study demonstrates the possibility of using data from multiple sources to predict patient no-shows. The prediction model results can provide a decision basis for hospitals to reduce medical resource waste.</td>
</tr>
<tr>
<td>Xu et al.</td>
<td>2020</td>
<td>Journal of Service Theory and Practice</td>
<td>By focusing on an outpatient appointment service, 921 no-show patients were interviewed patients to extract no-show reasons.</td>
<td>The results reveal ten reasons for no-show behavior.</td>
<td>This study provides a package of coping strategies for no-show behavior to deal with no-show reasons at each appointment service stage.</td>
</tr>
<tr>
<td>Denkovski and Gavrilov</td>
<td>2022</td>
<td>EAI Endorsed Transactions on Pervasive Health and Technology</td>
<td>A survey on medical consumers above the age of 15 years was conducted in July 2020. The results were analyzed in SPSS version 23.</td>
<td>The majority of participants were in favor of implementing an e-appointment system in primary care despite their neutral satisfaction with the walk-in method.</td>
<td>For the system to succeed, it must be financed and supported adequately and as such, further research is necessary to explore a real-time usage.</td>
</tr>
<tr>
<td>Hua et al.</td>
<td>2022</td>
<td>Service Industries Journal</td>
<td>A research model based on transaction cost theory is proposed and tested in the context of the web-based outpatient registration service.</td>
<td>Results of the research show that the occurrence of no-shows can be reduced when asset specificity factors increase and uncertainty factors decrease.</td>
<td>The awareness of cancelation policies can lead to more cancelations but can also weaken the effects of asset specificity factors.</td>
</tr>
<tr>
<td>Kitsios et al.</td>
<td>2023</td>
<td>Electronics (Switzerland)</td>
<td>This study collected information to help executives of a Greek state hospital to improve their electronic appointment system.</td>
<td>The patients’ satisfaction rate with the service provided by the electronic appointment system was not satisfactory.</td>
<td>The importance of having mutual participation and a collaborative decision-making process in the digital age has been highlighted.</td>
</tr>
</tbody>
</table>

LPT: longest processing time first, LEPT: longest expected processing time first, CORIAS: combined online referral and immediate appointment selection system, OR: odds ratio, GP: general practitioner, MI: medical informatics.
the latter scenario, the referral ensures that the patient has medical support for accessing healthcare services. Alternatively, a user might independently seek a consultation without any prior referral. This option raises the most questions within health services, yet it appears to be the most popular among users. Specifically, they value the ability to consult a specialist directly whenever they feel the need, as is the case in the private sector.

The various methods for scheduling a consultation are depicted through three distinct models, corresponding to the hospital (Figure 4), the health center (Figure 5), and the ongoing pilot project (Figure 6).

The articles reviewed identify several limitations of the online consultation booking system, whether deferred or in real-time. When appointments are made by a person, such as an employee or a doctor, there is flexibility to make minor adjustments based on the specific needs of each patient and the available schedules. In contrast, an online system is inflexible and unable to accommodate these nuances [14]. Additionally, each doctor often has unique scheduling preferences that an online system cannot easily adapt to, although there are exceptions [31]. Such systems also result in a loss of customization concerning appointment times, which could prevent doctors from prioritizing consultations based on the severity of cases or from rearranging breaks during their workday [14]. Concerns about safety have also been raised. Patients might schedule appointments without being able to accurately judge the urgency of their health needs, potentially leading to serious conditions being inadequately addressed in outpatient settings. This issue largely depends on the presence of an effective triage system, which is itself complex and has been the subject of research [32]. Some researchers have warned of “unexpected effects” when implementing electronic scheduling systems [10]. A study from China indicated that an increasing number of patients were scheduling appointments before consulting a doctor. However, these systems have pitfalls, as the timing of appointments may not align with the clinical urgency of patients’ conditions. Consequently, those who are first in line may not nec-

---

**Figure 4.** Different possibilities for making an appointment at the hospital, either a first “1” consultation or a follow-up “2”, through a direct appointment or a delivery of an order at a hospital.

**Figure 5.** Different possibilities for making an appointment at a health center, either a first “1” consultation or a follow-up “2”, through a direct appointment or a delivery of an order at a health center.

**Figure 6.** Pilot project of Póvoa de Varzim, Portugal. Users will be able to contact a call center (SNS24) in which a trained technician will carry out a triage. Users who are not referred to the hospital emergency room will have an appointment scheduled directly at their health center.
essarily be those who most urgently need care [32]. Another study suggested that for multistep treatment plans, such as oncological protocols, sequencing appointments could yield better outcomes than current scheduling practices [11]. Concerns have been raised about overbooking, as users might schedule too many appointments when time slots open—either from fear of missing out or due to hypochondriac tendencies—and then fail to show up or cancel at the last minute. The availability of free consultation slots could lead users to perceive certain doctors as less busy or in less demand. Additionally, there are potential limitations related to the cost, flexibility, security, and consistency of online booking systems [14]. Moreover, potential obstacles from the users’ perspective include difficulties in using the internet, distrust of electronic systems, a preference for speaking directly with someone, or simply being unaware of the availability of online appointments [14]. Age has also been identified as a significant factor, distinguishing those who are more adept at using technology, typically younger individuals [12,33], from older individuals. Despite these issues, the diversity of communication methods, both online and offline, can enhance interactions between citizens and health services [13]. It has also been observed that self-scheduling leads to a higher cancelation rate [12]. Other sources of inequality may emerge when access is mediated electronically. Some studies have found that women are more likely to use online services, while being non-white, economically disadvantaged, or having health vulnerabilities can hinder access to e-health services [30].

An interesting study on online consultation booking was recently published in Taiwan [12]. The authors highlight that Taiwanese society boasts a high internet penetration rate—80% in 2017—and is recognized as a global leader in technology. Despite this, the ability to access hospital services online is hindered by a rural-urban divide, with significantly lower percentages of online hospital access reported in rural areas [33]. This issue has also been noted in other studies [30]. It is generally more challenging to book an initial consultation than a clinical follow-up, as hospital services with online booking systems typically permit rescheduling but do not allow for the booking of first-time appointments. The study also explored how far in advance patients could schedule a first consultation. The findings revealed that the maximum lead time was approximately 90 days, while the minimum was only 7 days at local clinics. In regional or central hospitals, this minimum scheduling time extended to 14 days, indicating a faster response rate in the system’s more peripheral or less centralized services, depending on one’s perspective. Interestingly, when booking a first consultation, users are not required to provide a reason for the appointment.

Some authors have noted that online consultation booking might exclude older individuals or those who do not frequently communicate via email [31,33]. This exclusion largely depends on the level of internet penetration within the specific population group. Concerning rural areas, one study demonstrated how an algorithm can enhance the scheduling system and improve access to quality health services in rural China [17]. In Nigeria, which is not yet a developed country, there exists an intelligent electronic appointment system that incorporates the clinician’s role in authorizing each appointment. This system allows patients to schedule appointments from their homes, thereby reducing the potential spread of infectious diseases [18].

Due to changes in consultation demand triggered by the coronavirus disease 2019 (COVID-19) pandemic, questions have emerged regarding the actual reduction in waiting times for online consultations during this period [21]. It is noteworthy that access to electronic health booking systems proved more effective among those who are economically and educationally privileged, as some authors have observed [20]. This was also true for individuals with chronic illnesses, which raises concerns about the universality of healthcare access. Additionally, physicians expressed uncertainty about choosing between face-to-face and online consultations, lamenting the loss of direct patient contact. This has underscored the necessity to develop clinical decision-making protocols to determine the most appropriate means of communication [22]. These observations suggest that COVID-19 may have been a pivotal moment for the adoption of electronic methods in medicine [19,20].

As regards privacy, we can categorize concerns into two main types. One the one hand, there are technical questions, which involve ensuring that information is safe and encrypted [23]. This concern is not unique to healthcare, and has been raised in other industries as well [24]. On the other hand, there is the issue of anonymity: online appointment scheduling can enhance anonymity, particularly in specialties associated with greater social stigma, such as psychiatry or sexually transmitted diseases. This increased anonymity can improve access for more stigmatized groups [30]. Mold’s study also explored the potential for users to abandon direct booking if available dates are not frequently updated, which could undermine their trust in the system. Furthermore, online access provides users with information about the sched-
ules and activities of medical staff, potentially creating the impression that more resources are available than the ones that actually exist. This discrepancy poses a challenge for the management and reputation of hospital services.

According to some authors, providing patients with access to their health information can strengthen their sense of control, empower them, and transform the doctor-patient relationship [30]. However, there are concerns about the potential health consequences of allowing patients indiscriminate access to this information [30]. It is also important to differentiate between online scheduling and self-scheduling. The latter not only utilizes electronic means but also grants patients the direct authority to schedule their appointments. This has been identified as a complex intervention that warrants further investigation—on the one hand, it enhances patient satisfaction, but on the other, it may lead to an increase in the no-show rate [8,25]. The no-show rate is a significant variable in web-based appointments [26]. Some studies suggest that online appointments may increase both the no-show rate and patient tardiness [27], while others indicate that the cancelation policy affects attendance rates [33].

While the ability to communicate with health services is crucial for ensuring their efficiency, these services can only function properly when they are endowed with sufficient human, financial, and logistical resources. Here, it is important to consider (although it is not the primary focus of this article) public investment in healthcare, from human resources to the operational means available, as without this investment, the demand will not be met [7].

New technologies are continually emerging, and artificial intelligence is expected to drive significant advancements in this field. An example of this is the recent development of a “decision support system”. This system customizes scheduling decisions based on individual patient behavior profiles, thereby minimizing waiting times and reducing additional work at the end of each session [34].

Overall, online engagement with health services is viewed positively; however, it does have its limitations and carries the risk of exacerbating inequalities in healthcare access.

The lack of an international nomenclature for online booking systems hinders more comprehensive and thorough research [30]. It is important to note that this article is a scoping review, which entails significant limitations. Notably, some relevant studies may have been overlooked, and the sheer volume of publications in this field may have limited the accuracy of the selection process. Additionally, it should be mentioned that the review process was conducted by a single researcher, potentially limiting the objectivity of the decisions made.

It is hoped that by establishing a connection between the research published in this field since 2018 and a specific ongoing experiment in Portugal, other researchers and policy actors will be encouraged to think critically about healthcare access.

In conclusion, finally, although the internet is a nearly universal reality, it presents a vast array of solutions that make analyzing different consultation booking systems a complex task. Indeed, numerous variables and micro-variables, such as the type of healthcare involved [29], can cause two seemingly similar systems to differ significantly. The diverse capabilities of technological systems introduce significant concerns regarding access, confidentiality, and security, which require detailed examination. Although internet-based communication with health services appears to enhance access, it may actually exacerbate disparities between urban and rural areas and further marginalize economically vulnerable populations and the elderly. Addressing these issues is vital for future research.

In our opinion, it is crucial to expand this research and explore the potential impacts and challenges associated with the application of artificial intelligence to various medical procedures, including consultations and examinations. In the realm of online medicine, the pace of research is noticeably slower than the rate of technological progress.

Considering the complexities of online scheduling, policy actors interested in this field should advise all relevant authorities to invest in research on technologies and healthcare access. This is very important, as any misguided decision can have systemic consequences.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

ORCID

Lucas Manarte (https://orcid.org/0000-0002-9771-8179)

References

2. Oliveira FC. [Factors contributing to the influx of non-urgent cases in emergency services: a study at Hospital


34. Millhiser WP, Veral EA. A decision support system for real-time and dynamic scheduling of multiple patient classifications in ambulatory care services. Proceedings of 2016 Winter Simulation Conference (WSC); 2016 Dec 11-14; Washington, DC, USA. p. 2053-64. https://doi.org/10.1109/WSC.2016.7822249