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RESEARCH PAPER

A campaign aimed at increasing seasonal influenza vaccination coverage among post graduate medical residents in an Italian teaching hospital

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ABSTRACT

We analysed the impact of several strategies aimed at increasing influenza immunisation rates among Medical Residents (MRs) of an Italian teaching Hospital.

During the 2015–16 and 2016–17 influenza seasons we carried out several interventions: ambulatory doubling where vaccination was offered, ambulatory opening hour extension, email invitations, informative materials, forum theatre and vaccination campaign conference. In addition, during the 2016–17 the OSV was carried out: MRs who go to specific wards where they perform influenza immunisation counselling and eventually vaccinate the personnel. 99/1041 (9.5%) and 184/1013 (18.2%) MRs received the vaccine in 2015–16 and in 2016–17 respectively ($p < 0.0001$). Significant difference was found among three specialisation areas (medicine, surgery, "services"; $p < 0.001$) and among years of residency ($p < 0.001$). The highest coverage was found among Infectious Diseases, Paediatrics, Haematology and Hygiene MRs (80%, 67%, 52% and 52% respectively) in 2016–2017 season. The highest coverage increase was found among MRs in Pneumology and Geriatrics (566% and 268%, respectively). The coverage rate has increased even though important differences among specialties persist. The study shows a significant increase in immunisation rate among MRs after the implementation of these strategies.

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Introduction

Each year, seasonal influenza represents a major public health issue that occurs all over the world, affecting around 5–10% of adults. Its complications are responsible for a high number of deaths and hospital admissions, cause serious illnesses for 3–5 million people and lead to 290,000–650,000 deaths worldwide.[1]

In Italy, an estimated 4,900,000 people were hit by influenza-like illness during the 2015–16 influenza season with expected mortality excess of about 9,000 individuals.[2,3]

For these reasons, the World Health Organization (WHO), national institutions, and the Italian Ministry of Health, through the Italian National Vaccine Prevention Plan (PNPV), recommend vaccination against influenza for people who are considered as being at high risk to develop influenza and influenza-related consequences and do not have a contraindication to the vaccine[4,5] These groups include – among others: pregnant women, children from 6 months to 5 years of age, people aged 65 or over, people with one or more chronic conditions and Health Care Workers (HCWs), including Medical Residents (MRs), who take care of people at high risk.[5,6]

In particular, MRs are both involved in the everyday care of patients and represent the new generation of HCWs, their vaccination uptake is important to limit the spread of the virus, as symbol of their responsibility for avoiding its transmission to the patients, and most of all to ensure health care assistance continuity thanks to its individual and collective protective action.[7–9]

As a matter of fact, nowadays, the influenza vaccine is the safest and most effective way of preventing this disease and its potential sequelae.[4,10]

In Italy, though, the influenza vaccination coverage among people at risk is far from reaching the national target of at least 75% and a declining trend in influenza vaccination coverage has been reported from the 2009–10 influenza season.[5,11] This might follow a phenomenon of broader magnitude: the recent growth in vaccine hesitancy even among HCWs.[7,12] In order to reduce the impact of this trend, in 2018, in Italy, two Regions -Apulia and Emilia-Romagna- had to pass a law establishing mandatory vaccinations for HCWs.[13,14] Despite this, among HCWs influenza vaccination coverage in Italy is low[15] with regards to the recommended target set by the WHO and the PNPV.[5] A study conducted in a Palermo teaching hospital showed that during the 2005–06 and 2007–08 seasons 14.7% and 8.2% HCWs received influenza immunisation, respectively; while in Genoa, during the 2013–14 season, vaccination coverage resulted 30% and 11% among physicians and nurses, respectively.[16,17] Among MRs,

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a study that enrolled 18 Italian Universities, showed that only 11.9% of MRs, were vaccinated against influenza during the 2011–12 influenza season.[18]

In our Teaching Hospital, the IRCCS (Istituto di Ricerca e Cura a Carattere Scientifico) Fondazione Policlinico Universitario "Agostino Gemelli" (FPG) in Rome, where MRs of the Università Cattolica del Sacro Cuore (UCSC) work, the influenza vaccination coverage rate was even worse: only 1% of MRs underwent vaccination against influenza in the 2014–15 season.[19]

Overall, the most common reasons why HCWs and MRs do not undergo vaccination are: perception of not being at risk of getting infected by influenza and its complications; knowledge of the presence of people who develop influenza-like symptoms even when they received their influenza vaccination; perception of not being in need of the vaccination; lack of awareness of being potential carriers or even responsible for the transmission of the virus to patients or community members; lack of time, and doubts about the effectiveness of the vaccine.[12,18,20–24]

In view of the above, the UCSC Institute of Public Health, in collaboration with the FPG Health Management and the University Residency Program Directors, has carried out several strategies aimed at increasing the awareness and the adhesion of HCWs and MRs to influenza immunisation programs during the seasons 2015–16 and 2016–17.

The aim of this study is to analyse the impact of the strategies implemented through the years, as a tool for improving influenza immunisation rates during season 2016–17 among MRs who work in an Italian Teaching Hospital.

Results

Strategies that were adopted during the 2015–16 influenza season led to the immunisation against influenza of 99 MRs out of 1041 (9.5%).[19] MRs were distributed in the 42 residency programs (Table 1) as follows: 412 (39.6%) in a medical, 253 (24.3%) in a surgical, 376 (36.1%) in other "services" area.

During the 2016–17 influenza season, 1,013 residents and 41 residency programs (the paediatric surgery residency program was closed) were included in the analysis (Table 1). In the same season, MRs that follow a medical area were 421 (41.5%), those who follow a surgery area were 343 (33.9%) and, eventually, those in the "services" area were 249 (24.6%).

At the end of the 2016–17 influenza season, 184 MRs (18.2%) received the vaccine with a significant increase from the 2015–16 season ($p < 0.0001$). A significant difference was found in the vaccination coverage considering the three different areas: 120/421 MRs in the medical area (28.5%), 47/343 MRs in the "services" area (13.7%), and only 17/249 MRs in the surgical area (6.8%) received the influenza immunisation ($p < 0.0001$). This statistically significant difference among areas was found for the previous campaign ($p < 0.001$) as well. A comparison between the 2015–16 and the 2016–17 influenza seasons by area of specialty is shown in Table 2.

A comparison between academic years of the residency was carried out for the 2016–17 influenza season as shown in Table 3. A significant difference ($p < 0.001$) was found among different years. In particular, a difference of at least −50% can be observed between the 3rd, 4th and 5th vs. 1st and 2nd academic year (from 25.2% of the core training years to 12.8% of the advanced ones, $p < 0.0001$).

Influenza vaccination coverage by residency program and vaccination season is shown in Table 4. The highest percentage of coverage was found among Infectious Diseases and Tropical medicine residents (80.0%), followed by Haematology and Paediatrics residents (66.7% and 52.3%, respectively), and Hygiene and preventive medicine (51.9%) during 2016–17 season. In the same season, MRs of 10 residency program over 41 (24.4%) did not receive any influenza vaccine.

A total of 27 (64.3%) specialties showed an increase of the percentage MRs who got immunised, 5 (12.0%) a reduction, 9 (21.4%) remained unchanged and, eventually, only 1 program (2.3%) was closed. The highest coverage increase was found

Table 1. Residency programs of the FPG-UCSC active during the 2016–17 influenza season and gather together into three areas according to the Italian legislation.[25] The number of surgical, medical and other ("services") specialties are 11, 19 and 11 respectively.

Area	Residency Programs
Surgical Specialties (No 11*)	Cardiac surgery; General surgery; Neurosurgery; Obstetrics and Gynecology; Ophthalmology; Orthopedic surgery and Traumatology; Otorhinolaryngology; Plastic Surgery; Thoracic Surgery; Urology; Vascular surgery.
Medical Specialties (No 19)	Allergology and Clinical Immunology; Cardiology; Dermatology and Venereology; Emergency medicine; Endocrinology; Gastroenterology; Geriatrics; Hematology; Infectious Disease and Tropical Medicine; Internal Medicine; Medical Oncology; Nephrology; Neurology; Neuropsychiatry; Pediatrics; Pneumology; Psychiatry; Rheumatology; Sports Medicine.
Other Specialties ("Services") (No 11)	Anesthesiology, Pain and Intensive Care Medicine; Clinical Pathology and Biochemistry; Forensic and Legal medicine; Genetics; Hygiene and Preventive medicine; Microbiology and Virology; Nuclear Medicine; Occupational Medicine; Pathology; Radiology; Radiotherapy.

*During the 2015–16 influenza season, the number of surgical specialties was 12 (all 11 plus the paediatric surgery residency program, closed in the 2016–17).

Table 2. Influenza immunisation coverage by area of specialty and seasonal influenza vaccination coverage.

Influenza immunisation coverage among Medical Residents per area of specialty				
Area	Season: 2016–17 Vaccinated/total MRs (%)	Season: 2015–16 Vaccinated/total MRs (%)	Δ%	p value
Medical*	**120/421 (28.5)**	**57/412 (13.8)**	**106.5**	**<0.0001**
Surgical	17/249 (6.8)	11/253 (4.4%)	54.5	0.23
Other (Services)*	**47/343 (13.7)**	**31/376 (8.2)**	**67.0**	**0.02**
Total*	**184/1013 (18.2)**	**99/1041 (9.5)**	**91.6**	**<0.0001**

MRs: Medical Residents; *Indicates a statistically significant difference for that Area.

Table 3. Influenza immunisation coverage by academic year of residency.(2016–17).

Influenza immunisation coverage by 2016–17 Academic year		
2016–17 Academic year	MRs: Vaccinated/Total (%)	*p value*
1st	54/225 (24.0)	p < 0.001
2nd	56/211 (26.5)	
3rd	27/163 (16.6)	
4th	23/198 (11.6)	
5th	24/216 (11.1)	

MRs: Medical Residents

Table 4. Influenza immunisation coverage UCSC-FPG by Residency program. Data are ordered from the highest to the lowest proportion of Medical Residents (MRs) that received their vaccine during 2016–17 influenza season. Seven residency programs (Clinical pathology and biochemistry, genetics, nephrology, otorhinolaryngology, pathology, plastic surgery, vascular surgery) are not included in the table because vaccine coverage in both seasons were 0.0%.

		Vaccination coverage among MRs			
No	Residency Program	Season 2016–17 *Vaccinated/total (%)*	Season 2015–16 *Vaccinated/total (%)*	*Δ%*	*p value*
1	Infectious Disease and Tropical Medicine*	12/15 (80.0)	7/17 (41.2)	94,2	0.026
2	Hematology	8/12 (66.7)	6/11 (54.5)	22,4	0.680
3	Pediatrics*	23/44 (52.3)	6/41 (14.6)	258,2	<0.0001
4	Hygiene and Preventive medicine	14/27 (51.9)	10/28 (35.7)	45,4	0.282
5	Dermatology and Venereology	6/12 (50.0)	3/12 (25.0)	100,0	0.400
6	Geriatrics*	13/31 (41.9)	4/35 (11.4)	267,5	0.005
7	Rheumatology*	5/12 (41.7)	0/13 (0.0)	n.c.	0.015
8	Neurology	11/31 (35.5)	5/28 (17.9)	98,3	0.128
9	Pneumology*	7/21 (33.3)	1/20 (5.0)	566,0	0.022
10	Occupational Medicine	5/15 (31.3)	2/16 (12.5)	150,4	0.394
11	Emergency medicine	3/10 (30.0)	1/10 (10.0)	200,0	0.582
12	Forensic and Legal medicine*	3/10 (30.0)	0/13 (0.0)	n.c.	0.034
13	Radiotherapy	6/21 (28.6)	6/25 (24.0)	19,2	0.725
14	Thoracic Surgery	2/7 (28.6)	0/8 (0.0)	n.c.	0.200
15	Internal Medicine	15/58 (25.9)	12/52 (23.1)	12,1	0.735
16	Allergology and Clinical Immunology	1/5 (20.0)	1/5 (20.0%)	0,0	1.000
17	Cardiology	8/42 (19.0%)	4/43 (9.3%)	104,3	0.197
18	Anesthesiology, Pain and Intensive Care Medicine	15/105 (14.3%)	11/103 (10.7%)	33,6	0.531
19	Pediatric Neuropsychiatry	2/14 (14.3%)	0/14 (0.0%)	n.c.	0.481
20	General Surgery	6/46 (13.0%)	1/49 (2.0%)	550,0	0.054
21	Medical Oncology	4/31 (12.9)	0/28 (0.0)	n.c.	0.114
22	Sports Medicine	1/9 (11.1)	0/12 (0.0)	n.c.	0.429
23	Orthopedic Surgery and Traumatology	4/42 (9.5)	1/43 (2.3)	313,0	0.202
24	Cardiac Surgery	1/11 (9.1)	1/12 (8.3)	9,6	>0.999
25	Microbiology and Virology	1/11 (9.1)	0/16 (0.0)	n.c.	0.407
26	Nuclear Medicine	1/15 (6.7)	2/14 (14.3)	55,8	0.598
27	Neurosurgery	1/19 (5.3)	1/19 (5.3)	0,0	>0.999
28	Ophthalmology	1/23 (4.4)	0/21 (0.0)	n.c.	>0.999
29	Obstetrics and Gynecology	2/59 (3.4)	1/57 (1.8)	88,9	>0.999
30	Psychiatry	1/37 (2.7)	5/35 (14.3)	−37,2	0.102
31	Radiology	2/85 (2.4)	0/88 (0.0)	n.c.	0.240
32	Urology*	0/12 (0.0)	6/11 (54.5)	−100,0	0.005
33	Gastroenterology	0/14 (0.0)	1/15 (6.7)	−100,0	>0.999
34	Endocrinology	0/14 (0.0)	1/16 (6.3)	−100,0	>0.999
	Total	184/1013 (18.2)	99/1041 (9.5)	91,6	<0.001

n.c. not computable; *Statistically significant difference of number of Medical Residents who received influenza immunisation in the two seasons for that Residency program.

among pneumology and geriatrics residents (Δ = 566% and 267.5%, respectively). The highest and significant decrease was found among urology residents (Δ = −100%, $p < 0.005$).

Discussion

The results of this study show an important increase of MRs receiving the influenza vaccination after the implementation of a further strategy coordinated by the UCSC-FPG, namely the OSV.

From 99 MRs (9.5%) who got immunized against influenza in 2015–16, a total of 184 MRs (18.2%) were reached in 2016–17, with a 91% increase.

MRs who belong to a medical area seem to be more sensitive to the vaccination strategy and that can be due to type of patients they treat in their ward who are at higher risk of influenza complications (e.g. Infectious disease and tropical medicine and Haematology wards). Our study is consistent with previous literature, where poor adhesion among MRs that belong to surgical residency was found.[18] In particular, only two residency programs out of the first twenty were belonging to a surgical area (Table 4) while no surgical residency program can be found among the first ten. In part, this may be due to higher unattendance at wards, where the vaccination was offered, because surgical activities are mainly performed inside the operating rooms. This may have reduced the compliance with our vaccination strategy. A new set of interventions to increase vaccination coverage are surely necessary. An implementation process to specifically address every specialty area (medical, surgical, ad services) is needed. For instance, in order to reach those specialties that reported a lower coverage (such as surgical area) extension of vaccination offer closer to the operating rooms might be helpful.

Among those five residency programs that resulted in a reduction in the percentage of influenza vaccine coverage among MRs, only the Department of Urology showed a significant decrease ($p = 0.005$). A push for vaccination was carried out during the 2015–16 seasonal campaign but this this strategic action was not repeated in the following season. This highlights the importance of soft and leadership skills, first of all of Department chiefs, to achieve the expected results.[26]

Vaccine coverage still remains extremely low, even if doubled, this phenomenon can be unthoroughly explained by the organisational context: MRs attending the last three academic years are more frequently leave the FPG (where most of all spend the first two academic years) in order to increase their professional skills working in other institutions even those located abroad.

The overall improvement in influenza vaccine coverage remains far both from the higher level of influenza coverage achieved by different countries such as USA where, in 2004–2005 influenza season, a survey showed that 49.5% MRs received the vaccine; France (Paris), where in 2008–2009 influenza season a questionnaire showed that 45.6% MRs received the vaccine; and from the specific aim of the Italian PNPV.[5,22,24]

Information was not available and therefore was not collected with regard to the age, gender, social status, comorbidities, area of origin, or where MRs achieved their medical degree, leading to the possible presence of confounders that we were not able to control. Further investigations may be required to better understand these relationships as for the gap between the first two and the last three academic years. As a matter of fact, an education that strengthens and focuses on prevention strategies may represent further driving force that increases the vaccination coverage.[27–29]

We could not assess whether the vaccination campaign strategies we adopted could reach all MRs and, if they did, to what extent they helped to increase the influenza vaccination coverage.

Data are, moreover, related only to those MRs whose vaccination was performed inside the FPG-UCSC. These data were directly collected from the occupational medicine health records, therefore, they are not self-reported, and this improves the robustness of the estimation of MRs who took part in influenza vaccination campaigns. However, we did not collect data about MRs who received their immunisation at their family doctor practice or whether they bought the vaccine in a drugstore. These cases seem unlikely because most of MRs live in Rome, which is not their hometown, and therefore their family doctor and the local health authority where they can receive free immunisation, is located somewhere else. Most MRs are, furthermore, healthy and their access to their doctor practices can be deemed unlikely.

We describe an observational cross-sectional design study, with a relatively small sample size, therefore there's no possibility to determine direct causation between our intervention and results, therefore, we cannot infer that the OSV by itself or other strategies led to a better outcome. The strength of this study design, though, is the temporality that suggests that the intervention has impacted on the outcome. Any control over other aspects changing at the same time as the intervention is implemented are lacking. As a matter of fact, changes in outcome in the study period cannot be fully addressed to the specific interventions that were carried out.[30]

The strategies that were adopted in the FPG-UCSC did not require any additional cost and then can be considered good practices to carry out and to be maintained in future campaigns. Nevertheless, a cost-effectiveness analysis and/or further studies should be performed if new personnel is hired or other strategies that require a certain amount of expenses are carried out for this purpose.

Practice implications

This study shows a preliminary and promising, though still insufficient, multi-approach to the increase of influenza vaccination coverage among MRs in the short-term. We hope we will be able to monitor and extend this assessment through time and enlarge it to all categories of HCWs and medicine students during their internship.

Methods

According to the Italian National Law, Residency programs of the FPG-UCSC are divided in medical, surgical and other ("services") specialties as shown in Table 1.[25] Our pre-post study was carried out among all MRs of the FPG-UCSC. Data were collected in collaboration with the Occupational Medicine during the 2015–16 and 2016–17 influenza seasons.

Several strategies were carried out during both influenza seasons as listed below.

(1) Ambulatory opening hours extension in the teaching hospital building: the vaccination service was provided 1 hour twice a week in previous campaigns, while from 1.00pm to 2.30 pm 3 days per week from the 2015–16 campaign.
(2) Ambulatories where the vaccination was offered were doubled in number: the setting where the influenza vaccination was provided was one in the previous campaigns (located inside the teaching hospital building), while from the season 2015–16 the University building was provided with another new setting in the Occupational Medicine department as well.
(3) E-mail invitation: The General Director and Chief Executive Officer sent an email (official email address of the FPG Hospital) explaining to every HCW the importance of the immunisation, where and when this service was provided inside the FPG-UCSC (from the 2015–16 campaign).
(4) Promotional and informative material including advertising posters were placed in different strategic locations, e.g. main and secondary entrances, departments corridors, walls near to elevators (from the 2015–16 campaign).
(5) The Forum Theatre. A peculiar theatre methodology, created in Brazil in the 1970s, with the propose of promoting social and political change and characterized by a participative approach was adopted for the first time only in 2015–16 campaign in the FPG-UCSC, to increase awareness and promote influenza vaccination, reaching good overall success.[31] Every spectator -or rather "spect-actor"- can be involved in the theatrical representation, be stimulated to go on stage, play a part in the story, change the lines and make the events take another turn.
(6) Opening conference to launch the seasonal vaccination campaign. During this event, the results of the previous campaign were shown and people in attendance were invited to adhere to the campaign (from the 2015–16 campaign).

An additional bottom-up approach was carried out during the 2016–17 influenza immunization campaign along with the strategies listed above: the On-Site Vaccination against Influenza (OSV). In particular, the proposal of this strategy emerged from HCWs themselves, mainly from those who participated in the

Forum Theatre representations. The OSV consists of groups of MRs (in Hygiene and Preventive Medicine and/or Occupational Medicine) that go to a specific ward, perform influenza immunisation counselling to HCWs who work in that ward, collect the informed consent, and eventually vaccinate HCWs who want to be vaccinated. This kind of project has been already used as reported in scientific literature.[17,32,33]

Statistical analysis

Vaccination (yes/no), area of specialty (surgical, medical, other "services"), academic year of the residency programs and specific residency programs were considered as variables. The sample was described through absolute and relative frequencies when qualitative variables were taken into account. Comparisons between 2015–16 and 2016–17 influenza seasonal vaccination campaigns were performed using the chi-square test or the Fisher's test with regards to both overall vaccination coverage and vaccination coverage stratified by area of specialty and specific residency program. Similarly, the chi-square test was used to compare vaccination coverage among different academic years (1st and 2nd -core training, and 3rd–5th -advanced training) of the residency programs in 2016–17. Data were analysed using the STATA software. Significance level was set at $p < 0.05$.

Disclosure of potential conflicts of interest

No potential conflict of interest was reported by the authors.

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