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Theoretical foundation and cocreated training design

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2.4 Deliverable



The **ERASMUS+ MEDLIT project** will develop innovative and evidence-based training programs focused on advancing health literacy, disease prevention and the safe use of medications.

MedLit will enable adult educators to integrate medical literacy into their curriculum and educational activities, therefore amplifying the impact of the project. The program is designed to benefit patients and elderly citizens as well as parents and caretakers.

DELIVERABLE 2.4 THEORETICAL FOUNDATION & CO-CREATED TRAINING DESIGN



Co-funded by
the European Union

The MedLit project is co-funded by the European Union. MedLit is coordinated by the Vaccine Safety Initiative in Berlin, Germany in collaboration with two NGO's in Greece (Prolepsis and Givmed) as well as the Technical University of Cyprus and the University of Rzeszow, Poland.



Deliverable 2.4



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**Training for Safer Use of Medication
and Improvement of Health Literacy**

**Deliverable 2.2 Report
Co-creation Activities- Review**

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Table of Abbreviations

Abbreviation	Definition
WP	Work Package
VIVI	Vaccine Safety Initiative
CUT	Cyprus University of Technology
UR	University of Rzeszów
EU	European Union
EMA	European Medicines Agency
AEFI	Adverse Event Following Immunisation
ADR	Adverse Drug Reaction
WHO	World Health Organization
ECDC	European Center of Disease Control
EEA	European Economic Area
NCA	National Competent Authority
MAH	Marketing Authorization Holders
EOF	Greece's National Organization for Medicines
PIL	Patient Information Leaflet
MOH	Medication Overuse Headache
HL	Health Literacy
SES	Socio-Economic Status
VMP	Vaccine Monitoring Platform

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Executive Summary

This document presents a comprehensive review of the current state of medication and vaccination literacy in the European Union (EU), with a particular focus on parents, carers, older people, patients, and adult educators. The review is part of the 'Training for Safer Use of Medication and Improvement of Health Literacy' (MedLit) project, a three-year initiative funded under the European Erasmus+ framework.

The MedLit project aims to address pressing issues of medication safety and literacy, as well as vaccination literacy in the EU by developing an innovative digital training program. The project focuses on key areas such as antimicrobial resistance (AMR), vaccine hesitancy, mental health medication, medication disposal, and medication safety in specific populations.

Across the EU, medication and vaccination systems are moderated by the European Medicines Agency (EMA). Medication distribution typically involves pharmaceutical wholesalers acting as intermediaries between manufacturers and pharmacies. Non-prescription medicines are often the first choice for patients/consumers to manage symptoms of common illnesses. However, the issue of medicine waste and its disposal poses significant environmental and economic challenges. Vaccine systems and policies across the EU are left to the competence of national authorities, with the European Commission supporting EU countries in coordinating their policies and programs. The EU Pharmacovigilance System monitors the safety of medicines through the prevention, detection, and assessment of adverse drug reactions (ADRs).



The EU-wide monitoring of adverse events following Immunisation (AEFI) on the other hand, is organized collaboratively with the Vaccine Monitoring Platform (VMP) between the EMA and the European Centre for Disease Prevention and Control (ECDC). The aim of the VMP is to generate real-world evidence on the safety, effectiveness and use of vaccines in the European Union (EU) and the European Economic Area (EEA).

The document provides insights into the current state of medication and vaccination literacy in the EU, highlighting that a significant portion of the population uses prescribed medication, with older adults being the largest group of consumers. Socioeconomic factors, particularly educational attainment, play a crucial role in medication literacy. Lower health literacy is associated with difficulties in understanding prescription labels, drug instructions, and adhering to treatment plans.

The review also addresses specific challenges such as the overuse of antibiotics, which is a major driver of AMR, and the use of psychoactive substances. It emphasizes the need for distinct medical curricula that address the proper prescribing and use of these substances. Vaccine literacy is critical for ensuring high vaccine uptake across the EU. While most individuals recognize the safety and efficacy of vaccines, confidence varies across different age groups and member states. The document highlights the need for targeted interventions to address vaccine hesitancy and improve understanding of vaccine safety and effectiveness.

The review concludes with recommendations for improving medication and vaccination literacy. These include developing tailored educational programs, addressing common misconceptions,



improving communication between healthcare providers and patients, and leveraging technology for better engagement and accessibility of health information.

Overall, this document serves as a comprehensive resource for understanding the current landscape of medication and vaccination literacy in the EU and provides valuable insights for developing effective interventions to improve health outcomes across the region.

Introduction

This document presents a country and EU review to identify the situation in terms of medication and vaccination literacy especially among parents, carers, older people and patients as well as adult educators for the 'Training for Safer Use of Medication and Improvement of Health Literacy' (MedLit) project, a three-year project funded under the European Erasmus+ framework for Cooperation Partnerships in Adult Education, running from November 1, 2024 to October 31, 2027.

Coordinated by the Vaccine Safety Initiative (VIVI; Germany), MedLit brings together four additional participating organizations, namely GIVMED (Greece), Cyprus University of Technology (CUT; Cyprus), University of Rzeszow (UR; Poland), and Prolepsis Institute (Greece).

The overall purpose of the report is to acquire important information about the existing situation at the country and EU level.

Health literacy refers, broadly, to the ability of individuals to “gain access to, understand and use information in ways which promote and maintain good health” (Nutbeam, 1998). Health literacy includes



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medication and vaccine literacy. Medication literacy is a relatively recent concept broadly defined as an individual's competences or skills in the safe and effective use of medicines (Raynor 2009; Saucedo et al. 2012). Vaccine literacy is considered a huge part of health literacy and is based on the overall idea of health literacy connected with the motivation, knowledge, and competence of people about vaccines enabling them to take informed decisions when getting children and adults (including themselves) vaccinated (Biasio et al. 2020).

The MedLit project aims to address the pressing issue of medication safety and literacy, as well as vaccination literacy in the EU by developing an innovative digital training program. By achieving it, the MedLit project aims to contribute to a more health-literate population in the EU, empowered to make the best decisions about medication use and vaccination to protect their own health and the health of those they engage with. The project focuses on key areas such as:

- Antimicrobial Resistance (AMR): Educate on the need for appropriate use of antibiotics to combat the growing threat of AMR.
- Vaccine Hesitancy: Provide information to address vaccine hesitancy and promote informed vaccination decisions.
- Mental Health Medication: Educate on the safe and effective use of mental health medications, including adherence and potential side effects.
- Medication Disposal: Promote proper disposal practices to protect public health and the environment.



- Medication Safety in Specific Populations: Address medication safety for children and older adults, including overdose risks and potential adverse effects.

The target groups for the MedLit project include **adult educators, parents, older people, patients, and carers.**

Work Package 2 (WP2) of the MedLit project focuses on establishing the theoretical foundation and conducting co-creation activities to inform the design of the training program. This WP directly contributes to the project's overall goal of developing a comprehensive and effective training program on medication safety and literacy. The theoretical framework activity within WP2 involves:

1. Reviewing the existing situation by assessing the current state of medication and vaccination literacy in EU countries.
2. Co-creation activities by conducting focus groups with adult educators, parents, older people, patients, and carers to gather their perspectives and specific training needs.
3. Developing a theoretical foundation, which will be based on the review and co-creation activities, establishing a theoretical framework that will guide the design of the training curriculum and pedagogical approaches.

By establishing a strong theoretical foundation and incorporating the insights and needs of the target groups through co-creation activities, WP2 ensures that the MedLit training program is relevant, effective, and tailored to the specific requirements of the intended audience.

EU Overview

Across the European Union (EU), medication and vaccination systems are moderated by the European Medicines Agency (EMA). EMA oversees the research and development of medicines and vaccines across Europe through an EU-centralized procedure.

Medication

Medication distribution typically involves pharmaceutical wholesalers who act as intermediaries between pharmaceutical manufacturers (wholesale producers) and pharmacies (retailers). Thus, patients cannot receive medicine directly from wholesale producers, and it must be distributed to the public through licensed pharmacies. This is a typical procedure for prescribed medication. Typically, prescriptions are provided by doctors following a medical consultation and prescribed medication can treat more serious, long-lasting conditions. A prescription written by a doctor in an EU member state is valid across all other EU countries. On a national level, member states maintain national registers of authorized medicines maintaining their own national authorization methods for medicines produced for human and veterinary consumption.

Non-prescription medicines are medicines which can be sold without prescription directly to the patient/consumer. Non-prescription medicines are often the first choice for patients/consumers as they enable them to manage symptoms of a wide range of common illnesses, such as headaches, common cold, cough, musculoskeletal pain, allergies, tobacco dependence, heartburn, emergency contraception etc (AESGP, 2025). Non-prescription medicines can be

distributed to the public through licensed pharmacies but also by other retailers.

While access to medication is essential for public health, the issue of medicine waste and its disposal poses significant environmental and economic challenges. Each year, large quantities of unused medicines are discarded improperly, contributing to pharmaceutical contamination in water sources, soil, and air. In Greece alone, an estimated 40 million medicine boxes are thrown away annually (GIVMED, diaNEOsis, HPI, 2024), while in France, this waste amounts to 17,600 tons per year (OECD, 2022). Pharmaceutical contamination in water sources arises from various sources, including human and animal excretion, as well as improper disposal practices like flushing medicines down sinks or toilets, throwing them in the trash, or incinerating them (Rogowska and Zimmermann, 2022).

Vaccination

Vaccine systems and policies across the EU are left to the competence of national authorities, but the European Commission supports EU countries in coordinating their policies and programs. Support efforts include coordinated vaccine procurement, research and innovation, and addressing vaccine hesitancy. The overall objective is to increase the uptake of vaccination in the EU.

Vaccine schedules and suggested immunizations are organized on a national level as each country in the EU may have some variations. Specifications refer to the age of those getting vaccinated, population groups, the number and timing of doses, and whether vaccines are given alone or in combination with others. Vaccines are often administered by consent parties based on the suggested vaccine

schedule respective to each European country or upon request by the patient/guardians (*Vaccine Scheduler, ECDC, 2024*). They can generally be administered at a clinic, hospital, or doctor's office.

Pharmacovigilance System

Spontaneous reporting of adverse drug reactions (ADRs) is a cornerstone of the post-marketing safety surveillance of medicinal products. This especially concerns serious and rare ADRs that could not have been detected during the pre-authorization phase of drug development because of the low or short duration of exposure of patients to drugs in clinical trials. The EU Pharmacovigilance System monitors the safety of medicines through the prevention, detection, and assessment of ADR including medication errors and overdoses. EudraVigilance is the system for managing and analyzing information on suspected ADRs to medicines which have been authorized or being studied in clinical trials in the European Economic Area (EEA). EMA operates the system on behalf of the EU medicines regulatory network (European Database of Suspected Adverse Drug Reaction Reports, 2025).

EU Pharmacovigilance legislation became operational in 2012 and has been updated regularly since then. The legislation placed an obligation on all national competent authorities (NCAs) and marketing authorization holders (MAHs) to record and report cases of suspected adverse drug reactions received from patients. Patients can report adverse drug reactions directly to competent authorities (i.e., doctors, pharmacists, nurses, and other health care professionals). Additionally, the Black Symbol ▼, found in the product information, identifies medicinal products subject to additional monitoring allowing patients

and healthcare professionals to identify these products and report unexpected adverse reactions through national reporting systems. The [Vaccine Monitoring Platform \(VMP\)](#) for AEFI was launched only recently following a 2016 stakeholder workshop. It will be able to pool large amounts of data across the EU/EEA in partnership between EMA and ECDC generating a coordinated vaccine pharmacovigilance system.

Considerations from consortium countries

Cyprus

Cyprus offers a healthcare system that integrates both public and private sectors, ensuring residents have access to necessary medications and vaccinations. The Cyprus Association of Research and Development Pharmaceutical Companies (KEFEA) in collaboration with the European Federation of Pharmaceutical Industries and Associations (EFPIA), under the auspices of the Ministry of Health of the Republic of Cyprus work to evaluate medicines and vaccines to ensure their safety for the population. The Ministry often collaborates with international health bodies such as the World Health Organization (WHO) and the European Centre for Disease Prevention and Control (ECDC) to align its vaccination strategies with global best practices.

In Cyprus, vaccines and medications are dispensed through a network of public hospitals, clinics, and private pharmacies. To access a network of healthcare professionals and clinics, people must register with the GESY - introduced in 2019- website with a Cypriot mobile phone number (Theodorou et al., 2024). Then, they can view a list of general practitioners, pediatricians, specialist doctors, laboratories, pharmacies, clinics, and hospitals.

The eligible population to be registered is citizens of Cyprus, EU citizens working/or holding a long-term residence permit, third-country nationals with a long-term residence permit, members of the families of the persons mentioned above, and persons who have been granted refugee status or subsidiary protection status.

Germany

Medical Doctors are the primary prescribers of medicines and vaccines in Germany. Prescription medicines are distributed at pharmacies. More recently, pharmacies have also been authorized to provide specific vaccines, primarily seasonal vaccines such as influenza and COVID-19 vaccines. For those who have statutory health insurance, dispensing prescriptions for medicines and vaccines are mostly covered by the health insurance. They are provided by the doctor and filled at the pharmacy, usually with a small co-payment, usually around 5 to 10 euros, regardless of the medication's actual cost.

Patients with (voluntary) private health insurance receive a private prescription at the doctor's office, and they pay for the medicines in full at the pharmacy. They may then send in the receipts to their health insurance for possible reimbursement. Electronic prescriptions are becoming more prevalent. People can use an electronic medical data card or the e-prescription app on their smartphone (*Funktionen Der Gesundheitskarte, 2025*).

Vaccines administered in Germany require national approval by the Federal Institute for Vaccines and Biomedicine, also known as Paul Ehrlich Institute (PEI), whereas medicines are regulated by the Federal Institute for Drugs and Medical Devices (BfArM). Both agencies are as an independent specialized federal higher authority within the



portfolio of the Federal Ministry of Health of Germany. Both take into account the regulatory decisions at the European Medicines Agency (EMA). Vaccines Pharmacovigilance is another important role of the PEI, i.e. after approval, vaccines are continuously monitored for safety, efficacy, and tolerability. BfarM oversees authorizing new products and improving the safety of drugs, registering and assessing the risks of medical devices, and monitoring trade in narcotic drugs and precursors (Federal Institute for Drugs and Medical Devices, 2025).

Greece

Greece's National Organization for Medicines (EOF) protects public health in relation to medicinal products, medical devices, supplements, and cosmetics. EOF evaluates new safe and effective products, controls the production of medicines to meet the standards of good manufacturing, and promotes medical and pharmaceutical research. Additionally, EOF evaluates and regulates the distribution of vaccines and medicines along with the National Organization For Health Care Services (EOPYY) and the Ministry of Health. A yearly update is foreseen for recommended vaccinations for both children, adolescents and adults and an updated version of the Greek Immunization Schedule is provided (National Organization for Medicines, 2025). Upon medical consultation, vaccines are prescribed and primarily administered at clinics, hospitals, or doctor's offices.

For prescription medicines, citizens can obtain an electronic prescription service or paper prescription from a licensed doctor to receive the details of their drug prescriptions or referral tests from the physician by message (SMS), e-mail or mobile phone and not by utilizing printouts by doctors who possess an Electronic Prescribing

certification (Digital Public Services - Gov.gr, 2025). OTC medicines can be bought from licensed pharmacies without a prescription or any limitation.

ADR reporting is controlled by EOF through the online “yellow card” platform (www.kitrinikarta.gr). This platform was officially launched by EOF in 2012 and can be used by both patients and healthcare professionals to report on ADRs. Besides its use as a reporting platform, it also serves as a tool for healthcare professionals to collect information about the unwanted effects of medications and vaccines.

Poland

In Poland, the regulation of medicines and vaccines system is a complex endeavor involving various institutions, such as the Ministry of Health, the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products, the State Sanitary Inspectorate and Military Sanitary Inspectorate authorities, Main Pharmaceutical Inspector. The organization and functioning of the system for the supervision and monitoring of the safety of medicines and vaccines is defined by the Pharmaceutical Law (ISAP, 2001)

The Ministry of Health is a main body responsible for formulating health policies and overseeing public health initiatives, including vaccination programs. Specifically, the Act of December 5, 2008, on the Prevention and Control of Infections and Infectious Diseases in Humans provides the legal framework for mandatory vaccinations in Poland (Włodarska et al., 2021). The law mandates certain vaccinations, as well the parents are allowed to make some choice in other situations, influencing the overall vaccination landscape in the country (Kuřak et al., 2020). The

legal vaccination framework includes an annual Vaccination Program developed by the Chief Sanitary Inspectorate (Reczulska et al., 2022).

The next body is the Polish Agency for Health Technology Assessment and Tariff System (AOTMiT) which serves in conjunction with the Ministry of Health, evaluating the effectiveness and cost-efficiency of new vaccines and medicines prior to their inclusion in the financed health programs (Jahnz-Różyk et al., 2017). AOTMiT carries out the analysis required for reimbursement applications, which includes assessments of clinical effectiveness and economic evaluations (Jahnz-Różyk et al., 2018). This regulatory framework intends to ensure the safety and efficacy of vaccines administered to the population.

The supervision is a key element in ensuring the safety of people taking medicines and undergoing vaccinations, which is particularly important in the context of the increasing use of medicines and the associated adverse reactions (Raźniewska, 2024; Jurczakowski, 2023). Following the interpretation of the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products, the possible causes of adverse reactions are as follows: a) when a drug is used according to the indications and in the recommended dose, b) when a drug is used for indications other than those included in the leaflet, i.e. patient information - o_-label use, c) when a drug is misused, d) when a drug is used for non-medical purposes, e) when a drug is overdosed - knowingly or unknowingly, f) when an error in the use of a drug is made (<https://www.gov.pl/web/urpl/monitorowanie-bezpieczenstwa-lekow>).

The principles of supervision of the safety of use of medicinal products in Poland are set out in Chapter 2 of the Pharmaceutical Law, they are also regulated by the Act on Prevention and Control of Infections and Infectious Diseases and the Regulation of the Minister of Health on



Adverse Reactions to Vaccines and the Criteria for their Recognition (<https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20240000138/O/D20240138.pdf>).

Pharmacotherapy-related incidents are reported by medical professionals as well as patients (Raźniewska, 2024). Cooperation between patients and medical staff in this regard is essential and should be supported by appropriate health policies. These measures are not only aimed at improving the quality of pharmacotherapy, but also at patient education, which is essential in the context of the use of different groups of drugs, especially in the case of antidepressants, where side effects may affect the effectiveness of treatment and patient cooperation (Jurczakowski, 2023).

To increase health awareness the Office for Registration of Medicinal Products, Medical Devices and Biocidal Products carries out the 'Safe Medicine' public awareness campaign, which main objective is to make the public aware of the principles for safe use of medicines, to take action against the unjustified use of medicines, to eliminate the use of medicines from illegal sources, which are outside the official pharmaceutical circuit and are not authorized for sale by the Office, to make patients more sensitive to the possibility of the occurrence of adverse reactions associated with therapy, and to make them aware of the risks of drug interactions, including interactions between medicines, foodstuffs and dietary supplements (<https://www.gov.pl/web/urpl/kampanie-lek-bezpieczny>).

The Ministry of Health and the Centre for Health Information Systems (CSIOZ) as institutions responsible in Poland for the implementation of the eHealth system have implemented several innovations facilitating

the communication between participants in the treatment process which immensely contributed to improving patient safety (Internet Patient Account (IKP), Electronic prescription (e-prescription), Electronic issuance of medical certificates (e-release), Electronic referral for health services (e-referral), Teleconsultation (Teleporada), Electronic handling of visits (e-queue), Electronic medical records, information on treatment appointments (Electronic Medical Record)) (Iveta Štempelová et al.)

Current State of Medication Literacy and Vaccination Literacy-Needs

Medicines

In the EU, a significant portion of the population uses prescribed medication, with older adults (75+) being the largest group of consumers. Research indicates that medication literacy is directly linked to educational attainment, as people with lower secondary education tend to use prescribed medicines more frequently than those with tertiary education (Lopes et al., 2023). This is consistent with health literacy research, which suggests that individuals with lower health literacy may have difficulties understanding prescription labels, drug instructions, and adhering to treatment plans, leading to medication misuse or non-adherence (*Sørensen et al., 2012*). In contrast, individuals with higher educational attainment are generally more capable of navigating medication instructions, thus avoiding errors. This



highlights the need for clear, accessible educational materials to ensure that patients with varying levels of literacy can effectively manage their medications.

Moreover, women in the EU tend to have higher prescription drug use, particularly due to contraceptive and hormonal therapies for menopause, reflecting specific gendered health needs and medication literacy gaps (European Commission - Medicine Use Statistics, 2022). This also stresses the importance of gender-sensitive health literacy programs to ensure that women's health needs, such as reproductive health, are properly addressed in medication-related literacy initiatives.

Prescribed medication overuse/misuse, particularly of opioids, sedatives, and antidepressants, has become a significant concern across the EU. People with low medication literacy may misuse these medications due to a lack of awareness about their risks, incorrect knowledge about dosage, or misunderstanding of side effects (Novak et al., 2016). Psychotherapeutic medications, including antidepressants, are frequently misused, especially when patients do not fully understand the role of the medication in their treatment plan. In countries such as Poland, where there is limited access to mental health services and fragmented care, people often lack the comprehensive education necessary to correctly use psychiatric medications (Poland: Country Health Profile 2023, 2023). The lack of coordinated care exacerbates medication literacy issues, as patients may rely on primary care providers for mental health treatment but often miss critical aspects of medication management.

Furthermore, overuse of antibiotics is a major driver of AMR. Overuse of antibiotics is a significant public health threat. AMR affects countries in

all regions and at all income levels. Its drivers and consequences are exacerbated by poverty and inequality, and low- and middle-income countries are most affected. AMR makes infections harder to treat and makes other medical procedures and treatments – such as surgery, caesarean sections and cancer chemotherapy – much riskier. AMR due to antibiotic misuse has become a major challenge, contributing to an estimated 35,000 deaths annually in the EU (WHO and ECDC, 2022). It remains a global concern and the “2022 Global Antimicrobial Resistance and Use Surveillance System (GLASS) report” highlights alarming resistance rates among prevalent bacterial pathogens in 76 countries around the world. This reflects a lack of antibiotic literacy—the understanding of when and how antibiotics should be used. Misunderstandings about antibiotic resistance contribute to overuse or misuse, leading to dangerous public health consequences. Several interrelated factors influence this issue, ranging from public misconceptions to healthcare system shortcomings (Machowska et al., 2019). One of the primary reasons for irrational antibiotic use is the widespread lack of understanding about when antibiotics are necessary. Many people mistakenly believe that antibiotics are effective against viral infections such as colds and the flu. According to the Eurobarometer survey, 57% of Europeans are unaware that antibiotics do not work against viruses, and 44% do not know that antibiotics have no effect on colds and influenza. Although most European countries have laws requiring a prescription for antibiotics, enforcement varies. In some nations, pharmacies still dispense antibiotics without prescriptions, either due to weak regulations, patient pressure, or economic incentives. For instance, a study in Spain found that 79.7% of pharmacies sold antibiotics without a prescription when presented with a simulated case of urinary tract infection. Similarly, in Portugal’s



Algarve region, 7.5% of surveyed individuals reported that obtaining antibiotics without a prescription was easy. Another growing concern is the availability of antibiotics through online pharmacies, which operate outside regulatory control. Some patients also fail to complete antibiotic courses and the overprescription of antibiotics often results in leftover medications, which patients later use without consulting a doctor. The Eurobarometer study found that 2% of Europeans reported using leftover antibiotics from a previous illness. Also, it was reported that Europeans acquire antibiotics while traveling abroad, where regulations might be more relaxed. The German Antibiotic Resistance Strategy DART2030 has been successful in reducing community antibiotic consumption, largely through educational efforts aimed at improving public understanding of the appropriate use of antibiotics (WHO and ECDC, 2022). In Greece, however, antimicrobial resistance remains a pressing issue. Antibiotic misuse, particularly for treating bloodstream infections, has led to some of the highest rates of antibiotic-resistant bacteria in the EU (ECDC & WHO Regional Office for Europe, 2024). Public health campaigns aimed at antibiotic literacy in Greece have become crucial to combating this growing threat.

Another critical point is the use of antidepressants. A 2015 study examined antidepressant use across 27 European countries, exploring how sociodemographic, cultural, and economic factors influence both usage and adherence (Lewer et al., 2015). Between 2000 and 2010, antidepressant prescriptions increased by 20% annually, but usage varied widely. Key findings showed that 7.2% of Europeans used antidepressants in the past year, with usage ranging from 15.7% in Portugal to 2.7% in Greece. However, only 58% of users took them regularly, despite clinical guidelines recommending continuous use for



effectiveness. Sweden had the highest adherence (89%), while Bulgaria had the lowest (19%). Higher healthcare spending was strongly linked to more regular use of antidepressants, suggesting better access and guidance in wealthier countries.

While the use of OTC medications is lower than that of prescribed medicines, OTC medication literacy remains a critical concern across the EU. Paracetamol and ibuprofen are commonly used OTC drugs in the EU, especially among individuals aged 35-44 (Kamal et al., 2023). These medications are typically seen as harmless, but improper use—such as exceeding the recommended dosage or using them for longer periods than recommended—can lead to significant health risks, including liver damage (in the case of paracetamol) and gastric ulcers (in the case of ibuprofen). Consumers often lack adequate knowledge on safe usage and potential interactions with other medications. In the EU, OTC medication literacy is especially low among people with limited health literacy, as they may struggle to interpret drug labels, dosage information, or side effects (*Sørensen et al., 2012*).

Another critical point is that non-prescription medication use is notably higher in individuals with tertiary education, who often believe that self-medicating is a safe and effective way to manage minor health issues. While this may reflect better access to information, it also raises concerns about overuse and the potential for drug interactions that may not be fully understood. Moreover, there is evidence that self-medication practices are more prevalent among women, who may use OTC medications more frequently for managing mild symptoms, such as headaches or menstrual pain (Kamal et al., 2023).

A neglected but crucial impact of OTC medication overuse is the condition called medication-overuse headache (MOH) (Diener et al., 2020). The frequent and regular intake of drugs to treat acute headache episodes, e.g. migraine attacks in patients with primary headache disorders, can result in an increase in headache frequency and finally lead to chronic headache. In Europe, the prevalence of MOH in the general population is around 1-2%, with women representing a huge percentage (up to 93%) .

Cannabis, which is also widely used in the EU, accounts for 40% of the illicit drug market (EUDA, 2024). In several EU countries medicinal cannabis has been legalized in some countries but not in others, further adding to confusion. This highlights a major gap in medication literacy, as many individuals may not understand the long-term effects or risks of using illicit substances or non-prescribed medications. It is crucial to raise awareness about the dangers of self-medication with substances like cannabis, as well as educate the public on the risks associated with OTC and illicit drug use.

Moreover, another important aspect of safe medication use is reading the Patient Information Leaflet (PIL) before being administered a medication. The PIL provides essential information on proper administration, potential side effects, and precautions. However, studies indicate that while many patients do read these leaflets, the information presented can sometimes lead to increased anxiety and affect adherence to medication regimens. A study conducted in Israel found that 51.5% of patients read the PILs accompanying their medications (Vinker et al., 2007). A German focus group study explored patients' emotional reactions to PILs for commonly prescribed medications. The findings indicated that the extensive lists of side

effects often caused fear and anxiety among patients, leading some to discontinue their medication without consulting healthcare professionals (Herber et al., 2014). These studies underscore the importance of developing tailored training on how to effectively read PILs to be informed about medications.

Furthermore, when it comes to medication disposal, the European Commission has taken a proactive stance to safeguard public health and the environment. As part of its Strategic Approach to Pharmaceuticals in the Environment, it highlights the importance of proper disposal systems and raises public awareness to promote responsible practices. Similarly, the EU has issued modifications on its Waste Framework Directives (2018/852 and 851), placing more emphasis on the liability of producers, for household waste too. As a result, Greece, for example, has issued a policy obliging relevant stakeholders to create an effective system for the correct disposal of medicine (Hellenic Republic, FEK, 129, 2021).

Globally, establishing systems of safe and efficient unused medicine donation has emerged as a research topic and practice that could contribute to accelerating health equity, as well as reducing medicine waste. For example, the UK, during the pandemic, enabled individuals to donate medicine they wouldn't use to the National Health System (UK Government, 2020), however the guidance was withdrawn on 6 April 2022. Greece has established Social Pharmacies, entities that accept and redistribute unused medicine to socially vulnerable groups, that are operated by Municipalities with the support of ESPA EU-funding. Similarly, GIVMED facilitates the donation of unused medicines by connecting individuals and organizations with non-



profits and social pharmacies, ensuring that essential treatments reach those in need instead of going to waste.

Vaccines

Vaccine literacy is also critical to ensuring high vaccine uptake across the EU. Studies show that most individuals in the EU recognize the safety and efficacy of vaccines. However, confidence is variable across different age groups, with younger populations (18-34 years) showing decreasing confidence, while older populations (65+ years) exhibit growing trust (European Commission, 2018). While the European Commission's 2022 report, "The State of Vaccine Confidence in the EU," indicates a slight decline in vaccine confidence since 2020, it also reveals that confidence levels are roughly the same as in 2018. This suggests that vaccine literacy in the EU is a complex issue with varying levels of confidence across member states and demographics. This report also highlights that agreement that vaccines are important, safe, effective, and compatible with beliefs has fallen compared to 2020 values. This suggests a need for targeted interventions to address concerns and improve understanding of vaccine safety and effectiveness. Variability in vaccine confidence exists between countries, among vaccination types, and within sociodemographic characteristics. This emphasizes the need for tailored approaches to address specific concerns and improve vaccine literacy among different populations. The concept of "vaccine literacy" has been defined as not simply knowledge about vaccines but also developing a system with decreased complexity to communicate and offer vaccines. This emphasizes the importance of clear and accessible information to improve vaccine literacy (Lorini et al., 2017). However, several studies on vaccination literacy showed that the level of literacy significantly

increases with education level, indicating the need for targeted interventions to improve understanding among less educated populations (de Wit et al., 2020; Gusar et al., 2021). However, vaccine hesitancy is notably more prevalent in Eastern and Central Europe.

Efforts to improve vaccine literacy must also address misconceptions about vaccines, particularly concerning safety and side effects. In Germany, despite the availability of clear vaccination schedules and multilingual resources, vaccine hesitancy persists, especially regarding the HPV vaccine, where uptake remains below the EU average (OECD, Germany: Country Health Profile 2023, 2023). Addressing misinformation and reinforcing the public health benefits of vaccination through educational materials that are clear, accessible, and non-technical will help bridge gaps in vaccine literacy.

Pharmacovigilance

Over 2.9 million ADR reports were submitted to EudraVigilance in 2022, with 50% of which originated in the EU, representing a slight decrease (17%) compared with 2021 (European Medicines Agency Annual Report, 2022). Still, the number of reports remains significantly higher than before 2021. This increase is due to the unprecedented roll-out of COVID-19 vaccines to hundreds of millions of EU citizens who have been encouraged to report all suspected side effects to the authorities. Out of the 647,393 ADR reports submitted by European patients and consumers through the national competent authorities (NCAs) and the marketing authorisation holders (MAHs) in 2022, 551,716 (85%) were related to COVID-19 vaccines. However, in 2023, over 1.9 million ADR reports were submitted to EudraVigilance with 40% of which coming from the EU (European Medicines Agency Annual Report, 2023). The

data reflects a more in line with the pre-pandemic figures, substantial decrease (34 %) compared with 2022, assuming that the vast majority of reports may be a consequence of hesitancy towards COVID-19 vaccinations. The share of reports submitted by European patients and consumers in 2023 also decreased considerably compared to 2021 and 2022.

The reasons for patients not reporting medicines adverse events are multifaceted and involve both patient and healthcare system factors (Lorimer et al., 2012):

- Patients often lack awareness about reporting systems and their role in pharmacovigilance. The majority of patients are unaware of the national Yellow Card Scheme for patient reporting.
- Many patients perceive that ADR reporting is not their concern or responsibility, particularly as they obtained little direct benefit from it.
- Patients' emotional responses to ADRs can influence their reporting behavior.

These findings highlight the need for improved patient education and engagement in pharmacovigilance efforts to enhance ADR reporting rates.

Considerations from consortium countries

Cyprus

Vaccination knowledge and acceptance among Cypriot mothers and healthcare workers show a clear socioeconomic gradient. Higher education and income levels are associated with better vaccination

knowledge and acceptance (Kyprianidou et al., 2021; Pouliasi et al., 2023). For instance, mothers with higher education and income demonstrated higher vaccination knowledge, which in turn increased the likelihood of vaccinating their children and following local vaccination recommendations (Kyprianidou et al., 2021).

Age and gender also play a role in vaccination acceptance. Older individuals and males were more likely to accept COVID-19 vaccination compared to younger individuals and females (Fakonti et al., 2022). This suggests that targeted vaccination campaigns may be necessary for specific demographic groups. Health literacy, which is closely linked to socioeconomic status, has been found to mediate the relationship between socioeconomic factors and various health outcomes, including medication use and preventive care (Berete et al., 2023; Berete et al., 2024). While the mediating effect of health literacy is limited, it suggests that improving health literacy among lower socioeconomic groups could potentially reduce health disparities. Concerning a part of the health literacy, the parental health literacy (HL), factors as educational attainment, lower number of children in the family, increased self-assessed health status, and limited exercise habits have been found to play a role in vaccination acceptance (Menikou et al., 2023). Interestingly, the study on medication knowledge and adherence among older veterans (Mosher et al., 2012) found that while lower health literacy was associated with poorer medication knowledge, it did not correlate with lower adherence or increased adverse drug events. However, it's important to note that this study was conducted in a different context and may not be directly applicable to Cyprus.

In summary, socioeconomic factors such as education, income, age, and gender influence vaccination literacy and acceptance in Cyprus. By addressing these factors through targeted interventions and policies will lead to enhancement of health literacy in Cyprus, thereby increasing vaccination rates and improving overall public health outcomes.

Germany

Socioeconomic factors play a significant role in medication use and vaccination literacy in Germany, as evidenced by several studies:

Health literacy, which is crucial for understanding and applying health-related information, including medication use and vaccination, is low among a large portion of the German population. According to the Health Literacy Survey Germany 2 (HLS-GER 2), 58.8% of participants had low health literacy, with difficulties in accessing, understanding, and applying health information (Schaeffer et al., 2021a). This low health literacy can impair doctor-patient communication and exacerbate existing health policy problems (Schaeffer et al., 2017).

Socioeconomic status (SES) is strongly associated with health literacy and health outcomes. Individuals with lower SES, including those with lower education levels, lower income, and immigrant backgrounds, tend to have lower health literacy (Schaeffer et al., 2017; Schaeffer et al., 2021). This can lead to challenges in understanding medication instructions and vaccine information.

Regarding COVID-19 vaccination specifically, social differences are evident in uptake rates. The proportion of people vaccinated against COVID-19 increases with age, income, and higher education levels.

Lower vaccination rates are found among people with a migration history, those living in rural areas, and people from East Germany (Bartig et al., 2023). This may also be due to the fact that during the initial roll-out of the pandemic COVID-19 vaccine, vaccination centers (“Impfzentren”) were introduced whereas medical doctors remained at the side lines. Only after several months did general practitioners begin providing COVID vaccine, which helped with uptake rates as these are the traditional providers of vaccines in Germany (Warren and Lofstedt, 2021).

According to a survey conducted by the University of Bielefeld in 2021 during the COVID pandemic (Schaeffer et al., 2021b), digital health literacy (DHL) is becoming increasingly important in the context of medication use and vaccination information. However, 75.8% of the German population has low DHL, with lower literacy skills, older age, lower education, and lower social status associated with low DHL (Schaeffer et al., 2021b). This can impact the ability to access and understand digital health information, including information about medications and vaccines. Communicative Health Literacy (such as seeking health information in dialogue with the healthcare professional) data showed better results with low HL only in 36%.

A more recent study in 2024 showed that there is a strong generational component to DHL in Germany, concluding that especially the elderly, in addition to socioeconomically deprived groups, would benefit from DHL training and interventions (König et al., 2024).

In addition, early intervention in school-age children have shown to be helpful. (*Schulenkorf et al., 2021*). This finding was in line with a 2023 report by the Council of Europe (*Council of Europe, 2023*).

Also, institutional opportunities are underused in Germany as a recent survey of German hospitals with more than 50 beds has shown. (Ref: <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-024-11649-x>)

In conclusion, socioeconomic factors and age significantly influence medication use and vaccination literacy in Germany. Lower SES, including lower education and income levels and older age are associated with lower health literacy, digital health literacy, and vaccination uptake. These findings highlight the need for targeted interventions in these groups in particular, to improve health literacy and access to health information across all socioeconomic groups in Germany. Schools and hospitals may offer additional opportunities for effective programs to improve health literacy in the population.

Greece

Socioeconomic status (SES) appears to have a significant impact on health literacy (HL) including the concepts of medication and vaccine literacy. A study conducted in Attica, Greece found that education and income levels were positively associated with HL (Michou et al., 2019). Individuals with higher education and medium annual income demonstrated higher levels of health literacy compared to those with lower education and income. Interestingly, during the economic crisis in Greece, there were some unexpected trends in health-related behaviors (Filippidis et al., 2014). This suggests that economic hardship may have differential impacts on various health behaviors.

The latest EC report on medicines use was performed in 2019 through the third wave of the European health interview survey (EHIS) assessing the population aged 15 years and over living in private households



residing in the national territory. Both the prescription and non-prescription medicines use levels for Greece remained below the EU averages for 2019; 43.5% and 20.2% respectively for Greece, and 47.9% and 32.5% respectively for the EU. Additionally, the EHIS assessed the vaccination against influenza for the population over the age of 65 years old and the percentage for Greece (58.92%) was much higher than the average for the EU (41.93%), but still very low considering the benefit of such a preventive measure.

A qualitative study explored health literacy in older adults in Greece, Hungary, and the Netherlands. The study found that older adults in Greece often rely on their social networks, including family and friends, for health information. Additionally, the study highlighted the importance of accessible and understandable health information for older adults. The overall evidence suggests that socioeconomic factors play a crucial role in health literacy, which in turn affects health behaviors and outcomes (de Wit et al., 2020). The complex relationship between SES, health literacy, and health behaviors underscores the need for targeted interventions to address health disparities and improve overall public health in Greece.

A 2023 study in Greece found that 0.7% of the general population aged 18-70 suffered from medication overuse headache (Constantinidis et al., 2023). This prevalence is on the lower end compared to other countries. The study also found that MOH was more common in women than men (3.6:1 ratio). Additionally, it was most prevalent in the 35-54 age group, followed by the over 55 group. The Aegean islands and Crete had the highest proportion of medication overuse headache.

Regarding antibiotics use, a cross-sectional study conducted in rural Greece found that 44.6% of participants had used antibiotics without a medical prescription at least once in the previous 12 months (Skliros et al., 2010). The major source of self-medication was without prescriptions through pharmacies (76.2%). The most common reasons for self-medicating with antibiotics were fever (41.2%), common cold (32.0%), and sore throat (20.6%). The most frequently used antibiotics for self-medication were amoxicillin (18.3%), amoxicillin/clavulanic acid (15.4%), cefaclor (9.7%), cefuroxim (7.9%), cefprozil (4.7%), and ciprofloxacin (2.3%).

However, the scene has changed significantly in Greece from 2020, when the antibiotics prescription became mandatory. Nevertheless, Greece has one of the highest rates of antibiotic consumption in Europe, contributing to the development of AMR (Barmpouni et al., 2023). AMR in Greece leads to significant clinical and economic consequences, including increased mortality, longer hospital stays, and higher healthcare costs. The estimated monetary burden of AMR in hospital-acquired infections with limited treatment options over 10 years is €13.9 billion. A 10% reduction in current AMR levels, over a 10-year time horizon is associated with 67,421 quality-adjusted life years (QALYs) gained.

Regarding vaccine literacy, routine childhood vaccination rates are high, but there is lower vaccine uptake among older adults, reflecting gaps in vaccine literacy for this demographic. Specifically, Greece faces challenges in the vaccine uptake of flu vaccines and the HPV vaccine in young adults (ECDC, 2020). Therefore, addressing vaccine hesitancy in these populations should involve age-tailored educational campaigns to clarify the risks and benefits of vaccination, focusing on the role of



vaccines in preventing chronic diseases and protecting public health. The One Health National Action Plan for AMR (2019-2023) in Greece also included initiatives for improving vaccine literacy to combat the growing concern of antimicrobial resistance and encourage safer medication practices.

Beyond these general trends in health literacy and vaccination uptake, specific challenges have been identified for socially vulnerable groups, including refugees and migrants. Many refugees in Greece faced barriers to COVID-19 vaccination due to administrative and policy-related obstacles, as well as documentation issues. Additionally, a lack of accessible information further hindered their ability to receive the vaccine. More broadly, migrant health services have often been focused on emergency care rather than preventive measures, such as vaccination and routine screenings. This highlights the need for targeted public health interventions that facilitate access to preventive healthcare for migrant and refugee communities (EDUonMED, 2024). Similar challenges were reported in Greece when COVID-19 vaccines were introduced, with efforts by NGOs aiming to address these disparities (ERT News, 2021).

Poland

Health literacy in Poland is influenced by various interconnected determinants. A comprehensive understanding of these factors is vital for enhancing health outcomes, particularly among vulnerable populations like older adults. Socioeconomic status (SES), which encompasses income levels, occupational class, and other social factors, has been found to be associated with health literacy, including vaccine literacy, and medication use in various studies. Lower SES is

generally linked to lower health literacy levels and potentially problematic medication use patterns (Chawłowska et al., 2022; Berete et al., 2023; Berete et al., 2024; Lamot & Kirbiš, 2024). Moreover, the critical role of health literacy in managing chronic conditions cannot be overstated. Functional health literacy enables individuals to process and utilize health information effectively, while critical health literacy empowers them to advocate for their health needs within healthcare systems (Janik-Koncewicz et al., 2018). Studies have demonstrated that low health literacy significantly correlates with poor self-management, leading to adverse health outcomes, particularly in older adults (Kosicka et al., 2020; Sørensen et al., 2012). Therefore, it is essential to enhance not just the dissemination of health information but also individuals' capacity to engage with it actively. For instance, individuals with lower education levels and those experiencing greater economic deprivation express increased vaccine hesitancy (Lamot & Kirbiš, 2024). One primary determinant is indeed educational attainment. Studies indicate a strong association between levels of education and health literacy skills. In Poland, approximately 44.6% of older adults exhibit low health literacy levels, which is notably higher than some averages found in other European countries (Mirczak, 2022; Słońska et al., 2015). This trend underscores the importance of tailored educational interventions that consider the specific health literacy needs of different age groups, especially among seniors (Kosicka et al., 2020). The lack of individualized educational approaches may lead to non-adherence to health recommendations, impacting overall community health outcomes (Wang & Zhang, 2024).

Furthermore, the role of social networks and community support structures is significant. Higher levels of social support have been linked



Training for Safer Use of Medication and Improvement of Health Literacy

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to improved health literacy among older adults, suggesting that fostering supportive relationships can enhance health outcomes (Sørensen et al., 2012). Conversely, social isolation may exacerbate health literacy challenges, indicating the importance of community engagement strategies in health promotion (Wang & Zhang, 2024).

In summary, the determinants impacting health literacy in Poland are multifaceted, involving educational background, socioeconomic conditions, the ability to self-manage health, and social support networks. Addressing these factors comprehensively through tailored educational interventions, community programs, and supportive policies will be crucial for improving health literacy, particularly among the elderly population in Poland.



Existing Programs and Initiatives

Existing programs and initiatives dedicated to vaccine and medicine literacy are primarily informational in nature, with most resources focusing on patient knowledge, though these are less frequent and harder to find. The majority of available resources consist of informational websites, with only two long-form programs dedicated to the topic. Many of these resources are aimed at medical students, educators, and academics rather than the general public. EU and ECDC-issued websites provide most of the source material, either directly or through links to other platforms. Additionally, one initiative is specifically targeted towards carers, addressing their unique needs in understanding vaccines and proper medicine use (ECDC Healthcare Workers & Carers Toolkit). **Appendix I** and **II** refer to the existing programs and initiatives towards the increase of medication use and vaccine literacy, respectively.



Gaps and Limitations

Existing programs related to medication use and vaccination literacy have several gaps that need to be addressed. First, there is no clear way to locate clinics or doctor office locations, making it difficult for individuals to access healthcare services related to vaccinations and medicine. Additionally, there is a lack of long-term learning resources that can be revisited, limiting ongoing education and the ability to refresh key information over time. Another significant gap is the absence of resources aimed at informing carers about proper medicine use, which is crucial for those responsible for the health and well-being of others. Programs also fail to provide guidance on how to communicate effectively with others about medicines and vaccines, an important skill for both healthcare providers and the general public. There is a need for greater specificity in the language used, with more clear and concise terms and practices, as well as ensuring the accessibility of concepts through simplified language for a wider audience. Finally, addressing mental and psychiatric health stigmas remains an overlooked area, despite its importance in promoting mental health literacy and encouraging individuals to seek care without fear of judgment. These gaps suggest a need for more inclusive, accessible, and practical educational resources.

Recommendations

Proposed Interventions

Current programs aimed at improving vaccine and medicine literacy face several limitations related to financial, human, and technological resources, which hinder their effectiveness. One key issue is access to technology, including the ability to navigate digital media, which can be a barrier for certain populations, particularly those in underserved areas and older populations. According to the European Health Literacy Survey (HLS-EU), limited eHealth literacy—the ability to search for, understand, and use online health information—is particularly pronounced in older populations and those with lower socioeconomic status (Sørensen et al., 2015). This digital divide limits access to reliable online resources about medicines and vaccines, further contributing to knowledge gaps.

Moreover, many of these programs are limited by their target audience, often focusing on specific groups like medical professionals or students, a fact that restricts their accessibility to the general public. The language used in these programs is often highly technical, making it difficult for non-experts to fully comprehend the information provided. Additionally, programs and initiatives are not always easy to find, requiring considerable effort and repeated searches from users to discover relevant resources beyond official EU websites. This lack of visibility and user-friendly access further limits the reach and impact of these programs, underscoring the need for more inclusive, accessible, and well-promoted resources.



To improve vaccine and medicine literacy, materials should be structured into distinct sections or modules tailored to different groups, such as carers, clinicians, patients, and expecting parents. These sections should provide relevant and up-to-date information that aids individuals in navigating the complexities of medicine and vaccine information. Clear definitions and basic information on the importance of medicine and vaccine literacy should be included to lay a foundational understanding for all users in a centralized easily accessible location.

Risk Factors and Misuse of Medicine

One crucial aspect of literacy programs is to detail the risk factors associated with the common misuse of medicines, including drug interactions, side effects, and the differences between prescription and nonprescription medications. Additionally, polypharmacy (the use of multiple medications) is highly prevalent in older EU populations and associated with higher risk of adverse drug events (ADEs), particularly when medication instructions are misunderstood. Modules should focus on educating users about how to read medicine labels and instructions, including key details like dosage, frequency, and administration. This helps users understand how to safely manage their medications.

Furthermore, the role of pharmacists in literacy enhancement is crucial (FIP, 2020). Community pharmacists in the EU are increasingly recognized as frontline health educators, especially for older patients managing complex medications and parents with young children receiving vaccines. Training should educate patients, carers, and parents on how to effectively consult pharmacists, ask about



medication interactions, and understand over-the-counter (OTC) treatments.

Moreover, many patients struggle to interpret Patient Information Leaflets (PILs) correctly, especially those with lower health literacy (Tang et al., 2023). Training should teach step-by-step strategies for understanding PILs—what to focus on, how to identify side effects, and interpreting symbols (e.g., storage temperatures, warning icons). This part of training should highlight the importance of reporting adverse drug reactions (ADR) and vaccine side effects and also include a guide on how to report them through mechanisms like EudraVigilance, the EU’s pharmacovigilance system (EMA, 2021). This strengthens both individual empowerment and public health surveillance.

Curricula on Psychoactive Substances

There is a clear need for distinct medical curricula at various levels that specifically address the proper prescribing and use of psychoactive substances. Psychoactive medications—including antidepressants, antipsychotics, sedatives, anxiolytics, and opioids—are essential tools in treating mental health conditions, sleep disorders, and chronic pain. However, across the EU, there is growing concern about overprescription, prolonged use, dependence, and misuse. Older adults are particularly affected due to polypharmacy and chronic prescribing, while young people are increasingly accessing psychoactive drugs without prescriptions. Despite the importance of safe use, literacy around these medicines remains low among patients, carers, and even some healthcare providers, leading to misuse, abrupt discontinuation, and avoidable harm. Moreover, stigma associated with these drugs



discourages open discussions and informed decision-making, further complicating safe use and adherence.

Existing medicine literacy programs rarely include psychoactive medications as a specific focus, leaving a critical gap in public health education. Educational materials should address how these drugs work, why they are prescribed, their potential side effects, the risks of dependence, and safe tapering strategies. For young people, schools should teach about the dangers of sharing medications and the differences between therapeutic use and misuse. Given high rates of misuse reported in the ESPAD survey (*European Monitoring Centre for Drugs and Drug Addiction, 2020*), integrating psychoactive literacy into school-based health education is essential.

Targeted programs are particularly needed for older adults, carers, and migrant communities, all of whom face unique challenges in understanding and managing psychoactive medications. Carers, especially those supporting older adults with dementia, need practical training to avoid unnecessary use and safely monitor ongoing treatment. To be effective, literacy materials must be culturally adapted, accessible in plain language, and provided through trusted community channels. By embedding psychoactive medication literacy into broader EU health literacy initiatives, the safe and responsible use of these medicines can be improved, ultimately protecting patients, carers, and public health across Europe. This is especially important in order to limit the negative consequences of improper or prolonged misuse, particularly among young people. Ensuring proper education on the risks and management of psychoactive substances will help mitigate public health issues related to substance misuse.



Vaccine Hesitancy and Public Health

Another important aspect of vaccine and medicine literacy is addressing vaccine hesitancy, which can have significant consequences for both public and individual health. Educational materials should emphasize why the benefits of vaccination far outweigh the risks. Vaccine literacy programs should explicitly cover the importance of vaccines not only in childhood but also during pregnancy, adulthood, and old age. This comprehensive life-course approach is now a priority in EU vaccination strategies according to ECDC announcements. Providing clear, science-based explanations on the mechanisms behind vaccines—such as immunity, antigens, and antibodies—will help people understand how vaccines protect individuals and communities. Additionally, highlighting the difference between active and passive immunity can further demystify how vaccines work. Vaccine literacy should cover how adverse events following immunization (AEFI) are reported within the EU (e.g., EudraVigilance system), and how safety data are monitored post-approval. This empowers the target population to report adverse effects, fostering transparency and confidence. A program SEKI (Strengthening Educational Knowledge on Immunisation; <https://seki.eu>) consolidates valuable training resources for healthcare professionals in one single location, with specific color codes for different audiences. Collaborations with civic and patient organisations are underway to also accommodate information for lay audiences. MedLit educational content will become available via SEKI at the end of the project.

Antibiotic Literacy (Antimicrobial Resistance Focus)

Antibiotic literacy is critical in combatting AMR, a growing global health threat. AMR occurs when bacteria evolve to resist the drugs designed to kill them, making infections harder to treat and increasing the risk of disease spread. This issue is particularly concerning in the EU, where overprescription and misuse of antibiotics contribute to the acceleration of resistance. Patients often lack understanding of why antibiotics are ineffective against viral infections like the common cold or flu, leading to unnecessary demand for antibiotics and self-medication. Additionally, some may fail to complete the full course of antibiotics, further promoting resistance.

Antibiotic literacy programs should focus on the importance of proper antibiotic use – such as only using antibiotics for bacterial infections, following prescribed dosages, and never sharing or using leftover antibiotics. These programs should be tailored for specific populations, including parents, older adults, and caregivers, to reduce misuse, particularly in community settings. They should also emphasize the risks of AMR and the long-term consequences on public health. Furthermore, healthcare professionals should be trained to educate patients effectively, ensuring that antibiotic guidelines are followed. Ultimately, fostering better antibiotic literacy will contribute to slower rates of AMR and enhance public health outcomes across Europe. This is particularly relevant in southern and eastern EU countries, where antibiotic overuse remains problematic (ECDC, 2024).

Health Literacy and Shared Decision-Making

Finally, vaccine and medicine literacy should support shared decision-making between patients, carers, and healthcare providers. This

requires communication training that empowers users to ask the right questions, understand medical recommendations, and participate actively in decisions about vaccination schedules and treatment plans (Coulter, 2017).

Finally, it is essential to address common public misconceptions and myths surrounding vaccines and medicine. Literacy programs should teach how to critically evaluate online sources, particularly on social media where anti-vaccine movements flourish. This is highlighted as a major contributor to vaccine hesitancy in the EU as well. Educational materials should clearly distinguish between myths and facts, providing reliable and evidence-based information to combat misinformation. This helps reduce skepticism and fosters informed decision-making regarding health and vaccination choices.

Engagement

- a. **Summaries and Quizzes to Measure Engagement:**
To enhance engagement with the curriculum, offering summaries of key concepts from each module is essential. This allows learners to review and reinforce their understanding of critical topics. Additionally, incorporating quizzes that integrate content from various modules can help assess comprehension while encouraging learners to retain the material. Including matching quiz games further aids in ensuring understanding and facilitates memorization by prompting comparisons between related concepts.
- b. **Storytelling and Real-Life Examples:**
Storytelling is a valuable technique for engagement, as it

provides real-life examples that illustrate the practical application of the concepts covered in the curriculum. This approach fosters relational learning by helping learners connect emotionally with the material, making it more relatable and memorable. Through narratives, learners can gain insights into the human experiences behind vaccine and medicine literacy.

- c. **Interactive and Supplementary Resources:**
An interactive digital library can further bolster learning by providing access to sources, peer-reviewed research articles, videos, or podcasts that are accurate and relevant to the topics discussed in the curriculum. These supplementary resources can offer deeper insights and allow learners to explore specific areas of interest in greater detail. Additionally, having materials available for download ensures that learners can access the content offline, making it convenient for those with limited or inconsistent internet access.
- d. **Language and Terminology Adaptation:**
To ensure accessibility and relevance, the language and terminology used in the curriculum should be appropriate for the target audience. While the material may differ in presentation for patients, carers, or educators, it should consistently offer the same high-quality information. Adapting the language to the specific needs and comprehension levels of the audience ensures that all learners, regardless of their background, can benefit from the resources provided.



Monitoring and Evaluation

To assess the effectiveness of new initiatives focused on vaccine and medicine literacy, a variety of methods can be employed. One approach is to use pre-and post-assessments to establish the learner's baseline knowledge and compare it to their understanding after engaging with the curriculum. This can help track improvements in scores or shifts in attitudes toward medicine and vaccines, offering valuable insight into the program's impact. Additionally, monitoring completion and retention rates can be a useful indicator of engagement and the overall effectiveness of the content. Tracking which modules are completed or left unfinished can highlight areas where learners may face challenges or lose interest.

Further evaluation can be done by analyzing website traffic and the consistency with which users interact with the modules. This data can offer insights into which areas of the curriculum are more engaging or in need of improvement. Additionally, tracking specific medicines consumption data, such as antibiotics, can be a critical tool in assessing the broader impact of educational initiatives. By monitoring these consumption patterns, it is possible to gauge whether the initiative is successfully influencing behavior change and mitigating the risk factors associated with antibiotic misuse.

Co-Creation Activities

Introduction

This section of the report presents the findings of the qualitative research conducted within the MEDLIT project across four European countries: Poland, Germany, Greece, and Cyprus. The study was designed to gain an in-depth



understanding of the attitudes, perceptions, and everyday practices of different population groups regarding both the appropriate use of medicines and vaccination. In parallel, the research explored emerging educational needs in medicine and vaccine literacy. Through qualitative and participatory methodologies, the study identified shared patterns and national specificities closely linked to each country's social, cultural, and healthcare contexts.

The research's methodological approach was grounded in co-creation, positioning participants as active contributors to knowledge production. Participants were invited to articulate their views and behaviors regarding medicine use and management, and to reflect on their attitudes toward vaccination, including issues of trust, access to information, and decision-making processes. In addition, they provided proposals for the content, structure, and methodological approach of the MEDLIT training program, contributing to the development of an educational framework responsive to real-life needs and lived experiences.

The findings presented in this report highlight critical dimensions of both medicine and vaccine literacy, including understanding medication instructions, adherence to treatment, access to and evaluation of health information, and the roles of healthcare professionals, informal caregivers, and social networks. The comparative analysis across Poland, Germany, Greece, and Cyprus reveals both structural challenges and best practices, providing an evidence-based foundation for the design, adaptation, and implementation of the MEDLIT training across diverse national and social contexts.

Descriptive Characteristics

A total of 8 participants took part in the co-creation activities in **Greece**. Participant roles included 2 elderly persons, 2 trainers (both nurses), 2 patients, 1 parent, and 2 carers. Gender distribution comprised 7 female participants and 1 participant who preferred not to disclose their gender. Educational attainment was high, with 5 participants having graduated from university or college. Regarding health context, 3 participants reported living with chronic illness: among the elderly persons, 1 had a



chronic condition for over 10 years and took multiple medications regularly; both patients had chronic illnesses (one for 5-10 years, the other for 10-20 years), with both taking medication for their conditions, one requiring multiple medications and also facing additional health issues. The parent had two children aged 6-12 years. The two carers had been providing care for 2-3 months each and reported feeling somewhat comfortable with administering medication to their patients.

The dataset includes seven respondents, all residing in **Cyprus**. Based on five valid entries, the average year of birth is approximately 1983 (range: 1951–2001), indicating a mixed-age sample that includes both older adults and younger to middle-aged individuals; all respondents who reported their gender identified as women. Educational attainment was high overall, with most participants holding master's degrees and others reporting Doctoral or tertiary-level education. Among those who provided family information, participants reported an average of 1.5 children (range: 1-2), primarily in early and middle childhood (1-12 years). Health-related questions were completed by a subset of respondents. Two individuals reported chronic health conditions: one described a long-term condition of over 20 years requiring multiple medications, while another reported a 5 to 10-year condition without current medication use. One additional response referred to a caregiver supporting an older woman born in 1951, with moderate confidence reported in managing medications.

In **Germany**, a total of 6 participants took part in a 2-hour co-creation session. Participant roles included 1 parent (mother), 2 adult educators, 1 carer, 1 elderly person (aged 65+), and 1 patient. Several participants held multiple roles simultaneously—the mother also provided care for elderly parents, one educator was also a parent of a young adult, and the patient was training to become a geriatric/palliative carer. Gender distribution was evenly split with 3 female and 3 male participants (including 1 transgender male). Regarding health and caregiving context, the carer was supporting an elderly relative with a neurologic/mental health chronic condition. Two participants reported living with chronic conditions: one elderly participant with an unspecified chronic condition, and one middle-aged patient



with a metabolic chronic condition. The parent (Mother1) was caring for 2 small children while simultaneously providing care for elderly parents, representing a multi-generational caregiving role.

A total of 9 participants took part in the co-creation activities in **Poland**, all of whom were female. Participant roles included: 2 parents, 2 elderly persons, 1 patient, 2 carers, and 2 adult educators. Among the carers, participants reported varying levels of comfort handling medication for family members under their care, with caregiving experience ranging from 4 months to 10 years. Educational attainment was relatively high, with 3 participants holding doctoral degrees, 5 holding master's degrees, and 1 having completed tertiary education. Two participants reported having children. Two participants were diagnosed with chronic health conditions requiring medication, with disease duration ranging from 5-10 years to over 20 years. One participant reported facing other health issues beyond chronic disease.

Perceptions around vaccination and the use of medicine

Germany: Participants' perceptions of medications and vaccination were shaped by **both practical and contextual factors**. Mothers and educators highlighted the dual nature of medications as healing tools but also potential sources of misuse, emphasizing the need for well-trained doctors and clear, evidence-based explanations. Children's experiences with medicines, such as flavored syrups, were noted as requiring careful communication, while colorful pills and pharmaceutical marketing were perceived as influencing patient attitudes. Cost considerations, especially for vulnerable populations like the elderly or low-income patients, further shaped perceptions, affecting willingness to adhere to prescribed treatments. Several participants noted that patients rarely challenge prescriptions directly during consultations, but instead make private



decisions about whether or how to follow recommendations, highlighting a pattern of “silent non-adherence” linked to autonomy and limited consultation time.

Participants also recognized that **the perceived necessity of medication varied with the severity of illness and life circumstances**. Palliative patients, for example, may prioritize pain management over chronic disease treatments, while some patients experience secondary gains from medication use, such as feeling acknowledged in their illness. Holistic perspectives and alternative medicine practices were seen as important complements to conventional approaches, highlighting the interplay between physical, psychological, and social dimensions in shaping how individuals perceive medications and vaccines. Overall, the concept of communicating vaccines in the context of overall medication literacy was welcomed and allowed several participants to volunteer for the co-creation which they may otherwise not have been willing to do had the discussion been on vaccines alone.

Poland: Participants emphasized that **trust in medical recommendations is fundamental to the safe use of medications**, with adherence to doctors’ instructions on dosage and timing seen as essential across all groups. Adult educators, older adults, caregivers, and patients highlighted that following professional guidance ensures both safety and effectiveness, with those having medical education or close relationships with their doctors showing higher trust and awareness. However, participants also noted that safe medication use is often compromised by limited holistic explanations during consultations, as many fail to fully explain drug interactions, purposes, and potential side effects. This gap creates a need for patient education, empowering individuals to ask informed questions and actively participate in consultations. Older adults, in particular, reported feeling uncertain about what to ask and feared being perceived as “difficult” patients, highlighting the importance of structured guidance and tools such as written question lists or cheat sheets during medical visits.



Another recurring theme was anxiety triggered by medication leaflets and side effect warnings which can lead to self-discontinuation or avoidance of treatment. While younger participants may skim these sections, older adults often stop medications altogether due to concern over potential reactions. Additionally, participants reported relying on multiple sources of information—doctors, internet, and social networks—leading to variability in decision-making. Trust in healthcare professionals remained a strong enabler, especially when doctors were personally known or perceived as reliable, whereas those without such access often turned to social circles or online sources, sometimes resulting in misinformation. This underscores the dual need for accessible, clear guidance from professionals and improved health literacy to navigate alternative information sources effectively.

Greece: Participants’ narratives reveal **a pervasive ambivalence toward vaccination;** it is recognized as necessary and life-saving, yet accompanied by fatigue, mistrust, and a sense of being overwhelmed by contradictory information. Older adults connect vaccines to past experiences and express growing skepticism toward the pharmaceutical industry, while parents oscillate between the desire to protect their children and the fear triggered by conflicting messages. People with chronic conditions tend to view vaccination as an element of self-care, grounding their trust in long-standing relationships with their physicians, and caregivers approach vaccination as a moral responsibility tied to protecting vulnerable family members.

Similarly, perceptions of medicine use are shaped by **an awareness of polypharmacy but also by a sense of everyday familiarity,** especially among older adults for whom pill-taking has become a routine marked by occasional uncertainty or self-adjustment based on how they feel. Parents often resort to a more “preventive” use of medicines for their children, relying heavily on pharmacists’ advice, while caregivers highlight the anxiety of managing complex medication regimens and the fear of making mistakes. Educators and health professionals underscore the need for continuous adult education

and trustworthy sources of information, emphasizing that trust is cultivated through ongoing dialogue rather than through prescriptive instructions alone.

Cyprus: Participants' perceptions regarding the safe use of medicines and vaccination are strongly shaped by their **trust in healthcare professionals and their reliance on scientific evidence**. Many participants stated that doctors and pharmacists remain their primary sources of reliable guidance, emphasizing that safe practice means following prescriptions, reporting side effects, and acknowledging that professionals understand individual medical history. Confidence in vaccination was also tied to scientific proof: participants expressed support for immunization when it is backed by robust studies, long-term monitoring, and clear evidence of effectiveness and safety.

At the same time, participants highlighted the **complexity of navigating side effects, personal differences, and overwhelming online information**. While they recognized that medicines and vaccines can affect people differently, this awareness often pushed them to seek additional information—sometimes to verify professional advice, other times out of confusion or curiosity. Several described reading extensively online but struggling to distinguish reliable sources from misleading content. This blend of trust, vigilance, and uncertainty reveals that participants view safety as both a medical and informational challenge, shaped by professional guidance, personal responsibility, and the ability to critically assess available information.

Similarities and differences across countries

Similarities across countries

1. Trust in healthcare professionals: In all countries—Germany, Poland, Greece, and Cyprus—participants emphasized that trust in doctors and pharmacists is essential for feeling safe when using medicines or deciding on vaccinations. Clear explanations, continuity of care, and feeling heard emerged as universal enablers of adherence and confidence. When professional communication is rushed, incomplete, or paternalistic, mistrust grows, leading people to turn to online sources or social networks.

2. Anxiety about side effects and information overload: Fear of side effects—whether from medication leaflets, conflicting vaccine information, or personal experience—was present across all contexts. Participants in all countries described feeling overwhelmed by long lists of adverse effects or contradictory online content. This anxiety often results in avoidance, self-discontinuation, or hesitation, especially among older adults.

3. Desire for clear, accessible, evidence-based guidance: Regardless of age group or country, participants expressed a need for simple, comprehensible, and reliable health information. They want healthcare providers to explain interactions, purposes, benefits, and risks in a transparent manner. This includes a need for tools such as summaries, structured questions for doctors, or modular educational content.

Differences among countries

Germany: Holistic awareness, cost concerns, and alternative medicine integration

German participants showed strong awareness of the dual nature of medicines -both helpful and potentially misused- highlighting concerns about overprescribing and pharmaceutical marketing. Costs, particularly for elderly people or those in private insurance systems, shaped attitudes toward adherence. Germany stood out for its emphasis on integrating **holistic and alternative medical systems** (Traditional Chinese Medicine (TCM), homeopathy, Tibetan medicine) into perceptions of safety and trust. German participants acknowledged differences in the amount of time available for consultations by alternative care providers (often paid privately) compared to the speed and urgency of routine medical interactions (covered by insurance). Additionally, participants highlighted the psychological dimensions of medication use, such as “secondary gains” or differing priorities in palliative care.

Poland: Authority-Oriented Engagement with Adaptive Information-Seeking

Polish participants described a healthcare engagement pattern characterized by strong respect for medical authority and a clear emphasis on correct dosage, timing, and adherence as core elements of safe medication use. Doctors were widely perceived as the primary and most legitimate source of guidance, particularly for initiating treatment

and defining therapeutic routines. This orientation reflects a systemically shaped expectation that medical expertise provides structure and legitimacy to health-related decisions.

At the same time, participants highlighted that clinical encounters often provide limited contextual explanation regarding interactions, side effects, or the broader rationale behind prescriptions. In response, individuals—especially older adults and caregivers—adopted adaptive information-seeking strategies, consulting multiple sources such as pharmacists, medication leaflets, online resources, and trusted personal networks. While this multi-source engagement reflects high personal responsibility and active involvement in health management, it also occasionally resulted in fragmented or inconsistent guidance. Overall, the Polish profile illustrates a decision-making style shaped by strong institutional trust combined with compensatory strategies to address informational gaps, underscoring a pronounced need for clearer, more contextualized explanations within medical consultations to support confident and coherent decision-making.

Greece: Ambivalence, fatigue, and emotional decision-making

Greek participants expressed deep ambivalence toward vaccination -balancing recognition of its necessity with mistrust and fatigue caused by conflicting information and past negative experiences. Older adults showed growing skepticism toward pharmaceutical companies. Everyday medicine use among Greeks was highly habitual, especially among older people who adjust doses based on how they feel. Parents relied heavily on pharmacists, more than in the other countries, for quick medical guidance. Greek perceptions were particularly shaped by **emotional and relational factor**, with trust built through long-term personal relationships rather than through impersonal instructions.

Cyprus: High trust in professionals but strong need for scientific validation

Cypriot participants expressed the strongest confidence in doctors and pharmacists and linked safe practices closely to following prescriptions and reporting side effects. Their trust in vaccination was explicitly tied to **scientific evidence**, long-term monitoring, and confirmed effectiveness. However, Cypriots also described feeling overwhelmed

by online information and struggled to evaluate digital sources. They tended to combine trust in professional authority with vigilant information-seeking, reflecting a mix of confidence and caution.

Behaviors related to vaccination and the use of medicines

Germany: Participants expressed attitudes emphasizing autonomy, responsibility, and trust in healthcare providers. Several participants noted that patients rarely challenge prescriptions directly during consultations, but instead make private decisions about whether or how to follow recommendations, highlighting a pattern of “silent non-adherence” linked to autonomy and limited consultation time.

Many valued the guidance of pediatricians, specialists, and carers but stressed that patients should actively engage with treatment decisions, reflecting a desire for self-responsibility in health management. There was strong support for clear, concise, and accessible information, including patient-friendly summaries of medical guidelines, to foster informed decision-making. The attitude toward medications was cautious yet pragmatic, balancing recognition of their healing potential with awareness of possible side effects and misuse.

Attitudes toward vaccination were generally positive, especially when viewed as essential for disease prevention, such as polio, though some participants called for long-term studies to reinforce confidence. Participants also highlighted the importance of transparency and communication from healthcare providers, noting that trust can only be sustained when patients receive adequate explanations of diagnoses and treatment rationale. Overall, participants demonstrated a nuanced attitude that combined respect for medical expertise with a demand for personal agency, critical thinking, and ethical prescribing practices.

Poland: Participants emphasized that the safe use of medication and vaccination requires personal responsibility and self-awareness, including honesty with doctors, tracking symptoms, and preparing questions before appointments. At the same time, anxiety and fear of side effects or misdiagnoses act as barriers, sometimes leading to



avoidance or misuse of medication. Critical thinking toward medical authority was expressed in diverse ways: some participants trust doctors, while others are skeptical due to brief or insufficiently transparent consultations. Additionally, vaccination decisions are often shaped by social networks, emotional narratives, and misinformation rather than scientific evidence.

Participants also expressed a strong preference for holistic and personalized care that considers not only medical needs but also emotional, dietary, and lifestyle factors. While this desire is common across all groups, educators and carers emphasize broader health education, whereas parents focus on chronic conditions in their children. Overall, attitudes toward medication use and vaccination are shaped by a combination of personal responsibility, emotional factors, trust or skepticism toward medical professionals, and social influence.

Greece: Participants' behaviors surrounding vaccination and medication are shaped by a blend of knowledge, habit, and social influence, revealing that these practices are far more than clinical procedures -they involve trust, interpretation, and continuous management. Older adults tend to follow medical guidance but anchor their choices in personal experience and perceived risk, maintaining medication routines that are sometimes ritualistic yet not always accurate. Parents of children and adolescents display more active and information-seeking behavior, but their attempts to compare sources and explore alternatives often lead to confusion, particularly when confronted with contradictory advice. Patients with chronic illnesses show more stable adherence, recognizing the direct consequences of skipping medication or delaying recommended vaccinations, though they also stress the need for clarity and simplicity in instructions. Caregivers, driven by responsibility and anxiety, navigate complex medication regimens with caution, often struggling with the overwhelming volume of information and the fear of making mistakes, and prioritizing the vaccination needs of those they care for over their own. Adult educators and health professionals approach these issues with a more analytical and informed perspective, drawing on scientific sources and promoting best practices, while acknowledging that even well-informed adults can misunderstand medical information. Across all groups, effective engagement with



vaccination and medication relies heavily on accessible communication, stable relationships with healthcare providers, and the cultivation of trust through clear, consistent guidance.

Cyprus: Participants’ attitudes toward medicines and vaccination were deeply influenced by the quality and consistency of professional guidance. Many reported that conflicting advice from doctors or insufficient explanations eroded their confidence and made it difficult to make informed decisions. When professionals failed to justify recommendations or address expected side effects, participants felt uncertain and sometimes skeptical. This distrust extended beyond medical encounters to broader concerns about pharmaceutical companies and the origins of medicines, with several expressing hesitation toward products perceived as profit-driven or manufactured under unfamiliar standards.

At the same time, participants viewed health decisions as embedded within a wider social context. Many emphasized that individual choices impact community wellbeing, especially in relation to vaccination, where collective action is essential to prevent the re-emergence of diseases. Participants also highlighted the importance of supporting vulnerable groups who may struggle to understand or access health information. Personal experiences -especially adverse reactions or previous illnesses—further shaped attitudes, often overshadowing scientific evidence and influencing decisions for oneself and one’s family. These intertwined factors reveal a landscape where trust, social responsibility, and lived experience together shape both confidence and hesitation toward medicines and vaccines.

Similarities and differences across countries

Similarities across countries

1. Strong influence of trust in healthcare providers on behavior: Across Germany, Poland, Greece, and Cyprus, trust or mistrust in healthcare professionals was the strongest determinant of behavior. When doctors offer clear explanations, continuity of care, and respectful communication, participants adhere to medication regimens and

follow vaccination recommendations. When consultations are rushed or inconsistent, participants hesitate, modify treatment on their own, or turn to alternative sources, including the internet, family, or pharmacists.

2. High emotional weight of side effects and safety concerns: Across all four contexts, side-effect anxiety shapes behaviors significantly. Participants avoid medications, discontinue them prematurely, or delay vaccinations when they feel overwhelmed by warnings or lack clarity about risks. Fear is often amplified by personal experiences, anecdotal stories, or online misinformation, influencing both overcautious and risk-taking behaviors.

3. Desire for clear, consistent, and actionable information: Participants in all countries expressed a need for practical guidance: what to take, when, how, and why. They prefer straightforward instructions, simple language, and opportunities for follow-up questions. Written summaries, structured question lists, and patient-friendly materials are seen as helpful tools to support responsible behavior and reduce reliance on unreliable online sources.

4. Interplay of personal responsibility and social influence: Medication and vaccination behaviors are influenced by both individual responsibility (tracking symptoms, following instructions) and social contexts (family opinions, online communities, peer norms). Parents, caregivers, and chronic patients in all countries balance personal judgment with advice from their networks, revealing a blend of autonomy and dependence on social cues.

Differences across countries

Germany: Autonomy, holistic orientation, and ethical prescribing concerns

In Germany, behaviors are shaped by a strong emphasis on autonomy and self-responsibility. Participants actively seek to understand treatment options, question prescriptions when necessary, and integrate both conventional and alternative approaches. Caution toward medications -especially regarding side effects, misuse, or overprescribing- coexists with pragmatic acceptance of their benefits. Vaccination behaviors are generally positive, grounded in disease-prevention logic, but participants



request long-term studies to maintain confidence. Ethical prescribing, transparency, and informed decision-making play central roles in determining adherence.

Poland: High personal responsibility but strong vulnerability to fear and misinformation

Polish participants show a pronounced behavioral pattern of preparing questions, tracking symptoms, and attempting to follow medical guidance. Yet behaviors are often disrupted by fear of side effects, confusing leaflets, and inconsistent explanations from doctors. Some avoid or stop medications because of anxiety; others delay vaccination due to emotional narratives circulating in social networks. While many trust doctors, skepticism arises when communication is insufficient. Holistic behaviors, -such as considering diet, lifestyle, and emotional health, are more prominent than in the other countries. Parents and educators emphasize the need for structured tools to support responsible engagement with medication and vaccination.

Greece: Habitual practices, information-seeking, and socially anchored decision-making

In Greece, behaviors reflect a mix of habit, experiential learning, and social influence. Older adults follow routines of medication use that are stable yet sometimes inaccurate, adjusting doses based on how they feel. Parents actively seek information, but contradictory advice often leads to confusion, hesitation, or selective adherence. Caregivers operate under high stress, navigating complex regimens with caution and prioritizing loved ones' vaccinations over their own. Adult educators and professionals behave more analytically but acknowledge widespread misunderstandings. Effective behavior in Greece is strongly dependent on trustworthy communication and relational continuity with healthcare providers.

Cyprus: Compliance rooted in trust—but undermined by inconsistency and skepticism toward industry

In Cyprus, adherence to medicines and vaccination is high when professional advice is consistent, evidence-based, and clearly justified. However, inconsistent messages or insufficient explanations from doctors quickly erode confidence, leading participants to question treatments or seek verification online. Skepticism toward pharmaceutical

companies, especially regarding profit motives or unfamiliar manufacturing origins, also affects behavior. Participants frame vaccination as a social responsibility, emphasizing community protection and the need to support vulnerable populations. Personal experiences, particularly adverse reactions or previous illnesses, carry significant weight in shaping behavioral choices.

Barriers and facilitating factors related to vaccination and the proper use of medicines

Germany: Participants identified a range of barriers to the safe and effective use of medications, often linked to communication gaps, trust, and structural factors. Mothers and educators noted that doctors sometimes prescribe medications too lightly or assume patients will seek multiple opinions, which can undermine trust. Unexpected side effects, particularly from antibiotics or hormonal treatments, compounded patient anxiety, while insufficient explanations from healthcare providers left patients unsure about how to manage their treatment safely. Vulnerable populations, such as the elderly or low-income individuals, face additional obstacles due to high costs and complex reimbursement policies, forcing difficult trade-offs between daily needs and medication adherence.

Another major barrier highlighted was the limited patient engagement with prescribing decisions. Educator2 observed that patients rarely question prescriptions directly, instead choosing privately whether to follow instructions. This reflects a broader perception of limited autonomy and insufficient transparency in healthcare interactions. Elder participants also noted systemic barriers, including the lack of support or insurance coverage for alternative and holistic approaches, and a sense that mainstream medicine often focuses on symptoms rather than root causes, reinforcing the perception of a “pharmaceutical monopoly.”



Palliative care patients faced unique challenges, with medications often misaligned with life priorities. Patient1 emphasized that in late-life care, some prescriptions are unnecessary, while pain management may be under-prioritized. Poor communication about diagnoses and treatment plans further exacerbates stress and reduces adherence, highlighting the critical role of empathetic, patient-centered communication in enabling safe medication use.

Participants identified several enablers that could mitigate these barriers. Trustful, continuous relationships with healthcare providers were seen as essential, as they foster confidence in treatment plans and encourage adherence. Clear, concise, evidence-based communication, particularly when supported by long-term studies and patient education, was emphasized by educators and carers as key to reducing anxiety and misuse. Accessible, patient-friendly materials at the point of care, including summaries and guidance on medications, were considered particularly helpful for vulnerable populations.

Finally, participants highlighted the importance of holistic and personalized approaches to care. Including alternative medicine options, addressing quality of life, and prioritizing patient autonomy were cited as critical enablers. Across all groups, there was strong agreement that empathy, transparency, and education from healthcare providers can overcome structural and perceptual barriers, supporting both safe medication practices and informed decision-making.

Poland: Participants identified several barriers to the safe use of medication and vaccination, with **time-constrained consultations and limited opportunities for clarification** emerging as a major concern. Short, rushed appointments often prevent patients from fully understanding diagnoses, instructions, and potential side effects. While older adults and carers frequently reported **insufficient support or uncertainty during consultations**, parents and adult educators observed improvements in doctors' engagement and communication styles, highlighting differences in experiences across age and role groups. **Emotional burden associated with health-related decision-making** was another key factor influencing safe medication and vaccination practices.. Participants described anxiety about side effects, misdiagnoses, or potential harm to



loved ones, which could lead to hesitation, avoidance, or improper use of medications and vaccines. Older adults worried primarily about their own health, parents feared for their children, and educators were concerned about social judgment, showing how emotional factors vary across groups.

Misinformation and reliance on non-medical information sources also posed significant challenges **within the broader information environment**. Participants often turned to social media, friends, or unverified online sources, which contributed to confusion and mistrust of medical advice. Parents were particularly influenced by peer networks, while educators worried about misinformation spreading in schools and its impact on students' understanding of health and vaccination risks. Limited access to clear information about drug interactions and side effects, combined with healthcare system complexity, further challenged safe medication practices, particularly for individuals managing multiple prescriptions or navigating care pathways in urgent situations.

Several enablers were identified that promote safe medication and vaccine use. Trust in medical professionals and compliance with their recommendations were widely seen as essential, with adult educators and medically knowledgeable participants expressing higher confidence in interpreting instructions, while others relied primarily on trust. Patient education and encouragement to ask questions were emphasized as empowering strategies, enabling individuals to better understand medications and potential interactions.

Finally, participants highlighted the importance of holistic, coordinated care and access to reliable, science-based information. Coordinated oversight of multiple medications, addressing individual patient needs, and dispelling misinformation were seen as critical for safety. Early and lifelong health literacy initiatives, including school-based and adult-targeted programs, were also recommended to equip individuals with the knowledge to make informed decisions across their lifespan. These strategies collectively support safer, more informed use of medications and vaccinations across diverse populations.

Greece: Older adults describe medication use as a central part of daily life, yet their adherence hinges on clear medical guidance and trust in familiar healthcare



professionals. Many struggles with polypharmacy, unclear dosage instructions, and low health literacy, relying heavily on pharmacists or relatives for support. While vaccination is generally viewed positively, decisions are rarely self-initiated and depend almost entirely on a doctor's recommendation. Stable relationships with trusted providers facilitate adherence, whereas fear of side effects and confusion around new treatments remain persistent barriers.

Parents of children and adolescents portray vaccination as a responsibility intertwined with worry. The abundance of contradictory information, particularly online, creates uncertainty, making trust in the pediatrician a key stabilizing factor. Although careful with medication, parents sometimes fall into self-medication practices, especially for mild symptoms. Access to clear written instructions, reliable pharmacists, and stronger digital health literacy helps reduce hesitation, whereas social influences from peers or online communities tend to amplify doubts.

Patients with chronic illnesses recognize the importance of consistent treatment and preventive care, but long-term management often leads to fatigue and occasional lapses in adherence. Complex regimens, difficulties understanding instructions, and concerns about side effects create additional barriers, as do doubts about the effectiveness of medicines that do not yield immediate results. Vaccination rates are generally high due to heightened perceived risk, though information about additional recommended vaccines remains uneven. Facilitating factors include personalized doctor communication, stable routines, and family support.

Caregivers of adults or children with health problems experience high levels of responsibility, emotional strain, and information overload. They manage intricate medication schedules and vaccination needs yet often lack adequate training or support structures. Many neglects their own health and vaccinations due to time constraints and stress. Written instructions, pharmacist assistance, and participation in caregiver training or peer-support networks strengthen confidence and reduce errors, highlighting the importance of structured guidance.

Adult educators and health professionals navigate the dual role of applying best practices themselves while communicating them to populations with varying levels of

health literacy. Limited time for updating their knowledge, concerns about new scientific developments, and the challenge of conveying complex information without oversimplifying it shape their professional behavior. Access to continuing education, reliable scientific sources, and collaboration with healthcare providers enhances their ability to build public trust. Across all groups, the findings demonstrate that decisions about vaccination and medication are socially mediated practices shaped by trust, clarity of information, accessibility, and lived experience.

Cyprus: Participants identified several interpersonal and systemic barriers that hinder safe medication and vaccination practices. A recurring challenge involved blurred professional boundaries, especially in smaller communities where personal relationships with pharmacists or doctors can influence expectations and decisions. These close ties sometimes compromise objectivity and create uncertainty about the neutrality of guidance. Participants emphasized the need for clearer ethical boundaries and professional distance to maintain trust and credibility in healthcare interactions.

Another significant barrier emerged from communication gaps between patients and healthcare professionals. Several participants described encounters where doctors lacked the time or communication skills needed to explain treatment plans, side effects, or vaccination recommendations clearly. This absence of empathetic, patient-centered dialogue was said to undermine confidence, leaving individuals hesitant and poorly informed. Participants stressed that safe use of medicines requires not only accurate instructions but also a relational environment in which patients feel comfortable asking questions and clarifying concerns.

Emotional, cultural, and generational factors also shaped participants' attitudes toward medical decisions. Some expressed that culturally rooted tendencies, such as impulsiveness, fatalism, or skepticism, affect how people interpret risk and evaluate medical advice. Others highlighted that personal histories and generational experiences with healthcare influence contemporary decision-making: older participants recalled periods of limited access to reliable medicines or vaccines, which shaped long-standing expectations, habits, and levels of trust. These emotional and historical contexts create



barriers that cannot be addressed through factual information alone and require more holistic educational approaches.

Despite these obstacles, participants also pointed to meaningful enablers that support confidence and safe practices. Peer networks, in particular, emerged as powerful sources of influence. Many described relying on trusted colleagues, friends, or community members when evaluating medical information or making decisions about treatments and vaccines. This dependence on interpersonal trust underscores the value of peer-led education, community ambassadors, and group discussions within health literacy programs. By leveraging existing social networks, training interventions can build credibility, strengthen engagement, and create supportive environments that encourage safe and informed health behaviors.

Similarities and differences across countries

Similarities across countries

1. Communication gaps as a central barrier: All four countries highlight poor communication with healthcare professionals as one of the strongest obstacles. Short appointments (Poland), insufficient explanations (Germany, Cyprus), unclear dosage instructions (Greece), and lack of empathetic interaction (all countries) contribute to confusion, anxiety, and reduced adherence.

2. Emotional factors and fear of side effects: Fear, anxiety, and stress shape medication and vaccination choices everywhere.

- Germany and Poland emphasize fear of side effects and mistrust due to rushed consultations.
- Greece and Cyprus report emotional overload among caregivers and culturally rooted anxieties that influence decisions.

Across all groups, emotions -not only information- drive behavior.

3. The influence of social networks and non-medical sources: In every country, people rely heavily on peer networks, online information, and personal contacts.

- In Poland and Greece, this leads to misinformation.
- In Cyprus, peer networks act as both enablers and risk factors.

- In Germany, informal networks are less emphasized but still indirectly influence trust.

4. Trust as a critical enabler: Stable, long-term relationships with healthcare providers are universally viewed as essential for safe medication use and vaccine acceptance. Trust mitigates fear, clarifies doubts, and increases adherence across all populations and countries.

5. Health literacy challenges: All countries report barriers related to limited health literacy:

- Difficulty understanding treatment instructions
- Confusion around contradictory information
- Lack of accessible summaries or simplified materials

This affects older adults and caregivers most strongly.

6. Desire for holistic or personalized care: Participants in all four countries express a desire for care that considers individual needs, whether through alternative medicine (Germany), coordinated care (Poland), personalized routines (Greece), or culturally sensitive approaches (Cyprus).

Differences across countries

Germany: Structural barriers & emphasis on autonomy

- Participants placed strong emphasis on structural obstacles in the healthcare system, such as high costs, reimbursement difficulties, and limited insurance coverage for individualized care and consultations. They also contrasted time-intensive, privately paid alternative consultations with the brevity of insurance-covered medical encounters, which was perceived as influencing trust, depth of explanation, and openness to holistic approaches.
- Many participants described what they perceived as a “pharmaceutical monopoly,” alongside concerns that holistic or complementary practices are not sufficiently integrated into mainstream care. In this context, participants responded positively to discussing vaccination within the broader framework of medication use and disease prevention, rather than as a stand-alone topic.

- Patients often decide independently whether to follow a prescribed treatment, reflecting a high value placed on personal autonomy, even when prescriptions are not openly questioned during medical consultations.
- A theme that appears particularly prominent in Germany concerns palliative care in an aging society: on the one hand, concerns about unnecessary or inappropriate medications; on the other, a perception that pain management is sometimes not given adequate priority.

What stands out overall: structural critiques of the system, strong emphasis on patient autonomy, and a desire for better access to alternative medicine.

Poland: Misinformation, emotional barriers & consultation constraints

- Very strong emphasis on **rushed consultations**, leading to confusion and distrust.
- **Misinformation** and influence of social networks (especially among parents) are more pronounced than in other countries.
- Emotional barriers differ by group: older adults vs. parents vs. educators.
- Education teams strongly emphasize **health literacy interventions** and long-term educational programs.

What stands out: The system's time constraints, group-specific emotional barriers, and the pervasive impact of misinformation.

Greece: Polypharmacy, overreliance on doctors & caregiver burden

- Older adults struggle with **polypharmacy** and unclear dosing instructions, relying heavily on pharmacists or family.
- Vaccination decisions are **doctor-dependent**, reflecting strong professional authority.
- Caregivers face exceptional **responsibility and information overload**, sometimes neglecting their own health.
- Chronic patients show adherence fatigue and doubts about long-term treatments.

What stands out: Everyday medication burdens, high dependency on individual doctors, and pronounced caregiver strain.

Cyprus: Blurred Boundaries, cultural influences & interpersonal trust

- Unique challenge: **blurred professional boundaries** in small communities (close personal ties with doctors/pharmacists).
- Cultural tendencies, impulsiveness, fatalism, historical memories of limited access, shape trust and risk perceptions.
- Peer networks play an especially **positive enabling role** when trusted, more so than in other countries.
- Emphasis on regaining trust through **ethical distance**, clearer boundaries, and structured communication.

What stands out: The intertwining of cultural patterns, interpersonal dynamics, and historical memory with health decisions.

Comparative synthesis

Across the four countries, participants describe a complex interplay between communication, trust, emotions, and information quality as central to safe medication use and vaccination decisions. While all countries share structural and interpersonal barriers, the **dominant barrier type differs:**

- **Germany** highlights systemic and autonomy-related barriers rooted in trust and structure. In Germany in particular, framing vaccination within a broader discussion of medication literacy was reported to lower resistance and enable participation among individuals who might not have engaged in vaccine-focused initiatives alone.
- **Poland** is characterized by strong respect for medical authority alongside time-limited consultations and fragmented information, resulting in a need for clearer, contextualized explanations.
- **Greece** reveals everyday practical burdens -polypharmacy, unclear instructions, caregiver overload.
- **Cyprus** emphasizes cultural dynamics, blurred professional relationships, and historically shaped trust.

Enablers also vary:



Germany stresses evidence-based communication; Poland stresses education; Greece stresses personalized guidance; Cyprus stresses peer-led approaches.

Taken together, the cross-national patterns show that while health literacy interventions must address shared challenges (communication, trust, and misinformation), **effective design must also adapt to each country’s unique social textures**, historical legacies, and cultural health practices.

Thematic areas for the proposed training according to participants

Germany

Branding and presentation: Participants emphasized the importance of strong visual branding and a recognizable platform name or logo to enhance engagement and trust. Mother1 highlighted concise, revisit-able modules and short video formats for younger audiences, while Educator2 suggested a marketing-friendly slogan to attract attention. Carer1 and Patient1 supported clear, user-friendly presentation with accessible subtitles or mission statements, incorporating words like “empowering” to communicate the platform’s supportive intent. Overall, a visually appealing and approachable presentation was seen as critical for motivating participation and repeated use.

Platform labeling and perception: There was a clear concern about avoiding top-down or patronizing language in describing the platform. Educator1 and Elder1 proposed framing MedLit as an “information platform” rather than formal “training,” a view echoed by the group to ensure inclusivity and accessibility. This labeling aligns with participants’ desire to promote autonomy and empowerment, signaling that the platform offers guidance and support rather than prescriptive instruction, which could deter engagement.

Content structure and organization: Participants discussed structuring content around guiding questions, disease categories, or medication names to facilitate user navigation. Educator2 and Carer1 favored interactive, question-driven modules such as “Do you sometimes take too many medications?” or “How can you check for interactions?” Patient1 preferred organization by disease entity, while Carer1



highlighted classification by medication or vaccine name as a reliable approach. The consensus was that content should be flexible, enabling users to explore topics at different depths according to their needs and interests.

Scope of content: The thematic scope of MedLit content was proposed to include both conventional medicine and alternative approaches such as homeopathy, Tibetan medicine, and TCM. Elder1 stressed holistic perspectives, including psychosomatic health, while Educator1 reinforced inclusion of school medicine alongside alternative practices. Participants collectively emphasized the need for comprehensive content that balances scientific evidence with diverse perspectives to respect autonomy and varied health beliefs.

Practical and interactive learning: Participants recommended content that addresses practical, real-life questions and encourages interactive engagement. Mother1 suggested short, visually engaging videos; Carer1 and Patient1 highlighted actionable guidance on polypharmacy, drug interactions, and patient comprehension. The use of brochures, take-home materials, and opportunities for users to note questions for doctors was also suggested. Overall, the platform was envisioned as interactive, adaptable, and user-centered, facilitating both understanding and application in daily health management.

Poland

Safe use of medications: Participants described the safe use of medications as a complex and emotionally loaded process shaped by fragmented care and limited coordination between multiple specialists. Inconsistent or partial guidance on dosage, timing, and interactions frequently created uncertainty, particularly when no single healthcare professional was perceived as overseeing the entire medication regimen. Reading medication leaflets, while viewed as necessary, often increased anxiety and, in some cases, contributed to hesitancy or non-adherence when information appeared overwhelming or insufficiently contextualized.

Importantly, these challenges did not reflect passivity or lack of engagement. Participants expressed a strong sense of responsibility, autonomy, and desire for safety

in managing their treatment. They emphasized the importance of understanding drug–food interactions, recognizing and reporting side effects, and having access to trusted clarification from doctors and pharmacists. Many participants adopted proactive, compensatory strategies to manage uncertainty, such as preparing written notes or “cheat sheets” before medical appointments to ensure they could ask relevant questions and follow recommendations accurately. Overall, medication-related decision-making emerged as both cognitively and emotionally embedded, underscoring the need for health literacy interventions that integrate clear, coordinated information with reassurance and support for patient agency.

Vaccinations: Vaccine hesitancy among participants was most often expressed not as outright opposition but as uncertainty shaped by misinformation circulating on social media, anecdotal accounts, and emotionally charged narratives. These sources frequently generated fear and anticipatory anxiety, particularly in decisions concerning children, while gaps in clear and accessible communication from healthcare providers contributed to feelings of insufficient guidance regarding vaccine schedules and safety. Participants emphasized that decisions related to vaccinations and medications were not purely cognitive, but deeply embedded in emotional experiences such as responsibility for others, fear of potential harm, and concern for long-term consequences. Reading medication leaflets, deciding about childhood vaccinations, or managing preventive interventions were described as moments that directly affected psychological well-being. Importantly, these emotional responses did not translate into rejection of vaccines; rather, they prompted increased information-seeking and reliance on trusted relationships.

Across discussions, participants demonstrated awareness of the historical and global impact of vaccination programs and explicitly acknowledged their role in preventing diseases historically associated with high mortality. Acceptance of vaccines was shaped by a combination of trust in reliable guidance, understanding of risk–benefit trade-offs, and broader socio-cultural context, including intergenerational narratives and public discourse. Participants highlighted the importance of addressing myths, critically evaluating online health information, and situating vaccination decisions within both

historical experience and contemporary public health realities. Overall, vaccination attitudes emerged as context-sensitive and socially negotiated, underscoring the need for health literacy interventions that address emotional reassurance and trust alongside factual knowledge.

Communication with healthcare providers: A central theme across topics was a dynamic tension between trust in medical expertise and the need for relational, explanatory reassurance. Participants expressed respect for physicians' knowledge and authority; however, trust was described as conditional and highly dependent on the quality of communication. When diagnoses, treatment rationales, or timelines were insufficiently explained, participants reported increased uncertainty and anxiety, greater reliance on alternative information sources, and, at times, reduced adherence. Participants highlighted the importance of effective communication in enabling preparation for medical visits, formulation of relevant questions, understanding of patient rights, and engagement in shared decision-making. Clear explanations, sufficient time for dialogue, and openness to patient concerns were identified as core components of high-quality care. Consequently, training healthcare professionals in patient-centered communication, including strategies for addressing questions and uncertainties, was viewed as critical for supporting adherence, improving health outcomes, and strengthening confidence in medical recommendations.

These findings suggest that trust is not merely institutional but is actively co-constructed within clinical encounters. The findings underscore the importance of patient-centered communication in fostering trust, informed engagement, and adherence. Participants pointed to the need for sufficient consultation time, clear explanations, and structured opportunities for questions. Strengthening communication competencies among healthcare professionals was identified as a key leverage point for improving patient outcomes and confidence in healthcare decisions.

Supplement use and overmedication: Participants identified the use of supplements and over-the-counter medications as an area requiring particular caution, especially in the context of excessive or unmonitored consumption. Concerns focused on potential harms such as liver damage, cumulative toxicity, and adverse interactions with

prescription medications. While some participants reported uncertainty regarding the distinction between supplements and medications, discussions suggested that self-directed use was often motivated by attempts to manage symptoms, prevent illness, or compensate for perceived gaps in medical guidance rather than disregard for safety. Importantly, participants drew extensively on lay expertise and experiential knowledge when making decisions about supplement use. Personal, familial, and professional experiences—such as caring for children with chronic conditions or working in education, pharmacy, or dietetics—served as key interpretative frameworks for evaluating risks and benefits. Rather than treating this knowledge as sufficient in itself, participants frequently acknowledged its limitations and emphasized the need to validate personal judgments against reliable medical or pharmaceutical guidance. Participants stressed the importance of assessing supplement quality, understanding safe and evidence-based usage, and recognizing situations that require professional consultation. Overall, the motivation underlying discussions of supplement use was preventive in nature: minimizing avoidable harm while promoting informed, responsible consumption practices.

Understanding and managing information overload (leaflets, internet, social networks): Participants described medication leaflets and online information as major sources of anxiety and confusion, often leading to self-discontinuation of treatment. Training should focus on how to read leaflets selectively, distinguish warning language from actionable risk, and evaluate online health information critically. Particular emphasis should be placed on recognizing misinformation and emotionally charged narratives.

Navigating the healthcare system in practice: Beyond knowledge of medicines or vaccines, participants emphasized difficulties in knowing where to go and what to do in cases such as reporting side effects, deciding when to return for consultation, and distinguishing between GP care, out-of-hours services, and emergency departments. Modules should provide clear, scenario-based guidance on system navigation.

System navigation and education as core components of health literacy:



Beyond knowledge of medications or vaccines, participants emphasized difficulties navigating the healthcare system, including knowing whom to contact for side effects, when to seek follow-up care, and which services are appropriate in urgent but non-life-threatening situations. These challenges highlight system navigation as a key component of safe medication use and vaccination practices.

Participants understood education not as one-way information delivery, but as empowerment to ask questions, engage in dialogue, and make informed decisions. They emphasized the need for accessible, age-appropriate, and case-based educational initiatives delivered by trusted messengers, indicating readiness for participatory health literacy approaches rather than purely didactic models.

Greece

Basic principles of vaccination and medication use: Participants across all groups emphasized that gaps in foundational knowledge create uncertainty, anxiety, and frequent mistakes in daily medication routines. Many noted that they do not fully understand why a treatment is necessary, how different medicines work, or what distinguishes various types of vaccines. This lack of clarity becomes more challenging with polypharmacy, changing prescriptions, and new vaccine recommendations, making adherence harder, especially for older adults and caregivers who manage multiple regimens. The need for simple, structured explanations about dosage, timing, and indications was repeatedly highlighted as essential for safe practice.

The motivation to participate in such training stems from the desire to understand the rationale behind medical instructions and to reduce the fear of making harmful mistakes. Participants expressed that learning the basic principles would empower them to interpret recommendations more confidently and integrate them into everyday routines. A module covering vaccine types, guidelines for safe medication use, managing treatment changes, and monitoring side effects would address these concerns by strengthening knowledge, improving self-management skills, and ultimately preventing common errors.



Barriers to adherence: Participants identified a wide range of obstacles that interfere with consistent vaccination and medication practices, including fear of side effects, contradictory online information, emotional fatigue from long-term illness, and the burden of caregiving responsibilities. These barriers often undermine decision-making and lead to hesitation or inconsistent adherence. Caregivers in particular reported feeling overwhelmed by multiple instructions, while parents described anxiety intensified by competing sources of information. A module that names and normalizes these barriers helps participants recognize that these challenges are shared and manageable.

Motivation to engage with this module comes from the desire to feel safer, more confident, and more in control of one's own or another person's care. Participants believe that understanding their barriers would allow them to anticipate difficulties, reduce stress, and make more informed choices. Covering topics such as fear, fatigue, social pressure, misinformation, and stress-management strategies offers practical support and provides participants with tools to navigate emotionally charged situations that directly affect adherence.

Facilitating factors for adherence: Participants highlighted that adherence improves significantly when strong support systems are present, whether through a trusted doctor, a reliable pharmacist, or supportive family members. Positive communication, stable relationships with healthcare professionals, and consistent access to guidance make daily management far easier. These facilitating factors influence not only whether participants follow medical advice, but also how confident they feel when making decisions about medicines and vaccines.

This module responds to participants' motivation to adopt practical, realistic strategies that simplify their routines and reduce errors. Training on how to optimize supportive networks, strengthen trust with healthcare professionals, and use organizational tools helps participants sustain adherence over time. Emphasizing real-life tactics, such as leveraging family help, coordinating with pharmacists, and structuring medication schedules, can transform complex regimens into manageable everyday practices.



Communication and information management: Participants described major difficulties in understanding medical information and evaluating the reliability of what they read online or hear from others. Misinterpretation, gaps in communication with healthcare professionals, and contradictory messages, especially about vaccines, were common sources of confusion. A training module focused on communication and information management would give participants tools to navigate this complexity and ask clearer, more targeted questions during consultations.

Their motivation stems from a strong desire for trustworthy, comprehensible information. Participants want to feel confident distinguishing myths from facts and to better understand how to interpret guidelines. This module would address these needs by teaching communication techniques, strategies for verifying information, and methods for adapting messages to different health literacy levels. Such skills are critical for reducing anxiety, improving clarity, and enhancing participants' ability to engage meaningfully with healthcare professionals.

Emotional and social dimensions: Fear, anxiety, social pressure, and the emotional burden of responsibility emerged as powerful influences on participants' decisions about vaccination and medication use. These emotional and social factors often overshadow technical knowledge and impede consistent adherence, particularly for caregivers and parents who feel responsible for others' wellbeing. Addressing these dimensions helps participants understand how emotions shape behavior and why hesitation persists even when information is adequate.

Participants are motivated to manage these emotional challenges because they recognize that stress and uncertainty affect their ability to make sound health decisions. A module focusing on emotional resilience, social influence, and coping mechanisms would enable participants to identify their own emotional responses and respond more effectively to external pressures. By building self-awareness and strategies for managing fear and social expectations, participants can strengthen adherence and improve their overall sense of control.

Strengthening autonomy and participation: Across all groups, participants articulated the importance of being actively involved in decisions about their



medications and vaccines. When individuals understand the logic behind a regimen or recommendation, they are more consistent, confident, and motivated. Many expressed that passive obedience to instructions feels insufficient and that greater autonomy reduces uncertainty and enhances trust in healthcare encounters.

Participants are motivated to engage in this module because it empowers them to evaluate information critically and take responsibility for their health decisions. Training on shared decision-making, assessing credible sources, and building self-management skills supports the development of autonomy and encourages active participation. This approach not only improves adherence but also fosters long-term engagement with preventive health practices.

Practical tools and applications: Participants repeatedly emphasized the usefulness of tangible, everyday tools that help organize medication schedules and vaccination reminders. Pillboxes, calendars, checklists, and digital apps were identified as crucial supports, particularly for caregivers and older adults managing multiple treatments. Practical tools reduce confusion, prevent missed doses, and support safe, structured routines that participants find easier to follow.

The motivation behind this module comes from participants' desire for simple, actionable solutions they can immediately incorporate into daily life. The module would focus on teaching how to use organizational tools effectively, integrate reminder systems, and practice hands-on exercises that reinforce skills. By providing clear, practical applications, this module enhances safety, builds confidence, and supports long-term adherence to both medications and vaccinations.

Cyprus

Building trust and communication between patients and providers: Participants highlighted that trust in healthcare professionals is a key factor in the safe use of medicines and vaccines. Variations in communication quality, inconsistent advice, and unclear explanations often lead to confusion and mistrust. Participants expressed the need for open, transparent, and empathetic communication that allows them to feel

heard and supported when making health decisions. Trust must be actively cultivated through reliable guidance, accountability, and respect for patients' concerns.

The topic should cover strategies for building mutual trust, promoting transparency, and enabling shared decision-making. Participants emphasized the importance of addressing gaps in understanding caused by inconsistent medical advice and creating space for dialogue where patients can participate actively in their care. Improving communication skills of healthcare professionals and fostering two-way discussions were seen as critical steps toward enhancing adherence and patient confidence.

Understanding medicines and vaccines: development, testing, and regulation:

Participants reported limited knowledge about how medicines and vaccines are developed, tested, and regulated, which contributes to hesitation and uncertainty. Providing clear and accessible information about the stages of research, clinical trials, ethical standards, and regulatory approval can empower individuals to make informed decisions. Understanding labels, patient information leaflets, and safety data was identified as essential for increasing autonomy and confidence in treatment choices.

The content should explain the full lifecycle of medicines and vaccines, from development to public availability, emphasizing scientific and ethical principles. Participants expressed motivation to learn why specific treatments are recommended and how to interpret information critically. By increasing comprehension of regulatory and clinical processes, this topic can reduce fear, strengthen informed decision-making, and enhance trust in healthcare guidance.

Collective responsibility of vaccines and supporting vulnerable populations:

Participants recognized that vaccination decisions affect not only personal health but also the wellbeing of the community. Understanding concepts such as herd immunity and the social impact of vaccines was seen as essential to fostering collective responsibility. Participants emphasized that supporting vulnerable populations, including those who cannot be vaccinated due to age or medical conditions, is a key ethical consideration in vaccination campaigns.

The topic should cover ethical, social, and community dimensions of vaccination, including tailored communication and inclusive strategies for special populations. By



highlighting the interconnectedness of individual and community health, this module can reinforce solidarity, empathy, and informed participation. Participants expressed motivation to learn how their actions influence public health outcomes and to acquire strategies for protecting at-risk groups.

Understanding side effects and individual health differences: Participants expressed concern over the variability of responses to medicines and vaccines due to age, genetics, pre-existing conditions, or concurrent medications. A clearer understanding of potential side effects, risk factors, and expected reactions was identified as critical for building confidence and encouraging safe use. Knowledge of when and how to seek professional advice can help individuals make informed decisions and manage concerns effectively. The module should focus on variability in medication and vaccine responses, clear communication of side effects, and risk management strategies. Participants emphasized the importance of distinguishing normal from concerning reactions and balancing perceived risks against medical benefits. Increasing awareness and knowledge in this area supports informed consent, reduces anxiety, and strengthens adherence to health recommendations.

Critical evaluation of health information and misinformation: Participants reported difficulty in navigating the abundance of online health information, often struggling to distinguish credible sources from misleading or false content. This lack of clarity generates confusion, anxiety, and occasionally harmful decisions. Training in critical thinking, media literacy, and evidence-based evaluation was considered essential to enhance individuals' ability to assess health claims accurately.

The module should teach participants how to identify trustworthy information, evaluate scientific evidence, recognize misinformation, and understand the role of social media in shaping health perceptions. Participants emphasized the importance of verifying information while relying on trusted networks, such as healthcare professionals or peers. Strengthening these skills promotes informed decision-making, reduces susceptibility to myths, and empowers independent, evidence-based judgment.

Addressing fear and hesitancy; COVID-19, autism, and pharmaceutical companies: Participants described fears surrounding vaccination, particularly



regarding COVID-19, potential links to autism, and distrust toward pharmaceutical companies. These fears were often exacerbated by conflicting advice, negative personal experiences, and widespread misinformation. Addressing these concerns with transparent, evidence-based information is essential for rebuilding confidence and promoting safe vaccination practices.

The topic should cover common myths, the impact of social media, the role of pharmaceutical industry practices, and strategies for restoring trust through credible sources and community dialogue. Participants expressed motivation to understand the origins of fear, receive reliable guidance, and recognize how public attitudes influence collective health. Addressing these fears directly helps reduce misinformation-driven anxiety and strengthens informed, confident decision-making.

Cultural and contextual influences in trust and health decision-making:

Participants emphasized that personal experiences, social ties, cultural norms, and emotions strongly influence trust in healthcare and willingness to follow medical advice. Familiarity in small communities and differing exposure to medical information also shape health behaviors, risk perception, and decision-making. Recognizing these factors is essential for promoting trust and adherence.

The module should explore how cultural values, emotional responses, personal experience, and community context affect health decisions. Topics include professionalism in close-knit communities, risk perception, and culturally aware communication strategies. Participants highlighted the importance of empathy, respect, and cultural sensitivity in healthcare interactions to strengthen trust and support informed, confident choices.

Proposed health literacy training modules across countries

The following framework presents a set of health literacy training modules developed from cross-country participant insights on the safe use of medications and vaccines. Each module is designed to address key themes identified by participants, including trust in healthcare providers, understanding of medical information, emotional and social influences, and practical strategies for adherence. For each module, a detailed



description is provided, highlighting its objectives, learning outcomes, and practical applications. Additionally, the relevance of each module to Germany, Poland, Greece, and Cyprus is indicated, reflecting differences in local healthcare contexts, cultural factors, and population needs. This structured approach allows for the creation of a tailored, interactive, and evidence-based training program that supports informed decision-making, autonomy, and safe healthcare practices across diverse settings.

Trust & Communication

Description: This module focuses on building and maintaining trust between patients and healthcare providers. It teaches strategies for clear, honest, and empathetic communication, encouraging dialogue and active participation in decision-making. Emphasis is placed on understanding patient concerns, asking clarifying questions, and creating a supportive environment where individuals feel heard. Participants also explore practical techniques for enhancing communication, including active listening, providing patient-friendly explanations, and tailoring information to individual literacy levels.

A key addition highlighted by participants, particularly in Poland, is **preparation for medical visits**. This includes empowering patients with structured tools such as written question lists, checklists, or cheat sheets to help them ask informed questions and actively engage during consultations. Older adults reported feeling uncertain about what to ask and feared being perceived as “difficult” patients, underscoring the need for patient education and practical guidance in advance of appointments. Improved communication strategies, combined with preparatory tools, foster adherence, reduce anxiety, and strengthen confidence in treatment decisions.

Connected Countries: Strongly emphasized in Germany, Poland, Greece, and Cyprus, with a particular focus in Poland on tools supporting patient preparation for consultations.

Understanding Medications & Vaccines



Description: This module addresses the scientific, clinical, and ethical aspects of medications and vaccines, including their development, clinical trials, and regulatory approval processes. It aims to empower participants by providing a clear understanding of how treatments work, enhancing their confidence and ability to make informed decisions.

It also covers interpreting labels, patient information leaflets, and safety data, helping learners critically assess instructions and risk information. This module strengthens autonomy, reduces fear, and promotes informed engagement with healthcare.

Connected Countries: Particularly important in Poland and Cyprus; moderately emphasized in Germany and Greece.

Safe Use & Adherence

Description: This module focuses on safe medication and vaccine use, emphasizing the importance of following prescribed instructions and preventing errors. It includes strategies for maintaining treatment regimens, managing polypharmacy, and identifying potential drug interactions.

Participants are taught practical tools for tracking adherence, recognizing early warning signs of complications, and understanding when to seek professional guidance. The module supports confidence in self-management and encourages responsible engagement with healthcare recommendations.

Connected Countries: Strongly emphasized in Germany, Poland, and Greece; moderately in Cyprus.

Collective Responsibility & Vulnerable Populations

Description: This module highlights the societal dimension of health, focusing on vaccination and the impact of individual choices on community wellbeing. It covers



concepts such as herd immunity and ethical responsibility toward vulnerable populations, including those unable to receive vaccines.

Participants learn how personal health decisions contribute to public health outcomes, promoting solidarity, empathy, and informed participation in vaccination campaigns. The module emphasizes community engagement and social responsibility in healthcare. **Polish participants also highlighted the value of learning from other countries' experiences, suggesting that opportunities for international dialogue and cross-cultural exchange can enrich understanding and foster a broader sense of collective responsibility.**

Connected Countries: Strong emphasis in Cyprus; moderate emphasis in Germany, Poland, and Greece.

Critical Evaluation of Health Info & Misinformation

Description: This module develops participants' ability to assess the reliability of health information, distinguishing scientific evidence from myths and misinformation. It covers evaluating online sources, media literacy, and strategies for cross-checking claims with trusted references.

Participants also learn to identify misleading content and understand the influence of social networks and social media on health perceptions. These skills empower learners to make independent, evidence-based decisions and reduce anxiety caused by conflicting or false information. **Polish participants highlighted the added value of learning from experiences in other countries, suggesting that incorporating international examples and cross-cultural perspectives can enhance understanding and foster critical thinking.**

Connected Countries: Strong emphasis in Poland, Greece, and Cyprus; moderate in Germany.



Addressing Fear & Hesitancy

Description: This module addresses fears and doubts surrounding medications and vaccines, including COVID-19 concerns, perceived links to autism, and distrust of the pharmaceutical industry. It teaches how to confront myths, interpret evidence, and communicate effectively about safety and efficacy.

Participants explore strategies to rebuild confidence, including transparent explanations, credible sources, and community dialogue. The module emphasizes understanding the origin of fears and using evidence-based information to promote safe, informed health behaviors.

Connected Countries: Strong emphasis in **Greece and Cyprus**; moderate in **Germany and Poland**.

Cultural & Contextual Influences

Description: This module examines how culture, social networks, personal experiences, and beliefs shape healthcare decisions. It teaches participants to recognize the role of social norms, emotions, and local context in influencing trust and adherence.

It also provides guidance on culturally sensitive communication, understanding diverse health beliefs, and adapting messages to various communities. Participants learn how cultural and contextual factors affect interactions with healthcare providers, including how to prepare for consultations, ask informed questions, and feel confident in shared decision-making. The module emphasizes empathy, respect, and awareness of context-specific factors in promoting adherence, informed choices, and active patient participation.

Connected Countries: Strong emphasis in Germany, Greece, and Cyprus; moderate in Poland.

Practical Tools & Applications



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Description: This module provides hands-on tools for daily management of medications and vaccination schedules. It includes practical strategies such as calendars, pillboxes, checklists, and digital reminders to reduce errors and maintain consistent routines. Participants also learn to use digital motivators, such as e-books, certificates, or gamified tracking, to enhance engagement and adherence.

Participants learn how to integrate these tools into daily life, manage complex regimens, and reinforce safe practices. The module bridges theory and practice, while also encouraging preparation for medical consultations, helping participants feel confident in communicating with healthcare providers and asking informed questions.

Connected Countries: Strong emphasis in Germany and Greece; moderate in Poland and Cyprus.

Emotional & Social Dimensions

Description: This module explores the emotional and social factors that influence adherence, including anxiety, fear, social pressure, and caregiving stress. It teaches strategies for emotional regulation, coping with social expectations, and leveraging supportive networks.

Participants learn how emotions can impact decision-making and develop skills to manage stress, reduce hesitation, and maintain safe practices. The module also encourages interaction within family, community, and international peer networks, allowing learners to exchange experiences, compare practices across countries, and foster mutual understanding. This strengthens resilience and equips learners to navigate complex social and emotional influences on health behaviors.

Connected Countries: Strong emphasis in Greece and Cyprus; moderate in Germany and Poland.

Strengthening Autonomy & Participation



Description: This module encourages active participation in decisions about medications and vaccinations, emphasizing shared decision-making, critical evaluation of information, and personal responsibility for health. It helps participants develop self-management skills and confidence in engaging with healthcare providers. The module promotes independence, empowers learners to assess evidence, and fosters long-term engagement with preventive health practices.

Building on the insights from Polish participants, a central component of this module is **guidance on effective patient-provider communication**. Participants highlighted the importance of learning how to ask the right questions, express concerns, and actively participate during medical consultations. Tools such as question checklists, structured prompts, or preparatory guides can help patients, especially older adults, feel confident and competent in their interactions with healthcare professionals. By combining autonomy with practical communication skills, participants can make informed choices, reduce uncertainty, and strengthen their overall engagement with healthcare.

Connected Countries: Strong emphasis in Germany, Greece, and Cyprus; in Poland, particular attention is given to structured patient education for confident healthcare interactions.

Participants' proposals regarding methodology and other parameters for the MEDLIT training

Germany

Methodology: Participants emphasized that the MEDLIT methodology should be interactive, engaging, and accessible to lay audiences. Clear, simple language with relatable examples, metaphors, and visuals was recommended to enhance understanding, while clickable links and references could provide optional deeper learning for those who wish to explore topics further. There was consensus on the value of revisiting content multiple times, sharing it with family members, and gradually expanding knowledge, ensuring the methodology accommodates different learning



paces and levels of prior knowledge. Holistic approaches and respect for individual autonomy, including integration of alternative medicine perspectives, were also highlighted as important components of the teaching method.

Length of the training: Participants agreed that attention spans have shortened, particularly among younger learners, making short learning units preferable. Videos and modules were suggested to be under 10 minutes, with more complex content divided into incremental, easily digestible segments. Modular learning, scalable across different age groups and knowledge levels, allows users to progress at their own pace. Scheduled breaks, progress tracking, and gamification were recommended to maintain engagement and motivation, while intergenerational and family-friendly approaches were encouraged to make learning a shared, enjoyable experience.

Training materials: Training materials should combine printed and digital resources to accommodate diverse preferences and skill levels. Participants emphasized brochures, leaflets, and trifold flyers with space for note-taking as essential for calm, at-home processing of information and for future discussions with healthcare providers. Visual, interactive materials such as explanatory videos, including avatars and clickable links, were strongly favored to reinforce learning and allow for individualized exploration. All participants agreed that video and interactive content are more effective than lengthy text, and the use of AI technology may further enhance interactivity by enabling learners to ask questions and receive tailored feedback.

Poland

Blended learning approach: The proposed methodology emphasizes a blended learning approach, combining in-person sessions, online modules with interactive elements, webinars with live Q&A, case-based learning using real-life examples from partner countries, and peer-to-peer discussions. Community-based delivery in familiar and trusted environments, such as community centers or churches, was particularly valued by older adults and carers, while parents preferred online accessibility for convenience and flexibility due to caregiving responsibilities. Across all groups, interactive and visual learning was favored, with positive, relatable examples enhancing

engagement. Peer-led discussions and Q&A platforms were also important, fostering trust in expert guidance, though older adults and carers often preferred face-to-face interactions.

Length of the training: Participants supported a modular, concise training format consisting of short 20–30-minute sessions, totaling 1–1.5 hours, with the option to split into 2–3 modules and complete at their own pace. Short, digestible sessions were appreciated by all groups, though parents particularly valued flexibility to fit around childcare, whereas seniors sometimes preferred longer, uninterrupted sessions. Tailored modules for specific life stages or target groups were suggested, such as for older adults, pregnant women, or parents, ensuring content relevance. Self-paced learning was widely endorsed, allowing participants to watch, read, and analyze materials at their own speed, with younger adults generally more comfortable navigating digital formats.

Training materials: The training materials are proposed to be multi-format, including visual aids such as infographics and videos, podcasts with downloadable resources, printed brochures, case studies, interactive quizzes, certificates, and access to expert consultations. Visual storytelling was effective across all groups, though older adults and carers appreciated historical context, while parents preferred contemporary cases and best practices from other partner countries. Audio formats, like podcasts, were valued for multitasking, especially by parents, whereas printed materials increased trust, particularly for older adults and carers. Gamified learning, including ebooks or digital badges, was suggested as a motivational tool, with practical rewards preferred by older adults and digital incentives appealing to parents and adult educators.

Greece

Preferred learning style: Participants consistently emphasized that they learn most effectively through visual materials, concrete examples, and demonstrations drawn from real-life situations. They expressed that purely verbal or theoretical explanations are harder to retain, especially for older adults or individuals with lower digital literacy. Visual aids such as images, infographics, and short instructional videos were described as essential for supporting memory and reducing anxiety about making mistakes.



Seeing a process performed, such as proper medicine storage or how to organize a pillbox, was considered far more impactful than reading an abstract description.

Motivation to participate increases when the content feels accessible, engaging, and immediately useful. Participants noted that experiential learning methods, such as real-life caregiving scenarios or short self-assessment activities, make them feel more confident in their understanding and more capable of applying what they learn. They reported that such interactive and visual approaches not only enhance comprehension but also foster a sense of achievement. As a result, they proposed that the platform prioritize audiovisual materials and practical demonstrations to accommodate diverse learning preferences.

Balance between theory and practice: Across all participant groups, there was strong agreement that the training should be primarily practice-oriented. Participants expressed that while theoretical background information is valuable, it should be concise, clear, and directly connected to real-world applications. They prefer instruction that translates theoretical concepts into practical strategies—such as how to communicate symptoms to a doctor, how to avoid common medication errors, or how to remember daily dosages. For them, theory is supportive, not central to learning; practical content is what makes the program feel useful and relevant.

Participants' motivation is driven by their perception of the training as a tool for everyday problem-solving rather than an academic course. They stressed that a practical emphasis would help them immediately apply what they learn to their own situations, increasing both satisfaction and retention. They recommended a balance of approximately 70% practical content and 30% theory, ensuring that foundational information is included but always grounded in everyday realities. This approach would make the program more approachable, actionable, and motivating for participants of all backgrounds.

Importance of examples and case studies: Participants unanimously endorsed the inclusion of examples, short narratives, and case studies, noting that these elements significantly improve comprehension and memory. They explained that recognizing familiar situations—such as an older adult mixing up pills or a caregiver managing



multiple medications -helps them connect new information to their lived experiences. Case studies make abstract concepts concrete and demonstrate how recommended practices play out in real settings, thereby reinforcing the relevance of the training. Motivation increases when participants “see themselves” in the scenarios provided. Realistic examples sustain attention, make learning more relatable, and help them internalize correct behaviors. They also encourage reflection on one’s habits and potential mistakes. Participants proposed using diverse case studies tailored to different roles -caregivers, chronic patients, older adults- and incorporating interactive “What would you do if...?” questions to enhance engagement. This approach not only supports understanding but also cultivates problem-solving skills and reinforces correct decision-making.

Preferences for content format (text or visual): Participants expressed a strong preference for a mixed-format approach combining text, visuals, and short videos, with visuals playing the dominant role. They explained that lengthy text creates fatigue and reduces motivation, particularly among older adults, while images and videos help them process information quickly and with greater clarity. Text remains important, but mainly for reviewing information at one's own pace; it should therefore be concise, well-structured, and paired with visuals that illustrate key points.

Their motivation is driven by the belief that multimodal learning strengthens memory and allows individuals with different learning styles to engage effectively. Participants noted that short videos (1–3 minutes), infographics, and simple explanatory diagrams help them “learn without getting tired,” making the experience more enjoyable and less overwhelming. Combining visual and written elements also enhances accessibility, enabling users with varying literacy levels to benefit equally. This approach supports sustained engagement and facilitates comprehension in both digital and printed formats.

Suggestions for session duration: Participants overwhelmingly preferred short, structured learning sessions lasting 45–60 minutes, held one to two times per week. They emphasized that shorter sessions allow them to fit training into their daily schedules without causing fatigue, making the content more digestible and manageable. They argued that spreading the program over 4–6 weeks supports gradual learning and



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better long-term retention, as opposed to longer, intensive sessions that may lead to information overload.

Motivation increases when sessions are flexible and cognitively manageable. Participants stressed that shorter units help maintain concentration and reduce learning fatigue, particularly for those with caregiving duties or chronic health conditions. They suggested that each session should include clear learning objectives, brief self-assessment activities, and optional additional material for those who wish to deepen their understanding. This structure provides clarity, supports progression, and ensures that users with limited time can still fully benefit from the program.

Educational materials and resources: Participants expressed a strong desire for a blend of digital and printed learning materials, noting that both formats serve important but distinct purposes. Short videos and infographics help them understand and remember content quickly, while printed materials, such as leaflets, PDFs, or condensed guides, allow for later review without requiring digital access. They emphasized that materials should be simple, practical, and accessible, avoiding jargon or overly technical explanations.

Participants are motivated by the availability of tangible resources they can keep and consult after the training ends. This gives them a sense of continuity and security, especially when managing complex medication routines. They recommended including checklists, step-by-step guides, and interactive review quizzes to reinforce learning and ensure comprehension. A small take-home handbook summarizing the key points would enhance long-term usability and support participants in applying the knowledge independently.

Additional suggestions: Participants emphasized the importance of opportunities for interaction—either with trainers or with other learners—as a way to exchange experiences, clarify doubts, and build a sense of community. They proposed incorporating features such as written Q&A options, chat functions, or small discussion groups. This interpersonal dimension was seen as highly valuable, particularly for caregivers and older adults who often feel isolated in their health-related responsibilities.



Motivation is strengthened when participants feel supported, heard, and connected. Interaction not only enhances engagement but also reinforces trust and encourages peer learning. Participants suggested that even minimal opportunities for asking questions or sharing experiences would significantly improve the program's impact. Such elements foster a cooperative learning environment, increase confidence, and help participants apply what they learn more effectively in their daily lives.

Cyprus

Participants emphasized the importance of a **flexible and accessible methodology**, preferring online training that allows revisiting content at their own pace. Recorded sessions, apps, and newsletters were suggested to provide on-demand access to reliable health information, enabling participants to engage with the material when convenient. This approach was seen as particularly valuable for parents, caregivers, and older adults who may need to balance multiple responsibilities or time constraints.

The **blend of theoretical and practical content** was highlighted as critical for engagement and effective learning. Participants wanted materials that are informative but also interactive, avoiding purely passive formats like static PowerPoints. Connecting concepts to real-life scenarios helps learners understand applications, retain knowledge, and relate training content to daily health management tasks.

Participants stressed the need for **plain, understandable language** that accommodates varying levels of health literacy. Materials should avoid medical jargon and provide clear, simple explanations so that all participants, regardless of background, can easily comprehend the content. Trustworthy dissemination was also emphasized, with recommendations to place materials in reputable venues such as doctors' offices and on recognized online platforms to ensure credibility and reach.

Regarding **training length**, participants preferred shorter, concise sessions that maintain attention and reduce cognitive overload. Visually supported content with images, graphs, or videos was suggested to convey key information efficiently, making training both accessible and engaging without overwhelming participants.

Finally, participants highlighted the value of **interactive and participatory materials**, including videos, exercises, role-playing, group discussions, workshops, and hands-on activities. Such formats foster active learning, collaboration, and self-directed exploration. Social and practical components allow participants to apply knowledge in realistic scenarios, reflect on experiences, and engage in dialogue, reinforcing understanding and long-term retention of training concepts.

Similarities and differences across countries

Across all countries, participants converged on **interactive, visual, concise, and practical learning** that supports autonomy and allows revisiting content. Differences arise mainly in **delivery mode, session length, technological tools, and cultural/contextual adaptations** to meet learners' preferences and everyday constraints.

Similarities

Interactive and practical learning: All countries emphasized that training should be interactive and engaging. Visual aids, short videos, case studies, and real-life examples were universally preferred to enhance comprehension and retention. Practical, hands-on approaches were seen as more effective than purely theoretical instruction.

Concise, modular, and flexible content: Participants consistently recommended short, modular sessions to accommodate attention spans, daily routines, and life responsibilities. Self-paced, scalable modules allow learners to progress according to their own needs, with opportunities to revisit content for reinforcement.

Blend of digital and printed materials: A combination of digital (videos, infographics, and apps) and printed materials (leaflets, brochures, handouts) was suggested across all countries. Digital content supports visual and interactive learning, while printed resources enable calm review, note-taking, and long-term reference.

Accessible language and clarity: Clear, simple, jargon-free language with relatable metaphors and examples was highlighted in all contexts. Materials should be understandable to lay audiences and accommodate varying levels of health literacy.

Family- and community-oriented engagement: Intergenerational and social engagement, sharing content with family or peers, was valued universally. Learning was seen not only as an individual activity but also as an opportunity to foster dialogue and collective understanding.

In addition, participants, particularly in Poland, expressed strong interest in learning from **experiences and perspectives in other countries, highlighting the potential of MEDLIT to support international dialogue and cross-country understanding.** This suggests that community-oriented engagement can extend beyond local contexts, reinforcing a sense of shared European learning around medication use and vaccination.

Differences across countries

Preferred learning formats and delivery modes:

- **Germany:** Short videos (<10 minutes) with clickable links and AI-enhanced interactivity; strong emphasis on revisiting content at home.
- **Poland:** Blended learning combining in-person sessions, online modules, webinars, and peer discussions; community-based delivery appreciated by older adults.
- **Greece:** Emphasis on visual materials and demonstrations of real-life situations; participants favored mixed-format content with practical focus (70% practice, 30% theory).
- **Cyprus:** Online training with on-demand access, recorded sessions, and newsletters; strong preference for participatory and scenario-based learning.

Session duration preferences:

- **Germany:** Short modules (<10 minutes) for younger audiences, with incremental learning and breaks.
- **Poland:** Slightly longer sessions (20–30 minutes), with the flexibility to split modules and self-pace.
- **Greece:** Structured sessions of 45–60 minutes, 1–2 times per week over 4–6 weeks.
- **Cyprus:** Short, concise sessions; length adjusted to reduce cognitive overload and maximize attention.

Focus on autonomy vs. guided learning:

- **Germany & Cyprus:** Strong emphasis on autonomy, self-paced exploration, and optional deeper learning.
- **Poland:** Community-based or guided peer-led discussions were particularly valued, especially for older adults.
- **Greece:** Practical problem-solving was prioritized; learners motivated by applying skills immediately rather than academic exploration.

Role of technology and interactivity:

- **Germany:** AI-supported tools were highlighted for enabling interactive questioning, personalized feedback, and self-paced reflection, supporting autonomous learning outside clinical encounters.
- **Poland:** Participants emphasized motivational digital formats, including gamification elements, digital badges, podcasts, certificates, and e-books, which were seen as supporting sustained engagement and a sense of achievement throughout the learning process.
- **Greece:** Visual and practice-oriented content was prioritized over technology-heavy approaches; short, clear instructional videos were considered particularly effective for conveying key messages.

- **Cyprus:** Apps, role-playing, and group exercises prioritized for active engagement.

Contextual and cultural preferences:

- **Poland:** Community centers and familiar local settings preferred for trust and comfort.
- **Greece:** Real-life caregiving scenarios and case studies tailored to participants' experiences.
- **Cyprus:** Online accessibility is crucial due to participants balancing multiple responsibilities and geographic dispersion.

Cross-country implications for the design and implementation of the MEDLIT platform

Building on the comparative qualitative findings across Germany, Poland, Greece, and Cyprus, this section translates cross-national insights into concrete considerations for the design, framing, and implementation of the MEDLIT platform. Rather than reiterating country-specific results, it highlights shared principles while acknowledging national variations, providing guidance on engagement strategies, communication formats, technological tools, and methodological choices.

Framing MEDLIT as a tool for autonomy, not compliance

Across all four countries, participants expressed a strong desire to be respected as active decision-makers rather than passive recipients of medical advice. While the degree of autonomy varied, from pronounced self-responsibility in Germany to more doctor-dependent decision-making in Greece, the underlying expectation was consistent: learning initiatives should support understanding, reflection, and confidence, not impose behavioral directives.

For MEDLIT, this suggests content should be framed as enabling informed judgment rather than prescribing “correct” choices. Modules should invite users to reflect



independently, revisit information at their own pace, and explore optional deeper content. Additionally, structured guidance for patient–provider interactions, such as checklists, question prompts, or “cheat sheets,” can empower participants to prepare for consultations, ask informed questions, and feel confident during medical visits, particularly older adults and those with lower prior experience.

Designing for emotional safety and trust-building

Fear of side effects, emotional overload, and anxiety triggered by conflicting information emerged as powerful barriers to medication adherence and vaccination uptake across all countries. These emotional dynamics were evident among older adults in Poland, caregivers in Greece, and digitally active participants in Cyprus, and were often intensified by rushed consultations or impersonal communication.

This highlights the importance of MEDLIT adopting a tone and methodology that explicitly acknowledges uncertainty, fear, and lived experience. Trust-building strategies, such as transparent explanations, normalization of doubts, empathetic language, and opportunities for dialogue, should be embedded across modules. By creating a supportive rather than corrective learning environment, MEDLIT can enhance both retention and application of knowledge.

Prioritizing practical, modular, and revisitable learning formats

Despite national differences in preferred session length and delivery modes, participants in all countries converged on the value of short, modular, practice-oriented learning units. Visual materials, concrete examples, real-life scenarios, gamified elements, e-books, and digital incentives consistently outperformed abstract or text-heavy approaches, particularly for populations with lower health literacy or high caregiving responsibilities.

For implementation, this implies a flexible platform architecture that allows incremental engagement, repeated access to key messages, and direct application to



everyday situations. Digital tools such as reminders, calendars, and interactive content (including quizzes, podcasts, or AI-assisted feedback) can further reinforce learning and motivation. Such a modular design also enables adaptation to different national contexts, age groups, and technological capacities without altering core content.

Addressing the social, relational, and cross-cultural nature of health decisions

Medication use and vaccination decisions are shaped not only by individual responsibility but also by social networks, family influence, peer groups, pharmacists, online communities, and cultural norms. This dynamic was particularly evident in Greece and Cyprus, where relational trust and community influence play central roles, as well as in Poland and Germany, where peer information, informal networks, and societal debates affect perceptions and behavior.

MEDLIT should therefore facilitate dialogue within families, caregiving networks, communities, and across countries. Participants valued opportunities to exchange experiences internationally, learning from different cultural practices and approaches to health literacy. Incorporating features that encourage discussion, sharing, and reflection while maintaining evidence-based guidance can enhance relevance, engagement, and sustainability.

Balancing standardization with contextual adaptability

Finally, the comparative analysis underscores the need for a careful balance between a standardized MEDLIT framework and sensitivity to national specificities. Core themes, trust, communication, safety, critical evaluation of information, autonomy, and practical application, are universal, but their expression differs according to healthcare systems, cultural expectations, and historical experiences.

A successful implementation strategy combines standardized core modules with context-sensitive examples, delivery formats, technological tools, and engagement strategies. This ensures MEDLIT maintains conceptual coherence while remaining



responsive to local needs, preferences, and constraints, supporting informed decision-making and safe health practices across Germany, Poland, Greece, and Cyprus.

Conclusions

Across Germany, Poland, Greece, and Cyprus, trust in healthcare professionals emerges as the most critical determinant of safe medication use and vaccination adherence. Participants universally emphasized that clear, empathetic, and consistent communication from doctors and pharmacists fosters confidence and reduces anxiety. Where communication is rushed, incomplete, or paternalistic, mistrust arises, prompting individuals to rely on online sources, peers, or social networks. Relational continuity, professional credibility, and opportunities for structured preparation for consultations, such as patient checklists, question prompts, or “cheat sheets”, were highlighted as essential enablers of informed, confident engagement with healthcare providers. This pattern underscores the centrality of trust and professional guidance in shaping health behaviors, regardless of national context.

Emotional and cognitive factors also play a strong role across countries. Anxiety about side effects, overwhelming information, and fear of adverse outcomes influence decision-making in all populations. Participants described how these factors can lead to avoidance, self-discontinuation of treatments, or hesitation regarding vaccination schedules. Across contexts, there is a shared desire for clear, actionable, and evidence-based guidance, supported by practical tools, modular learning, and opportunities for revisiting content. Social networks, family influence, and peer learning interact with these factors, highlighting the importance of relational and experiential dimensions in health literacy. Participants additionally valued learning from the experiences of other countries, seeing international examples as a way to broaden understanding and foster cross-cultural dialogue.

Across the four countries, ten common training modules were identified as relevant for the MEDLIT platform: (1) Trust & Communication, (2) Understanding



Medications & Vaccines, (3) Safe Use & Adherence, (4) Collective Responsibility & Vulnerable Populations, (5) Critical Evaluation of Health Information & Misinformation, (6) Addressing Fear & Hesitancy, (7) Cultural & Contextual Influences, (8) Practical Tools & Applications, (9) Emotional & Social Dimensions, and (10) Strengthening Autonomy & Participation. These modules collectively address the core themes participants identified, trust, knowledge, emotional regulation, social influence, practical skills, and autonomy, providing a standardized yet adaptable framework for cross-national training. Modules explicitly incorporating guidance on preparing for consultations, structured questions, and opportunities for reflection strengthen participants' confidence in healthcare interactions.

Differences across countries reflect structural, cultural, and contextual influences on health behavior. German participants emphasize autonomy, holistic approaches, and ethical prescribing concerns, including attention to costs and integration of alternative medicine. Polish participants show high personal responsibility but are particularly sensitive to misinformation, rushed consultations, and emotional barriers, highlighting the need for structured guidance and preparatory tools to navigate healthcare encounters. Greek participants navigate habitual practices, polypharmacy, and caregiver burdens, relying heavily on personal relationships with professionals. Cypriot participants combine high trust in healthcare providers with careful evaluation of evidence, shaped by cultural norms, interpersonal closeness in small communities, and historical experiences with healthcare access. These differences indicate that while core principles of training can be standardized, contextual adaptation is essential for relevance and effectiveness.

Finally, commonalities in preferred learning methodology provide a strong foundation for the design of the MEDLIT training. Participants across all countries favor interactive, practical, and visually supported content delivered in concise, modular formats. They value blended approaches using both digital and printed resources, opportunities for hands-on practice, and engagement within families, peer networks, and broader international learning communities. Variations in session length, degree of



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autonomy, and technology use reflect contextual constraints and learner preferences, emphasizing the importance of flexibility, culturally sensitive adaptation, and the inclusion of both practical and reflective learning strategies. Taken together, these insights suggest that a cross-national health literacy program can simultaneously address shared challenges while remaining responsive to the unique social, cultural, and systemic contexts of Germany, Poland, Greece, and Cyprus.

Additional Comments

MedLit is an essential resource that addresses the “personal competencies and situational resources” in order to facilitate access and understanding, which are necessary to balance “individual, community and population skills and systems complexity” (Zanobini et al., 2022). By being informed, older adults, caregivers, patients, and parents will feel empowered and have greater control over their own health and well-being. Additionally, including referrals will allow information to be shared and distributed among individuals, ensuring a more collaborative approach to healthcare.

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Appendices



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Appendix I – Existing programs and Initiatives on medication use

Organization	Website	Audience	Description
European Medicines Agency	https://www.ema.europa.eu/en/homepage	Public, patients	Information on centrally authorized medicines
Drug interactions	https://www.ema.europa.eu/en/investigation-on-drug-interactions-scientific-guideline	Public	Guideline on drug interactions
National Registers of Authorized Medicines	https://www.ema.europa.eu/en/medicines	Public	Registers of authorized medicines in the EU
Cyprus	https://www.phs.moh.gov.cy/index_en.html	Public	National register of authorized medicines
Germany	https://www.pharmnet-bund.de/PharmNet/DE/Oeffentlichkeit/Arzneimittel-Informationssystem/_node.html	Public	National register of authorized medicines
Greece	https://services.eof.gr/human-search/home.xhtml	Public	National register of authorized medicines
Poland	https://rejestr.ezdrowie.gov.pl/rpl/search/public	Public	National register of authorized medicines
EUPATI Open Classroom	https://learning.eupati.eu/	Public, academics, educators	Training programme about the medicines development process
Paul-Ehrlich-Institut (PEI)	https://www.pei.de/EN/medicinal-products/medicinal-products-node.html	Public, patients	Information on human medicinal products, including vaccines



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International Coalition of Medicines Regulatory Authorities	https://www.icmra.info/drupal/en	Researchers, professionals	Information on clinical trials, medicine regulatory, and safety challenges
Medicines for Europe	https://www.medicinesforeurope.com/	Public, academics, educators	Information on generic and biosimilar medicine
European Directorate for the Quality of Medicines & Healthcare (EDQM)	https://www.edqm.eu/en/	Public, academics, educators	Information on medicines and consumer health
Europe Commission	https://health.ec.europa.eu/medicinal-products/legal-framework-governing-medicinal-products-human-use-eu_en	Public, academics, educators, policymakers	Pharmaceutical legislation and legal frameworks
Fact Sheets on European Union	https://www.europarl.europa.eu/factsheets/en/sheet/50/medicamento-si-dispozitive-medicale	Public, academics, educators, policymakers	Legal framework related to medicine and medical devices
Teddy European Network of Excellence for Paediatric Research	https://www.teddynetwork.net/	Private, academics	Paediatric pharmacological research activities
European Public Health Alliance	https://epha.org/about-us/	Public, patients	Publications and general health information
Medicines Authority	https://medicinesauthority.gov.mt/medicinesdatabase	Public, academics, policymakers	Regulation of medical products and pharmaceutical activities
European Federation of Pharmaceutical	https://www.efpia.eu/	Public, academics, educators	Information on medicine innovation and research



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Industries and Associations (EFPIA)			
European Society of Endocrinology	https://www.es-e-hormones.org/	Public, clinicians, academics, educators	Resources and information on hormone health
Patient information on medicinal products	https://www.medicinesforeurope.com/wp-content/uploads/2024/03/AESGP-EFPIA-MfE_PP_Patient-information-on-medicinal-product-2024.pdf	Public, clinicians, academics, educators	PDF on making medicine labels patient-centric
Federal Agency for Medicines and Health Products (Belgium)	https://www.famhp.be/en	Public, clinicians, academics, manufacturers	Guidelines and information for medicine manufacturers
Pharmavibes	https://www.pharmavibes.co.uk/	Public	Briefs on international medicine regulations and legislation
The European regulatory system for medicines	https://ecpc.org/wp-content/uploads/2019/08/ecpc-get-involved-EMA-the-european-regulatory-system-for-medicines-2.pdf	Public, academics, manufacturers, patients	PDF on how medicines are authorized and monitored in the EU
Head of Medicines Agency	https://www.hma.eu/about-hma.html	Public, clinicians, academics	Regulates medicinal products in the European Economic Area
European Patients Forum	https://www.eu-patient.eu/	Public, patients	Voice of patient organizations in Europe
European Board of Intensive Care Medicine	https://ebicm.esicm.org/	Public, carers	Educational credits and standards of training in intensive care



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Affordable Medicines Europe	https://affordablemedicines.eu/	Public, patients	Information on the distribution of medicine in Europe
European Commission	https://health.ec.europa.eu/medicinal-products/falsified-medicines_en	Public, clinicians, manufacturers	Falsified Medicines Directive (FMD)
National Organization for Medicines (Greece)	https://www.eof.gr/web/guest/eparkeia	Public, patients	Information on medicines in Greece
European Community Pharmacists (PGEU)	https://www.pgeu.eu/vaccination/	Public, clinicians	Policies related to medicine and vaccines
European Agency for Safety and Health at Work	https://osha.europa.eu/en	Public, patients, clinicians	Guidance, workbooks, publications, tools
European Collaborative Action on Medication Errors and Traceability (ECAMET)	https://ecamet.eu/	Public, academics, educators, manufacturers	Patient safety through proper handling of medication
Health Action International	https://haiweb.org/	Public, patients	Information on various health topics
National Contact Point	https://eu-healthcare.eopyy.gov.gr/en/medicines-and-medical-devices/cross-border-prescriptions/	Public, patients	Electronic cross-border health services



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European Alliance for Access to Safe Medicines	https://eaasm.eu/en-gb/	Public, patients	Ensuring access to safe and legitimate medicines
Schengenvisa	https://schengeninsuranceinfo.com/travel-health-safety/travelling-with-medication-in-eu/	Public, patients	Information for traveling with medication in the EU
Promoting Good Practice For The Off-Label Use Of Medicines	https://www.braincouncil.eu/golup/	Public, patients	Guidance on off-label use of medicines
MIAS Pharma	https://miaspharma.com/working-together-for-safe-medicines-in-the-eu/	Public, clinicians, policymakers	Information on safe medicines in the EU
Hospital Pharmacy Europe	https://hospitalpharmacyeurope.com/	Public, patients	Reviews, research, and recommendations for patients
ConcePTION	https://www.imi-conception.eu/results/mums/	Public, patients	Information for pregnant women on medicine safety
Innovative Health Initiative	https://www.ih.europa.eu/about-ih/	Public, academics, educators	Translating health research into benefits for patients
HELEM-EU	https://www.helemeu.org/	Public, medical students, doctors	Health literacy education program



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Appendix 2 – Existing Programs and Initiatives on vaccine literacy

Resource	Link	Audience	Description
Strengthening Education and Knowledge Immunisation (SEKI)	https://seki.eu/	Doctors, Scientists, Public	A shared European platform for vaccine-related education and training activities for healthcare workers and medical students. A section is also dedicated to the public to reflect their needs.
European Vaccination Information Portal	https://vaccination-info.europa.eu/en	Public, patients	Safety, side effects, history, and timing of vaccinations
Surveillance Atlas of Infectious Diseases	https://www.ecdc.europa.eu/en/surveillance-atlas-infectious-diseases	Public, academics, researchers	Mapped across the EU
Vaccines Europe	https://www.vaccineseurope.eu/media-hub/resources/	Public, patients	Infographic pamphlets on different vaccine topics
European Center for Disease Prevention and Control	https://www.ecdc.europa.eu/en/immunisation-vaccines/EU-vaccination-schedules	Public, patients	Vaccine schedules, recommendations by country, and age
World Health Organization	https://www.vaccinesafetynet.org/#gsc.tab=0	Public, patients	The Vaccine Safety Net global network of websites
Overcoming Obstacles to Vaccination	https://overcomingobstaclestovaccination.eu/en/relevant-sources	Public, patients	Country and language-based resources for all EU countries
International Federation of Pharmaceutical	https://teamvaccines.ifpma.org/trusted-vaccines-resources	Public, patients	Focus on vaccines as prevention



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Manufacturers & Associations			
Vaccines Today	https://www.vaccinestoday.eu/	Public, patients	Information on diseases and vaccines, stories, and video resources
Vaccines Work	https://www.gavi.org/vaccineswork	Public, patients	News, features, and explainers of global health and immunization
IAVI Vaccine Literacy Library	https://www.iavi.org/media-and-resources/vaccine-literacy-library/	Public, patients	Basic information about HIV, TB, and Lassa virus vaccines
European Vaccine Initiative	https://www.euvaccine.eu/	Public, clinicians, doctors	Publications and resources on vaccines
EUVABECO	https://euvabeco.eu/	Public, educators, academics	Medical, social, industrial, modeling/forecasting, and digital tools around vaccines
Vaccinations in Europe - Statistics & Facts	https://www.statista.com/topics/3536/vaccinations-in-europe	Public, academics	Statistics and maps representing vaccination and infection rates across EU countries
Immunisation Information Systems	https://pubmed.ncbi.nlm.nih.gov/28488999/	Limited Access, academic, educators	Publication
Vaccines, trust, and European Public Health	https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2018.23.17.18-00210?crawler=true	Limited Access, academic, educators	Publication
Vaccination as a social practice	https://link.springer.com/article/10.1186/s12889-023-16437-6	Limited Access, academic, educators	Publication
Improving knowledge and trust in vaccines	https://www.sciencedirect.com/science/article/pii/S0264410X21016534	Limited Access, academic, educators	Publication



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The EU Vaccines Strategy	https://www.cambridge.org/core/journals/european-journal-of-risk-regulation/article/eu-vaccines-strategy-a-missed-opportunity-for-eu-public-health/85BA74565877143DB2AD10C6026C6568	Limited Access, academic, educators	Publication
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