

Vaccination of Healthcare Providers: A Critical Step Toward Patient Safety
Dr. Helena Maltezou, Hellenic Center for Disease Control and Prevention, Athens,
A Webber Training Teleclass

Vaccination of Healthcare Providers:
A Critical Step Toward Patient Safety

Helena Maltezou, MD, PhD

Department for Interventions in Health Care Facilities
Hellenic Center for Disease Control and Prevention
Athens, Greece

Hosted by Paul Webber
paul@webbertraining.com

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May 7, 2015

Topics

- 1. Transmission of vaccine-preventable diseases (VPDs) in healthcare facilities**
- 2. Rationale for vaccination of healthcare providers (HCPs)**
- 3. Vaccination policies for HCPs**
- 4. Susceptibility to VPDs, vaccination coverage and attitudes of HCPs about vaccinations**
- 5. Toward an holistic approach of HCPs' vaccinations**
- 6. Conclusions**

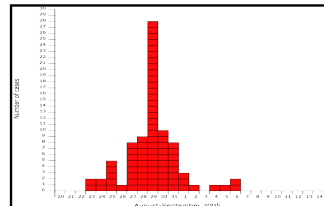
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**1. Transmission of vaccine-preventable diseases (VPDs)
in healthcare facilities**

Transmission of VPDs and large outbreaks continue to challenge healthcare facilities even in developed countries with long-standing vaccination programs.

**Re-emergence of measles in Europe and the United States and
pertussis in the United States**



**Nosocomial transmission of measles among healthcare
workers, Bulgaria, 2010**

R Komitova (radkakomitova@yahoo.com)¹, A Kunchev², Z Mihneva³, L Marinova³

1. University Hospital, Plovdiv, Bulgaria
2. Communicable Diseases Surveillance Department, Ministry of Health, Sofia, Bulgaria
3. National Centre of Infectious and Parasitic Diseases, Sofia, Bulgaria

Euro Surveill. 2011;16(15)

Hospital-Associated Measles Outbreak — Pennsylvania, March–April 2009

MMWR / January 20, 2012 / Vol. 61 / No. 2

**NOSOCOMIAL MEASLES CLUSTER IN DENMARK FOLLOWING AN
IMPORTED CASE, DECEMBER 2008–JANUARY 2009**

C Groth¹, B E Böttiger², A Plesner³, A H Christiansen⁴, S Glismann⁴, B Høgh (Birthe.Hoegh@hvh.regionh.dk)¹

1. Department of Paediatrics, Copenhagen University Hospital, Hvidovre, Denmark
2. Department of Virology, Statens Serum Institut, Copenhagen, Denmark
3. Medical Office of Health, Region Greater Copenhagen, Denmark
4. Department of Epidemiology, Statens Serum Institut, Copenhagen, Denmark

Eurosurveillance - Volume 14, Issue 8 - 26 February 2009

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Measles in health-care settings

Helena C. Maltezou MD, PhD ^{a,*}, Sabine Wicker MD, PhD ^b

American Journal of Infection Control 41 (2013) 661-3

- extremely contagious (starting 4 days prior the onset of rash)
- outbreaks in closed settings when < 90% of persons are immune
- 14 – 45% of cases of measles in measles-free countries (e.g. United States) are acquired in healthcare facilities
- **increased occupational risk for HCPs (x18.6 times compared with adults in the community)**
- complications occur more frequently in adults compared with school-aged children.

Measles outbreaks in Emergency Departments

- congregation of large numbers of patients
- delay in implementation of infection control measures
- in developed countries young physicians may not be familiar with measles
- the vaccination history of HCPs is often unknown or history of one dose
- **thousand contacts for tracing and investigation**
 - **in one healthcare associated outbreak in the US in 2008:**
7 cases → 8.231 contacts → 800.000 US\$ total costs



Maltezou HC, Wicker S. Nosocomial measles. *American Journal of Infection Control* 2013;41:661-66

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Nosocomial pertussis in neonatal units
H.C. Maltezou^{a,*}, L. Ftika^a, M. Theodoridou^b
^aDepartment for Interventions in Health-Care Facilities, Hellenic Center for Disease Control and Prevention, Athens, Greece
^bUniversity of Athens First Department of Pediatrics, 'Aghia Sophia' Children's Hospital, Athens, Greece
Journal of Hospital Infection xxx (2013) 1–6

- **Attack rate up to 15.8% among neonates and 50% among HCPs**
- **HCPs with compatible symptoms constitute the main source of infection**
- **In an outbreak in a Neonatal Unit, a HCP had cough for at least one month until suspicion of pertussis → contact with 113 neonates (11 with pertussis)!**

Nosocomial pertussis in neonatal units
H.C. Maltezou^{a,*}, L. Ftika^a, M. Theodoridou^b
^aDepartment for Interventions in Health-Care Facilities, Hellenic Center for Disease Control and Prevention, Athens, Greece
^bUniversity of Athens First Department of Pediatrics, 'Aghia Sophia' Children's Hospital, Athens, Greece
Journal of Hospital Infection xxx (2013) 1–6

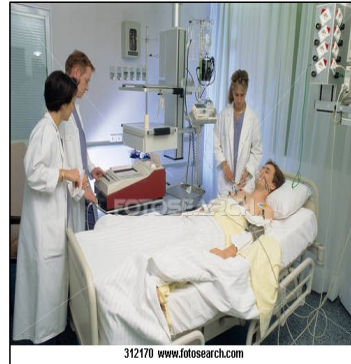
Year	Country	Setting	Source	Clinical presentation	Infected cases	Attack rate among infants	Vaccination status of infants	Severity of illness among infants	Case fatality among infants
2001	Australia ³⁴	Special care nursery	Mother	Non-productive cough	Three neonates, One HCW	15.8%	Unvaccinated	No	0
2003	Kentucky, USA ^{18,19}	Intermediate care nursery	HCW	Cough	One infant, four HCWs	1.4%	Unvaccinated	NICU admission, ventilation	0
2003	Pennsylvania, USA ^{19,32}	Paediatric unit	Neonate	Cough, fever, vomiting	17 HCWs, two children	NR	Unvaccinated	NR	0
2004	Texas, USA ¹¹	Newborn nursery	HCW	Cough, vomiting, dyspnoea	11 infants	9.7%	Unvaccinated	PICU: five infants, three ventilated	0
2004	UK ²¹	Neonatal unit	HCW	Prolonged severe cough	Two infants	NR	Two doses ^a in a 5-month infant	Both mechanical ventilation	0
2004	Louisiana, USA ¹⁷	Two NICUs	Unknown	NA	Four infants	12.1%	One dose ^a in a 5-month-old infant	Two had severe disease – no details	0
2009	Australia ¹¹	Maternity ward	HCW ^b	Cough	Four neonates	10.2%	Unvaccinated	Hospitalization, no severe disease	0
2012	UK ³⁰	NICU + general paediatric ward	Mother	Prolonged cough	Two neonates	4%	Unvaccinated	One: ventilation + thalamus infarct	0

HCW, healthcare worker; ICU, intensive care unit; NICU, neonatal intensive care unit; PICU, paediatric intensive care unit; NA, non-applicable; NR, not reported; DTaP, diphtheria–tetanus–acellular pertussis vaccine.
^a DTaP vaccine.
^b The HCW had received an acellular pertussis vaccine 3 years previously.

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Nosocomial influenza outbreaks

- Intensive Care Units
- Neonatal ICUs
- Internal Medicine, Pulmonary Clinics
- Bone Marrow Transplant Units
- Long Term Care Units



Nosocomial influenza outbreaks

- Attack rate up to 55% among patients
and up to 18% among HCPs*
- Up to 25% mortality rate in NICUs*



* Meara et al. Influenza A outbreak in a community hospital. *Irish Medical Journal* 2006;99: 175-177

** Munoz et al. Influenza A virus outbreak in a neonatal intensive care unit. *Pediatric Infectious Diseases Journal* 99;18:811-815

Nosocomial influenza: significant morbidity and mortality

- patients with underlying conditions
- immunocompromised patients
- elderly, neonates & young infants



high risk groups

Sources of nosocomial influenza

unsuspected or undiagnosed patients with influenza

visitors

unvaccinated HCPs



Maltezou HC. Nosocomial influenza new concepts and practice. *Current Opinion in Infectious Diseases* 2008;21:337-343

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HCPs continue to work while having influenza-like symptoms



J. Infect. 2010 Sep;61(3):270-2. Epub 2010 Jun 30.

Outbreak of novel influenza A (H1N1) in an adult haematology department and haematopoietic cell transplantation unit: clinical presentation and outcome.

Lalayanni C, Sirigou A, Iskas M, Smias C, Sakellari I, Anagnostopoulos A.

- 8 (38%) of 29 patients developed influenza
- 5 patients with severe lower respiratory tract infection
- 3 patients in ICUS
- 3 patients died
- 2 survivals remained in oxygen therapy for 2 - 3 months

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Indirect consequences of nosocomial influenza

● **increased hospitalization costs**

(diagnosis, prolongation of hospitalization, treatment, prophylaxis, infection control)

● **absenteeism of HCPs**

● **disruption of healthcare services**

Closure of medical departments during nosocomial outbreaks: data from a systematic analysis of the literature.

S Hansen, S Stamm-Balderjahn, I Zuschneid, M Behnke, H Rüden, R-P Vonberg, P Gastmeier
J Hosp Infect. 2007 Apr;65(4):348-53.

- **review of 1.561 nosocomial epidemics**
- **38.5% closure rate of a department in order to contain an outbreak of influenza**
- **influenza was the cause for the closure of an entire hospital in 3 of 10 such events**



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Susceptible HCPs in healthcare facilities

- occupational exposure to infectious agents
- source of VPDs for patients and other HCPs
- vehicles for the evolution of outbreaks



Occupational exposure and onset of VPDs among HCPs

measles
rubella
mumps
hepatitis A
hepatitis B
pertussis
chickenpox
multi-drug resistant tuberculosis
meningococcal disease

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Transmission of VPDs from HCPs to patients

influenza

pertussis

rubella

chickenpox

hepatitis A

hepatitis B

→ onset of serious nosocomial epidemics with high associated morbidity, mortality and costs

2. Rationale for vaccination of HCPs

- direct protection of HCPs**
- indirect protection of susceptible patients**
(immunocompromised, pregnant, infants)

from nosocomial transmission of VPDs



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Vaccination of HCPs against influenza: shield of protection

High vaccination coverage among personnel

→ reduction of transmission of influenza among patients



1. Salgado et al. Preventing nosocomial influenza by improving the vaccine acceptance rate of clinicians. *Infection Control and Hospital Epidemiology* 2004;25:923-928
2. Weinstock et al. Control of influenza A on a bone marrow transplant unit. *Infection Control and Hospital Epidemiology* 2000;21:730-732

Influenza vaccination of HCPs in long-term care facilities

↓↓ total mortality

↓↓ influenza-like illness mortality

↓↓ admissions to hospitals

1. Potter et al. Influenza vaccination of healthcare workers in long-term-care hospitals reduces the mortality of elderly patients. *J Infect Dis* 1997;175:1-6
2. Lemaitre et al. Effect of influenza vaccination of nursing home staff on mortality of residents: a cluster-randomized trial. *J Am Geriatr Soc* 2009;57:1580-6
3. Hayward et al. Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity, and health care use among residents: cluster randomized controlled trial. *Br Med J* 2006;333:1241
4. Carman et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: randomized controlled trial. *Lancet* 2000;355:93-7

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Influenza vaccination of HCPs in acute-care hospitals

- ↓↓ influenza episodes
- ↓↓ febrile respiratory illnesses
- ↓↓ absence from work



1. Dunais et al. Influenza vaccination: impact of an intervention campaign targeting hospital staff. *Infect Control Hosp Epidemiol* 2006;27:529-531
2. Pearson et al. Influenza vaccination of health-care personnel. Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) and the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep* 2006;55:1-16
3. Wilde et al. Effectiveness of influenza vaccine in healthcare professionals. *JAMA* 1999;281:908-913

3. Vaccination policies for HCPs

The United States Centers for Disease Control and Prevention
recommendations for HCPs vaccination

- all HCPs against influenza, varicella, measles-mumps-rubella
- specific groups of HCPs against hepatitis B, pertussis, meningococcus
- BCG by case, following risk assessment

CDC. Immunization of health-care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR* 1997;46(RR-18):1-44

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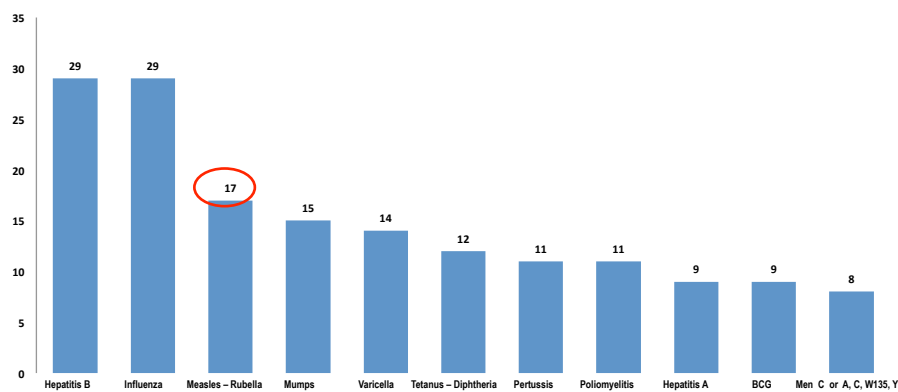
Influenza vaccination for HCPs in the United States

- Mandatory vaccination policies were adopted by several healthcare institutions and professional societies the past years
- Use as an index of healthcare quality

CDC. Immunization of health-care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). MMWR 1997;46(RR-18):1-44

Vaccination policies for health-care workers in acute health-care facilities in Europe

Helena C. Maltezou^{a,*}, Sabine Wicker^b, Michael Borg^c, Ulrich Heininger^d, Vincenzo Puro^e, Maria Theodoridou^f, Gregory A. Poland^g
Vaccine 29 (2011) 9557–9562



* 27 countries in the European Union, Norway, Switzerland & Russia

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Mandatory vaccination of HCPs in Europe against:

measles-mumps-rubella in Finland

hepatitis A in Slovakia

hepatitis B in France, Slovakia & Slovenia

BCG in France, Italy and Slovakia

poliomyelitis & tetanus-diphtheria in France

**In case of refusal the HCP is moved to a low-risk department or to a post
with no contact with patients**

**With the notable exception of hepatitis B and influenza
vaccinations, significant country-to-country differences exist in
Europe in terms of vaccines, implementation frame (mandatory or
recommendation), target HCP subgroups and healthcare settings.**

Maltezou HC, Poland GA. Vaccination policies for healthcare workers in Europe. *Vaccine* 2014;32:4876

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4. Susceptibility to VPDs, vaccination coverage and attitudes of HCPs about vaccinations*

Measles susceptibility rates in Europe: 6% - 17%

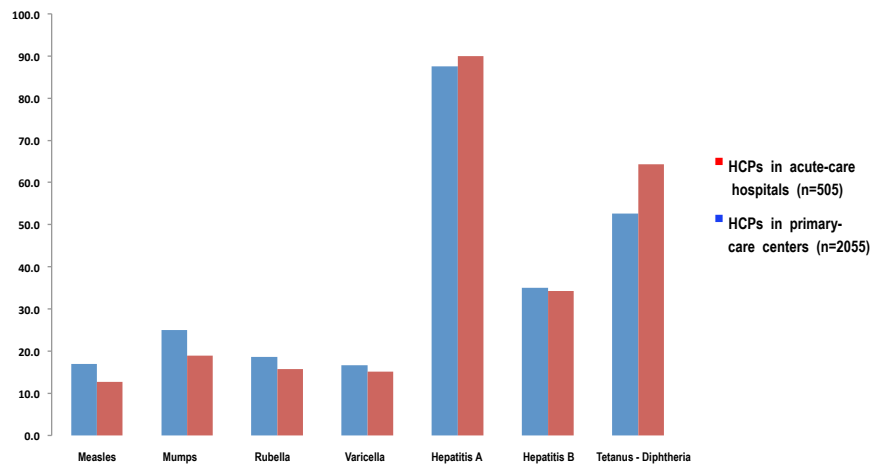
Mumps susceptibility rates in Italy, Brazil and Japan: 15.9% - 20.1%

Rubella susceptibility rates in Italy, Brazil and Japan: 4.5%-15%

* recent publications



Susceptible HCPs (%) in healthcare facilities in Greece, 2010 - 2011



Maltezou et al. *American Journal of Infection Control* 2013;41:66-70
Maltezou et al. *Journal of Infection* 2012;64:319-324

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Vaccination coverage of HCPs against influenza

- **low vaccination rates worldwide (< 40%)**

- **mandatory vaccination in US hospitals: > 98%**

1. Maltezou HC. Nosocomial influenza: new concepts and practice. *Current Opinion of Infectious Diseases* 2008;21: 337-43
2. Babcock et al. Mandatory influenza vaccination of health care workers: translating policy to practice. *Clinical Infectious Diseases* 2010;50:459-464

Table 2. Barriers to increase influenza vaccine uptake among health-care workers

Insufficient knowledge about nosocomial influenza
Misconceptions that they are not at risk for contacting influenza
Misconceptions about vaccine effectiveness
Misconceptions about vaccine safety
Misconception that the vaccine can cause influenza
Unawareness of the recommendations for annual influenza vaccination
Unavailable vaccine
Fear of injections
Lack of leadership support
Reliance on homeopathic agents

Maltezou HC, Tsakris A. Vaccination of health-care workers against influenza: our obligation to protect patients. *Influenza and Other Respiratory Viruses* 2011; 5:382-388

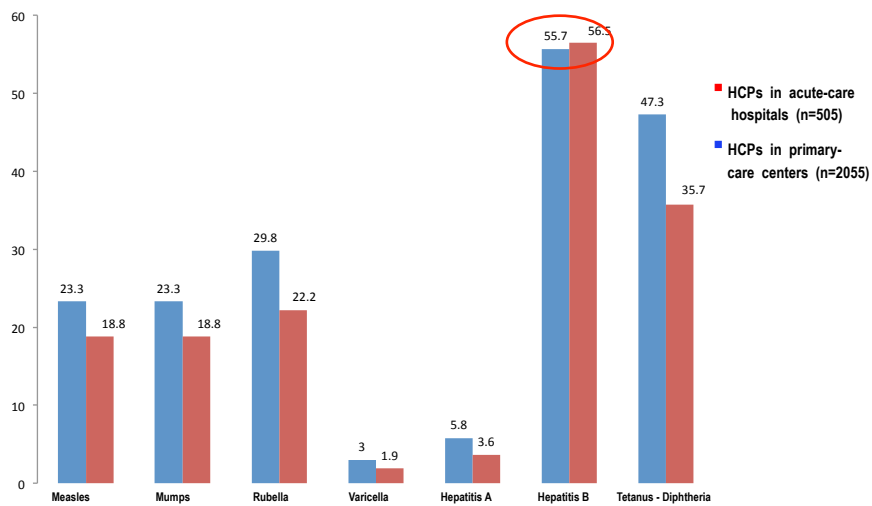
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Table 3. Strategies associated with increased influenza vaccine uptake in health-care workers

- On-site vaccination
- Vaccination free of charge
- Lectures about influenza and influenza vaccine
- Organization of campaigns
- Mobile vaccination teams
- Use of declination forms
- Implementation of a mandatory vaccination policy
- Use of reminding systems
- Incentive programs
- Leadership support

Maltezou HC, Tsakris A. Vaccination of health-care workers against influenza: our obligation to protect patients. *Influenza and Other Respiratory Viruses* 2011; 5:382-388

Vaccination coverage of HCPs in healthcare facilities in Greece, 2010-11



Maltezou et al. *American Journal of Infection Control* 2013;41:66-70
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Acceptance of mandatory vaccination policies for HCPs in healthcare facilities in Greece, 2010-2011 (n=1545)

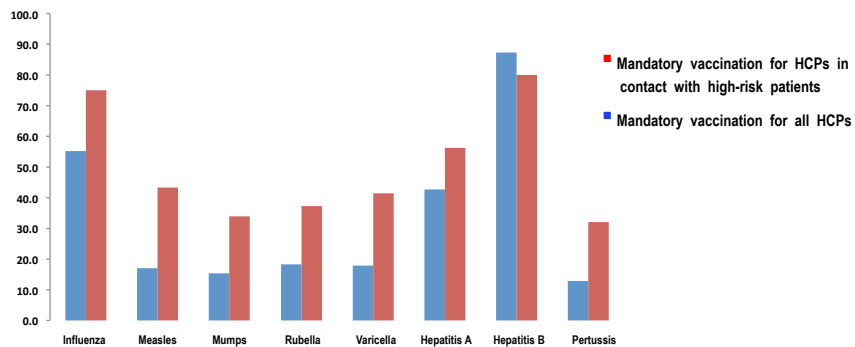
Vaccinations should be mandatory

- for all HCPs 52%
- for HCPs caring for high-risk patients 71%

Maltezou et al. *American Journal of Infection Control* 2013;41:66-70

Maltezou et al. *Journal of Infection* 2012;64:319-324

Acceptance of mandatory vaccination policies for HCPs by VPD and patient category in Greece, 2010-2011 (n=1005)



Maltezou et al. *American Journal of Infection Control* 2013;41:66-70

Maltezou et al. *Journal of Infection* 2012;64:319-324

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5. Toward an holistic approach of HCPs' vaccinations

- **Need to address the fragmentation of vaccination policies for HCPs.**
- **Vaccination policies should be implemented following risk assessment and taking into account the epidemiological trends, the movement of people across borders and overall immunity gaps.**
- **Mandatory vaccinations against VPDs which can be transmitted to patients and for which safe and effective vaccines exist should be considered for HCPs.**

Steps in the process of implementing a vaccination policy for HCWs.

Goal/actions to implement	
<i>Delivery of vaccine</i>	Development of in-hospital platforms to vaccinate HCWs (be flexible, use already existing procedures and infrastructures, e.g. occupational department, vaccination clinic, mobile vaccination teams, delivery of vaccine free of charge and in all working shifts)
<i>Estimate vaccine uptake</i>	Establishment of in-hospital records for vaccination uptake, need to review and update information on regular intervals, use standardized definitions
<i>Development of reminder systems</i>	Approach all non-immune HCWs at regular intervals
<i>Need to address concerns and mistrust about vaccines</i>	Education of HCWs about VPDs and vaccines, communication, collaboration with medical schools and professional societies

VPD: vaccine-preventable disease; HCW: health-care worker.

Maltezou HC, Poland GA. Vaccination policies for healthcare workers in Europe. *Vaccine* 2014;32:4876-4880

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6. Conclusions

Significant country-to-country differences in HCPs vaccinations exist.

Need to study the reasons for suboptimal vaccination rates and to overcome mistrust about vaccinations among HCPs.

Studies indicate that acceptance of mandatory vaccination policies are vaccine-specific, profession-specific and patient-specific.

The possibility of implementing mandatory vaccination policies for HCPs should be addressed.

Communication to HCPs is critical in order to raise vaccine uptake.

Need to improve awareness of HCPs about vaccines, their efficacy and safety as well as their ethical responsibility toward patients.

«Κάλλιον το προλαμβάνειν ή το θεραπεύειν»

“Prevention is better than cure”

Hippocrates, Greek physician (460-377 BC)



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Thank you for your attention !

Coming Soon

May 13 (Free WHO Teleclass – Europe)

**UNDERSTANDING CONSUMER PERCEPTIONS OF HAI AND
HAND HYGIENE THROUGH A GLOBAL SURVEY**

Claire Kilpatrick, WHO, and Dr. Maryanne McGuckin, McGuckin Methods International

May 21 (Free Teleclass)

**IS YOUR PHONE BUGGED? THE ROLE OF MOBILE
TECHNOLOGY IN INFECTION CONTROL**

Richard Brady, Western General Surgery, NHS, UK

May 27 (South Pacific Teleclass)

FOOD SAFETY CULTURE – FROM FARM TO FORK

Dr Douglas Powell, Powell Food Safety, Australia

June 02 (Free British Teleclass ... Denver Russell Memorial Teleclass Lecture)

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Dr. Martha Clokie, University of Leicester, UK

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