

Article

SMS and Telephone Communication as Tools to Reduce Missed Medical Appointments

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Abstract

The aim of this study was to analyze the effectiveness of implementing an automated appointment confirmation system in a mental health clinic and to assess its impact on patient attendance, which may indirectly support the patient recovery process. The study was conducted at a mental health outpatient clinic in Gdańsk, Poland, and focused on medical appointments across three affiliated outpatient units. Data from 2019 and 2023 were compared, focusing particularly on the rate of missed appointments (relationship between number of visits that did not take place and total number of visits that were scheduled in the software), form return rates (the relationship between the number of forms returned by patients and the total number sent), and patient opinions regarding the usability of the new system. The results showed a significant reduction in no-show rates—from 18.55% to 7.01%—confirming the high effectiveness of the automated system. The form return rate reached 55.41%, with the highest engagement observed among individuals aged 35–44. Patient evaluation of the system was highly positive—over 93% found it intuitive and meeting their expectations. A proprietary software solution developed in Python, alongside databases and Microsoft Office Access/Excel tools, was used for data collection and analysis. The study demonstrated that a comprehensive approach, combining automated reminders with the ability for quick patient response and telephone support, is an effective tool for improving the accessibility and quality of healthcare services. The analysis also considered limitations related to digital barriers and identified directions for further research, including studies on how patient abstention from appointments affects their recovery process.

Keywords: informatics; medical science; optimization; psychiatry; software; SMS



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1. Introduction

High rates of missed appointments represent a significant organizational and financial challenge in healthcare, particularly in outpatient care [1,2]. In mental health clinics, where continuity of therapy and appointment availability are crucial, patient no-shows can lead to a deterioration in health status and inefficient use of human resources [3,4]. Herein, one proposed solution to this issue involves automated appointment reminder and confirmation systems, which enable more active patient engagement in the care coordination process.

The article also discusses the study's limitations related to digital barriers, as well as directions for further research, including the potential impact of the system on treatment quality and a reduction in hospitalizations. In the context of increasing pressure on the healthcare systems and limited human and organizational resources, the search for effective technological solutions becomes not only desirable but also essential [5–7].

The aim of this study is to analyze whether the implementation of teleinformatic systems (understood as the integrated use of information and telecommunication technologies for the transmission, processing, and storage of data) has a positive impact on patient attendance at scheduled medical appointments in a mental health center. This may contribute to improved continuity of care and the prevention of patient deterioration—for example, due to medication discontinuation. Additionally, the study will assess patient satisfaction with the implemented teleinformatic tools to determine whether it meets the needs of patients and is willingly adopted in practice.

2. Literature Review

Improvement in the operations of healthcare entities (including the use of IT tools) and enhancing patient safety is an issue frequently analyzed by many researchers [8]. Although the implementation of IT/telecommunication tools requires substantial financial and organizational investment during the development and deployment phases, and involves ongoing maintenance costs, in the long term, such systems can lead to process optimization and overall cost reduction—for example, in areas like customer service efficiency or employee satisfaction [9–12]. Brenner et al. indicated that in 69 analyzed studies on medical implementations, 25 (36%) had a positive impact on patient safety, and only 1 (1%) was classified as having a negative effect [13].

The necessity of performing repetitive tasks often leads to errors. Data stored in paper form is difficult to analyze and may also present challenges such as the legibility of handwritten notes. Manually completing forms is also time-consuming [9,14], a problem identified by Kartika, who proposed an information system that partially automates this process at a very basic level [15]. Similar solutions have been implemented and deployed at Asy-Syifa Medika, also contributing to more efficient data aggregation and a reduction in errors [16]. Very positive outcomes in terms of error elimination were demonstrated in a study conducted at the National Cheng Kung University Hospital. As a result of implementing automated medication dispensing cabinets and accompanying systems, the rate of incorrect medication assignments was reduced from 3.03 to 1.75 per 100,000 prescriptions, administration errors dropped from 3.87 to 0 per 100,000 dispensations, and discrepancies arising during administrative processes were reduced from 0.046% to 0.026% [17].

It is essential to ensure that any teleinformatic solution developed is intuitive and easy to use. Successful implementation must take into account both technical and social aspects, fostering trust and support for healthcare professionals as well as patients within healthcare institutions [18–23]. A study conducted at a clinic in Taiwan demonstrated that perceived ease of use positively influences users' assessment of a system's usefulness. This suggests that the simpler the system is to operate, the more useful it is perceived to be. The authors also emphasized the significant role of mobile technologies in healthcare, given that smartphones have become an integral part of daily life [24]. The use of mobile applications for registration positively affects the quality of healthcare services and strengthens the relationship between patients and physicians [25,26].

The impact of medical systems on the patient treatment process is also being analyzed. A system was implemented to display reminders to resident physicians in order to improve adherence to care guidelines. Physicians were divided into two groups—those working with reminders and those without. The study showed a higher proportion of guideline-

compliant consultations in the group using reminders. An additional observation was made regarding a gradual decline in the positive effect of the notifications over time [27].

The impact of reminder mechanisms on patient attendance was also investigated in the Primary Care Clinic and HIV Clinic of the Geneva University Hospitals (Geneva, Switzerland). Implementation of an SMS reminder system reduced the non-attendance rate from 11.4% (control group) to 7.8%. The reduction in missed appointments generated revenue of EUR 1846. Additionally, 28% of previously unused appointment slots were successfully reassigned to other patients. Moreover, 78% of participants found the reminders helpful [28]. A similar study conducted at the Royal Children's Hospital in Melbourne showed that the proportion of missed appointments decreased from 19.5% to 9.8% following the introduction of a reminder system [29]. In India, the effect of SMS reminders on patient punctuality was also assessed. Among patients who received SMS notifications, 79.2% arrived on time for their appointments, compared to 35.5% in the control group [30]. The effectiveness of appointment reminders was also evaluated in China (Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University). The study included three groups: SMS reminders, phone call reminders from the clinic, and no reminders. Attendance rates were 87.5% for the SMS group, 88.3% for the phone call group, and 80.5% for the no-reminder group. Although the phone call reminders yielded slightly higher effectiveness, the authors calculated that they generated higher costs for the healthcare provider (SMS reminder: CNY 0.31 $\approx$ EUR 0.04; phone call reminder: CNY 0.48 $\approx$ EUR 0.06) [31]. A similar system was implemented at Moorfields Eye Hospital in London, where the non-attendance rate dropped from 18.1% before implementation to 11.2% afterward [32].

According to data from IAB Polska and CBOS reports, 98% of individuals or more in the 18–24, 25–34, and 35–44 age groups regularly use the Internet. Moreover, the 35–44 and 25–34 age groups represent the largest proportion of Internet users, accounting for 21.5% and 20.5%, respectively. This may suggest that patients within these age ranges are the most likely to adopt automated teleinformatic tools [33–35].

Such developments reduce the technological barriers experienced by both healthcare professionals and patients. As a result, there may be greater openness to implementing innovations and leveraging the latest technological advancements—such as artificial intelligence—to streamline and optimize both patient recovery processes and administrative tasks [36–39].

3. Materials and Methods

3.1. Research Assumptions and Needs

The Optimmed Mental Health Center (Centrum Zdrowia Psychicznego Optimmed) in Gdańsk, Poland, is one of the largest providers of outpatient services for the public payer in the Pomeranian province (voivodeship) [40]. The facility maintains an open approach toward innovation and changes that support the therapeutic process and facilitate the work of medical personnel.

Prior to the outbreak of the SARS-CoV-2 pandemic, all services were provided exclusively on-site. Patients would arrive during the physician's working hours (not at a specific time) and were admitted to the consultation rooms in the order of their arrival. The scheduling of follow-up appointments was initiated by the patient, who was required to visit the registration desk.

The restrictions introduced by the Polish government, along with new regulations enabling the provision of healthcare services via remote communication technologies [41], significantly altered the organizational model of the facility. The urgent need to adapt quickly to the realities of epidemic-related work led to an initial system in which all information regarding the form of service delivery (in-person visit, teleconsultation, phar-

macotherapy continuation), prescription codes, and the dates of follow-up appointments was recorded on paper—this being the simplest and fastest method to implement. SMS messages containing prescription codes and appointment dates were sent manually by the registration staff.

Due to the unreliability, complexity, and inconvenience of this system, the facility initiated a gradual implementation of teleinformatic tools aimed at automating administrative processes.

Except in non-standard situations (e.g., when a patient calls the registration office requesting to reschedule an appointment to an earlier date, when contact with the patient is not possible due to unanswered phone calls or SMS messages, or when the patient refuses to schedule a follow-up visit), the outpatient clinic is the party that initiates contact. Follow-up appointment dates are scheduled during the consultation. One week prior to the scheduled visit, registration staff initiate an automated messaging process in the system. This process sends appointment reminders in cases where the appropriate visit type has been entered into the system (Figure 1a), or a service-type selection form when the visit type has not been specified (Figures 1b and 2).

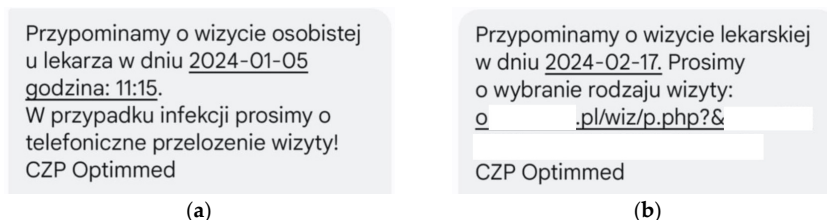


Figure 1. (a) SMS message reminding about a doctor’s visit: “We would like to remind you about your in-person appointment with your doctor on (...) at (...). In case of infection, please reschedule your appointment by phone.” (b) SMS messages with a link to open a form: “We would like to remind you about your doctor’s appointment on (...). Please select the type of appointment (...).”

(a) Witamy w systemie potwierdzania wizyty w Centrum Zdrowia Psychicznego Optimmed. Pesel pacjenta: 9 xxx. Proszę wybrać rodzaj wizyty, który Panią/Pana interesuje (zaznaczając kropkę w lewej części tabeli), a następnie nacisnąć przycisk "Wyślij":

☐	tylko recepta - jestem w stabilnym stanie psychicznym, proszę o wypisanie recepty (kontynuacja dotychczasowej farmakoterapii) - w przypadku wybrania tej opcji, w dniu wizyty otrzymacie Państwo SMSa z kodami e-recepty i terminem następnej wizyty
☐	rozmowa telefoniczna z lekarzem - w przypadku wybrania tej opcji, lekarz w godzinach pracy będzie kontaktował się z Panią/ Panem telefonicznie
☐	rezygnacja z wizyty
☐	rezygnacja z wizyty z prośbą o wyznaczenie terminu następnej wizyty (termin zostanie wysłany SMSem - prosimy o przekazanie Państwa preferencji poprzez pole "Dodatkowe informacje")

Dodatkowe informacje

(b) Dodatkowe informacje dla lekarza (pole OPCJONALNE) jeżeli ma Pani/Pan jakąś dodatkową prośbę lub informację można zawrzeć ją w tym polu. WYMAGANE: Oświadczam, że nie przebywam obecnie w szpitalu, oddziale dziennym lub innym stacjonarnym podmiocie udzielania świadczeń refundowanych przez NFZ (nie tylko psychiatrycznym), a w przypadku gdybym w dniu wizyty w nim przebywał skutecznie poinformuję o tym fakcie rejestrację CZP Optimmed. Przypominamy, że wizyty osobiste są możliwe, decyzję (oraz wyznaczenie terminu) podejmuje lekarz podczas teleporady z Pacjentem. W przypadku problemów i wątpliwości zachęcamy do kontaktu drogą mailową na adres lub telefonicznie - lista telefonów dostępna jest na stronie www.optimmed.pl. Wyślij

Figure 2. (a,b) A form that allows you to select the type of visit, send additional comments for the doctor, and submit the required declaration. The first line displays a welcome message addressed to

the user. This is followed by the anonymized patient identifier. Next, fields are presented that allow the user to select the type of service requested. Available options include a prescription (in cases of ongoing pharmacotherapy), a telephone consultation with a physician, cancellation of the visit, or cancellation accompanied by a request to schedule a new appointment. In the following section, the patient may optionally provide additional information. Subsequently, a declaration is presented in which the patient confirms that they are not receiving stationary medical services from another healthcare provider under the public insurance system on the same day. Finally, information is provided regarding how to register for an in-person appointment, along with an encouragement to contact the clinic via email in case of any issues or uncertainties.

People who do not fill out the form or have their SMS communication channel turned off are called to determine the type of visit needed. The process is shown in Figure 3.

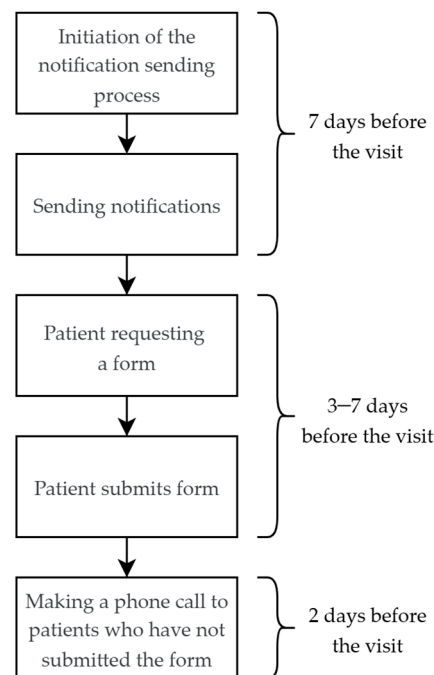


Figure 3. Procedure of the registration staff in the context of confirming visits.

The system covers patients of three outpatient clinics: the Mental Health Outpatient Clinic (Poradnia Zdrowia Psychicznego), the Child and Adolescent Mental Health Outpatient Clinic (Poradnia Zdrowia Psychicznego dla Dzieci i Młodzieży), and the Community Mental Health Team (Zespół Leczenia Środowiskowego), specifically for visits conducted by psychiatrists and physicians specializing in child and adolescent psychiatry.

Ethical approval from a bioethics committee was not required, as the study utilized anonymized data only. Authorization to use and publish the data for research purposes was granted by the management team of the healthcare facility.

3.2. Technical Implementation

The software was developed by lead author of this article in the Python 3.8.20 programming language [42] and utilizes the PySimpleGUI 4.23 graphical library [43] to display the user interface. Data are stored in two databases—one of which is also used by the electronic medical records software, while the other is dedicated exclusively to the Electronic List program (Elektroniczna Lista). Both databases are implemented using Microsoft Office Access [44]. Appointment management functionalities are accessible from the main application window (a screenshot is presented in Figure 4). Other modules (not relevant to the scope of this study) are accessed via the menu bar.

The screenshot shows the main window of the 'Elektroniczna Lista' program. The interface includes a top toolbar with various function buttons, a left sidebar for patient selection, and a main area for patient data and visit management. The patient data section includes fields for name, PESEL, phone numbers, and visit type. The bottom section displays system logs.

Figure 4. The main window of the Electronic List program (Elektroniczna Lista). At the top of the interface, a toolbar provides access to additional functionalities. Just below it, there are fields that allow the user to select the healthcare provider and date, enable automatic confirmations, and close the program. The left section of the window displays a list containing PESEL identifiers, the type and time of the visit, the status of service completion, as well as the patient's last and first name. The right section of the window is organized vertically. At the top, it includes buttons for navigating between individual days. Below that, it presents the patient's personal data, including phone number, medical record number, and any additional information. The next block shows the type and time of the visit, along with any relevant comments. This is followed by a section with fields and buttons used for managing prescriptions and scheduling the next appointment. Finally, system logs are displayed at the very bottom of the interface.

The online component (visit-type selection form) is implemented in PHP [45]. The responses are stored in a MySQL database [46]. A synchronization mechanism is triggered multiple times throughout the day, resulting in the transfer of data from the online database to the local database.

The satisfaction survey was conducted by providing a questionnaire created using Google Forms. A request to participate in the satisfaction survey, along with the relevant link, appeared after completing the visit selection form. The survey was conducted on a voluntary and anonymous basis. The questionnaire was reviewed and approved by the management team of the healthcare facility. The Supplementary Materials includes the questions that were used in the analysis and formulation of the study's findings.

The data analysis for the study was performed using query mechanisms in Microsoft Office Access software, through which appropriate SQL queries were executed [47]. The collected information was then exported to a Microsoft Office Excel spreadsheet for further analysis. Data used for further analyses were retrieved from the relevant tables in the databases (tables containing records of registration, medical services provided, SMS messages sent, data received from patients).

4. Results

The analysis was based on data from two distinct time points—in the years 2019 and 2023. In 2019, the system did not include practices for initiating contact from the healthcare provider and did not remind patients of medical appointments. In 2023, the clinic had a well-established system for initiating contact, including reminders for in-person visits and the option to choose the type of appointment via a form. A period immediately following the implementation of the system was not chosen for the study due to the need for patients, especially those who were initially distrustful of the new communication method or who faced technical barriers, to familiarize themselves with the system. This was particularly the case for patients who required assistance from registration staff in understanding how to use the form.

The study only included medical visits. Records from three physicians were excluded due to unreliable data (servicing of a social welfare home, psychiatric day care unit, and a very high number of absences caused by work at multiple locations). Additionally, days when 100% of the visits did not take place were excluded (usually due to extraordinary leave taken by the provider).

In 2019, 17,819 records were qualified for the study. A visit was considered unfulfilled if it was not associated with an entry or if the billing item was a service note (not subject to settlement with the National Health Fund—NFZ), which is used for recording information in the patient's medical history, such as failure to attend or refusal of service, among other specific details. A total of 14,514 records were classified as fulfilled visits, while 3305 visits were classified as missed. The non-attendance rate, calculated according to Formula (1), was 18.55% for the year 2019.

$$Nz = \frac{Ln}{Lc} \cdot 100\% \quad (1)$$

where:

Nz —Non-attendance rate;

Ln —Number of visits that did not take place;

Lc —Total number of visits that were scheduled in the software.

In 2023, a total of 17,025 records were qualified for the study, of which 124 were excluded due to patients selecting the visit type as “cancellation of appointment” or “cancellation of appointment with a request to reschedule.” It was assumed that in the previous system, when a patient canceled an appointment, the registration record was deleted. In the current system, this process occurs in two ways—either as in 2019 or through the addition of a specific visit type (e.g., via forms completed by patients). For this reason, these records were not considered. The classification of fulfilled and unfulfilled visits was performed in the same way as for the 2019 data. A total of 15,717 records were classified as fulfilled visits, and 1184 visits were classified as missed. The non-attendance rate was 7.01%.

The analyzed data underwent statistical verification, including tests for normality, assessment of the assumptions for dependent samples, and the application of the paired Student's *t*-test.

Detailed data are presented in the charts—Figures 5 and 6.

The return rate of forms sent to patients was also analyzed. In 2023, 8084 forms were sent to patients, of which 4479 received a response. This gives a return rate of 55.41%. Detailed data from individual months are presented in Table 1.

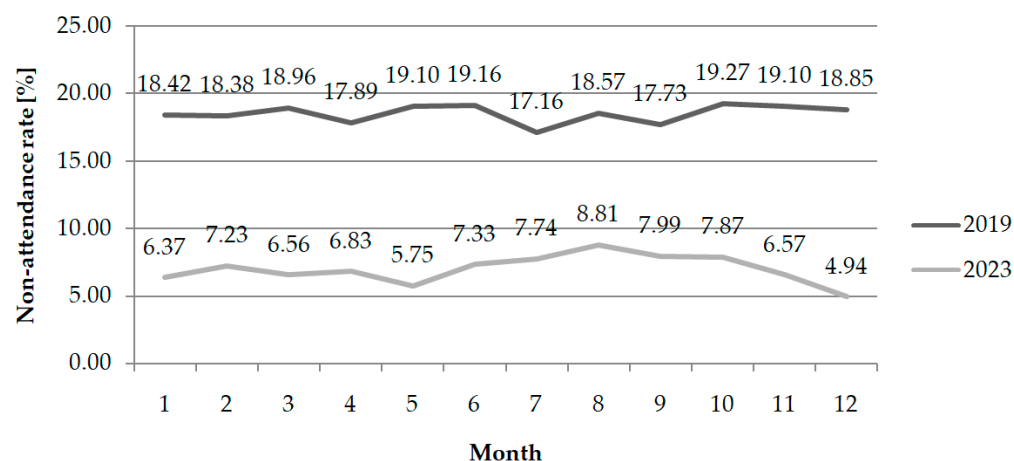


Figure 5. Patient absence rate for visits in individual months—2019 and 2023.

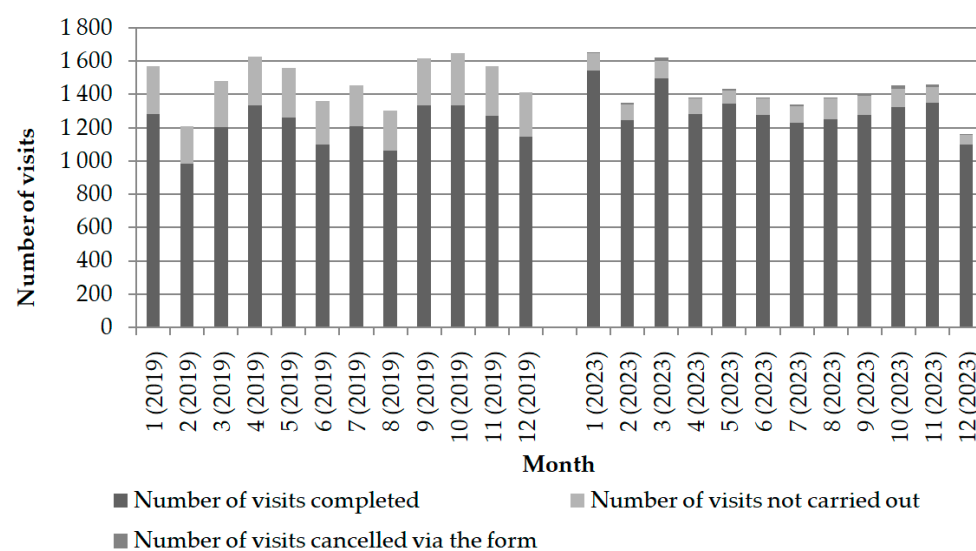


Figure 6. Number of visits completed, not completed, and cancelled via the form in 2019 and 2023.

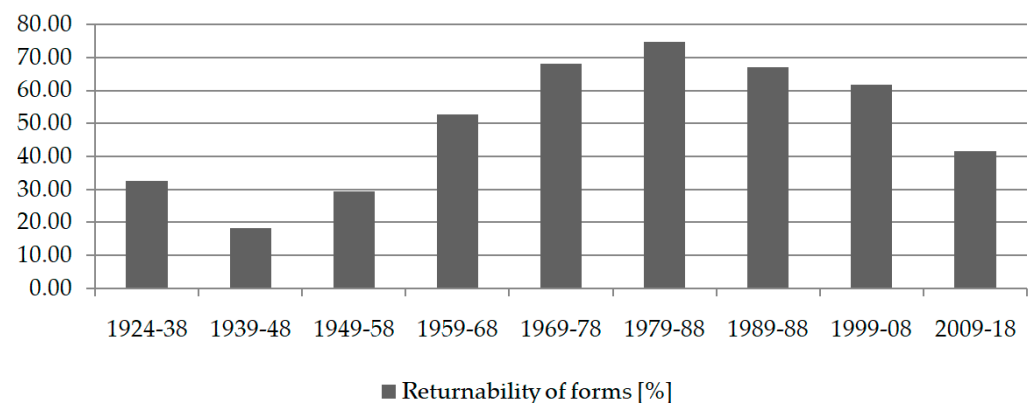
Table 1. Data on forms sent to patients in 2023.

Month	Return of Forms [%]
1	51.6
2	55.69
3	54.31
4	54.4
5	54.07
6	56.87
7	54.55
8	56.3
9	57.55
10	55.86
11	58.12
12	56.7
Whole year	55.41

The issue of the influence of the patient's age on the willingness to receive an answer was considered. The obtained data are summarized in Table 2 and Figure 7.

Table 2. Data on the return of forms sent to patients depending on the patient's date of birth.

Year of Birth	Return of Forms [%]
1924–1938	32.57
1939–1948	18.29
1949–1958	29.28
1959–1968	52.66
1969–1978	68.21
1979–1988	74.58
1989–1998	67.08
1999–2008	61.76
2009–2018	41.54
All years	55.41

**Figure 7.** Data on the return of forms sent to patients depending on the patient's date of birth.

The integration of a patient satisfaction survey request into the system resulted in 616 completed responses.

In response to the question, “Does the automatic appointment confirmation system meet your expectations?” participants could choose a rating on a 1–5 scale (where 1 indicates the lowest and 5 the highest level of satisfaction). A total of 483 respondents (82.6%) rated it as 5, 61 (10.4%) as 4, 26 (4.4%) as 3, 7 (1.2%) as 2, and 8 (1.4%) as 1.

For the question, “Is the use of the automatic appointment confirmation system intuitive for you?” the responses were as follows: 5—444 (78.3%), 4—84 (14.8%), 3—25 (4.4%), 2—5 (0.9%), and 1—9 (1.6%).

Participants were also asked, “Do you find automatic appointment confirmation more convenient than the previously used system (phone call from the registration desk)?” A total of 322 respondents (55.4%) indicated a preference for selecting the type of visit via the online form, 215 (37%) reported no preference regarding the method of contact, and 44 (7.6%) considered a phone call from the registration desk more convenient.

The results are presented in Figure 8. The detailed content of the questions used in the study is available in the Supplementary Material.

To ensure the reliability of the analysis, the authors made efforts to confirm the completeness and internal consistency of the data. The datasets were thoroughly examined for logical contradictions and verified to fall within expected value ranges. Additionally, the large volume of records and their consistency over time indicate strong data reliability. The data were generated within a healthcare facility that collaborated with the researchers, and the mechanisms for data collection were developed by one of the authors. Therefore, there is no concern regarding the authenticity or credibility of the data [48–50].

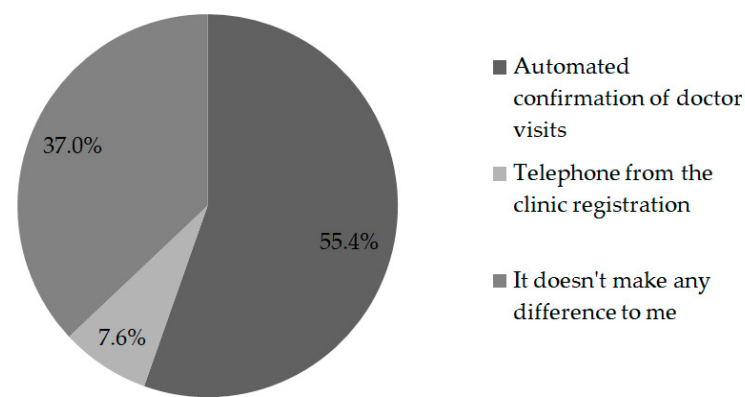


Figure 8. Answers submitted to the question, “Is automatic confirmation of visits more convenient for you or the system used so far (telephone from the clinic registration)?”

5. Discussion

Based on the data, a significant improvement in attendance rates was observed compared to other facilities—an increase of 11.54 percentage points. A greater improvement was recorded only in the case of the study listed as number 4 in Table 3; however, the methodology used in that study differs substantially, making direct comparisons inappropriate. Such favorable outcomes may be attributed to the fact that the healthcare facility serves a large number of regular patients who have become accustomed to and trust the implemented system functionality. The non-attendance rate prior to system implementation can be considered average, with only the values reported in positions 2 and 4 in Table 3 standing out from the others.

Table 3. Aggregate presentation of data on patient attendance at medical appointments in various research studies.

Research Number	Research Place	Non-Attendance Rate Before Implementation	Non-Attendance Rate After Implementation	Improvement
1	The Optimmed Mental Health Center (Centrum Zdrowia Psychicznego Optimmed), Gdańsk, Poland	18.55%	7.01%	11.54 percentage points
2	Primary Care Clinic and HIV Clinic of the Geneva University Hospitals, Geneva, Switzerland [28]	11.4%	7.8%	3.4 percentage points
3	Royal Children’s Hospital, Melbourne, Australia [29]	19.5%	9.8%	9.7 percentage points
4 *	ITS Centre for Dental Studies and Research (ITS-CDSR) in Muradnagar, Ghaziabad, Uttar Pradesh, India [30]	64.5% *	20.8% *	43.7 percentage points
5	Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University, China [31]	19.5%	11.7% (telephone reminders); 12.5% (SMS reminders)	7.8 percentage points (telephone reminders); 7% (SMS reminders)
6	Moorfields Eye Hospital, London, United Kingdom [32]	18.1%	11.2%	6.9 percentage points

* A scientific study of punctuality of reporting for a doctor’s visit—the table presents failure to report/unpunctual reporting.

The study results clearly indicate a significant impact of implementing an automatic appointment confirmation system, along with the option to choose the type of visit, on reducing patient non-attendance in a mental health outpatient clinic. The decrease in the percentage of missed appointments from 18.55% in 2019 to 7.01% in 2023 confirms the effectiveness of strategies based on proactive patient engagement and the integration of technology to support appointment management.

These findings are consistent with those reported in the literature, which highlights the effectiveness of SMS reminders and digital communication in reducing patient no-shows. For example, Badawy et al. [51] point out that text message reminders are an effective tool for improving attendance at scheduled appointments. Similar observations were made by Hasvold et al. [52], who noted a reduction in non-attendance by approximately 29% for automated reminders and 39% for manual telephone reminders, corresponding to an overall relative reduction of about one-third.

It is important to emphasize, however, that in the present study, the observed effectiveness cannot be attributed solely to SMS messaging. Rather, it results from a comprehensive system that combines reminders with the ability for patients to take immediate action (e.g., cancel or reschedule appointments), along with follow-up telephone contact from registration staff for those who did not complete the form. This expanded functionality aligns with a patient engagement model in the organization of care—an approach that, as noted by Badawy and Kuhns [51], can enhance patients' sense of responsibility for their participation in treatment and improve their overall engagement.

The patient attendance results in this study, alongside those reported by other researchers, are presented in Table 3.

The study also analyzed response rates—defined as the percentage of patients who, after receiving an SMS with a link to a form enabling them to choose the type of appointment, responded and submitted their data to the database. This value amounted to 55.41%, with no evident pattern observed across different months or seasons—the monthly rates ranged from 51.6% in January to 58.12% in November.

An analysis of response rates across age groups provides particularly interesting insights. The highest response rate was observed among patients born between 1979 and 1988 (aged 35–44 years), at 74.58%. This was followed by two almost identical groups: those born in 1969–1978 (aged 45–54 years), with a response rate of 68.21%, and those born in 1989–1998 (aged 25–34 years), at 67.08%. The lowest response rates were found among the oldest groups: 18.29% in the 1939–1948 cohort (aged 75–84 years), 29.28% in the 1949–1958 cohort (aged 65–74 years), and 32.57% in the 1924–1938 cohort (aged 85–99 years). Interestingly, the oldest group (85–99 years) showed a higher response rate than the two slightly younger groups. This may be due to SMS communication being managed by the patients' children or grandchildren in the oldest group, unlike the two younger groups, where patients themselves typically handle contact and treatment matters. These findings are consistent with data from CBOS and IAB regarding Internet users in Poland [33,34].

The analysis of patient satisfaction with the implemented tool revealed a high level of approval. A total of 93% of respondents rated their satisfaction and expectations as met, with a score of 4 or 5. A similar result was observed regarding the intuitiveness of the system—93.1%. Additionally, when asked about their preferred reminder system, 55.4% of patients chose SMS, while only 7.6% preferred phone calls (the remaining respondents indicated no preference). Based on these findings, the implementation of automated systems can be considered successful and beneficial.

Despite the overall positive reception, some limitations were identified. First, not all patients were able to use the SMS channel—this applied to approximately 5.1% of the study population, who were contacted exclusively by phone. Second, access to the satisfaction survey was only possible after confirming the appointment, meaning that the opinions of individuals who could not or did not wish to use the application were not included. This may have led to an overestimation of the system's effectiveness, as those with digital barriers—a group potentially more critical of the changes—were excluded from the analyses.

The use of tools to automate patient communication and support appointment management can thus be regarded as an effective strategy for improving clinic workflow organization and increasing access to healthcare services. In the context of limited human and organizational resources, implementing such a tool appears not only beneficial but indeed also necessary [53]—especially in outpatient psychiatry, where patient no-shows have tangible health and economic consequences.

An important future task involves addressing the limitations encountered during the current analysis, as doing so will enable higher-quality results.

In subsequent research, it would be valuable to explore whether the implementation of the reminder and appointment-type selection system has led to improved patient health outcomes, such as a reduction in the number of prescriptions issued or a decrease in hospitalizations [54].

The healthcare provider's existing data infrastructure allows for various analyses of treatment and the administrative process effectiveness, although these are often limited to what can easily be achieved through queries. The implementation of AI-based systems would be highly valuable; however, this requires particular attention to data security and legal considerations concerning the processing of such analyses [39,55–58].

It would also be beneficial to conduct comparative analyses using data from other healthcare providers dealing with different patient conditions, from different regions or countries, and from smaller localities, in order to distinguish local factors from universal patterns [59,60].

6. Conclusions

The conducted study clearly confirms the effectiveness of implementing teleinformatic tools in reducing patient no-show rates at a mental health outpatient clinic. The decrease in the non-attendance rate from 18.55% in 2019 to 7.01% in 2023 represents a tangible outcome of deploying a reminder system, automated appointment confirmations, and follow-up calls by registration staff. This result surpasses the improvements observed in many other healthcare facilities—both domestic and international.

A key component of this success was not only reminding patients about their appointments but also enabling them to easily select the type of service and automating the handling process. The system was rated very highly by patients—over 93% of respondents considered it intuitive and meeting their expectations. The most active users of the new solutions were patients aged 35–44, confirming prior observations regarding the digital engagement of this age group.

The findings indicate that well-designed and consistently implemented teleinformatic tools can serve as effective support for healthcare facilities, contributing to improved quality of care, increased service accessibility, and more efficient use of human resources. Despite certain limitations—such as the exclusion of a portion of patients from the SMS communication channel or the inability to fully capture the opinions of individuals facing technological barriers (partially mitigated through phone calls)—the implemented system can be regarded as a significant step toward modern, efficient, and patient-centered organization in psychiatric care [61,62].

Study Limitations

When analyzing aspects related to survey response rates, it is important to consider that the software allows SMS communication to be disabled for patients who do not have appropriate devices, the necessary skills, or the willingness to use such technology. During the study period, 5.1% of patients had SMS communication disabled. It should be noted that if SMS messages had been sent to all patients, the overall response rate would have

been lower due to the inclusion of this group. However, this does not affect the analysis of the reminder system's effectiveness, as these patients are contacted via telephone.

When interpreting the survey-based evaluation of the system, it is important to recognize that access to the questionnaire was granted only after the appointment confirmation form had been completed. This excluded individuals without the necessary equipment or digital literacy to use the application, which may have particularly influenced responses to the question, "Do you find automatic appointment confirmation more convenient than the previously used system (phone call from the registration desk)?"

It should also be acknowledged that the survey did not require all fields to be completed, which resulted in varying response counts across different questions.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/app15179773/s1>.

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