

PRESENTATION OF RESULTS

HAPPY  **PATIENT**

Seeking to reduce the impact of antimicrobial resistance by decreasing the inappropriate use of antibiotics in Europe



WHAT IS THE HAPPY PATIENT PROJECT?

Discover the groundbreaking efforts of the **HAPPY PATIENT** project in our results dossier.

Our mission has been to combat the growing threat of antimicrobial resistance (AMR) by tackling the inappropriate use of antimicrobials for common community-acquired infections.

The **HAPPY PATIENT** consortium contains a wide diversity of geographical and professional coverage throughout the EU.

WHY IS THE HAPPY PATIENT PROJECT NECESSARY ?

In a world where antibiotic resistance is on the rise, **HAPPY PATIENT** stands at the forefront, addressing the widespread issue of inappropriate antibiotic use in Europe.

“In Europe, as many as 35,000 lives are lost each year due to the direct repercussions of antibiotic overuse and misuse”

In Europe alone, up to 35,000 people lose their lives annually due to the direct consequences of antibiotic overuse and misuse, according to the European Centre for Disease Prevention and Control (an Agency of the European Union).

A PROJECT DEVELOPED IN FIVE EUROPEAN COUNTRIES

The **HAPPY PATIENT** project is based on existing evidence and introduces an innovative patient-centred approach. This strategy involves engaging healthcare providers that are the primary contact point for managing community-acquired infections.

This approach signifies the active participation of healthcare professionals (HCPs) working in general practices, out-of-hours (OOH) services, nursing homes, and community pharmacies.

The project has been implemented in five target countries - Spain, France, Lithuania, Poland, and Greece - each with varying healthcare systems, income levels, and rates of antimicrobial drugs consumption.



HOW HAVE WE IMPLEMENTED THIS PROJECT?

To develop and implement interventions for reducing inappropriate antimicrobial prescribing and dispensing, the **Audit Project Odense (APO) methodology has been followed**. This methodology involves HCPs self-registering cases of their practice before the implementation of a multifaceted intervention and then assess changes after its implementation. The registrations consisted of recording all contacts with community-acquired infections in the case of general practice and out of hours services and all antibiotics prescribed or dispensed, respectively, in nursing homes and pharmacies. Afterwards, the appropriateness of the antibiotic prescription, the type of antibiotic prescribed or the dispensing process was evaluated.

Based on the **Normalization Process theory**, the multifaceted intervention was developed, including: a) peer feedback with reflection and discussion, b) improvement of communication skills to enhance communication between healthcare professionals and patients, c) patient information brochures and posters, and d) country-specific information on antibiotic use.

Through this methodology, a total of 407 healthcare professionals from the four healthcare settings have participated in HAPPY PATIENT, which concludes after three years of work. The project has successfully **changed antimicrobial prescribing and dispensing practices in the five target countries**, despite their different healthcare systems and socio-cultural contexts. This variation in results is explained in detail later.

After three years of the project, which included initial data collection in February and April 2022, followed by intervention meetings and training in late 2022, and a second data collection in early 2023, **we can announce that this initiative has finally borne fruit**.

We also developed 6 patient educational tools to support the communication between HCP and patient about use of antibiotics:

- Antibiotic free prescription pad
- Viruses or bacteria - what caused your infection?
- Urinary tract infections informative leaflet for nursing homes.
- Bursting myths about use of antibiotics in UTIs.
- Antibiotic dispensing checklist for pharmacists.
- Informative cards about antimicrobial resistance and use of antibiotics for patients.

These tools and the rest of the intervention material can be found in our website:

<https://happypatient.eu/outcomes/happy-patient-communication-tools/>



EMPOWERING HEALTHCARE: ACHIEVEMENTS AND OUTCOMES AGAINST ANTIMICROBIAL RESISTANCE

HAPPY PATIENT, one of the most ambitious projects carried out in Europe towards antimicrobial resistance, has come to its end. Four outpatient settings and five countries have been able to collaborate in order to reduce the unnecessary use of antibiotics at a time when the fight against antibiotic resistance has become one of the most urgent issues in public health.

Saving costs, preserving health

This collaborative intervention on antibiotic use could save 114 million euros in the health budgets of the European Union, regarding general practice.

By reducing the inappropriate prescription and dispensing of antibiotics, the intervention of **HAPPY PATIENT** could result in economic savings through a reduction of:

1. The costs of the drugs itself
2. Adverse effects of antibiotics
3. Antimicrobial resistance

About clinical results

HAPPY PATIENT opens up horizons towards a more responsible use of antibiotics in our society, providing training and information to patients and health care professionals of primary care, out-of-hours services, nursing homes and pharmacies.

We changed the prescribing practices in all five countries, despite different health systems and sociocultural contexts.

In the following pages, we highlight the most significant results of our project across various countries and healthcare settings.

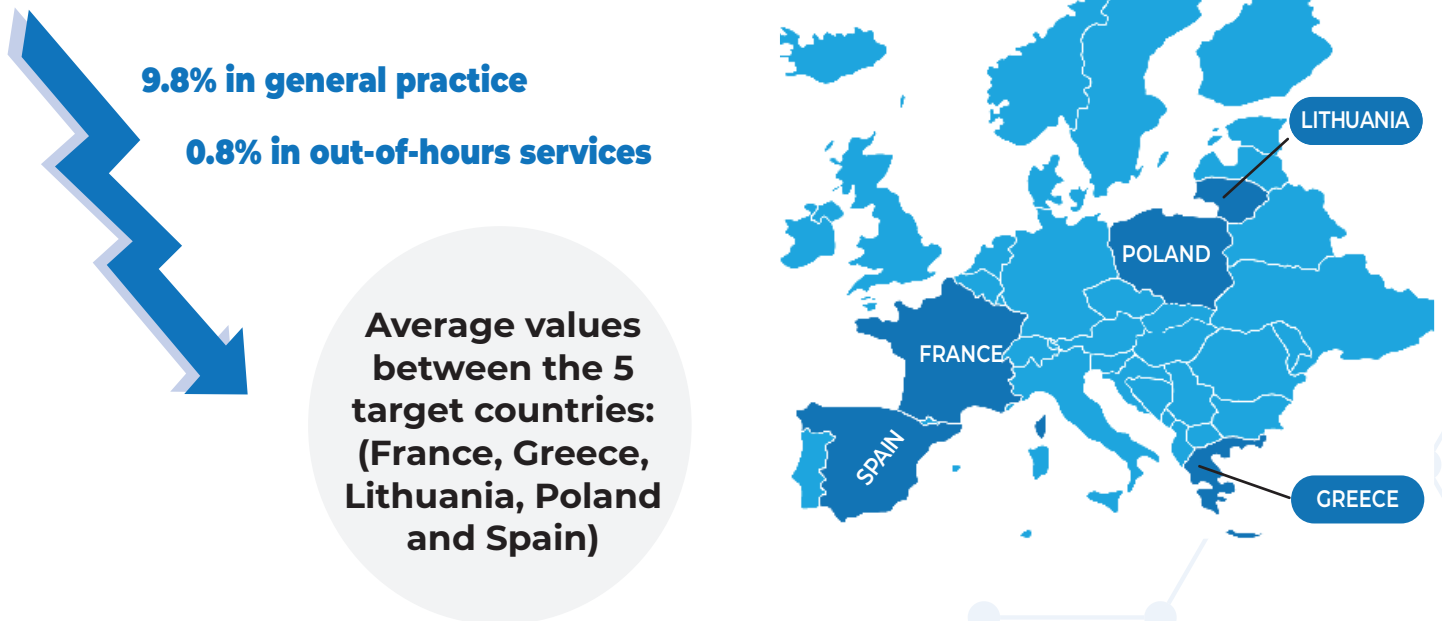
The implementation of HAPPY PATIENT across the European Union could lead to significant savings in the health budgets of the European Union

The project has an economic analysis regarding the recorded improvements and concludes, through two different scenarios (one realistic and another optimistic), the following:

- **Realistic scenario:** It would drive a reduction of 23 million of antibiotic prescriptions and imply an annual economic savings of 114 million euros in the health budgets of the European Union.
- **Optimistic scenario:** The reduction of antibiotic prescriptions would amount to 74 million, leading to an annual economic saving of 385 million euros in the European Union.

These data are based on projections of what would happen if the intervention applied in the HAPPY PATIENT project were implemented in all countries of the European Union, obtaining consistent results in the reduction of potentially unnecessary prescriptions:

POTENTIALLY UNNECESSARY PRESCRIPTIONS DECREASE



These estimates were calculated through the application of a coefficient that takes into account:

- Population per country
- Antibiotic prescription ratio
- Percentage of unnecessary prescriptions
- Different scenarios of unnecessary prescription reduction, as well as the cost of antibiotic prescription.

It is noteworthy that sensitivity analyses were conducted using extreme values for various estimates, including unit costs and the prevalence of adverse events. Additionally, detailed measurements of **costs associated with antibiotic consumption, adverse events, and antimicrobial resistance were considered for each target country.** These data included information such as the unit cost of each antibiotic, common daily dosage, the percentage of adverse events requiring medical attention or hospitalization, and costs associated with antimicrobial resistance. This comprehensive approach ensures the robustness and reliability of our economic projections.

PHARMACIES

A promising improvement in the pharmaceutical field

The approach of interventions promoted by HAPPY PATIENT in community pharmacies has focused on safety tips provided, including interactions and contraindications, and allergies when antibiotic prescriptions are dispensed there.

The overall increase in appropriate antibiotic dispensing following the multifaceted intervention in the five target countries is 18% regarding safety checks (contraindications, allergies and interactions) and 17% when it comes to the general advice given.

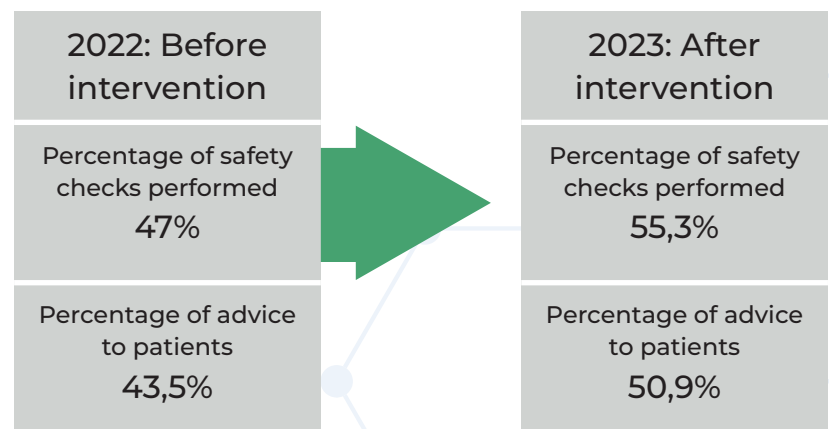


COMMUNITY PHARMACIES

91
Professionals

5.000
Registrations

2022	2023
2.565	2.435



Information based on safety checks and patient advice provided

In total, from the five countries evaluated, 2,522 antibiotic dispensing cases were analysed in the first phase of the audit (2022), where safety checks were provided in 47% of the cases and patient advice in 43.5%. After implementing the HAPPY PATIENT intervention, 2,473 cases were recorded and analysed, observing an increase on both safety checks performed and advice given to the patient (55.3% and 50.9%, respectively).

The intervention effect improved by 18% regarding safety checks and by 17% regarding advice to patients, improving antibiotic dispensing practices.

Breaking down the results by country, in France, in the first registration period 69.6% performed safety checks, which then increased (6%) to 73.6% in 2023; in Greece, in the 70.6% of the cases safety checks were performed during the first registration and 61.7% during the second. In Lithuania, safety checks increased from 40.2% to 53.7%, being the intervention effect of 34%. In Poland, the highest improvement belong to the % of advice given to patients, from 32.5% in the first registration to 38% in the second.

In the case of the intervention in community pharmacy, Spain achieved the best results. At the beginning of the intervention, 35% of prescriptions were accompanied by safety advice on interactions, contraindications, or allergies. After the intervention, this rate reached 60.1%. The improvement ratio reached 72%.

Percentage of safety advise given, including interaction, contraindications and allergies, before and after the intervention and intervention effect when dispensing an antibiotic prescription in community pharmacies:

Country	Before		After		Intervention effect (%)	P
	n	%	n	%		
France	585	69.6	624	73.6	6.0	0.060
Greece	290	70.6	254	61.7	-13.0	0.004
Lithuania	613	40.2	536	53.7	34.0	0.000
Poland	581	29.2	573	30.5	4.0	0.469
Spain	453	35.0	424	60.1	72.0	0.000
Total	2,522	47.0	2,411	55.3	18.0	0.000

*P < 0.05

Information based on safety checks and patient advice provided

OUT-OF-HOURS SERVICES

Encouraging results in out-of-hours services, especially in Spain

In total, taking into account data of all target countries, the choice of first line antibiotics did not improve during the second registration period, clearly affected by the shortage of first line antibiotics that occurred in some of the countries participating in HAPPY PATIENT.

Potentially inappropriate antimicrobial prescribing decreased by 0.8% after the interventions.

A particularly significant data is the results from Spain as the decrease in the potentially inappropriate antibiotic prescription was 16.5% after the intervention, and the choice of non first line antibiotic was reduced by 17.4%.



OUT-OF-HOURS SERVICES

63

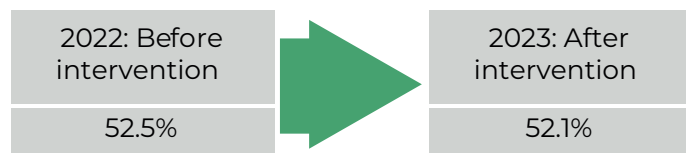
Professionals

3.606

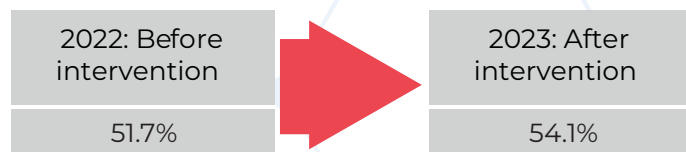
Registrations

2022	2023
1.786	1.820

Potentially unnecessary antibiotic prescribing



Non-first line antibiotic choices



Percentage of potentially unnecessary prescribing and non-first line antibiotic choices before and after the intervention and intervention effect:

OUT-OF-HOURS SERVICES												
Country	Unnecessary antibiotic prescribing						Non-first line antibiotic choices					
	Before		After		Intervention effect (%)	P	Before		After		Intervention effect (%)	P
France	17	23.5	33	42.4	80.4	0.187	13	30.8	19	10.5	-65.9	0.001
Greece	118	71.2	160	64.4	-9.6	0.232	34	64.7	57	66.7	3.1	0.849
Lithuania	322	54.4	358	58.1	6.8	0.325	147	55.8	150	64.0	14.7	0.148
Poland	236	51.3	155	47.7	-7.0	0.495	115	53.0	81	64.2	21.1	0.120
Spain	187	41.7	181	34.8	-16.5	0.173	109	43.1	118	35.6	-17.4	0.246
Total	880	52.5	887	52.1	-0.8	0.862	418	51.7	425	54.1	4.6	0.477

NURSING HOMES

Improvement of interventions in the long term care facilities is necessary

In nursing homes, the results after the intervention did not improve. Specifically, potentially inappropriate prescribing of antibiotics increased 4.5% and choice of non first line antibiotics by 25.1%.

Reasons for that might be that the context of nursing homes is complex and heterogeneous, and it could be interesting to consider in future projects more involvement of the nursing home staff in the design of the intervention and the inclusion of all professionals of the nursing home including prescribers into the project.

The worsening of the non-first line antibiotic choices in the second registration in nursing homes, also noticed in general practice and out-of-hours services is mainly due to the shortage of first-line narrow antibiotics affecting Europe from September 2022, particularly greater in the eastern countries, that was present during the whole second registration period elapsing from February to April 2023.

In this context, the majority of organizations working on **HAPPY PATIENT** consortium also participate in **IMAGINE: a project focused specifically on nursing homes with a more complex approach that includes the involvement of HCP in the design of the intervention and the improvement in Infection Prevention and Control measures**, addressing mainly urinary tract infections.



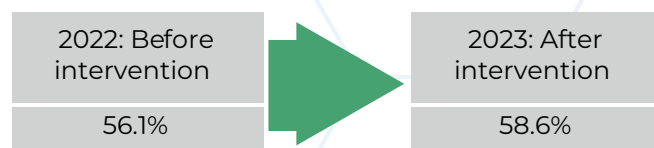
NURSING HOMES

58
Professionals

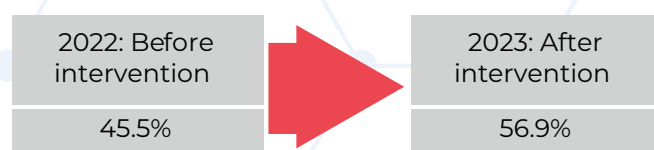
1.897
Registrations

2022	2023
1.000	897

Potentially unnecessary antibiotic prescribing



Non-first line antibiotic choices



Percentage of potentially unnecessary prescribing and non-first line antibiotic choices before and after the intervention and intervention effect:

NURSING HOME												
Country	Unnecessary antibiotic prescribing						Non-first line antibiotic choices					
	Before		After		Intervention effect (%)	P	Before		After		Intervention effect (%)	P
France	42	57.1	33	91.7	60.6%	0.001	18	50.0	3	33.3	-33.4	0.593
Greece	3	33.3	9	33.3	0.0%	1.000	2	100.0	6	83.3	-16.7	0.537
Lithuania	22	54.6	18	50.0	-8.4%	0.775	10	40.0	9	44.4	11.0	0.845
Poland	74	16.2	103	19.4	19.8%	0.585	62	66.1	83	67.5	2.1	0.865
Spain	139	77.7	114	86.6	11.7%	0.061	31	0	15	0	-	-
Total	280	56.1	280	58.6	4.5%	0.550	123	45.5	116	56.9	25.1	0.079

GENERAL PRACTICE

Good results achieved in General Practice

Globally in general practice a substantial variability across countries was noted and data was strongly influenced by the first line narrow antibiotic shortages in Europe.

The overall **data on unnecessary antibiotic prescribing in General Practice have improved after the intervention**, with a global reduction of -9.7%; it went from 72.2% inappropriate prescriptions to 65.2% in the second registration period, conducted in 2023. On the other hand, non first line antibiotic choice, where the selection of first line antibiotics according to national guidelines was assessed, increased by 29.2%, from 39.7% to 51.3%.

This figure is technically conditioned by the results of Lithuania and Poland. In the former, although a significant decrease of -19.9% in unnecessary prescriptions was evident after the intervention, the erroneous choices of antibiotics experienced a notable increase of 117.5%. Regarding Poland, potentially unnecessary prescribing showed a decrease of -5.0%, and erroneous choices of antibiotics increased significantly by 27.6%.

In Spain potentially unnecessary antibiotic prescribing decrease by 9.7% and the non-first line antibiotic choice increased by 11%, although still distant from the increment in the eastern European countries.



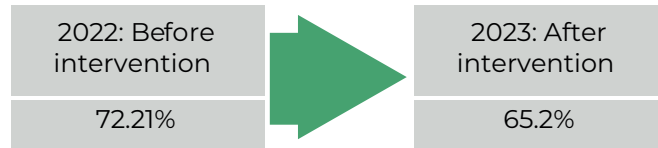
GENERAL PRACTICE

133
Professionals

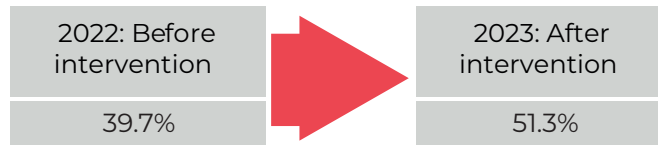
10.373
Registrations

2022	2023
5.393	4.980

Potentially unnecessary antibiotic prescribing



Non-first line antibiotic choices



Percentage of potentially unnecessary prescribing and non-first line antibiotic choices before and after the intervention and intervention effect:

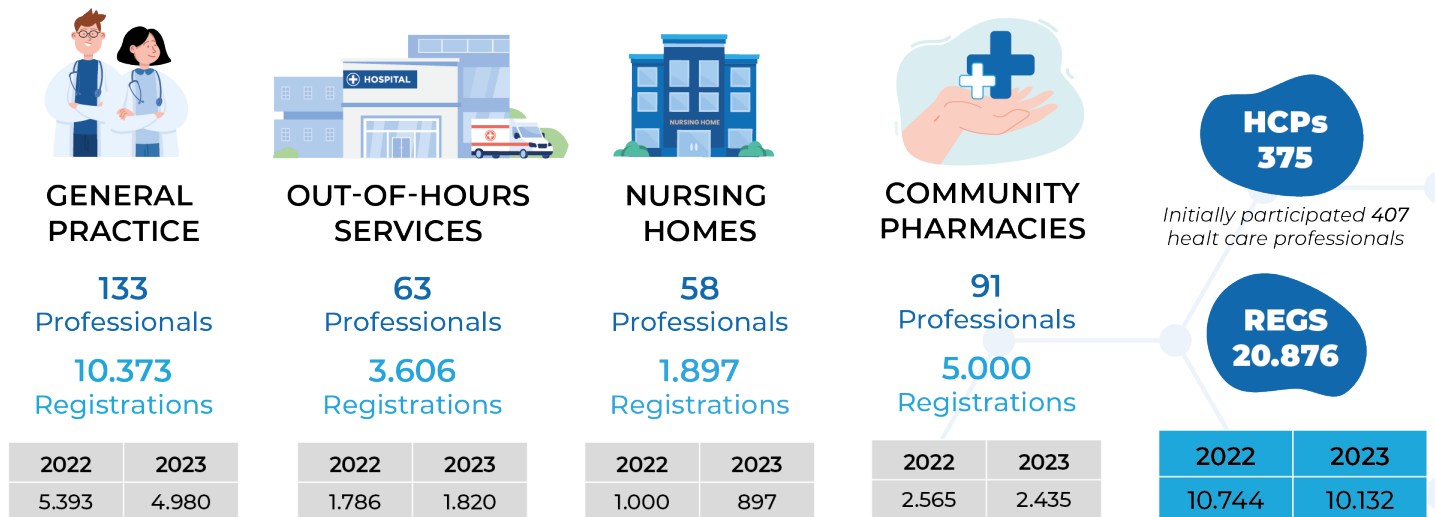
GENERAL PRACTICE												
Country	Unnecessary antibiotic prescribing						Non-first line antibiotic choices					
	Before		After		Intervention effect (%)	P	Before		After		Intervention effect (%)	P
France	117	65.8	152	55.3	-16.0	0.080	88	28.4	98	26.5	-6.7	0.774
Greece	189	70.4	254	71.3	1.3	0.839	116	69.8	127	72.4	3.7	0.653
Lithuania	204	75.0	268	60.1	-19.9	0.001*	106	29.2	156	63.5	117.5*	0.000*
Poland	361	75.9	344	72.1	-5.0	0.249	173	57.2	126	73.0	27.6	0.005
Spain	203	68.5	277	61.4	-10.4%	0.109	333	26.4	222	29.3	11.0	0.461
Total	1,074	72.2	1,295	65.2	-9.7	0.000*	816	39.7	729	51.3	29.2	0.000



More than 400 healthcare professionals have participated in HAPPY PATIENT

ABOUT THE PARTICIPATION AND CASES REGISTERED

A total of 407 health care professionals (HCPs) initially participated (146 in general practice, 86 in OOH services, 70 in nursing homes, and 105 in community pharmacies): 345 (84.8%) completed the intervention and joined the second registration period. A total of 10,744 common infections were registered during the initial registration (2022) and 10,132 cases more were registered during the second audit (2023).



Participation by country



“ A total of 345 (84.8%) HCPs undertook the intervention and participated in the second registration period ”

Spain, France, Lithuania, Poland and Greece have been targeted for the HAPPY PATIENT project.

They have diverse health systems incomes and level of antimicrobial consumption rates.

THE HAPPY PATIENT CONSORTIUM: A MULTIDISCIPLINARY AND EXPERIENCED TEAM FROM AROUND EUROPE

The HAPPY PATIENT consortium has had a wide diversity of geographical and professional coverage throughout the European Union during its duration from 2021 to 2023. Thus, the partners of this team are the following:



- Institut Català de la Salut (ICS)
- Institut Universitari d'Investigació en Atenció Primària (IDIAP Jordi Gol)
- Kobenhavns Universitet (UCPH)
- Syddansk Universitet (RUPO)
- Norce Norwegian Research Center (NORCE)
- Region Hovedstaden (CAPREG)
- Rijksuniversiteit Groningen (RUG)
- University of Las Palmas de Gran Canaria (ULPGC)
- Fundación Parque Científico Tecnológico
- Center Hospitalier Universitaire de Nice (CHUNICE)
- Mano Seimos Gydytojas (FDC), Uniwersytet Medyczny W Lodzi. (MUL)
- Panepistimio Kristis (UOC)
- Sociedad Española de Medicina de Familia y Comunitaria (semFYC)
- Europäische Vereinigung für Klinische Pharmakologie und Therapie EV (EACPT)
- Center Hospitalier Universitaire de Rennes (CHURE)
- Universitat Internacional de Catalunya (UIC)

CONCLUSIONS OF ONE OF THE MOST AMBITIOUS PROJECTS IN EUROPE AGAINST ANTIMICROBIAL RESISTANCE

Four outpatient settings and five countries have been able to collaborate to reduce the unnecessary use of antibiotics at a time when the fight towards antibiotic resistance has become one of the most urgent issues in public health.

“In total, inappropriate antibiotic prescribing has been reduced in different European countries after the interventions driven by the HAPPY PATIENT project”

This project, financed with European funds, represents a big step forward to address the serious health problem that antimicrobial resistance already represents, and which will be extremely worrying for future generations.

From the **HAPPY PATIENT** consortium, we advocate the implementation of more projects of these characteristics and of this depth, which, through knowledge and collaboration between different countries and scientific organizations, promote a better future that guarantees safety of patients and quality of life of the population.

A large version of the HAPPY PATIENT logo, centered on the page. The word "HAPPY" is in bold black font, followed by the circular icon, and the word "PATIENT" is in bold black font. The background features a light blue hexagonal grid pattern.

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the Health Programme
of the European Union

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