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ORIGINAL ARTICLE

Pan-European survey on medication adherence management by healthcare professionals

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Abstract

Aims: While medication adherence (MA) is a key prerequisite for achieving optimal clinical and economic outcomes, nonadherence is highly prevalent. Assessing how healthcare professionals (HCPs) in Europe manage MA, focusing on measurement, reporting and interventions, is the subject of this study.

Methods: A cross-sectional study was conducted among 40 European countries and quantitative analysis was conducted via an online survey. The multi-language online survey was created using Webropol 3.0 survey and reporting tool. Descriptive statistics and chi-squared tests were applied.

Results: In total, 2875 HCPs (pharmacists: 39.9%; physicians: 36.7%; nurses: 16.4%) from 37 European countries participated. The most used methods for MA assessment were direct communication with patients (86.4%) and referring to personal patient records (56.7%) ($P < 0.0001$). Physicians (74.9%) and nurses (58.8%) were more aware of problems related to MA in contrast to pharmacists (48.6%) ($P < 0.001$). Almost all HCPs (92.6%) indicated that MA-enhancing interventions involved mainly direct communication with nonadherent patients (93.3%) and their caregivers (55.7%). Medication review and related optimization of therapy were mainly performed in Western European countries (46.8%). Technological solutions were ranked as one of the less applied approaches (10–15%) ($P < 0.001$).

Conclusions: HCPs in all European regions recognize MA management as an integral element of overall patient-centred care. More efforts are needed to ensure timely, adequate and relevant MA assessment, reporting and improvement and involvement of all HCPs, especially among pharmacists who were generally less aware of MA

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issues. Promotion and use of digital technological solutions should be the focus of current and future clinical practice to optimize MA management processes.

KEYWORDS
ENABLE, Europe, healthcare professionals, medication adherence

1 | INTRODUCTION

Timely and continued use of prescribed medication therapy according to physician's recommendations is the key to effective control of chronic diseases, encompassing initiation, implementation and persistence.[1] A number of studies have shown that medicines are often not used as prescribed leading to poor clinical outcomes, more costs to the healthcare system and reduced or lost capacity to work. Regarding initiation, more than one in five new prescriptions are not executed[2] with the lowest rate of adherence by patients with chronic diseases.[3–6] Furthermore, around 50% of medicines for the control of chronic diseases are not taken as prescribed.[7] In certain asymptomatic diseases such as hypertension, the incidence of nonadherence can even be as high as 80%.[8]

Addressing the problems related to medication nonadherence can improve quality of healthcare and therapeutic outcomes, support better control of diseases, and reduce both the social and economic burden of diseases.[9] Nonadherence to therapy appears to be one of the most significant challenges faced by healthcare professionals (HCPs).

Notably, various studies reveal that behaviour towards prescribers' recommendations differs among patients.[10] Critical predictors of adherence are trust, understanding and good and effective patient–healthcare professional relationship.[8] As such, achieving optimal medication use is a joint process of communication and understanding between patients and their HCP.

Improving adherence to therapy is a continuous and dynamic process. The lack of compliance between the patient's readiness and the HCP's attempts to implement an intervention means that treatment is prescribed to patients who are not ready to follow it. Involving the patient in the decision-making process has been shown to improve health outcomes, especially in patients with several concomitant chronic conditions and polypharmacy.[11] HCPs need to assess the patient's readiness to adhere, provide advice and monitor the patient's progress at every contact. They can make a significant impact by assessing the risk of nonadherence and using a variety of interventions to optimize adherence levels such as patient education, medication regimen management, clinical pharmacist consultation, cognitive behavioural therapies, medication-taking reminders and other incentives to promote adherence.[12,13] To make this practice into a reality, tools and resources are needed, and HCPs must have access to specific training in adherence management and the systems in which they work to design and maintain relevant approaches.[14] As the World Health Organization (WHO) stated in 2003, there is a need for a so-called "adherence counseling toolkit" that can be adapted to different socioeconomic contexts. Such training should address three topics simultaneously: knowledge (adherence information), mindset (in the course of clinical decision-making) and specific actions (application of specific behavioural tools).[15] Whether these skills are currently available in European HCPs is unknown, as are the current ways medication adherence (MA) is managed.

What is already known about this subject

- While medication adherence (MA) is a key prerequisite for achieving optimal clinical and economic outcomes, nonadherence is highly prevalent.
- Cross-country comparisons of how MA is managed by European healthcare professionals (HCPs) are lacking.

What this study adds

- The European Cooperation in Science and Technology (COST) project "European Network to Advance Best Practices & Technology on Medication Adherence" (ENABLE) focuses on raising awareness and expanding knowledge on medication adherence among healthcare professionals in 40 European countries.
- This research offers insights into the management of MA across Europe, with a specific emphasis on: methods for MA monitoring, approaches for reporting medication nonadherence and interventions for enhancing MA.
- By conducting this study, researchers aim to gain a deeper understanding of the strategies employed by HCPs to address MA challenges and identify potential areas for improvement.
- The results of this study can serve as a foundation for future collaborative efforts and advancements in multidisciplinary knowledge on MA, ultimately contributing to better patient health outcomes.

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So far, several studies have assessed adherence management, yet they are typically focused on a single country, single profession or single therapeutic area. No studies focusing on the current general management of MA across Europe have been conducted.

The aim of this study is to identify HCPs' practices regarding MA management in Europe, focusing on MA measurement, reporting and interventions.

2 | METHODS

2.1 | Study design

A cross-sectional, online survey was designed as part of the European Cooperation in Science and Technology (COST) project "European Network to Advance Best practices & technoLogy on medication adherencE" (ENABLE). ENABLE has members from 40 European countries and aims to raise awareness of MA-enhancing solutions and to foster and extend multidisciplinary knowledge at patient, treatment and system levels.[16] The survey was disseminated among HCPs from 40 countries all over Europe: Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. Due to country-specific availability of resources and networks, different methods for distribution of the survey were applied: connections through health institutions, associations, personal contacts, networks of HCPs and official e-mails.

The survey contained closed-ended questions on how HCPs implement MA management in their daily work as well as barriers encountered and the interventions applied. The latter two topics have been reported in previous studies.[17,18] A pilot study was conducted before dissemination of the main questionnaire to all potential respondents. The current study presents the results of the questions about approaches related to MA management, i.e. the monitoring as well as the reporting of nonadherence. This study was reported according to the CHERRIES checklist for online surveys (Table S1). The flow diagram of the study is available in the study protocol published in the Open Science Framework (OSF), see https://osf.io/ebmz5/?view_only=3a1cb91a883c48efb05dff7612120b9e.

2.2 | Survey administration

The survey was open from July to November 2022. ENABLE country representatives were asked to disseminate the HCP survey as widely as possible in order to obtain the greatest possible number of responses among different HCP categories and across all levels of the healthcare system. Every representative applied a specific national-based approach to collect as many responses as possible: e.g. health institutions, associations, personal connections, colleagues and academic staff. The survey was carried out using the online Webropol 3.0 survey and reporting tool (https://webropol.com/). The survey was voluntary and anonymous and no personal information was collected. All questions were mandatory for completing the survey. The survey was available in English and 24 other European languages.

2.3 | Eligibility criteria

The HCP survey was targeted to a large group of HCPs who have patient encounters. HCP is defined in this survey as any professional working in the healthcare sector. A pilot study was designed aiming to validate the questions and the procedure to be used when conducting the main study. Between five and ten HCPs from eight ENABLE countries (Bulgaria, Croatia, Finland, Italy, Serbia, Spain, Sweden, Turkey) were approached to get responses to the pilot study. HCPs were recruited using a non-random sampling procedure, through professional organizations, websites and email lists of health institutions to which researchers had access.

2.4 | Outcomes

A summary of the study questions is presented in Table S2. The current study encompassed several outcomes: (1) approaches for monitoring patients' MA; (2) the tools used by HCPs to report medication nonadherence; and (3) the MA-enhancing interventions applied by HCPs across European countries.

2.5 | Analyses

Descriptive analyses were conducted. Respondents' characteristics were grouped into the following categories to perform a multivariate analysis and cross-tabulations: (1) country, (2) group of countries (according to the latest OECD classification dividing Europe into Western, Central and Eastern Europe (Global Burden of Disease [GBD] study); (3) profession (e.g., physician, nurse, pharmacist, other); and (4) organization/workplace. All analyses were performed using MedCalc software. Chi-squared tests were used to determine whether there were significant variations in the MA interventions implemented among the subgroups. Statistical significance was established at $P < .05$.

2.6 | Ethics

The study was approved by the Research Ethics Committee of Malaga, Spain (Number 1932-on 29 April 2021), Croatia (Number 501–04 on 1 June 2021; Number 251–29–11-22-05 on 8 September 2022), the Republic of North Macedonia (Number 2005–133/3 on 6 May 2021), and Turkey (Number 24714 on 16 February 2022). In other countries, no formal approval was needed given the nature of the study according to local legislation. The study was conducted by

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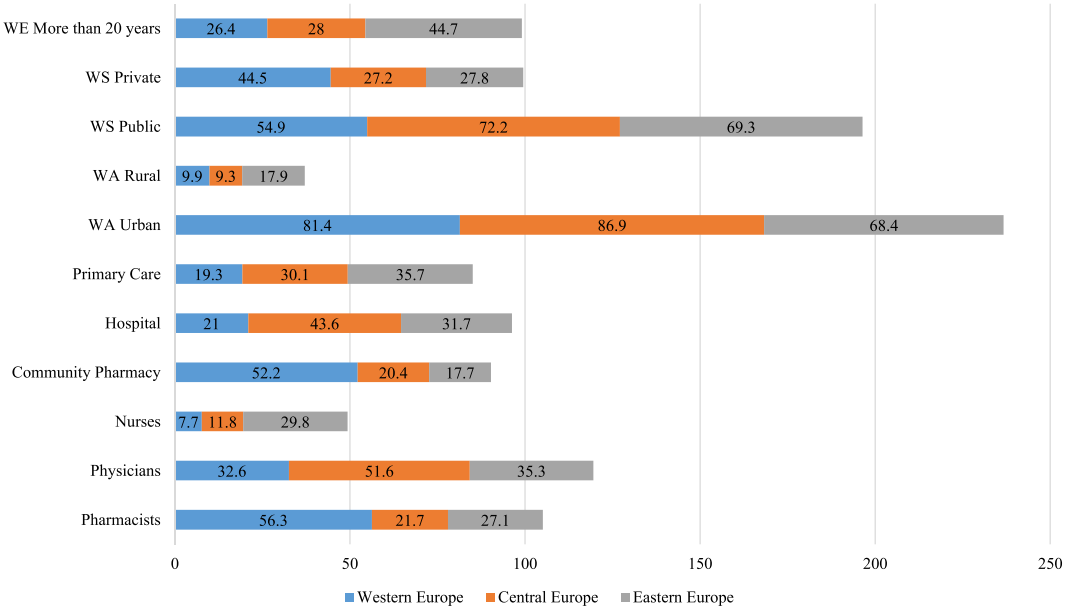

FIGURE 1 Respondents' ($n = 2875$) characteristics (%). *WE, working experience; WA, working area; WS, working sector.

the principles established in the Declaration of Helsinki, the Council of Europe Convention on Human Rights and Biomedicine, and the requirements established in each COST ENABLE country legislation. The study conformed to the norms of Good Clinical Practice (art. 34 RD 223/2004; Community Directive 2001/20/CE) and the provisions of Regulation 2016/679 of the European Parliament and of the Council of April 27, 2016, on Data Protection (GDPR).

All respondents expressed their agreement to participate in the study by providing online informed consent before answering the questions.

3 | RESULTS

3.1 | Study population characteristics

Of all 3019 HCPs who initiated the online questionnaire, only 144 (4.8%) did not give their informed consent to participate in the study. In total, 2875 HCPs (95.2%) from 37 countries out of all 40 invited replied to the HCP survey. Most were pharmacists (39.9%), followed by physicians (36.7%) and nurses (16.4%) (Figure 1 and Table S3). Overall work experience was 10 years or more in around 61% of the sample. Of the respondents, 1049 (36.5%) were from Western Europe, 1351 (47%) from Central Europe and 475 (16.5%) from Eastern Europe. Most responses ($n = 432$ and $n = 285$) came from Romania and Croatia, respectively, and the lowest number of responses ($n = 1$) came from Luxembourg and Norway. No responses from HCPs practising in Czechia, Denmark and Moldova were received (**Table S4**). Most of the respondents represented community pharmacy (34.4%) settings, followed by hospitals (28.7%) and primary care (27.1%), as influenced by those who practise in urban areas (77.6%) and in the public sector (63%) (Figure 1).

3.2 | Methods for medication adherence monitoring

Monitoring of MA for most, all or some patients was a procedure performed by 86.3% of the respondents [$P < .0001$]. Based on the responses, physicians (59.7%, $n = 630$) and nurses (53.9%, $n = 255$) assessed MA levels more often than pharmacists (31.6%, $n = 362$) ($P < .0001$] (Table S5). The most used method for monitoring MA across all European countries was "asking the patient" (86.4% in total: 82.8% for Central, 89.1% for Eastern and 89.8% for Western Europe) followed by "checking their dispensing history" (56.7%) and "checking prescriptions" (56.8%) (Table 1). Validated questionnaires for patients were used more often in Western European countries despite its spread being limited in comparison to other methods (5.9% of all respondents).

The top three reasons for lack of provision of timely and regular MA monitoring were: (1) lack of established methods for MA monitoring ($n = 171$); (2) no access to data ($n = 165$), and (3) no availability of adopted MA guidelines ($n = 147$). No significant or specific regional differences were observed (Table S6). The most prevalent response among physicians was that lack of access to data for monitoring (36.0%) and no available methods for monitoring (36.0%) were the main obstacles in their practice. Pharmacists were not provided with relevant methods (55.2%), guidelines (49.8%) or access to data (49.8%), which interfere with their ability to monitor the level of MA (Table S7).

More than half of the HCPs (53.7%) reported that in most or in all cases, they check their patients' MA if treatment goals are not reached. Only 4.4% of HCPs were unconcerned regarding their patients' MA level even though their condition might be worsening. HCPs' behaviour in different geographical regions was similar—checking patients' MA is one of the first approaches when the desired

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TABLE 1 Methods for medication adherence monitoring by regions.

How do you monitor your patients' medication adherence?	Central Europe *n* (%)	Eastern Europe *n* (%)	Western Europe *n* (%)	Total *n* (%)	*P*-value
Asking the patient	958 (82.8)	350 (89.1)	835 (89.8)	2143 (86.4)	<.0001
Checking their dispensation history (e.g., purchases from community pharmacies)	634 (54.8)	225 (57.3)	548 (58.9)	1407 (56.7)	<.0001
Checking prescriptions written to them	618 (53.4)	204 (51.9)	587 (63.1)	1409 (56.8)	<.0001
Evaluating the patient's condition	558 (48.2)	260 (66.2)	523 (56.2)	1341 (54.1)	<.0001
Interviewing the patient's caregiver or family member	473 (40.9)	188 (47.8)	488 (52.5)	1149 (46.3)	<.0001
From laboratory results	321 (27.7)	187 (47.6)	382 (41.1)	890 (35.9)	<.0001
A validated questionnaire for the patient	48 (4.1)	20 (5.1)	78 (8.4)	146 (5.9)	<.0001
Other way	47 (4.1)	16 (4.1)	69 (7.4)	132 (5.3)	<.0001

Note: Dark green: largest method (>50%); green: relatively large method (40–50%); orange: medium method (30–40%); yellow: medium-low method (20–30%); pink: relatively low method (<20%).

therapeutic outcomes are not detected (Table S8). Physicians were those HCPs (74.9%), followed by nurses (58.8%), who strictly follow up MA in most or in all cases if the treatment goals are not achieved. Most of the pharmacists (48.6%) are aware of MA only in some cases. Interestingly, around 11% among both nurses and pharmacists responded that assessing patients' treatment outcomes is not their role in contrast to 2.4% among physicians (Table S9).

3.3 | Approaches for reporting medication nonadherence

Reporting nonadherence was practised by more than half of the respondents (57.2%). Interestingly, around 11% of all participants in the survey reported that they have never identified nonadherent patients. More HCPs from Western European countries than Central and Eastern European countries reported or documented their nonadherent patients (81.0%, 40.6% and 51.8%, respectively) (Table S10). Moreover, significant differences exist between HCPs: according to the survey, more pharmacists (52.0%) did not report nonadherence while almost 70% of physicians and 85% of nurses reported documenting nonadherence (Table S11).

The preferred way of reporting MA was "Patient's medical records/electronic health records" (79.7%), followed by directly informing the patient's physician (43.9%) or their caregiver or family member (38.4%). "Patient's medical records/electronic health records" was the most frequently reported method in all three regions (88.1% in Western, 79.7% in Eastern and 64.3% in Central Europe) (Table S12). Physicians (95.0%) and nurses (85.4%) mainly reported using electronic or paper-based records of their patients in order to document nonadherence while most pharmacists directly informed patient's physicians (63.3%) (Table S13). No documenting procedures and systems (52.9%), guidelines (49.3%) or established good practices (48.5%) were the most frequently reported reason for not reporting nonadherence. Reasons for lack of reporting in Central and Eastern Europe were quite similar—lack of knowledge where to document (54.2% and 60.8%)—whereas in Western countries documentation of nonadherence is not a common practice (52.3%) (Table S14). Stratification by profession showed that the main barriers for physicians to report nonadherent patients are related to lack of knowledge where to do this (63.1%), not established good practice (54.8%) and lack of available guidelines (48.0%). It was almost the same for pharmacists, as lack of guidelines for reporting non-adherence was the most frequently reported obstacle (52.0%) (Table S15).

3.4 | Interventions for enhancing medication adherence

Almost 70% of HCPs reported trying to improve patients' MA level when needed in most or all cases, which is statistically significantly higher than those who apply MA-enhancing interventions in some cases (22.6%). In all European countries, most of the HCPs considered approaches on how to cope with medication nonadherence. However, among HCPs from Western Europe, the responses that they try to improve MA in all or most of the cases (80.3% *vs.* 69.3% in Eastern and 60.6% in Central Europe [$P < .0001$]) were more common (Figure 2). As was observed for other questions, most of the pharmacists are involved personally in application of MA-enhancing interventions for all cases of nonadherence (57.7%) but their share is still lower than for the other HCPs (81.1% for physicians and 75.7% for nurses [$P < .0001$]) (Table S16).

The main reason for lack of initiative to improve patients' adherence highlighted by HCPs was that they do not conceive of it as their professional task (36.5%), followed by "This task is the responsibility of other professions in health care" (27.0%) and lack of knowledge about the methods to improve MA (23.8%). Financial reasons, such as no additional payment for MA-enhancing intervention services provided by HCPs, were recognized by only two respondents (3.2%).

Motivating and counselling the patient (93.3%), involving family members or caregivers (55.7%) and making changes in medication

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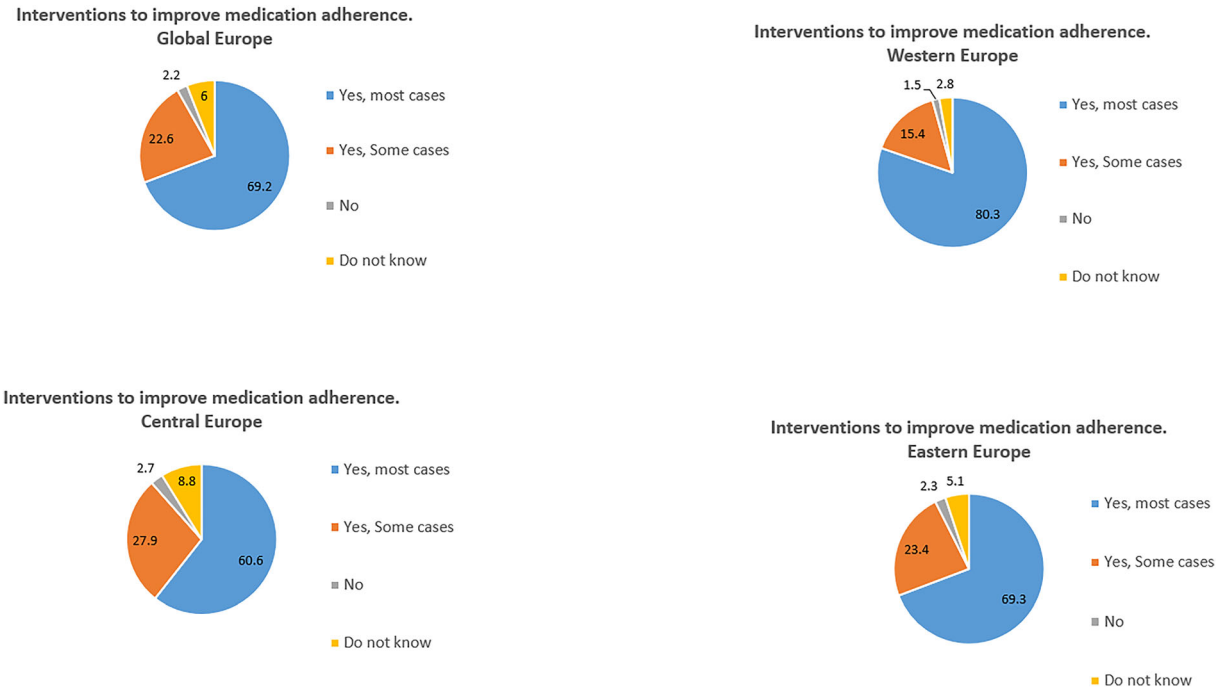

FIGURE 2 Applicability of medication adherence enhancing interventions across Europe.

treatment (44.5%) were the three most preferred interventions applied by HCPs to improve MA. Peer support (4.9%) and collaborating with patient associations (3.7%) were not recognized as applicable and appropriate methods for raising MA levels among patients. MA-enhancing interventions applied across Europe were quite similar as the most preferred ones were talking with patients about the importance of taking the medication (more than 90% in all three regions) and involving family members/caregivers (>50%). HCPs from Western countries reported performing medication review—a structured, critical examination of a patient's medications to detect drug related problems (46.8%)—while in Eastern and Central European countries it was not a common practice (25.0% and 33.1% [$P < .0001$]). Similar observation was detected about the use of medication organizers, which was a preferred technique in Western countries (48.4% *vs.* 21.6% and 38.5% in Eastern and Central Europe, respectively [$P < .0001$]) (Table 2). When stratified by profession, some similarities but also some differences were observed (Figure 3). Overall, physicians, pharmacists and nurses indicated "motivating and counseling the patient" as the preferred MA-enhancing intervention (93.0%, 94.6% and 93.0%, respectively). Physicians reported involving family members or caregivers (70.7%) and making changes in medication treatment (68.8%) as other approaches, while pharmacists focused on offering medication organizers (52.2%). Technological solutions (mobile apps and SMS reminders) were ranked as one of the less applied approaches by all professionals (between 10 and 15%). Pharmacists were less recognized by physicians as experts in MA as only 5.5% recommend pharmacist-led adherence interventions in contrast to interventions led by nurses (20.7%) (Figure 3).

4 | DISCUSSION

4.1 | Main findings

The most used methods for assessment of MA by HCPs from 37 countries in Europe were direct communication with patients and assessment of patient prescription/dispensing records. Physicians and nurses seemed more aware of problems related to MA compared to pharmacists. However, some issues related to reporting of nonadherence were recognized by all HCPs such as no implemented common practice and lack of nationally based guideines. Furthermore, almost all HCPs mentioned that they applied MA-enhancing interventions with the main approach being direct communication with nonadherent patients and their caregivers. Medication review and related optimization of medication therapy were mainly performed among HCPs who practised in Western European countries.

4.2 | Interpretation of the findings

Medication monitoring encompasses different methods for evaluation of whether the patient has taken the prescribed medication.[19] Most of the HCPs involved in this online survey relied mainly on their communication skills in order to collect information and assess their patients' MA level. This indirect method for MA measurement is, however, not especially reliable and might be counterproductive if it is not validated and controlled effectively. Indeed, there is no gold standard in monitoring MA described in the literature. In order to improve MA, validated and reliable methods for its measurement need to be

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TABLE 2 Medication adherence enhancing interventions by region.

How do you try to improve your patient's adherence?	Central Europe *n* (%)	Eastern Europe *n* (%)	Western Europe *n* (%)	Total *n* (%)	*P*-value
Motivating and counselling the patient (e.g., talking about the importance of using the medication)	1114 (93.1)	412 (93.6)	937 (93.4)	2463 (93.3)	< .0001
Involving family members or caregivers	605 (50.6)	262 (59.5)	602 (60)	1469 (55.7)	< .0001
Medication organizers (e.g., pill dispensers)	461 (38.5)	95 (21.6)	485 (48.4)	1041 (39.4)	< .0001
Making changes in medication treatment (e.g., simplification, changing medication dosage form)	427 (35.7)	178 (40.5)	569 (56.7)	1174 (44.5)	< .0001
Medication review (i.e., a structured, critical examination of a patient's medications to, e.g., detect medication-related problems)	396 (33.1)	110 (25)	469 (46.8)	975 (36.9)	< .0001
Organizing closer follow-up	330 (27.6)	164 (37.3)	389 (38.8)	883 (33.5)	< .0001
Referring to another professional	213 (17.8)	74 (16.8)	163 (16.3)	450 (17.1)	< .0001
Referring to patient education programmes	197 (16.5)	71 (16.1)	143 (14.3)	411 (15.6)	< .0001
Pharmacist-led adherence interventions	168 (14)	22 (5.0)	147 (14.7)	337 (12.8)	< .0001
Dose-dispensing (e.g., by community pharmacies)	157 (13.1)	31 (7.0)	286 (28.5)	474 (18)	< .0001
Technological solutions (e.g., mobile apps, SMS reminders)	128 (10.7)	46 (10.5)	165 (16.5)	339 (12.8)	< .0001
Nurse-led adherence interventions	82 (6.9)	69 (15.7)	275 (27.4)	426 (16.1)	< .0001
Peer support (i.e., other patients using the same medication or having the same disease)	63 (5.3)	20 (4.5)	47 (4.7)	130 (4.9)	< .0001
Collaborating with patient associations	59 (4.9)	10 (2.3)	28 (2.8)	97 (3.7)	< .0001
Other way	39 (3.3)	12 (2.7)	28 (2.8)	79 (3.0)	.0009

Note: Dark green: largest interventions (>50%); green: relatively large interventions (40–50%); orange: medium interventions (30–40%); yellow: medium-low interventions (20–30%); pink: relatively low interventions (<20%).

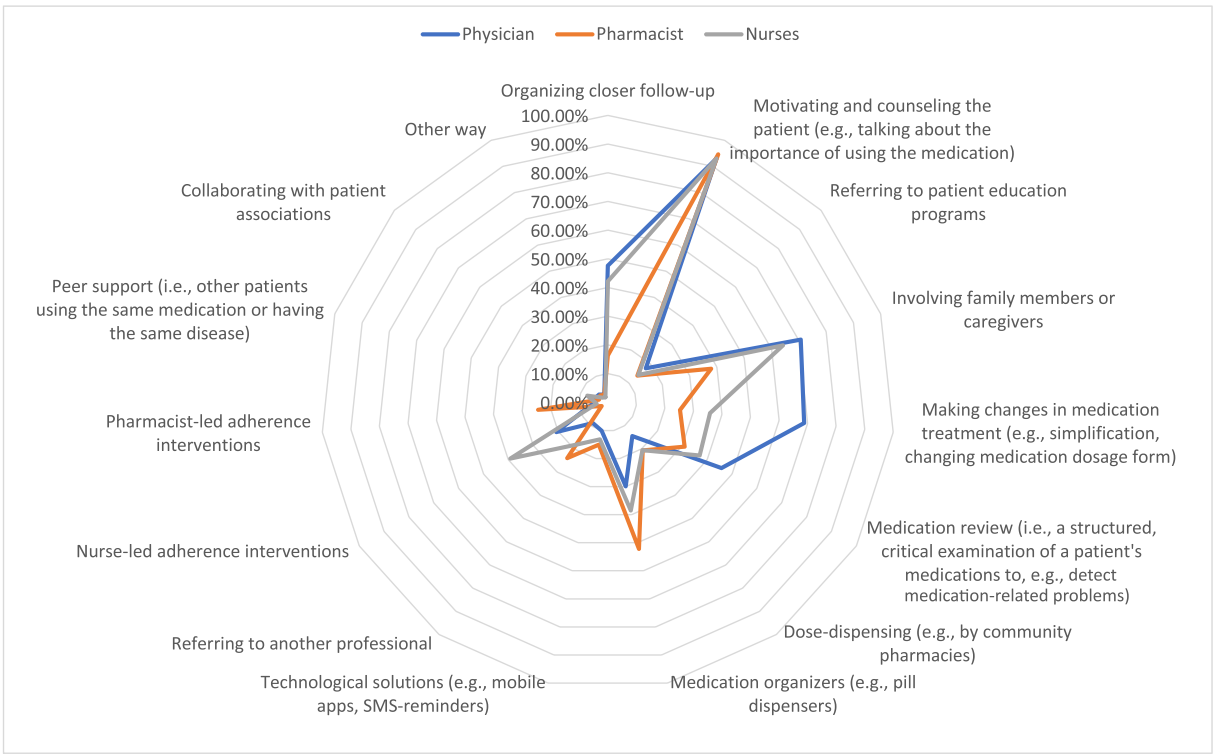

FIGURE 3 Medication adherence-enhancing interventions applied by European healthcare professionals, stratified by profession.

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created and applied.[20] Considering all these presumptions, HCPs across Europe should be more precise when using one or other method for measuring MA. It is worrying that validated questionnaires are used in only around 6% of all respondents in the current study, mainly representing Western European countries. None of the respondents used so-called electronic measurement systems, which are suitable to provide long-term monitoring. Probably, the main reasons these are not widely used are their high costs, unaffordability for patients and healthcare systems as well as some personal concerns regarding privacy data and users' non-acceptance.[21]

Among the main barriers of MA monitoring identified in the survey are the lack of methods, data and guidelines, especially surprising in the case of pharmacists. This could be due to a small number of clinical pharmacists participating in the survey rather than community pharmacists, since the former are in charge of carrying out medication review programmes that include monitoring treatment adherence. Proposals to overcome some of these barriers include the implementation of prescription monitoring programmes[22] and real-time medication monitoring tools.[23] Another interesting result of the survey was that one in three HCPs across Europe considered that MA monitoring is not their responsibility. This may possibly be related to two other barriers identified in similar proportions, namely lack of guidelines and lack of training. The existence of updated guidelines on prescribing patterns and appropriate use of medicines, including monitoring of patient follow-up, have been shown to have an impact on improving the prescribing patterns of HCPs.[24] Finally, an important recommendation would be to involve health professionals (doctors, nurses, pharmacists) in the development of the different monitoring tools through a strategy of collaboration with the developers of these technologies, also analysing the possible improvements suggested by these end-users to facilitate the implementation in real contexts where lack of time is a constant challenge.[25]

Regarding the recording of nonadherence, differences among type of HCP were observed. The highest percentage of registration was reported by physicians and nurses, while pharmacists reported a lower percentage. Possibly this may be related to the fact that the registration procedure focuses on the clinical history, which is primarily accessed from within the health system, while when a community pharmacist detects a lack of adherence in a patient, his or her method of reporting focuses on informing the prescribing physician. Information to the physician was also widely used by nurses. Sharing data among professionals involved in patient care is crucial to maintain and improve health. It should be noted that around 40% of all HCPs reported informing the patient's caregiver or family member. The caregiver is a crucial element for maintaining adequate adherence to treatment, and usually bears a large burden of care in daily life with the patient, especially in the case of patients with complex conditions, due to the clinical situation or a high burden of treatment.[26,27]

Medication adherence enhancing interventions (MAEIs) are used for "improving adherence to medication or correcting it once erroneous or drift is detected".[28] So, better understanding of the cultural, psychological and social factors affecting the patient's behaviour is required in order to choose the most suitable MAEI.[29] A previous study by the COST ENABLE project identified a variety of MAEIs with different characteristics, most of which are based on interpersonal collaborative skills.[30] For the purposes of optimizing the cost-effectiveness of MAEIs, Van Boven et al. proposed the adoption of interventions that target specific patients.[31] Therefore, HCPs must recognize different types of interventions and adapt them to their patients' needs and expectations—for example, motivational interviewing or cognitive behavioural therapy, daily treatment support, additional support from family or peers and so on.[32] Engagement of all HCPs (physicians, pharmacists, nurses, etc.) in MA management is visible from our study results despite the lowest role of pharmacists in the process. Inevitably, pharmacists are qualified to provide patient counselling not only about non-pharmacological treatment but for medication therapy management and optimization of MA levels. However, recognizing pharmacists as important members of the multidisciplinary health care team is a slower process than it should be.[33] Moreover, several studies have proved the significant impact of pharmacist-led interventions to improve MA. In-person pharmacist education to improve adherence had an impact on clinical outcomes, adverse events and costs for treatment.[34–38] Considering both benefits and lack of effective engagement of pharmacists in MA improvement, further efforts should be made, such as persuading society and politicians of their importance as well as implementing stimuli for the pharmacists to organize and offer MAEI services to their patients. When comparing the use of MAEIs across the European regions, some differences need to be taken into account—such as the lower use of medication review in Eastern Europe, closer follow-up in Central Europe or the higher use of nurse- and pharmacist-led interventions in Western Europe—to design training and organizational interventions to balance the application of MAEIs throughout Europe.

Medication reconciliation and medication review (MR) are interventions performed by clinical pharmacists. Thus, they could provide physicians with a very informative and reliable basis to support healthcare decisions for medication management.[39] MR might also improve patients' knowledge and understanding about their medication regimen. As well as providing a great possibility for the pharmacists to educate patients, medication review could be implemented not only for the purposes of individualized counselling but for assessment of patients' adherence.[40] Moreover, investment in MR services performed by clinical pharmacists might bring significant positive financial impact.[41] However, according to our survey, HCPs in Europe do not recognize it as a common practice as they do for other interventions such as motivating and counselling the patient and involving family members or caregivers. Considering the importance of and benefits related to MR services especially in MA, HCPs and healthcare decision makers should undertake measures and develop concrete proposals for implementation of these services in practice. One possible solution could be the implementation of interprofessional education, which is considered to be of importance in preparing future HCPs to solve complex patient problems and needs, including medication management.[42] Beyond education, overall work experience may result in better MA management. In this

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study, we observed a balanced sample regarding work experience, confirming generalizability. However, future studies may look into the impact of work experience on the extent and characteristics of MA management.

With "involving family members or caregivers", "counselling" and "making changes in medication treatment" being the preferred MAEIs by HCPs involved in the current study, technological solutions (video-observed therapy, video directly observed therapy, medication monitor boxes, ingestible sensors, SMS reminder, etc.) were much less used, while developments in this field are emerging and a number of studies confirm the promising role of digital health technology (DHT) in MA management.[43–45] Knowing the barriers to and facilitators of the adoption of DHT would help to increase its use both for MA and medication appropriateness.[46,47] Education of HCPs about the benefits of DHT as well as collecting more evidence on their effectiveness and cost-effectiveness to be reimbursed would also increase their usage and application in everyday practice.

4.3 | Strengths and limitations

To the best of our knowledge, this is the first comprehensive study to include HCPs from all over Europe assessing such a valuable topic as MA management. It attempts to target various subgroups of HCPs from different European regions such as nurses, pharmacists, physicians with different backrounds. Thus, a broad "picture" of the current situation regarding MA management across Europe could be drawn and analysed considering all specifics and nationally based practices. The current study could serve as a foundation for developing policies and best practices, not only at the local level but also on a European scale, aimed at enhancing MA management. This can help mitigate the negative consequences related to nonadherence.

It is also necessary to consider some limitations of this study. Firstly, the selection of participants was carried out by different procedures among the participating countries. These procedures were applied by the representatives of the ENABLE network, and, although the objective of reaching different professions and sectors was pursued, this has not been achieved in a homogeneous way, producing a selection bias that must be taken into account regarding the generalizability of the results. One of the main consequences of this bias was that some professions and sectors were overrepresented, which is why it was considered necessary to present the results stratified by profession and region. Secondly, there could also have been an intrinsic bias due to a greater response among the professionals most motivated about MA. Thirdly, although the qualitative analysis of the previous survey for MA experts, on which the construction of the survey for HCPs was based, followed several quality criteria, we could have missed some important aspects to explore in the present study. To this end, the analysis of the previous open-ended question survey was carried out blindly by a pair of reviewers for each question, and was complemented with a literature search. Closed-ended questions enhanced the interpretation and analyses across countries, but limited the depth of the anwers obtained (e.g. when "other way" was selected for some questions). Fourthly, the pilot survey for HCPs was created only in English, which limited respondents to only English speakers. Due to this circumstance, it was decided to translate the survey into the language of the COST country that requested it through its representatives. Still, social desirability bias might have affected the study results. However, by not collecting any personal information we aimed to keep the survey anonymous and therefore we expect a higher likelihood of honest answers. Moreover, the questions were tested in a pilot study. Therefore, great care was taken to ensure that the questions did not create a misleading impression or influenced respondents to answer in a particular way.

5 | CONCLUSION

HCPs in all regions of Europe recognize MA management as an integral element of overall patient-centred care. Still, more efforts are needed to ensure timely, adequate and relevant assessment, reporting and improvement of MA across Europe, especially in Central and Eastern regions. Technological solutions to support MA, being recognized nowadays as emerging methods, have still limited use by HCPs in Europe.

AUTHOR CONTRIBUTIONS

M.K., J.M., S.M., E.A., G.H., M.Q., I.P., I.T., M.E., J.B. and F.L. developed the design for the two-part online survey. M.K. and F.L. drafted the manuscript. All authors participated in the study design and reviewed the paper. All the authors have provided valuable contributions to the manuscript, read, and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors have to competing interests to declare.

DATA AVAILABILITY STATEMENT

The protocol and the study flow chart are available at: https://osf.io/ebmz5/?view_only=3a1cb91a883c48efb05dff7612120b9e. The survey data are available on reasonable request from the corresponding author.

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