Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections

D6.1

Revised guidelines for the implementation of infection control program in healthcare settings

WP6 | Policies for prevention of Healthcare Associated Infections and their implementation

Leader acronym | HCDCP

Authors | Flora Kontopidou, Mariana Tsana

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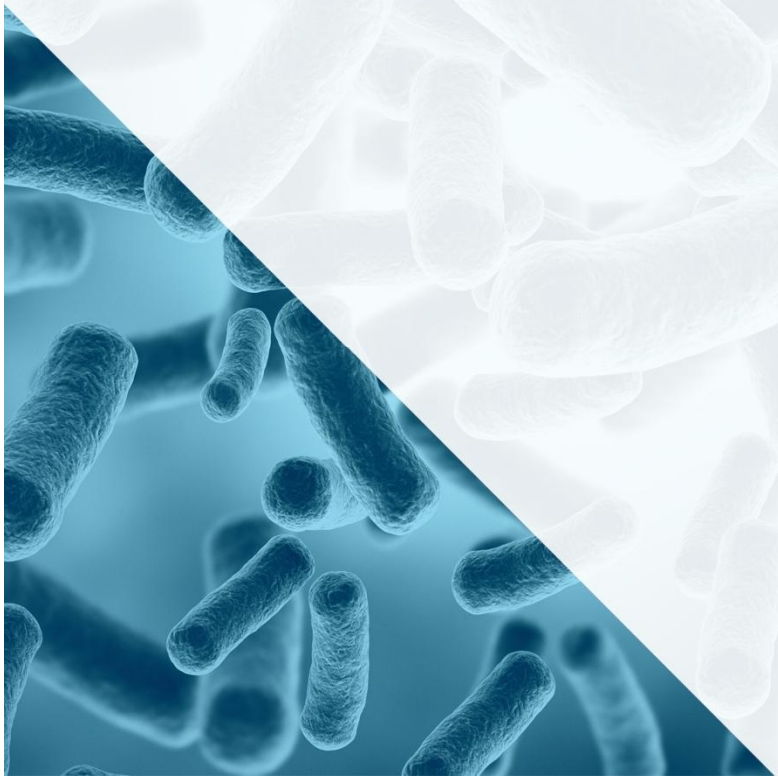

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WP6.1.1 PARTICIPATING PARTNERS

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ACRONYMS

ABC	Antimicrobial Consumption
AMR	Antimicrobial Resistance
ASP	Antimicrobial Stewardship Program
CDH	Clinical Department Heads
CRE	Carbapenem-Resistant Enterobacteriaceae
ECDC	European Centre for Disease Prevention & Control
HA	Hospital Administrators
HAI	Healthcare Associated Infections
HH	Hand Hygiene
HCW	Healthcare Worker
IC	Infection Control
ICC	Infection Control Committee
ICP	Infection Control Programs
MDROs	Multi-Drug-Resistant Organisms
PH	Public Health
PHA	Public Health Authorities
SSI	Surgical Site Infection
WHO	World Health Organization
AT	Austria
DK	Denmark
FR	France
EL	Greece
IT	Italy
NL	Netherlands
PT	Portugal
ES	Spain

1. BACKGROUND

Antimicrobial Resistance (AMR) poses an enduring threat to the global community and, in our days, a major public health risk to developed countries (1,2,3). The Control and Prevention of Healthcare Associated Infections (HAIs) is a key factor of limiting the horizontal spread of the Multi Drug Resistant Organisms (MDROs) within healthcare environment. Healthcare settings remain the main sector of Antimicrobial Resistance development to all the agents, especially to critical ones for the human health leading, nowadays, o Pan Drug Resistance Area (3,4,5).

International efforts (6,7) to address Antimicrobial Resistance should take into account of the peculiarities of each national health system so as to develop tools that are capable of helping countries effectively, especially those with significant problems and limited resources, as Antimicrobial Resistance knows no boundaries.

2. PURPOSE OF THE STUDY

The initial idea of this study was based on the global acceptance that the implementation of the Infection Control (IC) requires a holistic approach and the commitment of all stakeholders of the organization. In addition, the Infection Control Pyramid (Public Health Authorities, hospital administrators, Infection Control Committees and healthcare professionals) acts in different countries, healthcare systems and in completely different cultures. Regardless of healthcare structure and resources, both the organizational as well as the healthcare professional behaviour have proved to be key factors for the effective implementation of Infection Control (16, 17, 18, 19, 20).

Given the differences in AMR context in European countries, the objective is to fill the gap between policy and practice of IC in healthcare facilities based on evidence-based practices and the national experience of participating partners. WP6.1 will contribute in improving the IC capacity within healthcare settings through raising institutional awareness using identified key components and specific interventions which will be adapted to the real needs, resources and priorities of the national healthcare systems.

3. METHODOLOGY OF TASK WP6.1.1

The first objective of the WP.6.1 focused on strengthening our knowledge regarding the gap between the clinical reality and the international recommendations. The tools which were used to achieve this objective were based on:

i. The recent Guidelines on Core Components of Infection Prevention and Control programmes of WHO (11/2016) (9). The most updated guidelines on HAI prevention and Control globally are based on common domains (10, 11,12,13,14). WHO recommendations are focused on key components of Infection Control and Prevention Plan implementation at national and hospital level in accordance with the objectives of WHO Action Plan for AMR (6). Additionally, WHO recommendations are also focused on new domains (in the multimodal strategy), which until now were not mentioned in other guidelines in such an extent. Furthermore, the environment (organizational culture, human and financial resources) in which IC is implemented is indicated as a major factor for an effective implementation. These supplementary key components are strongly related to the organizational behaviour change which is the core objective of WP.6.1.

ii. Survey A was administered during the 1st year of the EU-JAMRAI implementation. The aim of this extensive survey is to have a clear picture of the reality associated with the capability of each country to implement IC policies in accordance with the most recent guidelines for the core components of infection prevention and control (IPC) programs of WHO. The results of Survey A were used to review the recommendations from a practical perspective resulting in areas that probably need improvements through research and interventions.

3.1 METHODOLOGY OF SURVEY A

Survey A was addressed to Public Health Authorities, Infection Control Committees (ICCs), and Hospital Administrators (HA). The valuable information from these three target groups who are responsible for the development and promotion of ICP in healthcare settings is crucial for an effective ICP implementation.

The questionnaire of Survey A was based on the following common domains:

i. Implementation of IC Policy
ii. Existence and operation of institutional bodies dedicated to IC
iii. HAI surveillance
iv. HCWs education and training - guidelines
v. Audit of IC practices
vi. Communication & cooperation procedure

More particularly, as far as resources are concerned, the assumption that the basic resources are met is taken for granted, therefore resources were not investigated per se. Nevertheless, other indirect aspects were examined, as the dedicated personnel working on a full time basis, the use of various training tools, the dedicated budget for IC and the satisfaction regarding the overall available resources for all 3 target groups.

Draft questionnaires were prepared in English by the Hellenic Centre of Disease Control and Prevention (HCDCP) leading team of WP6.1 and then each participating country sent a version translated in its native language which was uploaded in a specially developed database in http://www.eujamrai-icpsurveys.eu/survey/ in 7 European languages (English, Greek, French, Italian, Spanish, Portuguese and German). The database was open to the participants until 06/07/2018. At the same time healthcare professionals could participate also in survey B which is focused on the facilitators and barriers (attitudes, level of training, lack of awareness, etc.) to an effective implementation of an ICP in clinical reality, which are mainly linked to the institutional policy and organizational behaviour.

Data analysis was completed using SPSS, both for all countries overall and for each country separately (only for countries with more than 10 completed questionnaires by ICCs). Regarding the data from Public Health Authorities, all responses regardless of the number of the completed questionnaires were analysed. Furthermore, statistical analysis was also conducted, using the Chi-square test of independence with contingence tables. To examine whether or not there is a statistical significant association between the variables, p-value should be less than 0.05.

More particularly, statistical analysis focused on whether possible differences could exist on different types of hospitals (University, Tertiary hospitals), whether hospitals have specialised hospital units (ICU, Hematology Unit, Oncology Unit), on who is responsible for ICP implementation (ICC, HA, Head of Clinical Ward) and finally the size of hospitals in Acute Care Hospitals[1].

Finally, each country's data was also sent to each partner for further analysis and promotion.

3.2 RESPONSE FROM EU COUNTRIES

The questionnaires of Survey A and B were sent to the partners of WP6.1 and to other stakeholders of EUJAMRAI. Overall, 519 questionnaires were completed by healthcare professionals from eight countries (Austria, Denmark, Italy France, Germany, Greece, Portugal, Spain, & the Netherlands) for Survey A. As it was expected the majority of the questionnaires were completed by members of ICCs (n=335), but there was a significant response by HA (n=161) and also by Officers of Public Health Authorities (n=23) of all the participating countries at national or regional level (Figure 1).

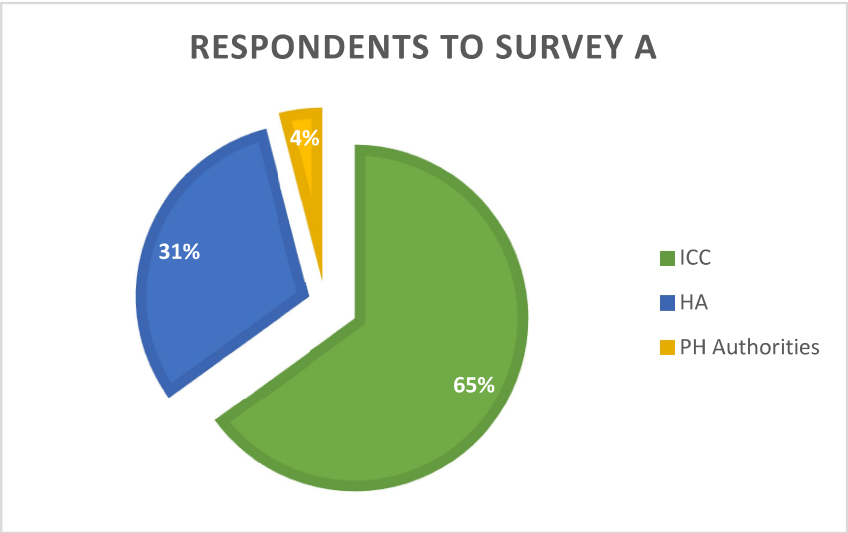

Figure 1: Proportion of respondents in Survey A per target group (n=519)

[1] According to beds' number of each hospitals, they were divided to 3 categories: S= 1-249, M=250-499, L=500+

The participation to Survey A per country and per target group is shown in Table 1.

Table 1. Total Number of Completed Questionnaires by Country (for ICCs & HA only countries with ≥10 completed questionnaires are included)

	FR	EL	IT	PT	ES
ICC	10	72	18	165	67
HA	5	27	22	88	15
PH Authorities	1	1	3	7	8

Portugal, Greece, Spain, France and Italy were the counties with the most respondents, while Austria, Denmark, Germany and the Netherlands had the lowest numbers of completed questionnaires. The questionnaire for Public Health Authorities was answered by Austria, France, Denmark, Greece, Italy, Portugal, Spain & the Netherlands.

The specific characteristics of the healthcare settings which participated in Survey A are indicated in tables 2, 3 and 4.

Table 2. Total Number & Proportion of Type of hospitals (Answers by ICC, n=335, multiple answers possible)

Type of hospital	Frequency	Percent
Acute care hospital	230	69%
Long term facility	111	33%
Private	39	11%
University hospital	53	16%
Tertiary hospital	42	13%

Table 3. Total Number & Proportion of Wards with hospitalized patients in high risk for HAI due to MDROs (Answers by ICC, n=335, multiple answers possible)		
	Frequency	**Percent**
Intensive Care Unit	179	53%
Hematology Unit	111	33%
Oncology Unit	135	40%
Dedicated isolation rooms for patients infected/colonized by MDROs	260	78%

Table 4. Proportion of Specialised IC Personnel in hospitals (Answers by ICC, n=335, multiple answers possible)	
Specialised IC Personnel-DICP (IC Nurse, Clinical Microbiologist, Infectious Diseases physicians, IC specialist)	**Percent**
IC Nurse	96%
At least 1 DICP *regardless of IC Nurse)*	43%
All 3 DICP *(regardless of IC Nurse)*	25%
No DICP *(regardless of IC Nurse)*	29%

Among the respondents who completed the questionnaire regarding the ICCs, almost half of them were doctors (44%), followed by nurses (43%). The mean duration of professional experience overall was 21.8 years, while the mean duration of professional experience in the current position was 7.7 years.

The majority of the participants stated that their hospital had participated in the last Point Prevalence Survey of Healthcare Associated Infections and Antimicrobial Use in acute care health settings of ECDC (81%).

4. KEY COMPONENT 1: INFECTION CONTROL POLICIES

Both at national and hospital level, written and well defined IC policies for HAI prevention and control should be established for each healthcare setting. All the contributing parties, namely Public Health Authorities, Hospital Administrations, Infection Control Committees and clinicians, should collaborate for an effective ICP implementation.

4.1 WHO RECOMENDATIONS[2]

At healthcare facility level, an Infection Prevention & Control Program (IPCP) with a dedicated, trained team is recommended to be in place in each acute healthcare facility for the purpose of preventing HAIs and combating AMR through good practices of IC.

Active, stand-alone, national IPCP with clearly defined objectives, functions and activities should be established. National Infection Prevention & Control Program should be linked with other relevant national programs and professional organizations.

4.2 OBJECTIVES OF SURVEY

The purpose of Survey A regarding the implementation of ICP was to determine whether the following elements in relation to WHO recommendations apply in each participating country:

- ✓ Policies should have specific objectives and their implementation should be monitored with specific surveillance indicators.
- ✓ Feedback regarding the progress of policies should be provided.
- ✓ ICP should be supported by hospital administration both during the allocation of funds and during the ICP implementation.
- ✓ ICP should be feasible and its effectiveness should be assessed.
- ✓ Policy implementation should be a collective responsibility, involving all levels of administration (HA, Clinical department heads etc.).

[2] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Questions asked regarding KEY COMPONENT 1 during Survey A were:

1. Are there written policies for the Healthcare Associated Infections prevention and control?
2. Which are the main goals of the infection control policies (ICP)?
3. Are these policies mandatory for all the hospitals in your country?
4. According to your opinion, which is the most important ICP goal for your country?
5. Which ICP goal has achieved progress in the last two years in your country?
6. Is feedback on the progress of the national policy provided to the hospitals of your country?
7. Is an infection control program being implemented in your hospital?
8. Do you believe that the implementation of the infection control plan is feasible and thus effective in the hospitals of your country?
9. Who is responsible for the implementation of the infection control program in your hospital?
10. Are ICPs funded by the hospitals' budget?
11. Is there a specific code for the funding of ICPs in the hospitals' budget?

4.3 RESULTS

IC Policies

According to the vast majority of ICCs (97%), there are written policies for HAIs prevention and control.

According to PH Authorities there are written policies for HAIs prevention and control at national or regional level, however, 2 out of the 8 countries reported that these policies are not mandatory for all the hospitals in their countries.

ICP Goals

Regarding the main goals of the ICP, as shown in Figure 2, the reduction of HAIs is a top priority for all healthcare settings while the increase of Hand Hygiene (HH) Compliance is the goal with the most achieved progress in the last 2 years at national level, followed by the reduction of HAIs, as depicted in Figure 3.

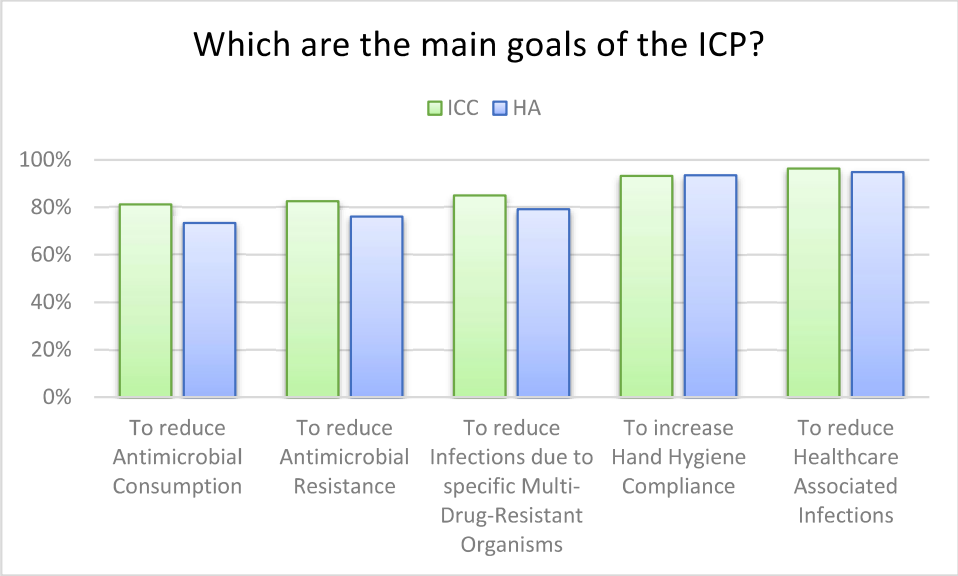

Figure 2: Which are the main goals of the ICP? (Answers by ICC n=335 & HA n=161, multiple answers were possible)

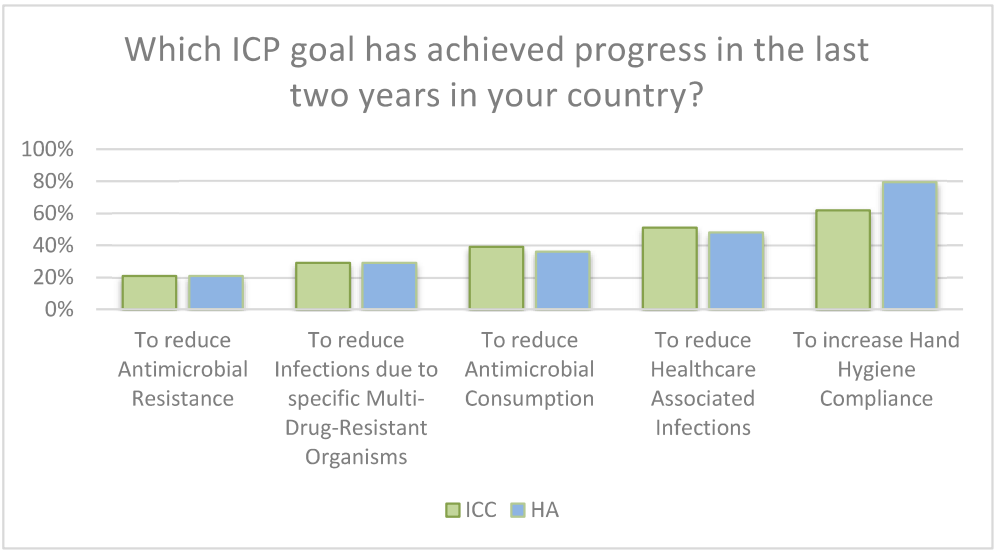

Figure 3: Which ICP goal has achieved progress in the last 2 years in your country? (Answers by ICC n=335 & HA n=161, multiple answers were possible, up to 3 answers)

According to PH Authorities, reducing HAIs is the most important ICP goal in their countries, while reducing Infections due to specific MDROs and increasing Hand Hygiene Compliance are the goals with the highest progress.

While the priorities of ICCs and HA regarding the progress of ICP goals are absolutely harmonized, there is significant discrepancy with the PH Authorities' opinion.

Table 4. ICP Goals (Answers by PHA, multiple answers possible)

According to your opinion, which is the most important ICP goal for your country?	AT	DK	FR	EL	IT	PT	ES	NL
To reduce Antimicrobial Resistance	✓	✓		✓	✓	✓	✓	
To reduce HAIs	✓	✓	✓		✓	✓	✓	✓
To reduce Antimicrobial Consumption	✓			✓	✓	✓		
To reduce Infections due to specific MDROs		✓	✓	✓		✓		✓
To increase Hand Hygiene Compliance							✓	✓

Table 5. ICP goal has achieved progress in the last two years at national level Answers by ICCs, HA and PHA (multiple answers possible, **Different colours for each country, darker shade when all 3 parties agreed)*

Which ICP goal has achieved progress in the last two years in your country?	FR			EL			IT			PT			ES		
	ICC	HA	PHA	ICC	HA	PHA	ICC	HA	PHA	ICC	HA	PHA	ICC	HA	PHA
To reduce Antimicrobial Consumption															
To reduce HAIs Incidence															
To reduce Infections due to MDROs															
To reduce AMR rates															
To increase HH Compliance															

The agreement with PHAs was based on the two highest rates of ICCs and HA answers regarding which ICP goals have achieved progress in the last two years in their countries.

Feedback on IC policy progress

A significant proportion (31%) reported that feedback on progress of the national IC policy is **not** provided to the hospitals and a similar proportion (35%) reported that feedback is **not** provided to clinicians. More than half of the respondents (57%) claimed that published reports of hospital IC policy progress are produced.

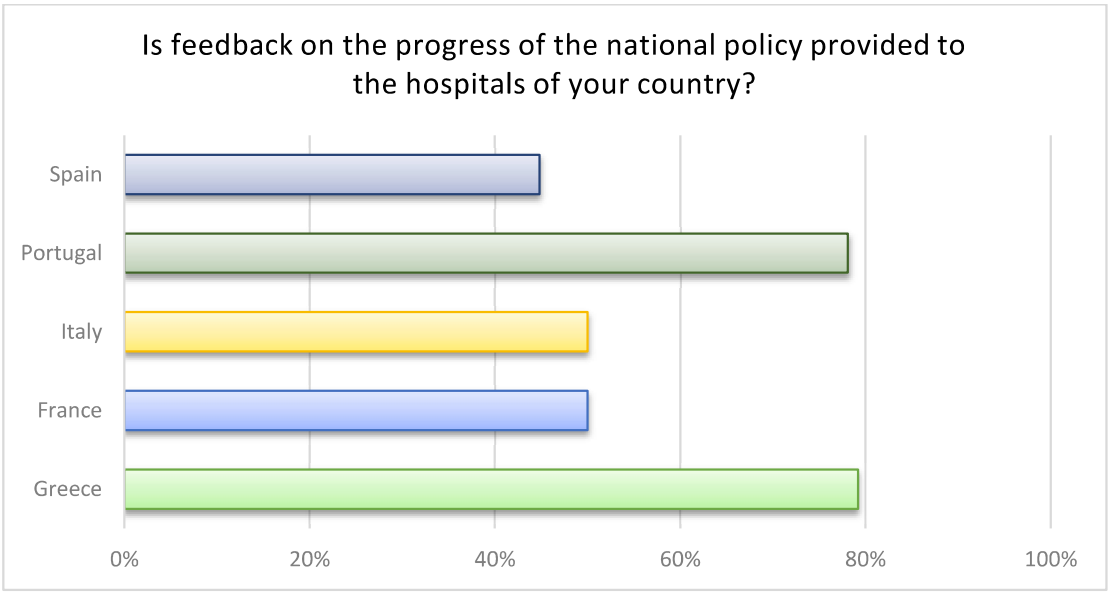

Figure 4: Is feedback on the progress of the national policy provided to the hospitals of your country? (Answers by ICC, answer= YES)

According to PH Authorities, feedback on national progress is provided to clinicians, government and hospital administrators. Moreover, 5 out of the 8 countries reported that there are published reports regarding the progress on national policy.

Table 6. To whom is feedback on the progress of national policy is provided (Answers by PHA, answer=YES)

Is feedback on the progress of national policy progress provided to:								
	AT	DK	FR	EL	IT	PT	ES	NL
Government	✓	✓	✓	✓	✓	✓	✓	
HA	✓	✓	✓	✓	✓	✓	✓	
Clinicians	✓	✓		✓		✓	✓	

Table 7. Whether published annual reports of national policy progress exist (Answers by PHA, answer=YES)

Are there published annual reports of national policy progress?								
	AT	DK	FR	EL	IT	PT	ES	NL
YES	✓		✓		✓	✓	✓	

IC Programs

Regarding the ICP implementation, the vast majority of the respondents (94%) stated that such programs are implemented in their hospitals and also it is their firm belief that its implementation is feasible and effective (91%).

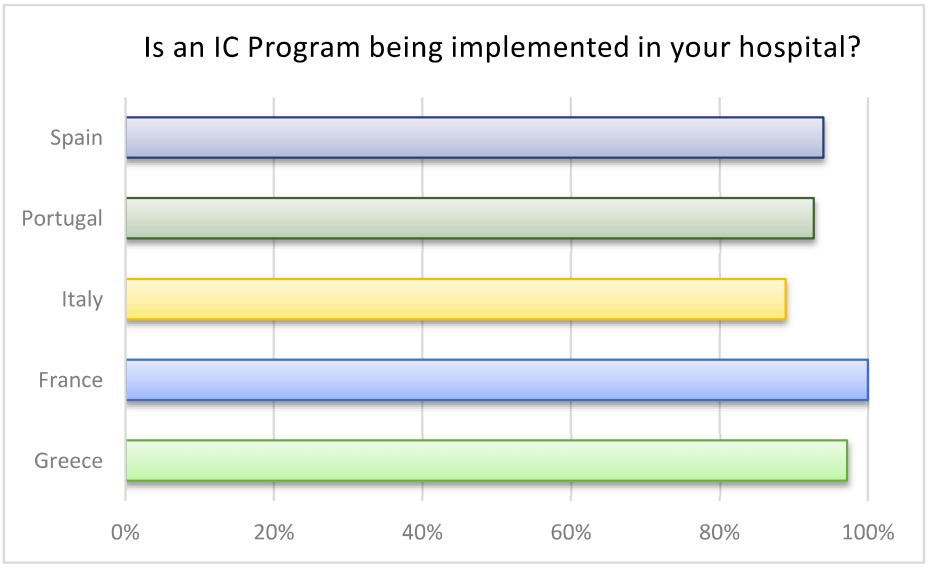

Figure 5: Is an ICP being implemented in your hospital? (Answers by ICC, answer='YES')

According to PH Authorities, IC Programs are implemented in the majority of hospitals of the participating countries.

Responsibility

The responsibility of the ICP implementation was reported to be mainly under the authority of ICCs (81%), followed by the clinical department heads (CDH) and at a lower proportion (36%) by the hospital administrators (34%), as Figure 6 depicts.

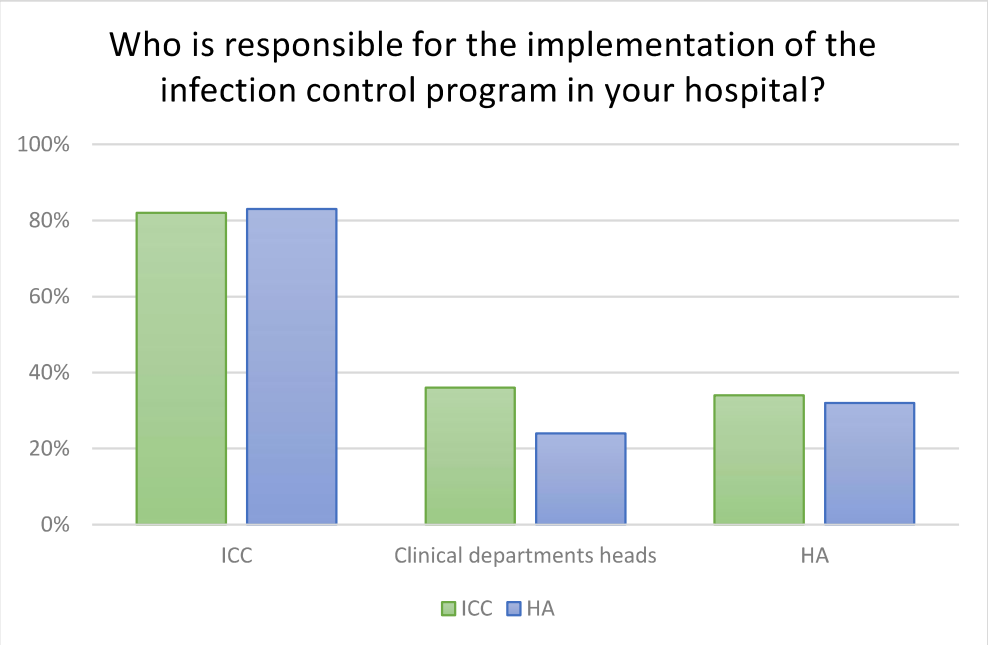

Figure 6: Who is responsible for the implementation of the infection control program in your hospital? (Answers by ICC & HA)

According to PH Authorities, the responsibility of ICPs implementation is firstly under the ICCs (5/8 countries) and the HA (5/8 countries) and finally the clinical department heads (4/8 countries). There was an agreement between all parties and between most of the countries regarding the responsibility of ICCs and the poor contribution of HA and (CDH) to the leadership of the ICP implementation. The results are shown in Table 8.

Table 8. Who is responsible for the implementation of the infection control program in your hospital? (Answers by ICC, HA & PHA, multiple answers possible)

Who is responsible for the implementation of the infection control program in your hospital?				
		ICC	HA	PHA
FR	ICC	90%	100%	✓
	HA	40%	0%	✓
	CDH	20%	20%	
EL	ICC	96%	96%	✓
	HA	53%	56%	✓
	CDH	49%	44%	✓
IT	ICC	78%	59%	✓
	HA	61%	68%	✓
	CDH	11%	27%	
PT	ICC	76%	85%	✓
	HA	22%	13%	
	CDH	46%	18%	
ES	ICC	83%	80%	
	HA	42%	53%	✓
	CDH	8%	20%	

Funding

Regarding the funding of ICPs, 62% of ICCs reported that ICPs are funded by the hospital's budget. The majority of the ICCs (83%) who reported that the ICPs are funded by the hospital's budget reported that the hospitals do not have a specific code in hospitals' budget.

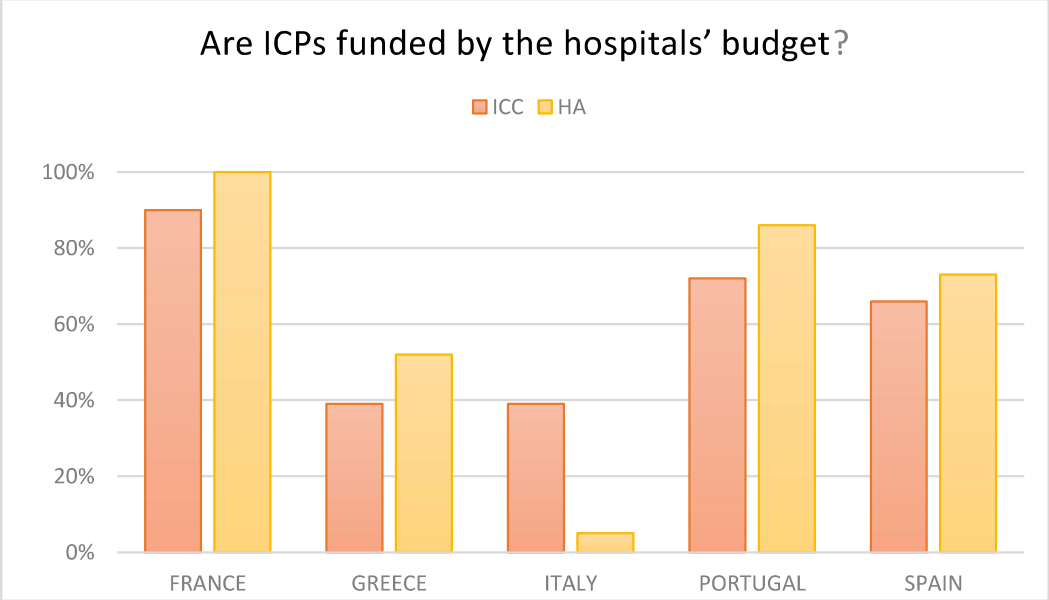

Figure 7: Are ICPs funded by the hospitals' budget? (Answers by ICC & HA, answer='YES')

According to PH Authorities, in 2 out of the 8 countries ICPs are ***not*** *funded by the hospitals' budget. From those* who reported that the ICPs are funded by the hospital's budget reported that *the majority of hospitals do not have a specific code in hospitals' budget (5/8 countries).*

4.4 CONCLUSIONS – KEY POINTS

All countries that participated in Survey A reported that written Infection Control Policies exist in their countries and the majority of them reported that IC policies are mandatory for all healthcare settings. The ICPs have specific goals focused on reducing HAIs incidence and increasing HH compliance. In most healthcare settings at least one ICP is reported to be implemented and is assessed as feasible to be performed. The survey results indicate that the first objective of establishing an ICP with specific targets in most of the healthcare settings seems to have been achieved at a significant proportion.

Feedback on progress of national and hospital IC policies is not provided to all the hospitals and to clinicians. When focused on the answers mainly from the ICCs regarding the progress of national policy, feedback in healthcare professionals though ICC was not sufficient.

Despite the fact that government and HA should be the main target groups for the ICP feedback in order to achieve higher level commitment, providing feedback to

clinicians for the purpose of informing and raising awareness is also crucial. The annual published reports of the national policy progress are a way to disseminate the information to clinicians. ICP feedback should be provided to all parties aiming to support the ICP implementation.

The funding of ICP implementation is an important issue, thus the results from Survey A show that in the majority of the hospitals ICPs are funded directly from the hospital budget, but only in a few hospitals there is a specific code. Allocation of resources efficiently is a major factor for the effective implementation of ICP and reflects the priorities that have been posed at national and hospital level.

5. KEY COMPONENT 2: DEDICATED ORGANIZATIONAL BODIES /PERSONNEL

Having a specialized professional or group working on IC in hospitals is a crucial factor for an effective ICP implementation. This organizational body should have specific authorities aiming at promoting all the appropriate interventions needed for HAI prevention and control of MDROs spread in hospital environments.

5.1 WHO RECOMMENDATIONS[3]

It is critical for a functioning Infection Prevention & Control program to have dedicated, trained professionals in every acute care facility. A minimum ratio of one full-time or equivalent infection preventionist (nurse or doctor) per 250 beds should be available. However, there was a strong opinion that a higher ratio should be considered, for example, one infection preventionist per 100 beds, due to increasing patient acuity and complexity, as well as the multiple roles and responsibilities of the modern preventionist.

5.2 OBJECTIVES OF SURVEY

The purpose of Survey A regarding the dedicated organizational bodies was to determine the following elements in relation to WHO recommendations:

- ✓ The existence of ICCs in the hospitals
- ✓ Whether the authorities of ICCs are defined and legislated
- ✓ The existence of IC professionals in ICCs and their type of employment (full time/ part time)
- ✓ Whether the implementation of antibiotic stewardship program is included in their duties

[3] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Questions asked regarding KEY COMPONENT 2 during Survey A were:

1. Is there an Infection Control Committee (ICC) in your hospital?
2. Are the duties of the ICCs defined and legislated?
3. Which members of the ICC work full time on the IC?
4. Who are the main members of the ICCs?
5. Which members of the ICC work full time on the IC?
6. How many health professionals participate in the ICC?
7. Do ICC duties include the implementation of an antibiotic stewardship program?

5.3 RESULTS

Establishment of Infection Control Committees (ICCs) in healthcare settings

As reported, in almost all hospitals (95%) Infection Control Committees exist and their duties are well defined and legislated (86%). At national level, almost all countries (6/8) agreed to the last one. The average number of participants in an ICC is 11 professionals, as reported by ICCs.

Members of ICCs

As Figure 8 depicts, the most popular answer regarding the main members of the ICC was an IC nurse, followed by another specialist clinician (but not an IC specialist). The discrepancies between countries were high except the IC nurse proportion. Less than 40% of the participants answered an IC specialist and less than 25% answered that HA participate in ICCs.

Only 50% of ICCs reported that IC nurses are employed on a full time basis on IC, while 35% of the settings do not have an ICC member employed on a full time basis on IC (Figure 9, 10, 11).

Statistical analysis shows that in University & Tertiary hospitals and hospitals with specialised units, dedicated personnel on IC are main ICC members in much higher proportion in comparison to the other hospitals, especially Infectious Disease Specialists' participation (p-value <0.001).

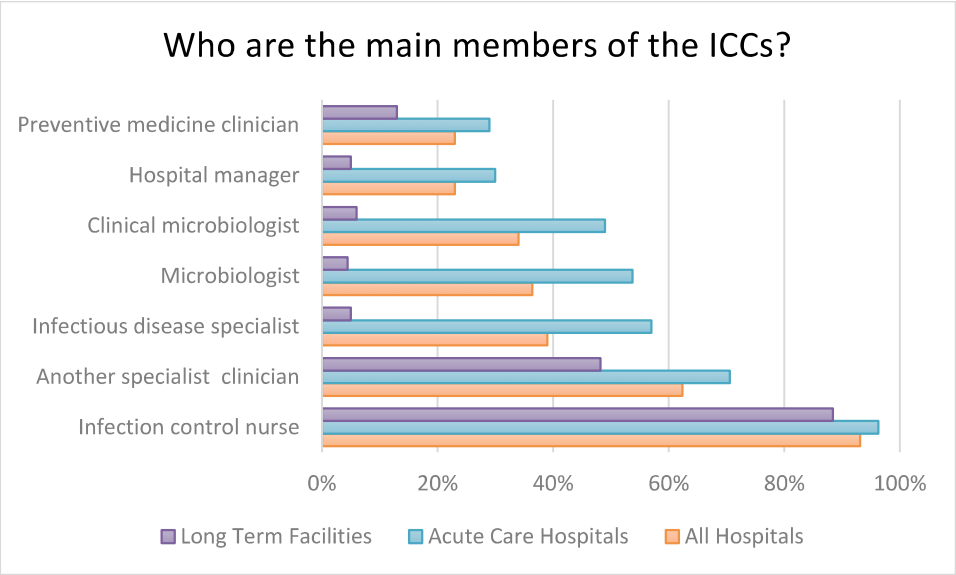

Figure 8: Who are the main members of the ICCs? (Answers by ICC, divided by Acute Care, Long Term Facilities & All hospitals, multiple answers possible)

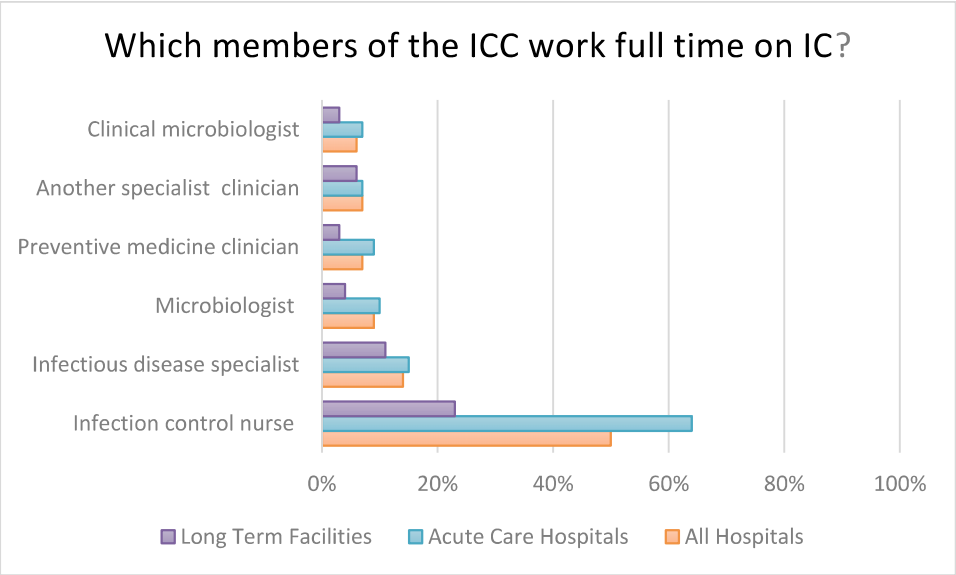

Figure 9: Which members of the ICC work full time on IC? (Answers by ICC, multiple answers possible, divided by Acute Care, Long Term Facilities & All hospitals, percentage of 'All of them' already included in each answer)

Table 9. Who are the main members of the ICCs? (Answers by ICC)					
Who are the main members of the ICCs?					
	FR	**EL**	**IT**	**PT**	**ES**
Infectious disease specialist	0%	43%	100%	20%	73%
Clinical microbiologist	0%	51%	71%	17%	56%
Preventive medicine clinician	0%	33%	88%	9%	35%
Another specialist clinician	30%	54%	65%	66%	80%
Microbiologist	30%	61%	71%	18%	52%
IC Nurse	80%	100%	88%	99%	92%
Hospital Manager	20%	28%	88%	7%	42%

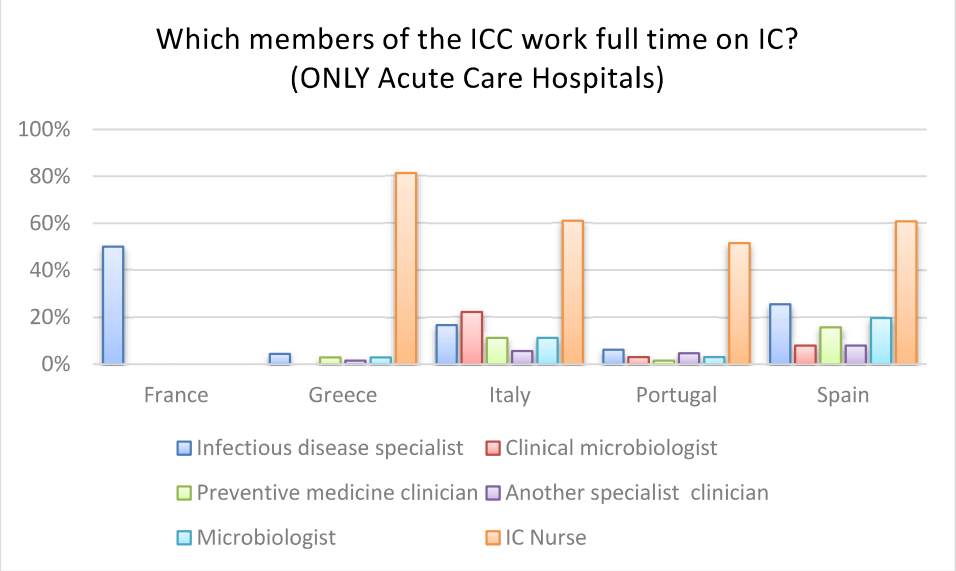

Figure 10: Which members of the ICC work full time on IC ONLY in Acute Care Hospitals? (Answers by ICC, multiple answers possible)

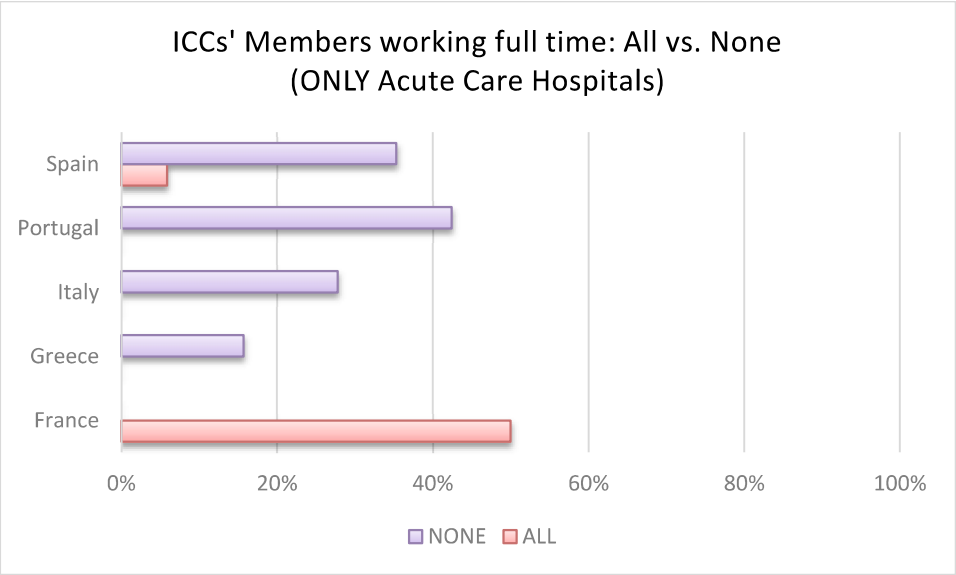

Figure 11: Members of the ICC working full time on IC ONLY in Acute Care Hospitals? (All vs. None, Answers by ICC)

According to ICCs, almost all hospitals have IC Nurses, followed by Clinical Microbiologists and then IC Specialists. Only 24% reported that all 4 specialists are included in the IC-dedicated personnel (Table 11).

Table 10. Proportion of Specialised IC personnel (Answers by ICC, multiple answers possible, n=335)

Specialised IC Personnel (IC Nurse, Clinical Microbiologist, Infectious diseases physicians, IC specialist)	**Percent**
IC Nurse	96%
Clinical Microbiologist	55%
IC Specialist	46%
Infectious Disease Physician	43%
Only IC Nurse	13%
At least 1 Specialist	43%
All 4 Specialists	24%
No Specialist *(regardless of IC Nurse)*	29%

According to the most recent WHO recommendations[4], a minimum ratio of 1 full-time or equivalent infection preventionist (nurse or doctor) per 250 beds is recommended for an effective ICP implementation. Moreover, it is also considered that it would be better for 1 infection preventionist per 100 beds, due to increasing patient acuity and complexity, as well as the multiple roles and responsibilities of the modern preventionist. The data analysis of Hospital data given by ICCs' members, showed that the vast majority of hospitals are complied with these ratio as all but 2 & 14 respectively do not follow these ratios. Nevertheless, as results show, while there are these specialties, they are not working on a full time basis.

According to PH Authorities, almost all participating countries reported that ICCs include an Infectious disease specialist and an IC nurse. Five out of the eight countries reported that the infectious disease specialist works full time on IC and Greece was the only country which reported that the IC nurse works full time on IC (Table 11).

Table 11. Main members of the ICC and work status (Answers by PHA, multiple answers possible)

Who are the main members of the ICCs? (2nd ✓ full time on IC)								
	AT	**DK**	**FR**	**EL**	**IT**	**PT**	**ES**	**NL**
Infectious disease specialist	✓	-/✓	✓✓	✓	✓✓	✓✓	✓	✓✓
Clinical microbiologist	✓	✓	✓		✓	✓	✓	✓
Preventive medicine clinician		-/✓	✓		✓		✓	
Another specialist clinician	✓		✓	✓	✓	✓		✓
Microbiologist			✓	✓	✓			
IC nurse	✓	✓	✓	✓✓	✓	✓	✓	✓
HA			✓	✓	✓		✓	✓

[4] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Duties

In the majority of the ICCs, the implementation of an antibiotic stewardship program (ASP) (77%) is included in their duties, which is a major task and demands additional dedicated personnel focused on the implementation of ASP in healthcare settings (Figure 12).

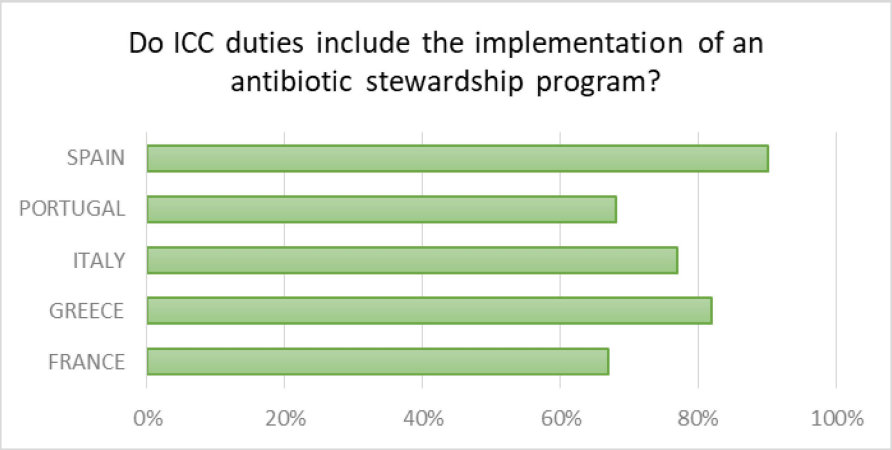

Figure 12: Do ICC duties include the implementation of an antibiotic stewardship program? (Answers by ICC, answer='YES')

5.4 CONCLUSIONS – KEY POINTS

Despite the fact that a very large proportion of healthcare settings reported that there are organizational bodies in each hospital for the implementation of IC (ICCs) with well-defined and legislated duties and comprised of members from different specialities, a small proportion of ICCs have IC professionals working on a dedicated full time basis. Additionally, the majority of hospitals' administration does not participate in the ICCs. As a consequence, the following issues related to an effective IC implementation should be noted:

There seems to be a need for more human resources and personnel with specific skills and training who will work exclusively on IC. HAIs prevention is a complex issue involving all sectors that deal with the personnel and the environment of the healthcare settings. Especially, in settings with high HAIs or/and AMR rates, the need for specialized personnel is even more imperative and necessary.

The participation of HA in ICCs is another way to raise awareness, to activate and support the work of ICC, and to invest on IC. The administrations should have an

active role in ICCs and share the responsibilities for an effective ICP implementation for the benefit of the patient's safety and healthcare services' quality.

6. KEY COMPONENT 3: GUIDELINES - EDUCATION-TRAINING

Continuous training and education of healthcare professionals is the core element of the effective ICPs implementation. Training of healthcare workers at any level to evidence based IC practices should be based on national and regional guidelines and be established as a priority of national and hospital policy.

6.1 WHO RECOMMENDATIONS[5]

Evidence-based guidelines should be developed and implemented for the purpose of reducing HAIs and AMR.

Education and training on IC practices of the healthcare workers in accordance with the guidelines and recommendations and monitoring of adherence to them should be undertaken to achieve a successful implementation.

At healthcare facility level, IC education should be in place for all healthcare workers by utilizing team- and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAIs and AMR.

At national level, ICP should include the education and training of healthcare workforce in its core functions.

6.2 OBJECTIVES OF SURVEY

The purpose regarding the Guidelines- Education- Training of Survey A was to determine the following elements in relation to WHO recommendations:

- ✓ The existence of training programs in healthcare facilities for all the personnel (including HA and heads of clinical wards), focused on the basic principles of IC in accordance with the national/regional guidelines.
- ✓ Training program is a key element of IC in hospitals, using the available resources in an effective and equitable way for its implementation (training team, material, educational tools).
- ✓ Whether the responsibility for the training program's sustainability is a priority at the highest level of the hierarchy.

[5] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

- ✓ The effectiveness of training implementation, using interactive methods aiming at raising awareness in all healthcare professionals.

Questions asked regarding KEY COMPONENT 3 during Survey A were:

1. Are there educational/training programs at national level for the HAIs control and prevention for healthcare professionals?
2. Has it ever been a specialized training program targeting the administrative personnel regarding the impact of the IC in healthcare settings? Have you ever attended any of this training?
3. Is there a training program for IC of health professionals in your hospital?
4. Is it mandatory for all the personnel?
5. Is training on IC is mandatory for health professionals at undergraduate level?
6. Who is responsible for the training of the health professionals in your hospital?
7. Is there a dedicated team of trainers for the infection control in your hospital?
8. Are the heads of clinical departments being trained in the implementation of infection control measures?
9. Are there guidelines on infection control practices in healthcare settings?
10. Have health professionals been trained according to these guidelines?
11. How have the guidelines been distributed to health professionals?
12. Do you believe that the training of the health personnel is effective in your hospital?

6.3 RESULTS

Training Programs

The majority of ICCs stated that there are educational/training programs at national level for HAI control and prevention targeted to healthcare professionals (76%). Figure 13 depicts the results per country.

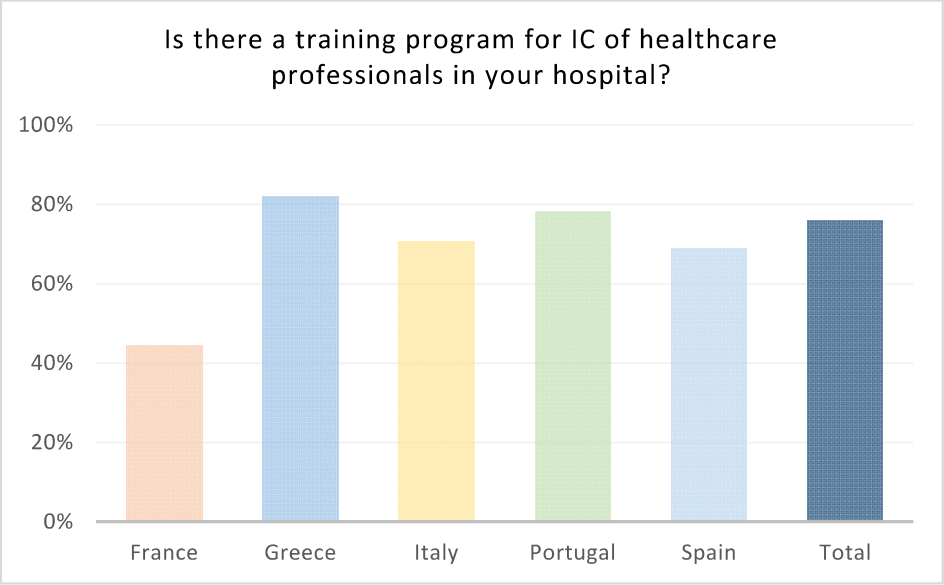

Figure 13: Is there a training program for IC of healthcare professionals in your hospital? / Country (Answers by ICC, answer='YES')

Among hospitals providing a training program, only 58% reported that it is mandatory for all the personnel, and while statistical analysis for university hospitals showed that it's not mandatory for them (p-value= 0.013<0.05).

According to PH authorities there are postgraduate programs for IC at national level in all the countries. The training on IC for health personnel is mandatory in 4 out of the 8 participating countries (including the Netherlands).

Table 13. Is the training on IC mandatory for all the hospital personnel?/Country (Answers by ICC, HA & PHA, answer= 'YES')

Is the training on IC mandatory for all the hospital personnel?			
	ICCs	HA	PHA
FR	67%	0%	✓
EL	49%	73%	✓
IT	71%	53%	✓
PT	68%	71%	
ES	33%	58%	

The contribution of HA and Head of Clinical Departments to the IC training

92% of the HA reported that in their hospital an IC training program for the personnel is performed and the vast majority of the HA (80%) have attended it.

Nevertheless, half of the HA (52%) reported that they have not attended a specialized training program targeting the administrative personnel regarding the impact of the IC in healthcare settings (Figure 14). Moreover, only 64% of the ICCs reported that the heads of clinical departments are trained in implementation of IC measures, as Figure 15 shows in results per country.

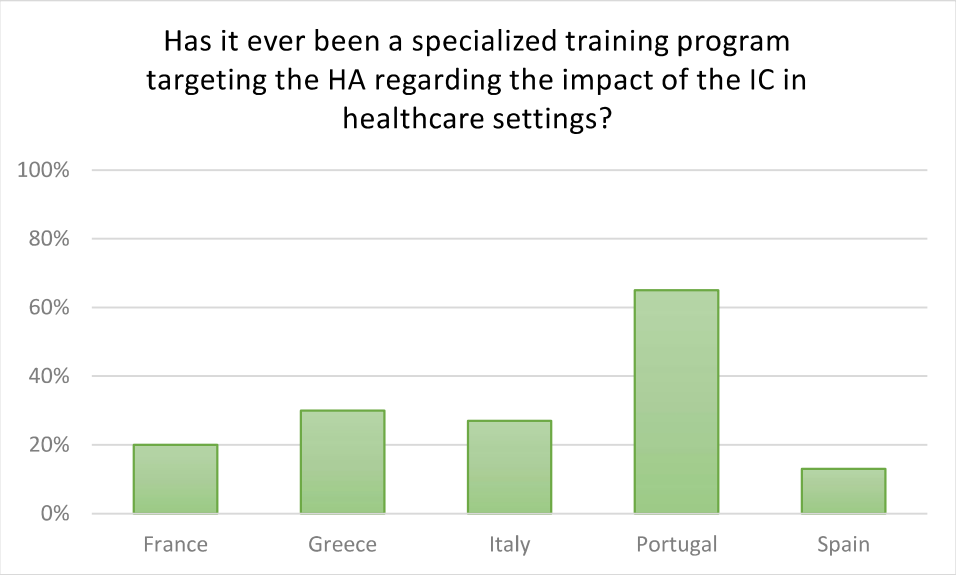

Figure 14: Has it ever been a specialised training program targeting the HA regarding the impact of the IC in healthcare settings? (Answers by HA, answer= 'YES')

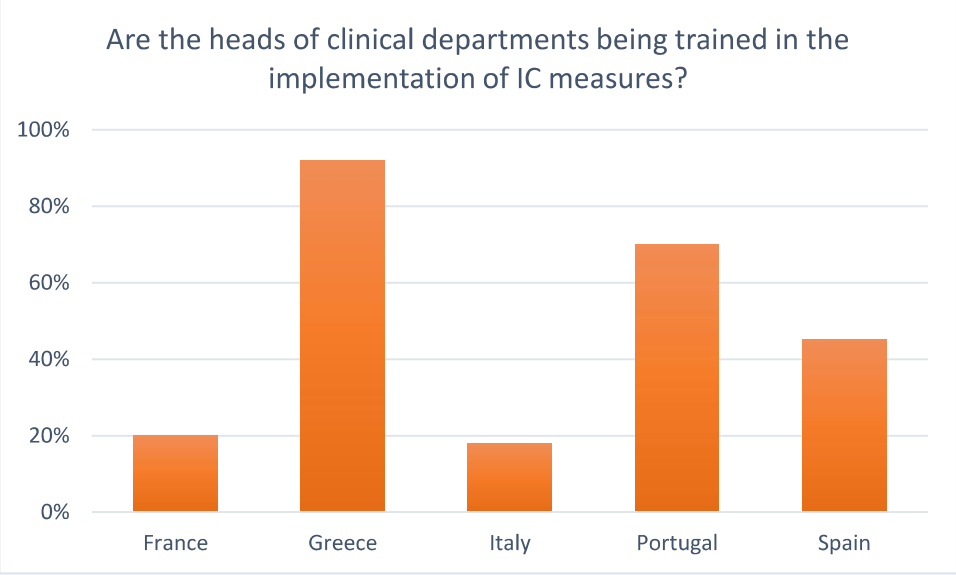

Figure 15: Are the heads of clinical departments being trained in the implementation of IC measures? (Answers by IC, answer= 'YES')

Regarding the IC training program implementation, most of the respondents argued that ICCs are responsible for the training of healthcare professionals in their hospitals (73%). Results are shown in Table 14.

Table 14. Who is responsible for the training of healthcare professionals in your hospital? (Answers by ICC, multiple answers possible)

Who is responsible for the training of the health professionals in your hospital?					
	FR	**EL**	**IT**	***PT***	**ES**
ICCs	22%	88%	18%	*83%*	52%
HA	0%	14%	6%	*2%*	24%
Clinical department head	0%	19%	35%	*30%*	11%
Educational department personnel	67%	22%	18%	*16%*	50%

Sixty-five (65%) of the ICCs stated that there is a dedicated team of trainers for IC in their hospital.

According to PH authorities, 5 out of the 8 countries reported that there are dedicated training teams in the hospitals of the country.

Training Methodology

More than half of the respondents (57%) use a combination of training tools. Nonetheless, methodologies such as face-to-face training in clinical department or small mixed groups prevail as the most modern and effective training methods (93% & 88% respectively).

Effective training program implementation

The majority of the ICCs (72%) reported that the training program of their hospital needs to be improved while 25% of ICCs answered that the implemented training program is effective. Figure 16 depicts the results per country.

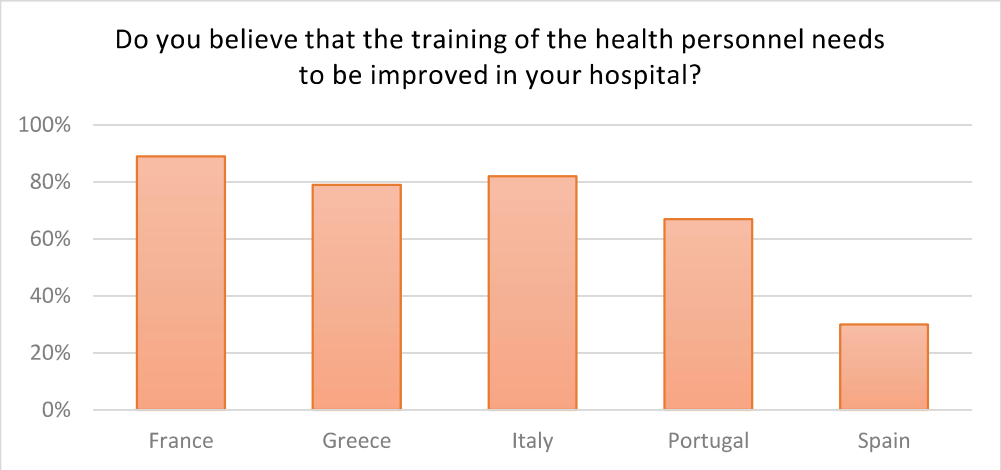

Figure 16: Do you believe that the training of the health personnel needs to be improved in your hospital? / Country (Answers by ICC, answer= 'YES')

Guidelines

Almost all respondents (98%) reported that guidelines on IC at national/regional/hospital level as well as in their hospital (94%) exist and the vast majority of HCWs (91%) have been trained according to these. The most popular way for distributing the guidelines is the digital one (71%), followed by hard copies (67%) and reminders (33%).

Ninety-four percent (94%) of the respondents reported that Hand Hygiene is a top priority for improving the quality of healthcare, followed by the isolation precautions for patients with Multi-Drug-Resistant Organisms, as it is shown in Figure 17.

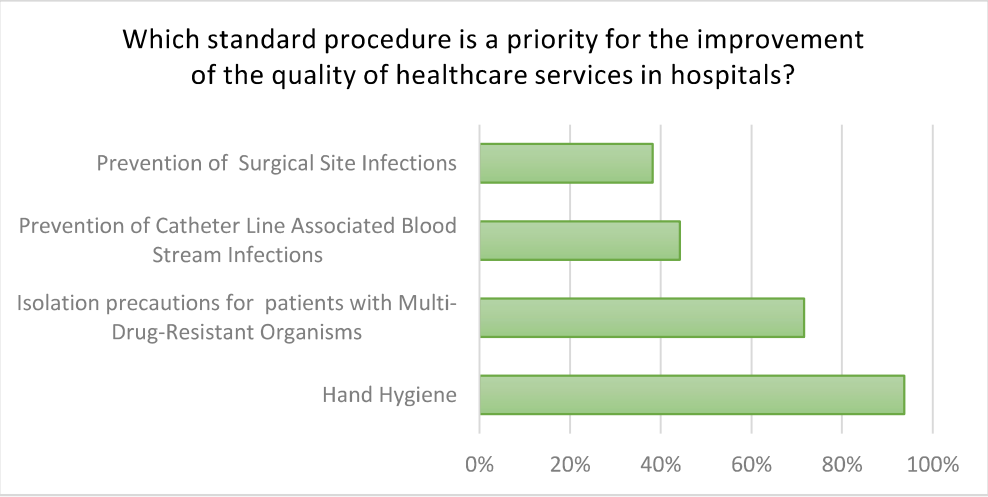

Figure 17: Which standard procedure is a priority for the improvement of the quality of healthcare services in hospitals? (Answers by ICC, multiple answers possible)

According to PH authorities, all countries reported that there are guidelines at national/regional/hospital level.

6.4 CONCLUSIONS – KEY POINTS

Regardless of providing training programs to healthcare professionals in the majority of the healthcare settings, a significantly high proportion of these programs are not mandatory for all the personnel, especially to settings with patients in high risk of HAIs. Additionally, those at the highest levels of hierarchy of clinical department, are not trained either to the impact of HAI infection Control and Prevention or to the implementation of IC measures.

Furthermore, HAs and heads of the wards have no responsibility for the training of the healthcare personnel. This is an outcome of crucial importance as they cannot act as role models for the personnel without having the responsibility to guide the personnel to perform safe and evidence- based practices in routine clinical work. Moreover, they cannot support the work of ICCs without being involved properly.

Furthermore, the training of healthcare personnel is a complex issue due to its direct relation with the personnel compliance to IC measures. Therefore, HCWs should be trained by an appropriate and qualified team which uses written guidelines and which customizes the training activities to the needs and the behaviour of each target group of personnel. The results from Survey A show that the majority of hospitals do not have such dedicated training teams.

7. KEY COMPONENT 4: HAI SURVEILLANCE

Surveillance is the main tool to evaluate the ICP implementation and the progress of interventions. Establishing a surveillance system at national and hospital level is one of the most important domains which provides the opportunity i) to set goals and estimate their achievement, ii) to detect outbreaks and, iii) to identify events of major importance for public health. The success of surveillance depends not only on establishing a reliable system responding to national and local needs, but also on the correct and timely dissemination of data to all stakeholders in an understandable and approachable way.

7.1 WHO RECOMMENDATIONS[6]

At Healthcare facility level, a facility-based HAI surveillance, including AMR surveillance, should be performed to guide IC interventions and detect outbreaks, including AMR surveillance with timely feedback of the results to healthcare workers and stakeholders and to national networks.

National HAI surveillance programs and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAIs and AMR.

7.2 OBJECTIVES OF SURVEY

The purpose regarding the surveillance of HAIs and AMR of Survey A was to determine the following elements in relation to WHO recommendations:

- ✓ Whether hospitals participate in a national/regional/hospital surveillance system regarding HAIs and AMR.
- ✓ Whether hospitals measure indicators regarding HAIs and AMR and whether these indicators are used for evaluating healthcare services.
- ✓ Whether surveillance data is used to inform and raise awareness in all related parties of the IC pyramid.

[6] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Questions asked regarding KEY COMPONENT 4 during Survey A were:

1. Is there an established surveillance program for HAIs and AMR in your country?
2. Is it mandatory for all the hospitals?
3. Does your hospital participate in the national surveillance system?
4. Which indicators are being measured at national and hospital level?
5. Who has access to the surveillance data of your hospital?
6. For whom are annual surveillance reports produced in order to inform? Are they published?
7. Are the surveillance results used for the evaluation of the quality of healthcare services in your hospital?

7.3 RESULTS

HAIs and AMR surveillance

There is an established surveillance program for HAIs and AMR at national or regional level in the majority of the healthcare settings (91%). The vast majority of respondents participate in these surveillance systems (93%).

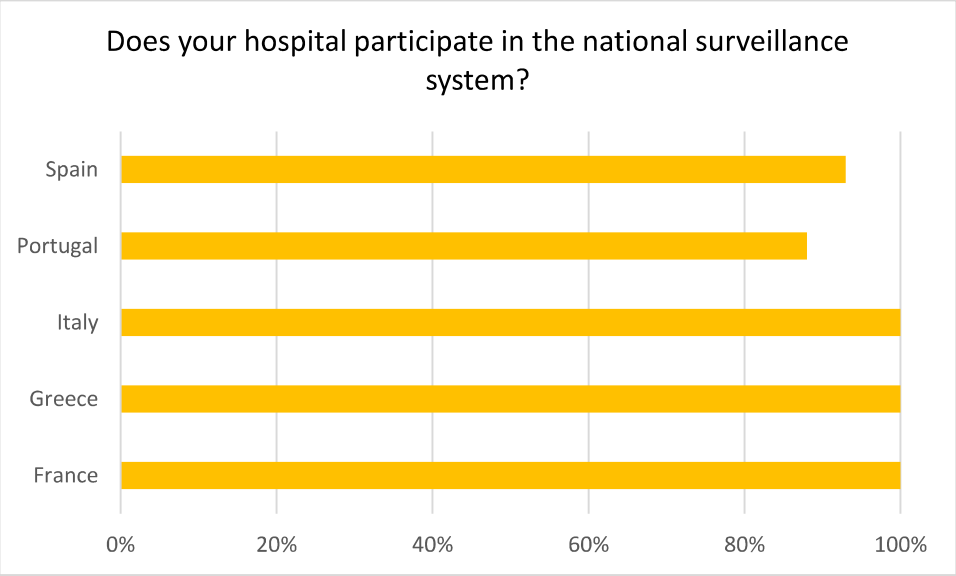

Figure 18: Does your hospital participate in the national surveillance system? / Country (Answers by ICC)

According to PH Authorities 6 out of 8 countries reported that surveillance is mandatory for all the hospitals.

ICP's measured indicators

Seventy-four percent (74%) of the ICCs who participate in a national/regional surveillance program use at least two of the proposed indicators, the proportions of which are shown in Figure 19.

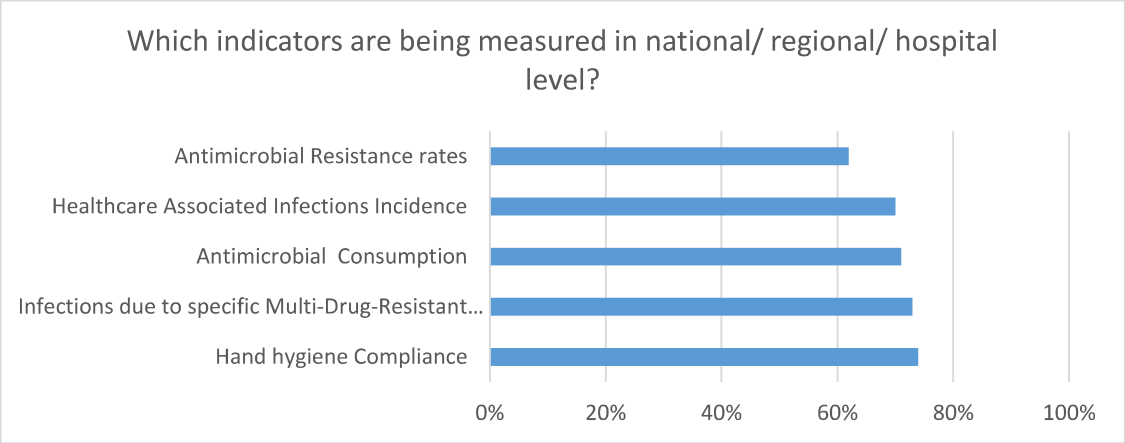

Figure 19: Which indicators are being measured in national/ regional/ hospital level? (Answers by ICC)

According to PH Authorities, all countries measure at least 2 indicators, while 4 out of 7 countries measure all 5 indicators.

Table 15. Indicators measured in national level (Answers by PHA, multiple answers possible)

Which indicators are being measured in national level?								
	AT	**DK**	**FR**	**EL**	**IT**	**PT**	**ES**	**NL**
AMR rates	✓	✓	✓	✓	✓	✓	✓	✓
HAIs Incidence	✓	✓	✓	✓		✓	✓	✓
Hand hygiene Compliance	✓		✓	✓		✓	✓	
Infections due to specific MDROs	✓	✓	✓	✓		✓	✓	
Antimicrobial Consumption	✓	✓		✓	✓	✓	✓	✓

Access to surveillance data

ICCs are the ones who have mainly access to surveillance data (93%), followed by HA (61%), health professionals (60%), and the government (42%) as shown in Figure 20.

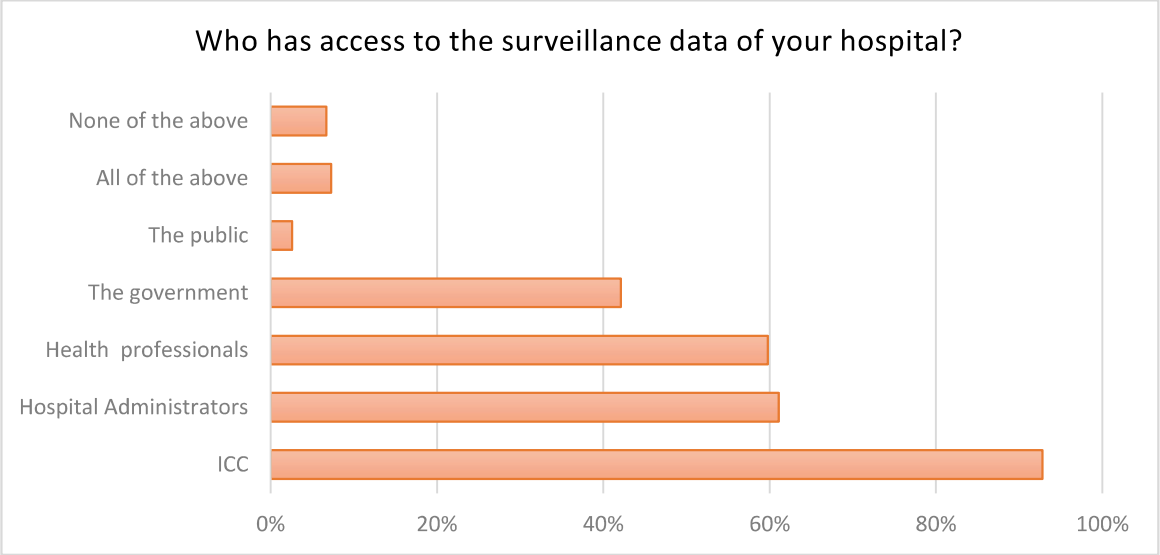

Figure 20: Who has access to the surveillance data of your hospital? (Answers by ICC)

Statistical analysis shows that in hospitals with specialized units, HAs have access to surveillance data in a higher proportion in comparison to those who do not have any (p-value= 0.013<0.05). In contrast, in University hospitals, HCWs do not have sufficient access to surveillance data (p-value= 0.013<0.05).

According to the PH Authorities, 5 out of 8 countries reported that access to surveillance data have "all of the above", public included. (Table 16).

Table 16. Groups with access to the surveillance data (Answers by PHA, multiple answers possible)

Who has access to the surveillance data?	AT	DK	FR	EL	IT	PT	ES	NL
Public	✓	✓	✓	✓				✓
Healthcare professionals	✓	✓	✓	✓	✓	✓	✓	✓
ICC	✓	✓	✓	✓	✓	✓	✓	✓
HA	✓	✓	✓	✓	✓		✓	✓
Government	✓	✓	✓	✓		✓		✓
All of the above	✓	✓	✓	✓				✓

Surveillance Reports

The majority of respondents (82%) reported that surveillance reports are produced annually, and 68% of ICCs reported that surveillance results are used for the evaluation of quality of healthcare services in their hospitals. HA and clinicians are the ones who are mainly informed by these reports whereas the government is reported to be informed by a smaller proportion (Figure 21, 22).

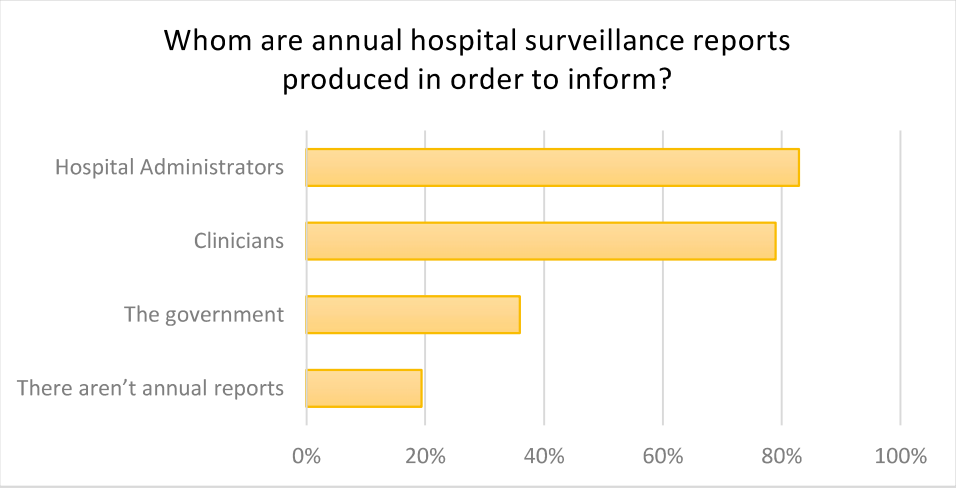

Figure 21: Whom are annual hospital surveillance reports produced in order to inform? (Answers by ICC)

Table 17. Whom are annual hospital surveillance reports produced in order to inform? (Answers by ICC)

Whom are annual hospital surveillance reports produced in order to inform?	FR	EL	IT	PT	ES
Hospital Administrators	83%	94%	86%	72%	93%
Clinicians	14%	80%	20%	92%	72%
The Government	100%	37%	75%	36%	21%
NO annual surveillance reports	25%	23%	47%	20%	5%

According to PH Authorities, all countries use surveillance results to evaluate the quality of the healthcare services. All eight participating countries reported that annual hospital surveillance reports are produced to inform the clinicians and the government and 4 out of the 8 countries reported that the public is informed, as shown in Table 18.

Table 18. Whom are annual hospital surveillance reports produced in order to inform? (Answers by PHA)

	AT	DK	FR	EL	IT	PT	ES	NL
HA	✓	✓	✓	✓		✓	✓	✓
Clinicians	✓	✓	✓	✓	✓	✓	✓	✓
Government	✓	✓	✓	✓	✓	✓	✓	✓
Public	✓		✓		✓		✓	

7.4 CONCLUSIONS- KEY POINTS

An important conclusion that can be drawn by the results is that surveillance related to HAI and AMR is enhanced at national/ regional level in all the participating countries. Nevertheless, the results of the surveillance are not distributed in all the interested parties, as it should (apart from the ICCs). Healthcare professionals should the main recipients of information regarding the

surveillance results. Data should be accessible to them in a comprehensive manner, responding to clinical reality. Finally, it should also be mentioned that in several countries public has access to surveillance data.

8. KEY COMPONENT 5: AUDIT OF IC PRACTICES AND ACTIVITIES FEEDBACK

The aim of auditing IC practices and feedback is to improve the quality of healthcare, to reduce the incidence of HAIs and the spread of MDROs in nosocomial environment. In order to achieve behavioural change and improvement of adherence to IC measures, feedback to all interested parties in IC pyramid should also be part of healthcare personnel training.

8.1 WHO RECOMMENDATIONS[7]

At healthcare facility level, it is recommended that regular monitoring/ audit and timely feedback of health care practices according to ICP standards is performed to prevent and control HAIs and AMR.

Feedback should be provided to all audited persons and relevant parties. National IC programmes should be linked with other relevant national programmes and professional organizations.

A national IC monitoring and evaluation program should be established to assess the extent to which standards are being met and activities are being performed according to the program's goals and objectives.

8.2 OBJECTIVES OF SURVEY

The purpose of Survey A regarding the audit of IC practices was to determine the following elements in relation to WHO recommendations:

- ✓ Whether an audit on IC program implementation in the hospitals of the country exists.
- ✓ Which are the procedures covered by the audit.
- ✓ Whether feedback is provided to all interested parties of IC at hospital and national level.

[7] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Questions asked regarding KEY COMPONENT 5 during Survey A were:

1. Is there an audit on the implementation of the IC program in country hospitals? (Internal audit - external audit)
2. For which of the following procedures does it cover?
3. Who access the audit results?

8.3 RESULTS

Audit of the ICP implementation

More than half of the respondents claim there is either an internal or an external audit on the ICP implementation (63%). However, 28% of the ICCs reported they do not have one. The small proportion of hospitals in which there is an external audit should also be noted. The results are shown in Figure 22 and Table 19. The audit procedures covered were Hand Hygiene (87%), followed by Isolation precautions for patients with MDROs (76%), and finally Care Bundles of HAIs (67%).

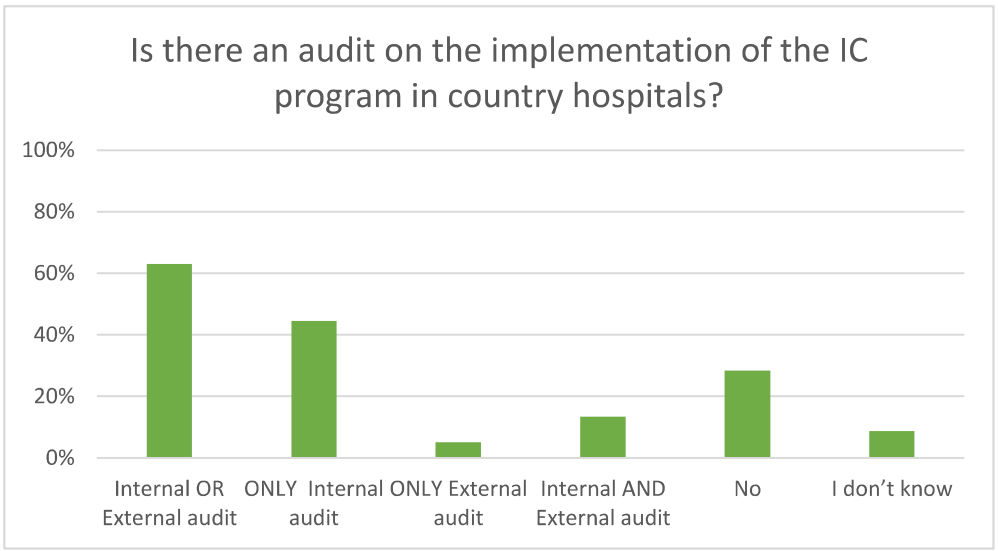

Figure 22: Is there an audit on the implementation of the ICP in your country hospitals? (Answers by ICC)

Table 19. Is there an audit on the implementation of the ICP in your country hospitals? (Answers by ICC)					
Is there an audit on the implementation of the IC program in country hospitals?					
	FR	EL	IT	PT	ES
Internal audit OR External audit	70%	71%	83%	60%	55%
ONLY External audit	40%	10%	0%	1%	10%
ONLY Internal audit	50%	61%	72%	49%	27%
Internal AND External audit	20%	17%	11%	10%	18%
No	10%	17%	11%	36%	28%
I Don't know	20%	13%	6%	4%	16%

According to PH Authorities, all hospitals are audited either externally or internally, while 2 out of the 8 countries reported that both internal and external audits are performed in their hospitals.

Audit Results

The audit results are usually assessed by the ICCs, followed by PH Authorities/MoH. The low proportion of HA as responsible for the assessment should also be noted (Figure 23). Statistical analysis showed that when HAs or ICCs are responsible for ICP implementation, audit is implemented more effectively (p-value= 0.026<0.05 & p-value=<0.001 respectively), while when ICC is responsible, there is also internal or external audit in higher percentage additionally (p-value=<0.001).

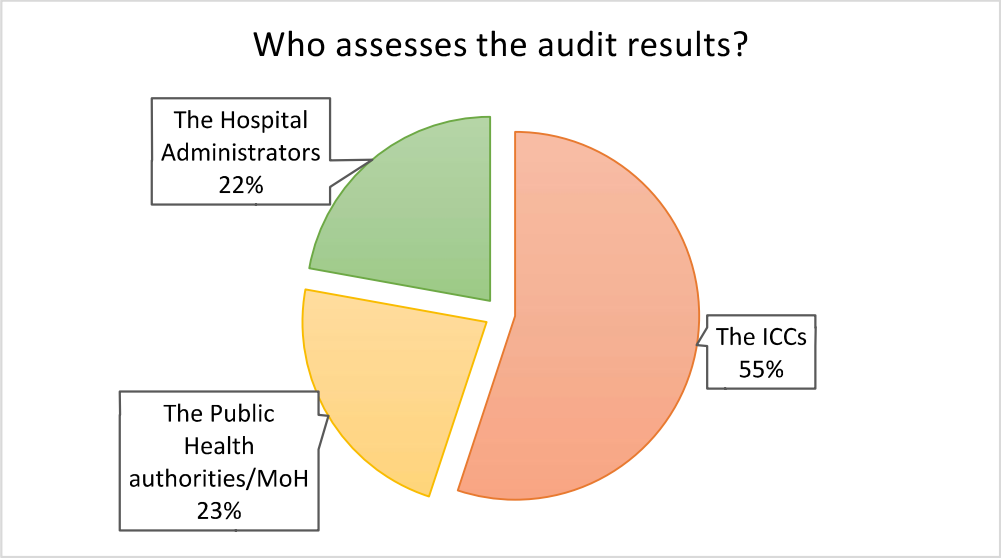

Figure 23: Who assesses the audit results? (Answers by ICC, multiple answers possible, n= 335)

Table 20. Who assesses the audit results (Answers by PHA, multiple answers possible)

Who assesses the audit results?								
	AT	**DK**	**FR**	**EL**	**IT**	**PT**	**ES**	**NL**
PHA/ MoH	✓		✓	✓			✓	
HA	✓	✓	✓	✓	✓			✓
ICCs	✓	✓	✓	✓	✓	✓	✓	✓

8.4 CONCLUSIONS- KEY POINTS

Results depict a lack of external audit on ICP implementation in hospitals, while the proportion of no audit at all is high. Moreover, audit results are assessed by ICCs and less by PH Authorities or Hospital Administrators.

Ineffective audit control not only results in non-proper ICP evaluation, but also parties at high ranks in the IC pyramid are not included in the assessment of the audit results. An effective process for auditing the ICP implementation should be developed as a key component for patients' safety.

9. KEY COMPONENT 6: COMMUNICATION & COOPERATION- MULTIMODAL STRATEGIES

The communication and cooperation among the parties of the IC Pyramid (PH authorities, HA, ICCs & clinicians) is an important condition for an effective ICP implementation. It reflects the organizational culture regarding the promotion of IC implementation in clinical practice and the dynamic environment into all these activities aiming at the sustainability of an ICP. Also, it reflects the capability of any healthcare system to support multimodal and multisector strategies in order to promote the effective implementation of the national policy.

9.1 WHO RECOMMENDATIONS[8]

Healthcare facility level: Successful multimodal interventions should be associated with an overall organizational culture change as effective Infection Prevention & Control Program can be a reflector of quality care, a positive organizational culture and an enhanced patient safety climate.

National level: The national approach to coordinating and supporting local (health facility level) multimodal interventions should be within the mandate of the national ICP and be considered within the context of other quality improvement programmes or health facility accreditation bodies.

9.2 OBJECTIVES OF SURVEY

The purpose of Survey A regarding the cooperation & communication between the partners of the IC pyramid was to determine the following elements in relation to WHO recommendations:

- ✓ Whether the cooperation and the communication between all the relevant contributors is a key component of the ICP implementation and performed in a continuing and stable manner.
- ✓ Whether cooperation is effective, functional, and satisfactory for all parties.
- ✓ Whether key activities of an ICP are included in the multimodal strategy and performed efficiently in the hospitals.

[8] Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. Licence: *CC BY-NC-SA 3.0 IGO.*

Questions asked regarding KEY COMPONENT 6 during Survey A were:

1. Is there an established procedure for the cooperation between hospital manager and the ICC in your hospital? Which procedures does it cover?
2. How does the ICC cooperate with the hospital administrator?
3. Is the cooperation between hospital administrations and the ICC regarding the HAI prevention and the combat of Antimicrobial Resistance in your hospital efficient?
4. Is the cooperation between ICCs and clinicians regarding the prevention of HAI and the combat of Antimicrobial Resistance in your hospital efficient?

9.3 RESULTS

Cooperation of ICCs and different parties

The majority of ICCs (70%) stated that there is an established procedure for the cooperation between HA and ICCs. Less than half of the respondent (48%) ICCs reported that there is a systematically established cooperation between both parties. Almost half of ICCs reported that cooperation is implemented by reports or in a crisis and only 4% reported that there is no need for a systematic collaboration (Figure 24).

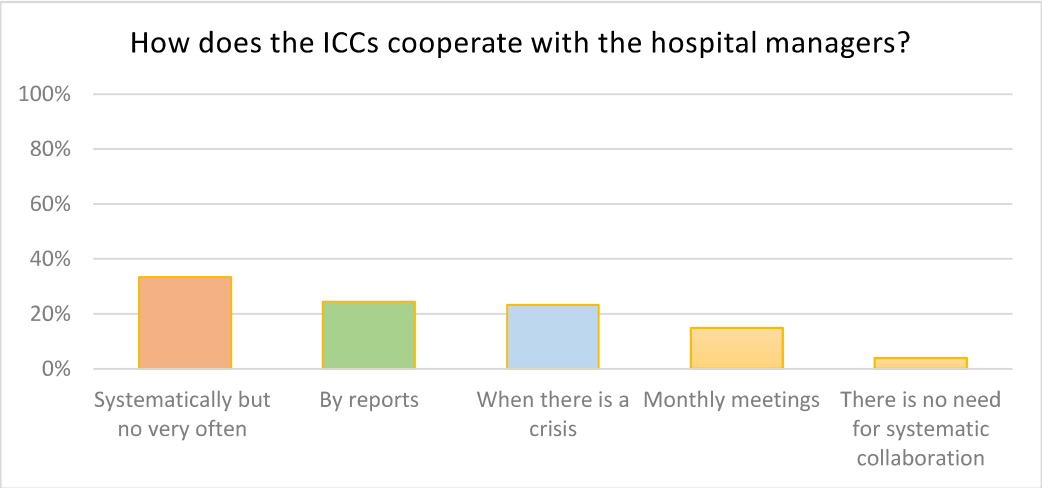

Figure 24: How does the ICCs cooperate with HA? (Answers by ICC)

The majority of the respondents (77%) reported that the cooperation between the ICCs and the clinicians could be improved, while only 19% of ICCs answered that

the cooperation with clinicians is efficient. Only a third of the ICCs reported that cooperation between HA and ICCs is satisfactory. Moreover, when ICC is responsible for ICP implementation, statistical analysis showed that established cooperation between Has & ICCs existed in higher proportions (p-value=<0.001).

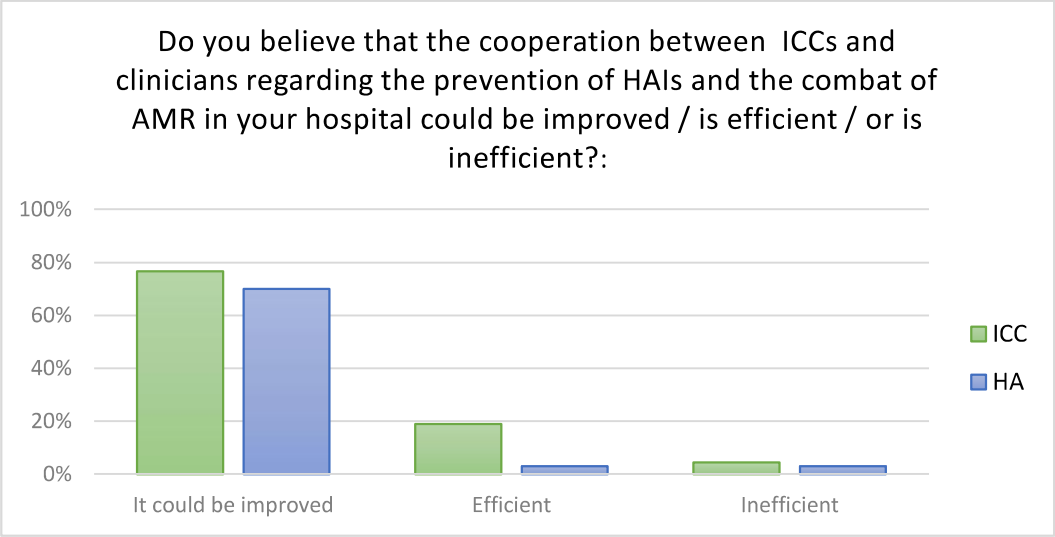

Figure 25: Do you believe that the cooperation between ICCs & clinicians regarding the prevention of HAIs & the combat of AMR in your hospital could be improved / is efficient / or is inefficient? (Answers by ICC & HA)

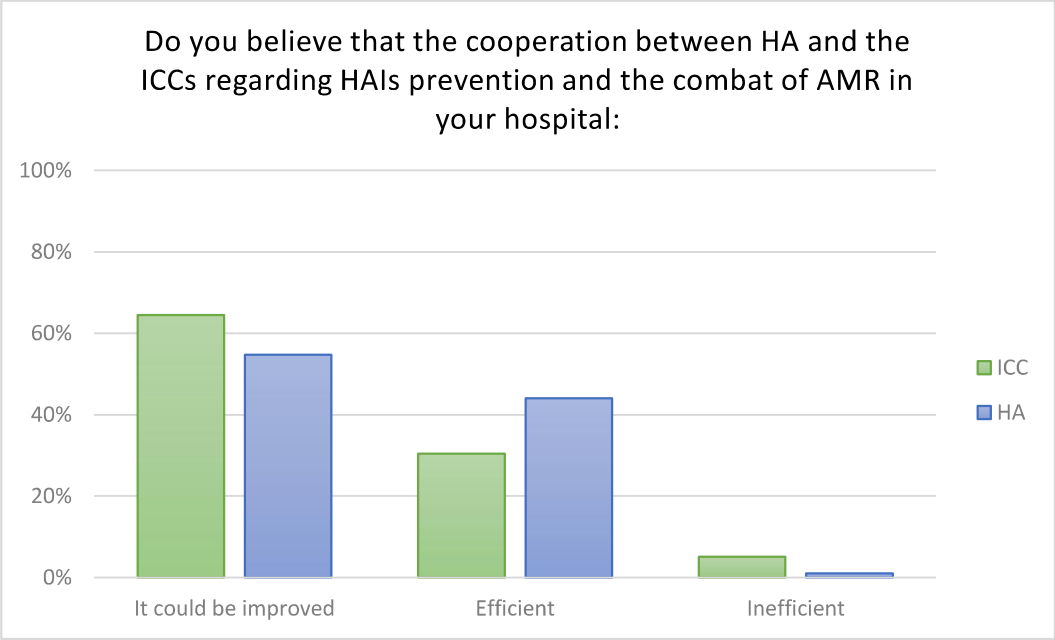

Figure 26: Do you believe that the cooperation between HA & ICCs regarding the prevention of HAIs & the combat of AMR in your hospital could be improved / is efficient / or is inefficient? (Answers by ICC & HA)

Cooperation of PH Authorities and different parties

Even though according to PH authorities there is an established procedure for the cooperation between PH Authorities and hospitals on the implementation of the

national policy in 5 out of the 7 countries, the cooperation is reported as effective only in 4 out of the 8 participating countries.

Table 21. Do you believe that the cooperation between PHA & hospitals regarding the prevention of HAIs & the combat of AMR in your hospital is effective? (Answers by PHA)

Do you believe that the cooperation between PH Authorities and hospitals regarding HAIs prevention and the combat of AMR is:								
	AT	**DK**	**FR**	**EL**	**IT**	**PT**	**ES**	**NL**
EFFECTIVE	✓	✓		✓				✓

Activities Performed

Finally, as Figure 27 shows, significant differences were noted on the type of IC activities that are satisfactorily performed in the hospitals. According to the ICCs, training is the top activity performed (67%), nevertheless in less than 50% of the healthcare settings, organizational culture and resources regarding IC implementation are provided satisfactorily. Finally, the proportion of ICCs that reported that none of these activities are satisfactorily performed in their hospital is 19.1%. The results are shown in Figure 27 & Tables 22 &23.

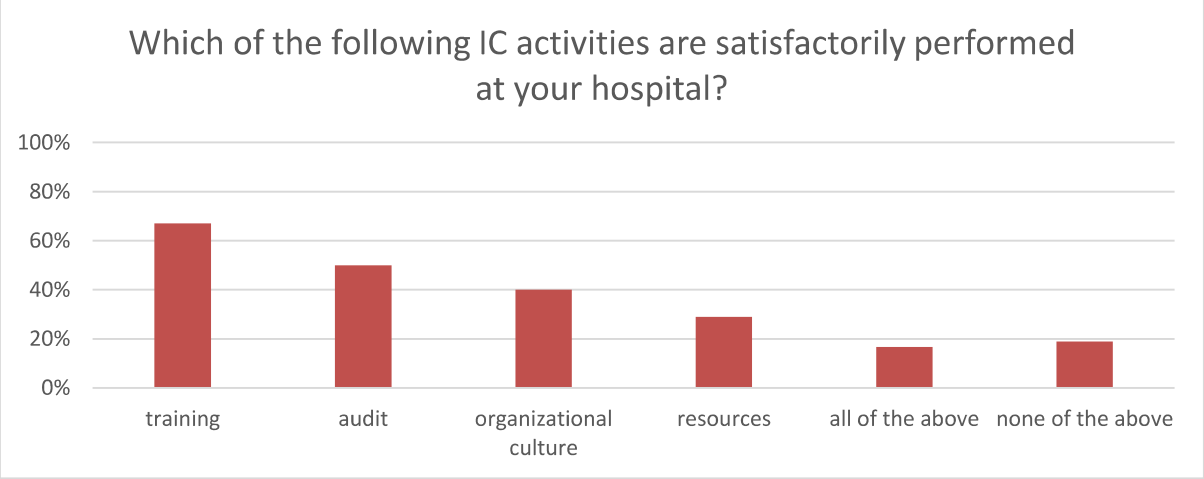

Figure 27: Which of the following IC activities are satisfactory performed at your hospital? (Answers by ICC)

Table 22. IC Activities which are performed satisfactory in hospitals (Answers by ICC & HA, multiple answers possible)

Which of the following infection control activities are satisfactorily performed at your hospital?										
	FR		**EL**		**IT**		**PT**		**ES**	
	ICC	HA	ICC	HA	ICC	HA	ICC	HA	ICC	HA
Training	50%	100%	75%	85%	72%	73%	75%	88%	43%	87%
Audit	70%	80%	71%	78%	50%	82%	47%	59%	34%	27%
Organizational Culture	30%	20%	36%	52%	33%	50%	46%	57%	34%	60%
Resources	10%	0%	25%	44%	17%	32%	35%	48%	24%	20%
All of the above	0%	0%	11%	19%	11%	32%	15%	25%	16%	13%
None of the above	20%	0%	13%	0%	17%	0%	12%	3%	16%	7%

Table 23. IC Activities which are performed satisfactory in hospitals (Answers by PHA, multiple answers possible)

Which of the following IC activities are satisfactorily performed in your country hospitals?								
	AT	**DK**	**FR**	**EL**	**IT**	**PT**	**ES**	**NL**
Training	✓	✓		✓		✓		✓
Audit	✓	✓	✓					✓
Organizational culture	✓	✓						✓
Resources		✓						✓
All of the above		✓						✓
None of the above					✓		✓	

9.4 CONCLUSIONS- KEY POINTS

Communication and cooperation between the different parties in the IC pyramid is an essential condition for an effective IC implementation and is shaped to a large extent by the body's culture from top to bottom. The results of Survey A depict that this chapter is a challenging one for Public Health Authorities, Hospital Administrators and ICCs. Most of the respondents (ICCs & HA) report that cooperation between them or the clinicians is not effective. The same applies for the cooperation between HA and PH Authorities. An effective ICP implementation requires a multifaceted approach, with a continuous and harmonic cooperation among all interested parties. This can be achieved only in settings where similar culture regarding HAIs prevention is promoted.

The above are also confirmed by the ICCs' answers regarding the IC activities performed in their hospitals. Resources and organizational culture still remain in low proportions and should be targeted for future improvement. Especially in countries with the highest proportion of respondents (Greece, Portugal and Spain), the majority reported that the availability of resources is not satisfactory. The level of satisfaction (as expressed by the proportions of the positive answers) regarding the organizational culture, which determines at a great extent all IC activities' implementation is relatively low.

10. AREAS FOR IMPROVEMENT AND FURTHER RESEARCH

Having completed the initial approach to the institutions, structures and procedures applied in some European countries regarding IC according to international guidelines, the following general conclusions can be drawn:

In the majority of hospitals, the basic structures and procedures are reported to exist and be functional. More specifically:

1. A national policy on the prevention of HAIs with specific objectives is reported to exist, for whose progress Public Health Authorities and Governments are regularly updated.
2. Infection Control Programs at hospital level are reported to have been put into practice with specific objectives.
3. Competent bodies, such as the Infection Control Committees, have been formed and have undertaken the task of monitoring the implementation of Infection Control Programs.
4. HAI Surveillance Systems have been developed at national level in which the majority of hospitals participate.
5. Training programs about Infection Control for Health Professionals have been implemented.

These outcomes emerged from responses given by all three target group-stakeholders. The responses from the Infection Control Committees were generally in accordance with those from Hospital Administrators. Differences were detected in some of the responses given by Public Health Authorities compared with those of the ICC and HA. This differentiation reflects, to some extent, the gap between legislations and recommendations and their implementation to the clinical practice. The research has revealed areas in which we could make improvements in order to boost the effectiveness of the Infection Control Programs and improve the implementation of key components in line with the recommendations of the World Health Organization. These areas are heavily influenced by organizational culture,

which is however the subject matter of Survey B. Regardless of organizational culture, they could be establish an integral part of the Infection Control.

The areas found with gaps in their implementation mainly concern the following:

1. The active involvement of hospital hierarchy (HA and CDH responsible for Infection Control). There is a lot of evidence regarding the involvement of HA in the IC implementation and the increase of HCWs adherence to IC measures (14,15,20,21). Additionally, HA awareness leads to more effective redistribution of resources and the promotion of a better professional environment (22). The active role of CDH is another essential factor to the personnel adherence because they are working closer to them and they act in daily practice as *a role model* especially for the newer staff (23,24). Because of above, it's very important for the hierarchy to be trained accordingly and to take responsibilities regarding the ICP implementation.
2. Feedback on national and hospital policies should be given to all stakeholders as well as feedback on surveillance and audit results. Feedback and access to all parties are emphasized by all the relevant recommendations both in older and in updated versions because is an important function of all surveillance systems (28,29). HAIs has main differences compared to other communicable diseases, Prevention and Control of HAIs is part of the daily reality of clinicians. Because of that, an important issue that is revealed is regarding the implementation of ICP in a way that the appropriate messages can be disseminated timely and properly to all the stakeholders leading to effective innervations. At hospital level, feedback must be part of the HCWs training based on interactive procedures and untestable findings. The digital applications and electronic tools are useful, but they cannot make the difference (30). A similar approach would be effective at national level with a closer communication and cooperation between public health authorities and healthcare settings, as it has been mentioned above. For that reason, feedback should be introduced as a communication tool between contributable parties.
3. Strengthening of hospitals with financial and human resources, including qualified personnel with exclusive employment in Infection Control, at the

very least. Evaluating the dedicated and full time personnel on IC as the most valuable information reported from the responders, we conclude that there are not efficient number of specialists in hospitals and moreover, they are not on a full time basis on IC. Additionally, in the majority of countries, ICCs have to implement Antimicrobial Stewardship Programs, which is recommended to be performed by dedicated personnel (25,26).

4. The establishment of collaboration procedures among the stakeholders so as the implementation of both local and national policies on Infection Control becomes feasible (27). This factor has been mentioned especially in the latest guidelines of CDC for the strategies for the prevention and control of CRE in healthcare settings (14). It is a measure that can result in effective outcomes without any additional costs or resources. More particularly, in endemic areas with MDROs the communication between healthcare settings and PHA is of crucial importance for the timely detection of carriers and outbreaks, but also for the effective national strategy implementation. Especially for epidemic and endemic areas the monitoring from PHA (audit, feedback, resources) should be strengthened and even more interactive with healthcare settings as the national experience has already proved (31,32,33).

The most important points are presented in Table 24.

Table 24. Domains & Finfings according to the results of Survey A

DOMAIN	FINDINGS
KEY COMPONENT 1: INFECTION CONTROL POLICIES	
Feedback of national policy progress	The feedback of national policy progress is not disseminated to all the parties to inform and inform them properly.
Funding of ICP	The funding of the ICP is not part of the hospital budget as priority of the hospital policy for the improvement of the quality of healthcare services, as it was expected.
KEY COMPONENT 2: INSTITUTIONAL BODIES FOR IC	
Dedicated personnel and full time work on infection control	In the majority of ICCs, no dedicated personnel participates in IC and also working on a full time basis.
Contribution of HA to the responsibility of IC implementation	The responsibility of ICP implementation is under the authority of ICCs and not under the responsibility of HA and CDH.
KEY COMPONENT 3: EDUCATION AND TRAINING	
Training programs	Training should be mandatory for all interested parties, not only in undergraduate level but also as continuous training of the personnel in healthcare facilities
Responsibility of the training programs implementation	The responsibility for the development of training programs & tools should involve parties from high ranks in IC pyramid.
KEY COMPONENT 4: HAI SURVEILLANCE	
Access to surveillance data	Only ICCs usually have access to surveillance data. All parties involved in IC should have access to surveillance data.
Feedback to Surveillance data Reports	Feedback at higher level to hospital administrations and governments should be enhanced, as well as to clinicians.

KEY COMPONENT 5: AUDIT	
Establishment of audit procedures	ICP implementation is not audited externally and only at low levels internally.
Feedback of audit results	ICCs are the main recipients of the audit results feedback while the HA and government are not.
KEY COMPONENT 6: COMMUNICATION AND COOPERATION	
Cooperation of PHA and other parties	The cooperation of PHA with hospitals needs to be closer to achieve goals and combat crises at national level given the current rates of AMR is in nowadays.
Cooperation of ICC/HA with other parties	The cooperation between ICCs and HAs or clinicians is amenable to major improvement and support from top to bottom.

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Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections

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