



POLISH HEART JOURNAL

Kardiologia Polska

The Official Peer-reviewed Journal
of the Polish Cardiac Society
since 1957

Online first

This is a provisional PDF only. Copyedited and fully
formatted version will be made available soon

ISSN 0022-9032

e-ISSN 1897-4279

e-Concilium: An online platform for cardiology consultation — results from a pilot study

Authors: Mikołaj Błaziak, Tomasz Jeruzalski, Paweł Pławiak, Janusz Granat, Jarosław Czerkies, Magdalena Kosiarska, Tomasz Masternak, Monika Szelaąg, Adam Perliński, Tomasz Zieliński, Szymon Urban, Weronika Wietrzyk, Katarzyna Modrzejewska, Bartosz Balcer, Natalia Dolata, Katarzyna Mazur, Kinga Brawańska-Maśluch, Paulina Tomecka, Wiktor Kuliczkowski

Article type: Short communication

Received: August 20, 2024

Accepted: November 25, 2024

Early publication date: November 27, 2024

This article is available in open access under Creative Common Attribution-Non-Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) license, allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially.

e-Concilium: An online platform for cardiology consultation — results from a pilot study

Short title: e-Concilium — results from a pilot study

Mikołaj Błaziak¹, Tomasz Jeruzalski², Paweł Pławiak^{3,4}, Janusz Granat^{4,5}, Jarosław Czerkies⁴, Magdalena Kosiarska⁴, Tomasz Masternak⁴, Monika Szeląg⁴, Adam Perliński⁴, Tomasz Zieliński⁸, Szymon Urban⁹, Weronika Wietrzyk⁶, Katarzyna Modrzejewska⁶, Bartosz Balcer⁶, Natalia Dolata⁶, Katarzyna Mazur¹⁰, Kinga Brawańska-Maśluch⁷, Paulina Tomecka⁷, Wiktor Kuliczkowski¹

¹Institute of Heart Diseases, Wrocław Medical University, Wrocław, Poland

²Faculty of Economic Sciences, University of Warsaw, Warszawa, Poland

³Faculty of Computer Science and Telecommunications, Krakow University of Technology, Kraków, Poland

⁴National Institute of Telecommunications, Warszawa, Poland

⁵Faculty of Electronics and Information Technology, Warsaw University of Technology, Warszawa, Poland

⁶Wrocław University Hospital, Wrocław Medical University, Wrocław, Poland

⁷Students' Scientific Group of Invasive Cardiology, Institute of Heart Diseases, Wrocław Medical University, Wrocław, Poland

⁸Federation "Porozumienie Zielonogórskie", Zielona Góra, Poland

⁹Department of Cardiology, The Copper Health Centre (MCZ), Lubin, Poland

¹⁰Collegium Medicum Jan Kochanowski University, Kielce, Poland

Correspondence to:

Mikołaj Błaziak, MD,

Institute of Heart Diseases,

Wrocław Medical University,

Borowska 213, 50–556, Wrocław, Poland,

phone: + 48 71 733 11 12,

e-mail: blaziak.mikolaj@gmail.com

INTRODUCTION

Despite numerous improvements in the Polish healthcare system, access to high-quality cardiac care remains unsatisfactory [1]. The limited number of specialists, increasing demand for cardiology consultations, and the frequent need to travel considerable distances to specialists result in prolonged diagnostic processes or make access nearly impossible. Moreover, the complexity of cardiovascular diseases often requires a team-based assessment by a Heart Team, which is available exclusively in high-volume centers [2]. One possible solution is online e-consultations, which can help address this issue. In this study, we present the preliminary results of *a* pilot study that analyzes the efficacy of online cardiology consultations for general practitioners (GPs) and remote centers.

METHODS

The pilot study began on August 31, 2023, and concluded on December 31, 2023. The program was implemented by the Ministry of Health and the National Institute of Telecommunications. The study was part of the POWER program, under the number POWR.05.02.00-00-0001/23. The project was conducted across four centers: the Institute of Heart Diseases at Wrocław University Hospital, the National Institute of Cardiology in Warsaw, the Silesian Center for Heart Diseases in Zabrze, and Poznań University Hospital. Patients were eligible for referral by GPs or physicians from any hospital department, including remote facilities. The inclusion criteria comprised individuals over 18 years of age with diagnosed cardiovascular diseases. No exclusion criteria were applied. External institutions were required to submit demographic data, laboratory findings, electrocardiograms, and imaging tests such as transeosophageal or transthoracic echocardiography, coronary angiography, and computed tomography. When necessary, patients could be presented live *via* camera to demonstrate their clinical status. The e-Concilium used a dedicated platform where all data was collected, and the final results were validated as official medical consultations. Based on the patient's profile, subsequent referrals were directed either to a cardiologist or to a Heart Team. Cardiac consultations could confirm diagnoses, optimize pharmacological and non-pharmacological management remotely, assess patient eligibility for initial or advanced diagnostic procedures, and/or recommend patient transfer to specialized cardiac centers. Additionally, consultations could facilitate the organization of targeted Heart Team evaluations.

Statistical analysis

Statistical analyses were performed using Microsoft Excel software. Descriptive statistics were calculated for both quantitative and qualitative variables.

RESULTS

During this period, 2907 consultations were commissioned, with 2360 successfully completed (81.2%). Of these, 2681 (92.2%) referrals originated from GPs, with a completion rate of 81.4%, while 223 (7.7%) referrals were from remote centres, with a completion rate of 79.4%. This data was collected from 24 external institutions. Among patients referred by GPs, 58.3% were female, with a mean age of 61 years for both sexes (interquartile range [IQR] 51–72) the 3 most common reasons for consultation were hypertension (44.1%), AF (4.4%), and other arrhythmias (3.9%). For patients referred from remote hospitals, 44.1% were female, with a mean age of 66 years for (IQR 54–75) both sexes. The primary reasons for consultation in this group were hypertension (15.2%), coronary artery disease (10.3%), and heart failure (9.9%). Consultations referred by GPs were categorized as follows: 0.37% in emergency mode, 12.9% in planned mode, and 86.7% in offline mode. Consultations referred from remote hospitals were categorized as: 1.7% in emergency mode, 16.3% in planned mode, and 77.7% in offline mode. An increase in consultations was observed, with 213 in October 2023, 951 in November 2023, 2901 in December 2023 (Figure 1).

DISCUSSION

To our knowledge, this is the first implementation of online cardiology consultations in Poland provided by high-capacity healthcare facilities. The main findings of our pilot study are as follows: (1) there is a significant demand for comprehensive cardiology consultations from GPs and remote centers; (2) a dedicated online platform that enables the analysis of complete medical records is feasible; and (3) this approach can expedite cardiac diagnostics and improve the accuracy of patient qualification for hospitalizations.

The increasing number of referrals clearly indicates a substantial need for this type of consultation. Recent analyses of the Polish cardiac healthcare system suggest that the incidence of new cardiac cases is expected to rise, primarily due to the aging population. It is estimated that the number of individuals with cardiac diseases will increase from 377 000 in 2015 to 426 000 in 2025 [3]. These projections are supported by subsequent analyses demonstrating increased admissions for heart failure and a higher number of invasive diagnostic procedures [4, 5]. Results from other large-scale trials indicate that this approach in cardiology care can reduce waiting lists and improve access to high-quality cardiac care in peripheral institutions [6, 7]. Additionally, Rey-Aldana et al. [8] demonstrated that one year following the introduction

of an e-consultation program, there was a significant reduction in hospital admissions and mortality rates.

The integration of online consultations into the Polish healthcare system holds significant potential for achieving similar outcomes. The platform designed for consultations appears feasible and user-friendly. During the trial period, the dedicated software functioned smoothly without technical issues, ensuring that all data and completed consultations were securely stored and fully accessible. The software facilitates data transfer and addresses issues related to varying file formats. From a practical standpoint, the most crucial aspect is that the referring institution receives an official medical consultation with full legal standing. Based on our current experience, the completeness and clarity of clinical problem descriptions appear to be areas for improvement. Several referrals included vague indications for consultation, requiring additional information. Furthermore, remote centers experienced equipment-related challenges, such as inadequate high-quality cameras or microphones for online Heart Team meetings. These issues were resolved in subsequent sessions. We believe that the introduction of such a platform, along with the education of peripheral institutions, can help overcome these challenges.

This system is accessible to all interested participants, including GPs and various cardiac and non-cardiac departments from different centers seeking comprehensive cardiac consultations. Online, complex consultations can help address care gaps in the healthcare system at both individual and population levels. First, online consultations can occur earlier than in-person visits, eliminating the need to transfer patients to other institutions. This approach can overcome several organizational barriers, such as incomplete documentation or gaps in diagnostic procedures. Consultations are conducted only when essential medical records are uploaded to the online platform. Furthermore, it is particularly valuable for patients in remote centers, as it facilitates a faster diagnostic process and speeds up qualification for non-cardiac procedures. Finally, proper pre-hospitalization qualification can reduce hospitalizations, especially for cases disqualified from further procedures.

Our preliminary results indicate a substantial demand for cardiac diagnostics, and online consultations can help overcome several organizational barriers, potentially leading to improvements in the healthcare system.

Article information

Acknowledgments: This work was supported by the subsidy for the Institute of Heart Diseases, Wroclaw Medical University, Poland.

Conflict of interest: None declared.

Funding: None.

Open access: This article is available in open access under Creative Common Attribution-Non-Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) license, which allows downloading and sharing articles with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially. For commercial use, please contact the journal office at polishheartjournal@ptkardio.pl

REFERENCES

1. Więckowska B, Kowalik E, Witkowski J. Medical treatment in Poland – analysis and models, Volume II: Cardiology. 2015: Cardiology.
2. Lee C, Tully A, Fang JC, et al. Building and optimizing the interdisciplinary Heart Team. *J Soc Cardiovasc Angiogr Interv.* 2023; 2(6Part A): 101067, doi: 10.1016/j.jscai.2023.101067, indexed in Pubmed: 39129880.
3. Gaps, C. & Healthcare, W. A map of healthcare needs for Poland — Cardiology.
4. Lelonek M., Pawlak A., Nessler J., et al. Heart Failure Association of the Polish Cardiac Society. *Heart Failure in Poland 2014–2021.* 2023.
5. Siudak Z, Hawranek M, Kleczyński P, et al. Interventional cardiology in Poland in 2022. Annual summary report of the Association of Cardiovascular Interventions of the Polish Cardiac Society (AISN PTK) and Jagiellonian University Medical College. *Postepy Kardiol Interwencyjnej.* 2023; 19(2): 82–85, doi: 10.5114/aic.2023.129205, indexed in Pubmed: 37465633.
6. Mazón-Ramos P, Cinza-Sanjurjo S, Garcia-Vega D, et al. Longer-term results of a universal electronic consultation program at the cardiology department of a Galician healthcare area. *Circ Cardiovasc Qual Outcomes.* 2022; 15(1): e008130, doi: 10.1161/CIRCOUTCOMES.121.008130, indexed in Pubmed: 35041483.
7. Wasfy JH, Rao SK, Kalwani N, et al. Longer-term impact of cardiology e-consults. *Am Heart J.* 2016; 173: 86–93, doi: 10.1016/j.ahj.2015.11.019, indexed in Pubmed: 26920600.
8. Rey-Aldana D, Cinza-Sanjurjo S, Portela-Romero M, et al. Universal electronic consultation (e-consultation) program of a cardiology service. Long-term results. *Rev Esp Cardiol (Engl Ed).* 2022; 75(2): 159–165, doi: 10.1016/j.rec.2020.11.017, indexed in Pubmed: 33579644.

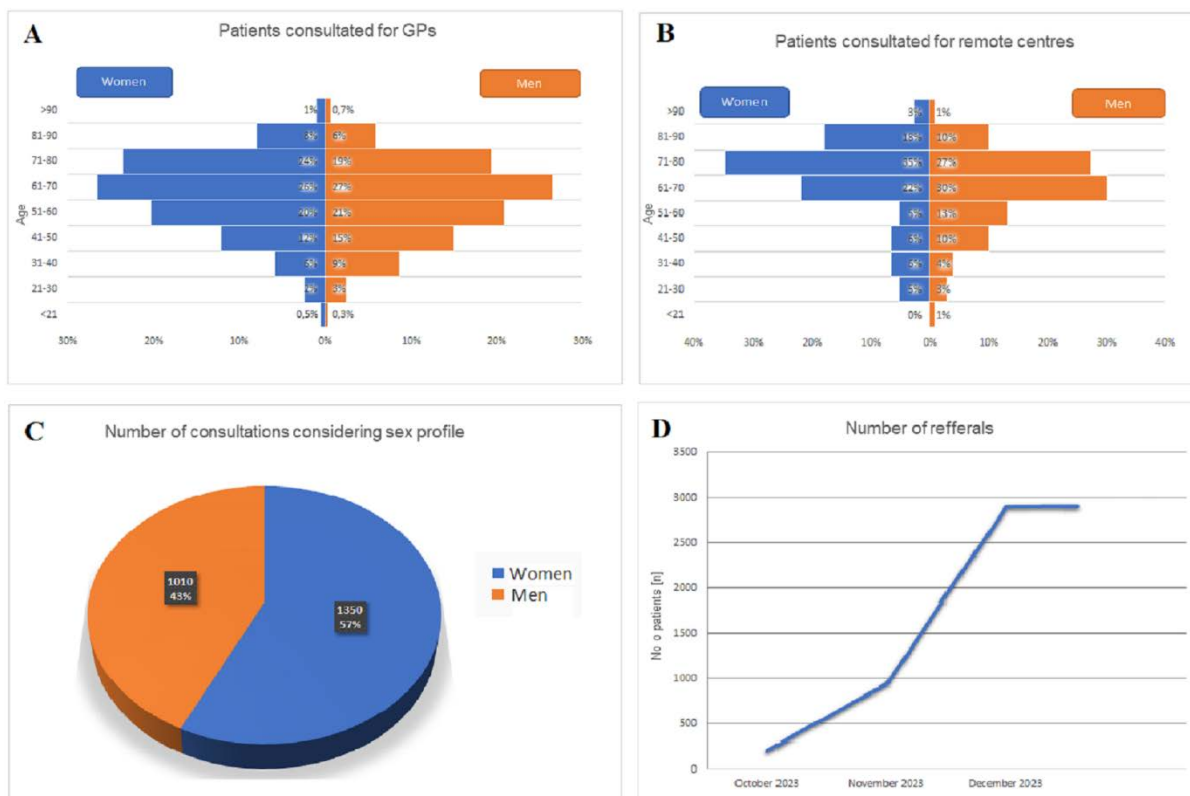


Figure 1. **A.** Patients consulted for general practitioners considering age groups. **B.** Patients consulted for remote centres considering age groups. **C.** Number of completed consultations considering sex profile. **D.** The trend toward increased admissions in following months