

Background document

“How to reach healthcare workers?”

Viral Hepatitis Prevention Board Meeting
Barcelona, Spain, 15-16 November 2012.

Greet Hendrickx
VHPB Secretariat

Executive VHPB Secretariat, Vaccine and Infectious disease Institute, University of Antwerpen, Campus Drie Eiken, Universiteitsplein 1, BE-2610 Antwerpen, Belgium, ☎ +32 (0)3 265 26 64 📠 +32 (0)3 265 26 40 @: Greet.Hendrickx@ua.ac.be

Content

This pre-meeting document contains a list of selected abstracts/ references from a Pubmed MEDLINE search on different search terms. The references are ranged by publication year (most recent first) and for each year in alphabetical order of the first author's name.

1.Meeting subjects.....pag.3

Pubmed MEDLINE search on {(Healthcare workers OR HCW) AND (vaccine* OR Immuni*)} in all fields and published from 2007 on, was performed. }. In End-note the relevant references were selected and classified in the different meeting subjects.

Session 2: Vaccination coverage data of hepatitis B and other vaccine preventable diseases in healthcare workerspag.3

Session 3: Vaccination policies and recommendations in healthcare workers on national and global level.....pag.21

Session 4: Acceptance of vaccination by the healthcare workers.....pag.34

Session 5: Best practices to increasing vaccination rates among healthcare workers.....pag.47

2.Bibliography of the Speakers.....pag.61

List of publications achieved via speakers form when this form was not available a Pubmed MEDLINE search was performed on Name of the speaker in [Author] and [vaccin*]. If more than 10 references only the most recent articles are shown.

1. Meeting subjects

Pubmed MEDLINE search on {(Healthcare workers OR HCW) AND (vaccine* OR Immuni*)} in all fields and published from 2007 on, was performed. }. The reference were sorted in end note following the structure of the meeting

Session 2: Vaccination coverage data of hepatitis B and other vaccine preventable diseases in healthcare workers ()

Presentation Lorenzo Pezzoli - Can we know the immunization status of healthcare workers? Results of a feasibility study in hospital trusts, England, 2008

Pezzoli, L., K. Noakes, P. Gates, F. Begum and R. G. Pebody. "Can we know the immunization status of healthcare workers? Results of a feasibility study in hospital trusts, England, 2008." *Epidemiol Infect* 2010 138(1): 45-52.

In England, there is no surveillance system for vaccines offered to healthcare workers apart from that in place annually for the seasonal influenza vaccine. To inform the feasibility of a general vaccine uptake surveillance system and to understand which policies are currently in place, we conducted a survey in the 162 National Health Service Foundation and Acute Hospital trusts in England, by submitting a questionnaire to their occupational health departments on immunization policies and methods of storing vaccine uptake data. In total, 104 hospital trusts (64.2%) responded. All responders offer hepatitis B, tuberculosis, measles-mumps-rubella, and influenza vaccines to healthcare workers; 0.9% reported not offering varicella and 13.5% not offering tetanus-diphtheria-polio; 66.4% record staff eligible for immunizations and 68.2% record staff they have immunized. Our study suggests that setting up a surveillance system to monitor vaccine uptake in healthcare workers is possible but would be challenging, given the variation in current systems.

Presentation Patricia Blank - Disparities in influenza vaccination coverage rates in health care workers and the ways to overcome the barriers.

Blank, P. R., M. Schwenkglens and T. D. Szucs. "Disparities in influenza vaccination coverage rates by target group in five European countries: trends over seven consecutive seasons." *Infection* 2009 37(5): 390-400.

BACKGROUND: The primary objective of this study was to measure influenza vaccination coverage rates in the general population, including children, and in high-risk groups of five European countries during the season 2007/2008. An additional aim was to analyze coverage trends over seven consecutive seasons and to gain an understanding of the primary drivers and barriers to immunization. METHODS: Community-based telephone and mail surveys have been conducted in the UK, Germany, Italy, France, and Spain, yearly, since 2001/2002. Approximately 2,000 individuals per country and season were interviewed who were considered to be representative of the adult population aged 14 years and older. Data on the vaccination status of children were obtained by proxy interviews. The questionnaire used was essentially the same for all seven seasons. Five target groups were identified for the study: (1) persons aged > or = 65 years; (2) elderly suffering from a chronic illness; (3) patients suffering from a chronic illness; (4) persons working in the health care sector; (5) children. RESULTS: In the season 2007/2008, vaccination coverage rates in the general population remained stable in

Germany. Compared to the coverage rates of the previous season, increases of 3.7%, 2.0%, and 1.8% were observed for the UK, Spain, and France, respectively, while a decrease of -1.5% was observed for Italy. Across all five countries, vaccination rates in the predefined target groups decreased to some extent (elderly) or increased slightly (chronically ill and health care workers). Vaccination rates among children varied strongly between countries and ranged from 6.1% in UK to 19.3% in Germany. The most powerful motivation for getting vaccinated in all countries was advice from a family doctor (58.6%) and the perception of influenza as a serious illness (51.9%). The major reasons why individuals did not become vaccinated were (1) the feeling of not being likely to catch influenza (39.5%) and (2) never having considered the option of being vaccinated (35.8%).

CONCLUSIONS: The change in general influenza vaccination coverage in the 2007/2008 season compared to the previous season was small, but decreases were seen in some target groups. The underlying motivations for and against vaccination did not substantially change. An effort to activate those driving forces that would encourage vaccination as well as dealing with barriers that tend to prevent it may help enhance coverage rates in Europe in the future.

Blank, P., M. Schwenkglens and T. D. Szucs. "The impact of European vaccination policies on seasonal influenza vaccination coverage rates in the elderly." Hum Vaccin Immunother 2012 8(3).

Despite strong recommendations, seasonal influenza vaccination coverage rates (VCRs) remain limited in Europe, even in high-priority groups. There is a need for understanding the impact of vaccination-related policy elements and barriers toward vaccination. We aimed at assessing essential elements of vaccination policies and the influence of policy-related driving factors on VCRs among elderly. Sixteen European National Vaccine Industry Groups (NVIGs) were included in a survey to make an inventory of vaccination policies implemented at national level (2009). The questionnaire was structured around four topics: management of vaccination programs; influence of health care workers (HCWs); role of information/communication campaigns; and access to vaccine. The information retrieved was put in relation to current VCRs among the elderly (≥ 65 y). Correlation coefficients between policy elements and vaccination rates were calculated. Several policy elements may be suitable to increase influenza vaccination uptake in the elderly, but only few countries make use of all alternatives. Countries with good monitoring systems regarding vaccine uptake rates (Spearman's $\rho = 0.639$, $p = 0.010$) or sending personal letters offering free vaccination ($S\rho = 0.728$, $p = 0.002$) showed on average higher coverage among the elderly than countries with less developed vaccine management systems. The presence of additional policy elements (setting national objectives, HCW incentives, vaccination reimbursement systems, awareness campaigns and clear VCR objectives) led to numerically increased VCRs. The presence of several elements of vaccination policies at national level, including broad information and reminding systems, strong official recommendations and good access to the vaccine may help to achieve improved influenza vaccine coverage rates among elderly.

Blank, P. R., M. Schwenkglens and T. D. Szucs. "Vaccination coverage rates in eleven European countries during two consecutive influenza seasons." J Infect 2009 58(6): 446-458.

OBJECTIVES: This study assessed influenza vaccination coverage rates in eleven European countries during seasons 2006/07 and 2007/08. The aims were to analyse vaccine uptake rates in the general population and in high-risk groups, including children, as well as to understand the principal drivers and barriers towards vaccination. METHODS: Community-based face-to-face interviews, telephone surveys or mailed surveys were conducted in UK, Germany, Italy,

France, Spain, Austria, Czech Republic, Finland, Ireland, Poland and Portugal. Approximately 2000 representative adult individuals per country and season were interviewed. Data on the vaccination status of children were obtained by proxy interviews. For the analysis, five target groups were defined. RESULTS: Vaccination coverage levels in the general population ranged from 9.5% (Poland) to 28.7% (UK) during season 2007/08. In comparison with the previous season, only minor increases were visible. The coverage in the elderly target group was highest at 70.2% in the UK and lowest at 13.9% in Poland. The vaccination rate of chronically ill persons ranged from 11.1% (Poland) to 56.0% (UK). Vaccination levels among health care workers were generally low. Vaccine uptake in children was lowest in Ireland (4.2%) and highest in Germany (19.3%). Respondents from all countries were aware of the seriousness of influenza as a disease. People who had never been vaccinated regarded being infected as unlikely. The advice from a family doctor or a nurse was deemed as the main encouraging factor for vaccination. CONCLUSIONS: During 2007/08, influenza vaccination coverage rates differed widely between countries, not only in the general population but also in the predefined at-risk groups. Generally, the increases in coverage compared to the previous season were marginal. Overcoming the barriers and implementing the driving forces identified by our surveys may help to increase vaccine uptake and to reach the corresponding WHO goals.

Blank, P. R., M. Schwenkglens and T. D. Szucs. "Influenza vaccination coverage rates in five European countries during season 2006/07 and trends over six consecutive seasons." *BMC Public Health* 2008 8: 272.

BACKGROUND: The objectives of the survey were to identify the level of influenza vaccination coverage in five European countries between 2001 and 2007, to understand the drivers and barriers to vaccination, to assess vaccination intentions for the winter 2007/08 as well as major encouraging factors for vaccination. METHODS: Between 2001 and 2007, representative household surveys were performed with telephone or mailed (France) interviews of individuals aged 14 and above. The questionnaire used in the UK, Germany, Italy, France and Spain was essentially the same in all seasons. The data were subsequently pooled. Four target groups were defined for the analysis: 1) persons aged 65 years and over; 2) persons working in the medical field; 3) chronically ill persons and 4) combined target group composed of individuals belonging to one or more of the previous groups 1, 2 or 3. RESULTS: In 2006/07, vaccination coverage was, 25.0% in UK, 27.4% in Germany, 21.8% in Spain, 24.2% in France and 24.4% in Italy. During six influenza seasons (2001-2007), vaccination coverage showed a slight positive trend in the five countries ($p < \text{or} = 0.0001$). In the elderly ($> \text{or} = 65$ years), across all countries, no significant trend was seen; the vaccination rate decreased non-significantly from a peak of 64.2% in season 2005/06 to 61.1% in season 2006/07. The most frequent reason for getting vaccinated was a recommendation by the family doctor or nurse (51%), and this was also perceived as the major encouraging factor for vaccination (61%). The main reason for not getting vaccinated was feeling unlikely to catch the flu (36%). CONCLUSION: In the UK, Germany and Spain, influenza vaccination coverage rates in season 2006/07 dropped slightly compared to the previous season. However, a trend of increasing vaccination coverage was observed from 2001/02 to 2006/07 across Europe. The family doctor is the major source of encouragement for individuals getting vaccinated. Efforts to overcome the barriers to vaccination need to be put in place to reach the WHO objective of 75% coverage in the elderly by 2010. This is a major challenge to be faced by governments, healthcare workers and healthcare organisations.

Blank, P. R., A. U. Freiburghaus, M. M. Schwenkglenks, T. D. Szucs and U. Kunze. "Influenza vaccination coverage rates in Austria in 2006/07 - a representative cross-sectional telephone survey." *Wien Med Wochenschr* 2008 158(19-20): 583-588.

The objective of the study was to evaluate influenza vaccination coverage in Austria in the season of 2006/07 and to understand motivations and barriers. Two-thousand telephone interviews with individuals over 15 years of age were conducted. The overall influenza vaccination coverage rate was 17.8%. In the elderly (>65 years) the rate was 32.1%, and the adjusted odds ratio of being vaccinated, compared to those not belonging to a high-risk group, was 3.8. Chronically ill persons and health care workers had adjusted odds ratios of 2.6 and 1.5, respectively, while chronically ill elderly persons had an odds ratio of vaccination of 7.0. Minimizing the risk of contracting influenza was the most frequent reason for getting vaccinated (35.2%), and a recommendation by the family doctor was perceived as the major encouraging factor for vaccination (46.4%). The main reason for not getting vaccinated was indifference (>50%). Vaccination coverage in Austria in 2006/07 was low and far behind WHO objectives.

Blank, P. R., A. U. Freiburghaus, B. R. Ruf, M. M. Schwenkglenks and T. D. Szucs. "Trends in influenza vaccination coverage rates in Germany over six seasons from 2001/02 to 2006/07." *Med Klin (Munich)* 2008 103(11): 761-768.

BACKGROUND AND PURPOSE: Influenza is a considerable health problem all over the world. Vaccination is the most important measure for preventing influenza and reducing morbidity and mortality. The aims of this study were to assess influenza vaccination coverage from 2001 to 2007 in Germany, to understand motivations and barriers to vaccination, and to identify vaccination intentions for season 2007/08. METHODS: In representative household surveys, 12,039 telephone interviews with individuals aged ≥ 14 years were conducted between 2001 and 2007. Essentially the same questionnaire was used in all seasons. RESULTS: In season 2006/07, the overall influenza vaccination coverage rate dropped from 32.5% in the previous season to 27.4%. In the elderly (≥ 60 years), the rate decreased from 51.6% to 44.7% and the odds ratio of being vaccinated, compared to those not belonging to a high-risk group, remained < 5 . Chronically ill elderly persons had an odds ratio of vaccination of 7, while younger chronically ill persons and health-care workers had odds ratios of about 2. Perceiving influenza as a serious illness was the most frequent reason for getting vaccinated. 14% of those vaccinated in 2006/07 indicated the threat of avian flu as a reason. The main reason for not getting vaccinated was thinking not to be likely to catch the flu. A recommendation by the family doctor/nurse was perceived as the major encouraging factor for vaccination. A total of 44.7% of the respondents intended to get vaccinated against influenza in 2007/08. CONCLUSION: A trend of increasing vaccination rates was observed from 2001 to 2006 in Germany, but the rates dipped by almost a sixth after 2005/06. The loss of media interest in the threat of avian influenza after February 2006 and stalling reimbursement programs may have contributed to the recent drop in vaccination rates.

Presentation Silvio Tafuri Vaccination coverage in healthcare workers in Italy

Prato, R., **S. Tafuri**, F. Fortunato and D. Martinelli. "Vaccination in healthcare workers: an Italian perspective." *Expert Rev Vaccines* 2010 9(3): 277-283.

The Italian National Vaccination Plan 2005-2007 strongly recommends that healthcare workers (HCWs) be offered hepatitis B and influenza vaccines and that susceptible workers should also be offered measles, mumps, rubella and varicella

vaccines. Nationwide figures for vaccination coverage among HCWs are not currently available. Vaccination coverage is high but not yet satisfactory for hepatitis B and is absolutely insufficient for influenza. Susceptibility rates to childhood exanthematic diseases are low: when attempting to achieve complete immunity, screening the individuals at recruitment is cost effective. The procedures for TB prevention are a consolidated practice for occupational health physicians. Hospital health directors should be empowered on the importance of vaccinating HCWs as a milestone of hospital risk management. More adequate training, including specific courses on vaccinations, is required for occupational health physicians.

Tafari, S., C. Germinario, M. Rollo and R. Prato. "**Occupational risk from measles in healthcare personnel: a case report.**" J Occup Health **2009** 51(1): 97-99.

Tafari, S., D. Martinelli, G. Caputi, A. Arbore, P. L. Lopalco, C. Germinario and R. Prato. "**An audit of vaccination coverage among vaccination service workers in Puglia, Italy.**" Am J Infect Control **2009** 37(5): 414-416.

The aim of the study is to assess the determining factors and the level of vaccination coverage for those vaccinations recommended to health care workers. The employees of the Apulian Vaccination Services were given an interview-based standardized anonymous questionnaire. Of the 302 replies from the employees, 54.5% of the respondents had received the hepatitis B vaccine and 32.7% the influenza vaccine in the 2007-2008 season. There were 4.6% susceptible to varicella, and 2.6% had been vaccinated. Of the replies received, 9.3% were susceptible to measles or mumps or rubella, and 5.9% had been vaccinated. There is the need for on-going education for vaccine requirements to improve immunoprophylaxis among health care workers.

Tafari, S., D. Martinelli, G. Caputi, M. T. Balducci, C. Germinario and R. Prato. "**Simultaneous administration of vaccines in immunization protocols: an audit in healthcare workers in the Puglia region of Italy.**" Hum Vaccin **2009** 5(11): 745-747.

Through a standardized questionnaire, this study investigated the opinions and attitudes of Vaccine Service staff in the Puglia Region of Italy regarding simultaneous administration of vaccines. Co-administration was practiced by 89.4%, and the staff's positive opinions were that it is important for work organization (80.8%) and as an opportunity to increase vaccine take-up (59.9%). Negative opinions were that it increases the risk of adverse reactions or undesired effects (11.3%) and can engender fear of such reactions in parents (31.1%).

Tafari, S., D. Martinelli, G. Caputi, C. Germinario and R. Prato. "**An audit of TB prevention on Italian health care workers.**" J Prev Med Hyg **2009** 50(2): 127-128.

Tuberculosis (TB) is considered an occupational disease in health care workers. The aim of this study is to assess the state of tuberculosis prevention among the personnel of the Vaccination Services of the Puglia Region (Italy), who were given an interview-based standardised questionnaire. Of the 302 replies, TB screening had been undergone by 80.5%, whom 78.6% took advice by the occupational health physician. Of those who were negative to the PPD skin test, 60.6% had received BCG, whom 78% took vaccination advice by the occupational health physician. In Italy, the procedures for the monitoring and prevention of tuberculosis are a consolidated practice for occupational health physicians.

Presentation Andrea Trevisan Prevalence of markers for hepatitis B virus and vaccination compliance among medical school students in Italy.

Bruno, A., M. Borella-Venturini, M. Giraldo, M. Mongillo, E. Zanetti, M. Beggio, E. Davanzo and **A. Trevisan**. "[Prevalence of virus hepatitis B markers among medical students]." G Ital Med Lav Ergon 2007 29(3 Suppl): 752-754.

Healthcare workers are a category of subjects at risk of infections higher than general population, though the introduction of vaccination against hepatitis B generally reduced this risk. In the present research, 2137 students of graduate course for health professions were subdivide in two age classes: 25 years old or younger and older than 25 years old according to the vaccination strategy defined by the law 165/91. A high number of students (82.3%) appeared immune against hepatitis B virus, whereas 16.7% were negative. About 30% of negative subjects declared vaccination. Females and subjects 25 years old or younger showed a significantly higher prevalence of anti-HBsAg antibodies ($p < 0.001$) than males and older subjects respectively. The obtained results show the need to evaluate the immunity status of the healthcare workers in training with the aim to reduce the number of susceptible subjects.

Presentation Sabine Wicker: Seroprevalence of vaccine preventable and blood transmissible virus infections.

Wicker, S., H. F. Rabenau, R. Gottschalk, H. W. Doerr and R. Allwinn. "Seroprevalence of vaccine preventable and blood transmissible viral infections (measles, mumps, rubella, polio, HBV, HCV and HIV) in medical students." Med Microbiol Immunol 2007 196(3): 145-150.

In the course of clinical training medical students are in particular exposed to infectious diseases. Therefore, the present study was performed to investigate the immunity status of 223 medical students in their first clinical semester to job-related diseases. Specific serological antibody testing of hepatitis B-virus (HBV), hepatitis C-virus (HCV), human immunodeficiency virus (HIV), varicella zoster- (VZV), measles-, mumps-, rubella and polioviruses' type 1, 2 and 3 were performed. The results yielded, that 69.5% of the students had an anti-HBs-level $> \text{ or } = 10 \text{ IU/l}$ and 54.7% $> \text{ or } = 100 \text{ IU/l}$. Neither HCV infection nor HIV infection were found, but one student showed an active HBV infection. Virus specific immunity rates were found in 91.5% for measles, 80.3% for mumps, 90.1% for rubella and 96.9% for varicella. Furthermore the medical students demonstrated neutralizing antibodies to polioviruses: 95.1% (type 1), 96.9% (type 2) and 70% (type 3). 68.2% had antibodies (titer 1: $> \text{ or } = 10$) against all three virus types. The partly significant gaps of immunity in the students need to be closed prior to the first contact with patients.

Wicker, S., H. F. Rabenau, J. M. Pfeilschifter and R. Gottschalk. "[Measles in 2010. Knowledge and vaccination status of medical students]." Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2011 54(2): 238-242.

OBJECTIVES: In 2002, the WHO Regional Office for Europe developed a strategic plan for measles in the WHO European Region. WHO recommends that at least 95% of children receive two doses of measles vaccine. This plan targeted the elimination of measles for the year 2010 and is supported by the Federal Republic of Germany. METHODS: Questionnaire survey, serological tests and check-up of the certificates of vaccination were offered to second year medical students of Goethe University Frankfurt/Main, Germany. RESULTS: Only 62.3% of medical students had received two doses of measles vaccine. Serological data showed that 23.1% were not immune against measles. Important gaps of knowledge were identified in the knowledge test of the survey; less than one third of the students ($n=95/324$) were able to answer more than 50% of the questions correctly.

DISCUSSION: The suboptimum measles-vaccination coverage shows that the goal of eliminating measles will not be met across Europe by the target year 2010. Both occupational and public health measures need to make sure that vaccination programs should achieve a minimum of 95% coverage with two doses. In addition, the obligation to notify the authorities even of suspected cases serve the same purpose and measures to improve the knowledge of medical students are required. Consequent surveillance systems are necessary to investigate chains of measles infections. Healthcare workers play a decisive role in this issue.

Wicker, S., R. Allwinn, R. Gottschalk and H. F. Rabenau. "**Reliability of medical students' vaccination histories for immunisable diseases.**" BMC Public Health 2008 8: 121.

BACKGROUND: Medical students come into contact with infectious diseases early on their career. Immunity against vaccine-preventable diseases is therefore vital for both medical students and the patients with whom they come into contact. METHODS: The purpose of this study was to compare the medical history and serological status of selected vaccine-preventable diseases of medical students in Germany. RESULTS: The overall correlation between self-reported medical history statements and serological findings among the 150 students studied was 86.7 %, 66.7 %, 78 % and 93.3 % for measles, mumps, rubella and varicella, conditional on sufficient immunity being achieved after one vaccination. Although 81.2 % of the students' medical history data correlated with serological findings, significant gaps in immunity were found. CONCLUSION: Our findings indicate that medical history alone is not a reliable screening tool for immunity against the vaccine-preventable diseases studied.

More recent literature on session 2 pubmed search (Healthcare worker OR HCW) AND (vaccine Or immune*) AND Hepatitis) endnote search (Coverage) after 2007*

Guthmann, J. P., L. Fonteneau, C. Ciotti, E. Bouvet, G. Pellissier, D. Levy-Bruhl and D. Abiteboul. "**Vaccination coverage of health care personnel working in health care facilities in France: Results of a national survey, 2009.**" Vaccine 2012 30(31): 4648-4654.

We conducted a national cross-sectional survey to investigate vaccination coverage (VC) in health care personnel (HCP) working in clinics and hospitals in France. We used a two-stage stratified random sampling design to select 1127 persons from 35 health care settings. Data were collected by face-to-face interviews and completed using information gathered from the occupational health doctor. A total of 183 physicians, 110 nurses, 58 nurse-assistants and 101 midwives were included. VC for compulsory vaccinations was 91.7% for hepatitis B, 95.5% for the booster dose of diphtheria-tetanus-polio (DTP), 94.9% for BCG. For non-compulsory vaccinations, coverage was 11.4% for the 10 year booster of the DTP pertussis containing vaccine, 49.7% for at least one dose of measles, 29.9% for varicella and 25.6% for influenza. Hepatitis B VC did not differ neither between HCP working in surgery and HCP in other sectors, nor in surgeons and anaesthesiologists compared to physicians working in medicine. Young HCP were better vaccinated for pertussis and measles ($p < 0.01$), and those working in an obstetric or a paediatric ward were better vaccinated for influenza and pertussis ($p < 0.01$). HCP are overall well covered by compulsory vaccinations, whereas VC

for non-compulsory vaccinations is very insufficient. The vaccination policy regarding these latter vaccinations should be reinforced in France.

Carvalho, P., M. I. Schinoni, J. Andrade, M. A. Vasconcelos Rego, P. Marques, R. Meyer, A. Araujo, T. Menezes, C. Oliveira, R. S. Macedo, et al. **"Hepatitis B virus prevalence and vaccination response in health care workers and students at the Federal University of Bahia, Brazil."** *Ann Hepatol* **2012** 11(3): 330-337.

BACKGROUND AND RATIONALE FOR THE STUDY: Hepatitis B (HB) is one of the most prevalent occupational infections in health attendance environments. According to the Brazil Ministry of Health, health professionals must be vaccinated against the hepatitis B virus (HBV) and provide laboratory proof of immunization. **AIMS:** To evaluate the seroprevalence of HBV infection and to analyze the response to vaccine by measuring serum antibodies against HBV surface antigen (anti-HBs) levels in a sample of students and health professionals at the Federal University of Bahia. **RESULTS:** As part of this cross-sectional study, a campaign against occupational HB was launched in 2007 and vaccination and blood samples were collected for analysis of the following serological markers: HBV surface antigen (HBsAg) and anti-HBs (measured by enzyme-linked immunoassay) and total antibodies against HBV core antigen (anti-HBc). The study sample comprised 766 people. Global seropositivity for HBV was 1.7%: 0.5% in the students and 8.8% in the professionals. In a group of volunteers, a serological profile compatible with postvaccine immunity was shown by 95% of volunteers with proof of vaccination and by 81.8% of volunteers without proof of vaccination. **CONCLUSIONS:** In conclusion, this study shows that it is important to promote vaccination campaigns and improve knowledge and awareness about HB among health care workers and higher education students.

Zamani, F., F. Fallahian, F. Hashemi, Z. Shamsaei and S. M. Alavian. **"Immune response to hepatitis B vaccine in health-care workers."** *Saudi J Kidney Dis Transpl* **2011** 22(1): 179-184.

This study was performed to study the immune response to hepatitis B virus (HBV) vaccine in health-care workers. Through a cross-sectional study, relevant information and blood samples from 151 healthcare workers at the Firuzgar hospital were studied. The age range of the study individuals was 20-59 years, with the mean and standard deviation being 35.11 and 10.06, respectively. There were 24 males (15.9%) and 127 females (84.1%). The mean and median of months after HBV vaccination was 63.42 and 49.00, respectively. The mean and median of anti-HBs titer in those who received HBV vaccination was 164.81 and 200 milli international units per milliliter (mIU/mL), respectively. Of the 129 HBV-vaccinated subjects, 103 (68.2%) had anti-HBs titer >10 and 26 (17.2%) had anti-HBs titer <10. There was no association between gender and anti-HBs titer, but vaccination and adequate completion of its courses were associated with higher anti-HBs titer ($P < 0.05$). Also, the logistic regression method showed that the association between duration after vaccination and age with anti-HBs titer was not statistically significant. Our study suggests that the HBV vaccine immunization program had obtained excellent efficacy. There is need for further investigation among subjects who are not vaccinated against HBV but are positive for anti-HBs as well as in HBV-vaccinated subjects with low anti-HBs titers, about possible low-level viremia and other causes of lower vaccine efficacy, particularly in health-care workers.

Silveira, M. B., D. A. Perez, A. Yamaguti, E. Z. Saraiva, M. G. Borges and M. I. de Moraes-Pinto. **"Immunization status of residents in pediatrics at the Federal University of Sao Paulo, Brazil."** *Rev Inst Med Trop Sao Paulo* **2011** 53(2): 73-76.

Vaccination of health care workers is an efficient way to reduce the risk of occupational infection and to prevent nosocomial transmission to vulnerable

patients. Despite this, achieving high immunization rates among those professionals is a challenge. We assessed the immunization status of Residents in Pediatrics at the Federal University of Sao Paulo from June to December 2008. Their immunization records were checked and evaluated according to the Brazilian Immunization Schedule for health care workers. Considering all required vaccines, only 3.1% of the 64 Residents were up-to-date with their immunizations. Influenza was the vaccine with the lowest uptake (3.1%) and measles and rubella were diseases with the highest evidence of immunity (62.5% each). Only 37.5% of Residents had received three hepatitis B vaccine doses with a subsequent serology confirming seroconversion. Moreover, the vast majority of Residents in Pediatrics who were not up-to-date were unaware of the fact. Both medical schools and Pediatric Residence programs should not only offer information but also check vaccination records in an effort to keep their healthcare workers' vaccinations up-to-date.

Elduma, A. H. and N. S. Saeed. "**Hepatitis B virus infection among staff in three hospitals in Khartoum, Sudan, 2006-07.**" East Mediterr Health J 2011 17(6): 474-478.

The study was conducted to determine the seropositivity of hepatitis B infection, associated risk factors and history of vaccination among staff in 3 teaching hospitals in Khartoum. The study was carried out from March 2006 to March 2007. Participants comprised 245 randomly selected hospital staff; 12 (4.9%) reacted positively for HBsAg, 6 of whom were nurses, 4 domestic staff and 2 laboratory staff. Only 37 participants (15.1%) said that they had attended training courses in biosafety. Just over 50% indicated that they had had needle-stick or sharps injuries during work; 61 (24.9%) indicated that they always followed the bio-safety precautions, 52 (21.4%) said that they always wore gloves during their work while 43 (17.6%) said they never wore them. Only 11 (4.5%) of the participants had received the full vaccination dose for hepatitis B.

Duong, M., S. Mahy, R. Binois, M. Buisson, L. Piroth and P. Chavanet. "**[Vaccination coverage of healthcare professionals in an infectious diseases department].**" Med Mal Infect 2011 41(3): 135-139.

OBJECTIVES: The study's objective was to evaluate with a standardized questionnaire the knowledge of healthcare workers (HCWs) regarding occupational vaccinations and their vaccination coverage. **POPULATION AND METHODS:** This cross-sectional survey was conducted in the department of infectious diseases of a 1796 bed-teaching hospital in Dijon, France. **RESULTS:** Fifty-seven (93%) out of 61 HCPs completed the questionnaire. Vaccination against HVB was the most frequently mentioned vaccination (79%), followed by BCG (66%), and combine vaccine against diphtheria, tetanus, and polio (DTP) (66%). Influenza was the most often quoted among recommended vaccinations (70%), followed by measles (61%), pertussis (39%), and varicella (14%). The number of correct answers was significantly correlated with age of participants, being a physician, and having had courses on vaccination. Almost all HCPs were up to date for mandatory vaccinations. In 2009 to 2010, vaccination rates against seasonal flu and H1N1 flu reached 88%. Only 52% of HCPs knew about their pertussis immunization and only a third of those born before 1980 had been tested for measles. **CONCLUSIONS:** HCPs knowledge of mandatory vaccinations is adequate but more limited for recommended vaccinations. Information on influenza vaccination has significantly improved its perception among HCPs resulting in a better adherence to vaccination.

Burnett, R. J., G. Francois, M. J. Mphahlele, J. G. Mureithi, P. N. Africa, M. M. Satekge, D. M. Mokonoto, A. Meheus and M. van Sprundel. "**Hepatitis B vaccination coverage in healthcare workers in Gauteng Province, South Africa.**" Vaccine 2011 29(25): 4293-

4297.

Hepatitis B (HB) virus (HBV) is highly endemic and HBV infection is a major public health problem in sub-Saharan Africa. Percutaneous/parenteral transmission is an important mode of spread of HBV in the healthcare setting, thus healthcare workers (HCWs) and their patients are at risk for acquiring HBV infections. This study was conducted on three HCW populations in Gauteng Province during 2009, in order to (1) determine HB vaccination coverage of HCWs, and (2) investigate demographic predictors of vaccination uptake. Being a doctor was a statistically significant predictor of vaccination uptake (odds ratio [OR]: 3.2; 95% confidence interval [CI]: 1.48-6.72; p-value: 0.003), while working in the private sector was also statistically significantly associated with vaccination uptake (OR: 1.73; 95% CI: 1.01-2.98; chi-square p-value: 0.035). The majority (67.9% [491/723]) of HCWs had received at least 1 dose of vaccine, but where data on number of doses was available, only 19.9% (94/472) were fully vaccinated. In conclusion, there is a need to increase HB vaccination uptake in Gauteng HCWs through a policy that is properly implemented and routinely monitored and evaluated, and this policy must ensure that all three doses of vaccine are administered.

Pezzoli, L., K. Noakes, P. Gates, F. Begum and R. G. Pebody. **"Can we know the immunization status of healthcare workers? Results of a feasibility study in hospital trusts, England, 2008."** *Epidemiol Infect* 2010 138(1): 45-52.

In England, there is no surveillance system for vaccines offered to healthcare workers apart from that in place annually for the seasonal influenza vaccine. To inform the feasibility of a general vaccine uptake surveillance system and to understand which policies are currently in place, we conducted a survey in the 162 National Health Service Foundation and Acute Hospital trusts in England, by submitting a questionnaire to their occupational health departments on immunization policies and methods of storing vaccine uptake data. In total, 104 hospital trusts (64.2%) responded. All responders offer hepatitis B, tuberculosis, measles-mumps-rubella, and influenza vaccines to healthcare workers; 0.9% reported not offering varicella and 13.5% not offering tetanus-diphtheria-polio; 66.4% record staff eligible for immunizations and 68.2% record staff they have immunized. Our study suggests that setting up a surveillance system to monitor vaccine uptake in healthcare workers is possible but would be challenging, given the variation in current systems.

Oliveira, L. C. and J. P. Pontes. **"Frequency of hepatitis B immunity and occupational exposures to body fluids among Brazilian medical students at a public university."** *Rev Inst Med Trop Sao Paulo* 2010 52(5): 247-252.

In the present study the frequencies of immunity against hepatitis B (HB) and of potentially contaminating accidents among medical students of a Brazilian public university were evaluated. Of all the 400 students who should have been immunized, 303 (75.7%), 66.3% of whom were women, answered an anonymous, self-administered questionnaire. Serum anti-HBs were determined in 205 of them and titers ≥ 10 UI/L were considered to be protective. A total of 86.8% of students had received three doses of HB vaccine. The frequency of immunity among women (96.4%) was higher ($p = 0.04$) than that among men (87.7%). Among those who did not have immunity, 12/13 (92.3%) had been vaccinated before entering medical school. Only 11% of the students with complete vaccination had previously verified serological response to the vaccine. A total of 23.6% reported having been somehow exposed to blood or secretions. Among final-year students, this frequency was 45.0%, being similar among men (47.8%) and women (43.2%). Of all these accidents, 57.7% were due to body fluids coming in contact with mucosa and 42.3% due to cut and puncture accidents. The results from this study show that: 1) the frequency of immunity against HB is high among the evaluated medical

students, although verification of response to vaccination is not a concern for them; 2) anti-HBs titers should be verified after complete vaccination and on a regular basis, especially by men; and 3) the frequency of potentially contaminating accidents is high.

Dinelli, M. I., T. N. Moreira, E. R. Paulino, M. C. da Rocha, F. B. Graciani and M. I. de Moraes-Pinto. "**Immune status and risk perception of acquisition of vaccine preventable diseases among health care workers.**" *Am J Infect Control* **2009** 37(10): 858-860.

Risk perception of acquiring vaccine preventable diseases and the immune status of 187 health care workers (HCW) from a high-complexity university hospital in Sao Paulo, Brazil, were assessed. The vaccine preventable diseases more cited as at risk for acquisition were hepatitis B (94.1%), influenza (92.5%), meningococcal disease (90.3%), tuberculosis (85.0%), and varicella (72.7%). Previous disease or vaccination reported by HCW were hepatitis B (82.4%), tetanus (87.7%), diphtheria (81.8%), measles (86.6%), mumps (85.6%), rubella (85.0%), varicella (82.9%), and influenza (35.8%). One third of HCW reported previous percutaneous or mucosal occupational accidents, and 83.6% had notified the event to the Hospital Infection Control Committee. Despite good risk perception of acquiring vaccine preventable diseases, only 35.8% of individuals were fully immunized. Efforts should be made to increase influenza vaccination coverage among all professionals and to reduce the number of nonreported accidents, especially among physicians.

Hees, L., N. Afroukh and D. Floret. "[**Vaccination coverage among health care workers in the pediatric emergency and intensive care department of Edouard Herriot hospital in 2007, against influenza, pertussis, varicella, and measles.**]" *Arch Pediatr* 2009 16(1): 14-22.

AIM: The aim of this study was to determine the vaccination coverage among the medical and paramedical health care workers of the pediatric intensive care and emergency department of Edouard Herriot hospital in Lyon, with respect to influenza, pertussis, varicella, and measles, 4 diseases with air transmission and vaccination recommendations. METHOD: During February and March 2007, a questionnaire was given by hand to 123 health care workers by a medical student working there or available in the intensive care unit. RESULTS: The response rate to the questionnaire was 68.3%. The vaccination coverage against influenza was 42.8%; men and medical health care workers were better vaccinated. With respect to vaccination against pertussis, one third had received an injection in adulthood, adults under age 30 and medical health care workers were better vaccinated, but the difference was not statistically significant. Ten health care workers were not vaccinated and had no history of measles: only 1 had had a measles serology and none were vaccinated. Eleven had no history of varicella: 6 had had a varicella serology and none were vaccinated. CONCLUSIONS: Vaccination coverage against influenza is higher than what has been reported in the literature, possibly because of a mobile vaccination campaign against influenza made during winter 2006 in this pediatric department. Vaccination coverage against pertussis is encouraging and probably the consequence of an awareness of the gravity of the disease among infants. Individual information is necessary for health care workers on the nosocomial risk for influenza and pertussis in infants, and vaccination must be proposed. Serology against varicella and measles is compulsory for all health care workers with no history and no vaccination against these 2 diseases, to track and vaccinate the nonimmunized personnel. Occupational physicians have a very important role to play in meeting this goal.

Sukriti, N. T. Pati, A. Sethi, K. Agrawal, G. T. Kumar, M. Kumar, A. T. Kaanan and S. K. Sarin. "**Low levels of awareness, vaccine coverage, and the need for boosters**

among health care workers in tertiary care hospitals in India." J Gastroenterol Hepatol 2008 23(11): 1710-1715.

BACKGROUND AND AIM: The risk of acquiring hepatitis B virus (HBV) infection through exposure to blood or its products is highest amongst health care workers (HCWs). Despite potential risks, a proportion of HCWs never get vaccinated. India is second to China in the numbers of people with chronic HBV. This study aimed to investigate the vaccination practices and the prevalence of HBV infection in HCWs in India. **METHODS:** A total of 2162 HCWs were screened for the presence of serological markers of HBV and hepatitis C virus (HCV). Occult HBV infection was tested by detection of HBV-DNA for surface and core regions by nested polymerase chain reaction in HBsAg-negative and IgG anti-hepatitis core antigen-positive subjects. **RESULTS:** Only 1198 (55.4%) of the 2162 HCWs screened had been vaccinated; and 964 (44.6%) were not vaccination-status conscious; of these HCWs, 600 (27.7%) had never been vaccinated and 364 (16.4%) were unaware of their vaccination status. Protective (> 10 IU/mL) anti-hepatitis B surface (anti-HBs) antigen titers were seen in only 61.7%. The anti-HBs titers were found to be lower with the passage of time; the median anti-HBs titers in subjects who were vaccinated > 10 years ago were significantly lower than those who had been vaccinated < 5 years ago ($P < 0.001$). One percent of HCWs were HBsAg-positive, and 24.7% of 700 HCWs screened had past exposure (IgG-anti-HBc-positive). Occult HBV was detected in 5% of 120 positive subjects with past exposure; all had anti-HBs titers > 10 IU/mL. **CONCLUSIONS:** Even today, 28% HCWs in India are unvaccinated and 17% are unaware of their vaccination status. This data suggests that use of hepatitis B immune globulin be mandatory in needle-pricked HCWs in India, and that implementation of awareness strategies is urgent. Since the anti-HBs titers decline in a fair proportion, there is justification for giving a booster dose of vaccine 10 years after primary vaccination to HCWs in India.

Stroffolini, T., R. Coppola, C. Carvelli, T. D'Angelo, S. De Masi, C. Maffei, F. Marzolini, P. Ragni, R. Cotichini, C. Zotti, et al. **"Increasing hepatitis B vaccination coverage among healthcare workers in Italy 10 years apart." Dig Liver Dis 2008 40(4): 275-277.**

BACKGROUND: In Italy, vaccination against hepatitis B virus infection was strongly recommended for healthcare workers since 1985. Update findings on vaccination coverage are lacking. **AIM:** To assess current vaccination coverage against hepatitis B in this job category. **METHODS:** In 2006, 1,632 healthcare workers randomly selected in 15 Italian public hospitals completed a self-administered precoded questionnaire. **RESULTS:** The overall vaccination coverage was 85.3%, a figure higher than the 64.5% observed in 1996. Vaccine coverage showed a significant downtrend ($p < 0.01$) from the Northern (93.1%) to the Southern (77.7%) areas. Logistic regression analysis showed that residence in the North (Odds ratio 4.2; 95% confidence interval 2.6-6.7) and youngest age (Odds ratio 4.5; 95% confidence interval 2.6-7.8), both were independent predictors of vaccine acceptance. **CONCLUSIONS:** Ten years apart, vaccine coverage has markedly increased, closely paralleling the downtrend in the incidence of acute B hepatitis among healthcare workers in Italy.

Djeriri, K., H. Laurichesse, J. L. Merle, R. Charof, A. Abouyoub, L. Fontana, N. Benchemsi, E. Elharti, R. El Aouad, A. Chamoux, et al. **"Hepatitis B in Moroccan health care workers." Occup Med (Lond) 2008 58(6): 419-424.**

AIM: To evaluate knowledge and perception of hepatitis B, including prevention, among Moroccan health care workers (HCWs) and to estimate seroprevalence of hepatitis B and vaccine coverage (VC). **METHODS:** Four hundred and twenty HCWs were randomly selected and stratified by site: 120 in Rabat, 140 in Taza and 160 in Temara-Skhirat. The study included an anonymous questionnaire about knowledge of hepatitis B and its prevention and a serological survey. Oral

statements and vaccine registers were used to analyse the VC of the HCWs. Serological testing and VC were analysed according to the occupational exposure. RESULTS: Participation rates in the questionnaire and serological tests were 68% (285/420) and 66% (276/420), respectively. Fifteen (5%) HCWs had a history of hepatitis B. All HCWs considered that hepatitis B virus (HBV) infection may be acquired through blood exposure. Vaccination was acknowledged as a necessary means against HBV transmission by 276 (98%) HCWs. Forty-two per cent HCWs had no HBV serological markers. The prevalence of hepatitis B surface antigen was 1%. The mean prevalence of hepatitis B core antibody (anti-HBc) was 28% and was significantly higher ($P < 0.05$) among nursing auxiliaries (57%), nurses (30%), medical physicians (31%) and midwives (25%) than among laboratory technicians (13%). According to the vaccination registers (available in two sites), VC ($> \text{ or } = 3$ doses) was 55%. VC was 75% among midwives, 61% among nurses, 53% among nursing auxiliaries and 38% among medical staff. Of the fully vaccinated HCWs without anti-HBc, 51% had serological evidence of protection. CONCLUSION: HBV vaccines should be more readily available for Moroccan HCWs by reinforcing current vaccination programmes.

Duclos, A., D. Bouhour, C. Baptiste, O. Launay and N. Guiso. "**Assessment of individual vaccine status in a vaccinology experts' group.**" *J Eval Clin Pract* 2008 14(4): 610-614.

RATIONALE: Worldwide, experts in vaccinology have promoted the broad annual coverage of health care workers with the influenza vaccine. Furthermore, pertussis vaccination is now recommended for young adults and health care workers working with newborns. AIM: To analyse the compliance with these guidelines among experts responsible for the development or dissemination of national immunization schedules. METHOD: A cross-sectional survey was conducted in a vaccinology workshop group of French experts, using a self-administered questionnaire. RESULTS: Among 44 experts, the average rate of influenza vaccination was 69.5% (95% confidence interval, 61.6% to 77.3%) between the 2003/04 and 2005/06 flu seasons, whereas the rate of pertussis vaccination during this period was only 30%. The main reasons that the experts gave for not being vaccinated were a lack of time or simply not remembering to do so. CONCLUSION: Experts had low coverage rates for influenza and pertussis vaccination. To improve these rates, a multifaceted intervention combining audit and feedback strategy with a vaccine day is planned.

Madani, T. A. and T. M. Ghabrah. "**Meningococcal, influenza virus, and hepatitis B virus vaccination coverage level among health care workers in Hajj.**" *BMC Infect Dis* 2007 7: 80.

BACKGROUND: The objective of this study was to assess the compliance of health care workers (HCWs) employed in Hajj in receiving the meningococcal, influenza, and hepatitis B vaccines. METHODS: A cross-sectional survey of doctors and nurses working in all Mena and Arafat hospitals and primary health care centers who attended Hajj-medicine training programs immediately before the beginning of Hajj of the lunar Islamic year 1423 (2003) using self-administered structured questionnaire which included demographic data and data on vaccination history. RESULTS: A total of 392 HCWs were studied including 215 (54.8%) nurses and 177 (45.2%) doctors. One hundred and sixty four (41.8%) HCWs were from Makkah and the rest were recruited from other regions in Saudi Arabia. Three hundred and twenty three (82.4%) HCWs received the quadrivalent (ACYW135) meningococcal meningitis vaccine with 271 (83.9%) HCWs receiving it at least 2 weeks before coming to Hajj, whereas the remaining 52 (16.1%) HCWs received it within < 2 weeks. Only 23 (5.9%) HCWs received the current year's influenza virus vaccine. Two hundred and sixty (66.3%) of HCWs received the three-dose hepatitis

B vaccine series, 19.3% received one or two doses, and 14.3% did not receive any dose. There was no statistically significant difference in compliance with the three vaccines between doctors and nurses. **CONCLUSION:** The meningococcal and hepatitis B vaccination coverage level among HCWs in Hajj was suboptimal and the influenza vaccination level was notably low. Strategies to improve vaccination coverage among HCWs should be adopted by all health care facilities in Saudi Arabia.

Students

Mir, O., J. Adam, R. Gaillard, T. Gregory, N. Veyrie, Y. Yordanov, P. Berveiller, B. Chousterman and P. Loulergue. "**Vaccination coverage among medical residents in Paris, France.**" Clin Microbiol Infect **2012** 18(5): E137-139.

Medical residents are particularly exposed to the risk of occupational infection. We aimed to determine the vaccination coverage in residents with an anonymous self-reporting electronic questionnaire. A total of 250 residents took part in this survey. Vaccination rates were particularly high for mandatory vaccinations (diphtheria, tetanus, poliomyelitis, hepatitis B virus and tuberculosis). Regarding recommended vaccinations (influenza, 45.6%; pertussis, 65.2%; measles, 62.8%; varicella, 62.8%), rates were insufficient to prevent hospital epidemics, but higher than those reported in other healthcare workers. Further immunization programmes should target residents, and not only senior healthcare workers, with a critical role for occupational medicine departments

Gir, E., J. C. Netto, S. E. Malaguti, S. R. Canini, M. Hayashida and A. A. Machado. "**Accidents with biological material and immunization against hepatitis B among students from the health area.**" Rev Lat Am Enfermagem **2008** 16(3): 401-406.

Undergraduate students from the health area often handle piercing-cutting instruments in their academic activities, which exposes them to the risk of contracting infections. This study aimed to analyze accidents with biological material among these students. Out of 170 accidents registered, 83 (48.8%) occurred with Dentistry students, 69 (40.6%) with Medical students, 11 (6.5%) with Nursing students and in 06 (3.5%) of the cases there was no such information in the files. Most accidents, 106 (62.4%), occurred with students from private schools and 55 (32.3%) with those from public schools. Percutaneous accidents occurred in 133 (78.2%) exposures and there was immediate search for specialized health care in only 38 (21.3%) accidents. In 127 (74.7%) accidents, the immunization schedule against hepatitis B was complete. Therefore, schools need to offer courses and specific class subjects regarding biosafety measures, including aspects related to immunization, especially the vaccine against hepatitis B.

Talas, M. S. "**Occupational exposure to blood and body fluids among Turkish nursing students during clinical practice training: frequency of needlestick/sharp injuries and hepatitis B immunisation.**" J Clin Nurs **2009** 18(10): 1394-1403.

AIM AND OBJECTIVE: To describe the rate of needlestick/sharp injuries in nursing students, to estimate the rate of vaccination administration and to define nursing students' status using universal precautions for protecting from blood-borne infections. **BACKGROUND:** Nursing students have a high risk of occupational exposure to bloodborne pathogens because they may have insufficient background knowledge to recognise the level of risk posed by a particular patient and their inexperience with procedural skills and infection control procedures. **DESIGN:** This study was designed as a retrospective and descriptive survey. **METHODS:** The frequency and mechanism of needlestick/sharp injuries and hepatitis B immunisation were determined retrospectively by surveying students in three nursing schools. In November 2004, 473 students were questioned about

needlestick/sharp injuries that they had sustained during their clinical practice and hepatitis B immunisations. RESULTS: Forty-nine per cent of the students who responded sustained injuries; of these 74% were injured while on wards. The highest number (72.2%) had been injured by hollow-bore needles; 65.2% who were injured were not wearing gloves at the time of injury; 27% of injuries were associated with recapping the needle; 43.9% reported their injuries to administrators and the rate of those receiving medical assistance after needlestick/sharp injuries was less than not seeking assistance; 67.7% had been vaccinated against hepatitis B. CONCLUSION: This study showed that nursing students frequently sustain needlestick/sharp injuries and hepatitis B immunisation rate was low. RELEVANCE TO CLINICAL PRACTICE: Findings will help in designing more intensive education programs directed at the students to increase their awareness of and compliance with Universal Precautions and in instituting policies so that they are fully immunised against hepatitis B before beginning clinical practice.

Srichomkwun, P., A. Apisarnthanarak, K. Thongphubeth, C. Yuekyen and L. M. Mundy. **"Evidence of vaccine protection among thai medical students and implications for occupational health."** Infect Control Hosp Epidemiol **2009** 30(6): 585-588.

In a cross-sectional study of Thai medical students, we compared the seroprevalence of antibody to measles virus, rubella virus, varicella zoster virus, hepatitis A virus, and hepatitis B virus with self-reports of prior infection or vaccination. Self-report predicted immunity to varicella zoster virus only. These data contribute to risk assessment and occupational health strategies in this resource-limited setting.

Overview vaccination coverage in Healthcare workers or students

Reference	country	subjects	Hep B	influenza	DTP	BCG	Measles	Varicella	Pertusis	other
[2012 Mir, Adam]	France	250 students (residents)	100% (m)	45.6%	96.8%(m)	98.4%(m)	62.8%	62.9%	65.2%	
[2012 Guthmann, Fonteneau]	France	1127 HCW 35 settings	91.7% (m)	25.6%	95,5% (m) booster dose (10 year booster dose 11.4%)	94,9% (m)	49.7% At least one dose	29.9%		
[2011 Silveira, Perez]	Brazil	64 residents	37.5%	3.1%			62.5%(+ rubella)			
[2011 Elduma and Saeed]	Sudan	245 HCW	4.5%							
[2011 Burnett, Francois]	South Africa	472 HCW	19.9% fully vaccinated 67.9% one dose							
[2011 Wicker, Rabenau]	Germany (Frankfurt)	324 students					62.3%			
[2010 Oliveira and Pontes]	Brazil	303 students	86.8%							
[2009 Hees, Afroukh]	France (Lyon)	84 HCW		42.8%			33.3%	0%	33.3%	
[2009 Tafuri, Martinelli]	Italy (Puglia)	302 HCW	54.5%	32.7%			5.9% (MMR)	2.6%		
[2008 Sukriti, Pati]	India	2162 HCW	55.4%							
[2008 Stroffolini, Coppola]	Italy	1632 HCW	85.3%							
[2008 Djeriri, Laurichesse]	Marocco	276 HCW	55% (75% midwives,							

			61% among nurses, 38% medical staff)							
[2007 Madani and Ghabrah]	Saudi Arabia	392 HCW	66.3% 3doses 19.3% 1 or 2 doses	5.9%						82.4% meningococcal meningitis
[2007 Bruno, Borella-Venturini]	Italy	2137 Students	82.3%							
[2007 Wicker, Rabenau]	Germany	223 students	Immunity rates 69.5% (>10mIU/ml anti-HBs)				Immunity rates 91.5% Measles 80.3% Mumps 90.1% rubella	Immunity rates 96.9%		

Abbreviations: ; HepB = doses of hepatitis B vaccine; BCG = bacille Calmette-Guérin; DTP = diphtheria-tetanus-pertussis vaccine; MMR= Measles, Mumps, Rubella. (m)= manda

References

- [1] Mir O, Adam J, Gaillard R, Gregory T, Veyrie N, Yordanov Y, et al. Vaccination coverage among medical residents in Paris, France. Clin Microbiol Infect 2012 May;18(5):E137-9.
- [2] Guthmann JP, Fonteneau L, Ciotti C, Bouvet E, Pellissier G, Levy-Bruhl D, et al. Vaccination coverage of health care personnel working in health care facilities in France: Results of a national survey, 2009. Vaccine 2012 Jun 29;30(31):4648-54.
- [3] Silveira MB, Perez DA, Yamaguti A, Saraiva EZ, Borges MG, de Moraes-Pinto MI. Immunization status of residents in pediatrics at the Federal University of Sao Paulo, Brazil. Rev Inst Med Trop Sao Paulo 2011 Mar-Apr;53(2):73-6.
- [4] Elduma AH, Saeed NS. Hepatitis B virus infection among staff in three hospitals in Khartoum, Sudan, 2006-07. East Mediterr Health J 2011 Jun;17(6):474-8.

- [5] Burnett RJ, Francois G, Mphahlele MJ, Mureithi JG, Africa PN, Satekge MM, et al. Hepatitis B vaccination coverage in healthcare workers in Gauteng Province, South Africa. *Vaccine* 2011 Jun 6;29(25):4293-7.
- [6] Wicker S, Rabenau HF, Pfeilschifter JM, Gottschalk R. [Measles in 2010. Knowledge and vaccination status of medical students]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2011 Feb;54(2):238-42.
- [7] Oliveira LC, Pontes JP. Frequency of hepatitis B immunity and occupational exposures to body fluids among Brazilian medical students at a public university. *Rev Inst Med Trop Sao Paulo* 2010 Sep-Oct;52(5):247-52.
- [8] Hees L, Afroukh N, Floret D. [Vaccination coverage among health care workers in the pediatric emergency and intensive care department of Edouard Herriot hospital in 2007, against influenza, pertussis, varicella, and measles]. *Arch Pediatr* 2009 Jan;16(1):14-22.
- [9] Tafuri S, Martinelli D, Caputi G, Arbore A, Lopalco PL, Germinario C, et al. An audit of vaccination coverage among vaccination service workers in Puglia, Italy. *Am J Infect Control* 2009 Jun;37(5):414-6.
- [10] Sukriti, Pati NT, Sethi A, Agrawal K, Kumar GT, Kumar M, et al. Low levels of awareness, vaccine coverage, and the need for boosters among health care workers in tertiary care hospitals in India. *J Gastroenterol Hepatol* 2008 Nov;23(11):1710-5.
- [11] Stroffolini T, Coppola R, Carvelli C, D'Angelo T, De Masi S, Maffei C, et al. Increasing hepatitis B vaccination coverage among healthcare workers in Italy 10 years apart. *Dig Liver Dis* 2008 Apr;40(4):275-7.
- [12] Djeriri K, Laurichesse H, Merle JL, Charof R, Abouyoub A, Fontana L, et al. Hepatitis B in Moroccan health care workers. *Occup Med (Lond)* 2008 Sep;58(6):419-24.
- [13] Madani TA, Ghabrah TM. Meningococcal, influenza virus, and hepatitis B virus vaccination coverage level among health care workers in Hajj. *BMC Infect Dis* 2007;7:80.
- [14] Bruno A, Borella-Venturini M, Giraldo M, Mongillo M, Zanetti E, Beggio M, et al. [Prevalence of virus hepatitis B markers among medical students]. *G Ital Med Lav Ergon* 2007 Jul-Sep;29(3 Suppl):752-4.
- [15] Wicker S, Rabenau HF, Gottschalk R, Doerr HW, Allwinn R. Seroprevalence of vaccine preventable and blood transmissible viral infections (measles, mumps, rubella, polio, HBV, HCV and HIV) in medical students. *Med Microbiol Immunol* 2007 Sep;196(3):145-50.

Session 3: Vaccination policies and recommendations in healthcare workers and medical students on national and global level

Overview of current vaccination policies and recommendations in healthcare workers

PAHO

Proceedings of the 2007 State-of-the-Art Conference Pre-conference Workshop: Protecting the Health of Health Care Workers: A Global Perspective. 25 October 2007 Vancouver, British Columbia, Canada, Rebman, R., (Ed.). Rodríguez Guzmán, J.; Dybka, L.; Watson, R.; Lavoie, M.; Yassi, A.; Gamage, B.; Pugh, S.; Lehtinen, S.; Tennassee, M.; Nophale, L.E. (2008)

http://www.picnetbc.ca/sites/picnetbc2/files/PICNet_Publications/ICOH_Occupational_Health_Care_for_Health_Care_Workers_Feb_2009_FINAL_PUBLISHED.pdf.

CDC Healthcare vaccination recommendation:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00050577.htm>

Healthcare Personnel Vaccination Recommendations¹

Vaccine	Recommendations in brief
Hepatitis B	Give 3-dose series (dose #1 now, #2 in 1 month, #3 approximately 5 months after #2). Give IM. Obtain anti-HBs serologic testing 1–2 months after dose #3.
Influenza	Give 1 dose of influenza vaccine annually. Give inactivated injectable influenza vaccine intramuscularly or live attenuated influenza vaccine (LAIV) intranasally.
MMR	For healthcare personnel (HCP) born in 1957 or later without serologic evidence of immunity or prior vaccination, give 2 doses of MMR, 4 weeks apart. For HCP born prior to 1957, see below. Give SC.
Varicella (chickenpox)	For HCP who have no serologic proof of immunity, prior vaccination, or history of varicella disease, give 2 doses of varicella vaccine, 4 weeks apart. Give SC.
Tetanus, diphtheria, pertussis	Give a one-time dose of Tdap as soon as feasible to all HCP who have not received Tdap previously. Give Td boosters every 10 years thereafter. Give IM.
Meningococcal	Give 1 dose to microbiologists who are routinely exposed to isolates of <i>N. meningitidis</i> . Give IM or SC.

Hepatitis A, typhoid, and polio vaccines are not routinely recommended for HCP who may have on-the-job exposure to fecal material.

Hepatitis B

Healthcare personnel (HCP) who perform tasks that may involve exposure to blood or body fluids should receive a 3-dose series of hepatitis B vaccine at 0-, 1-, and 6-month intervals. Test for hepatitis B surface antibody (anti-HBs) to document immunity 1–2 months after dose #3.

- If anti-HBs is at least 10 mIU/mL (positive), the patient is immune. No further serologic testing or vaccination is recommended.
- If anti-HBs is less than 10 mIU/mL (negative), the patient is unprotected from hepatitis B virus (HBV) infection; revaccinate with a 3-dose series. Retest anti-HBs 1–2 months after dose #3.
 - If anti-HBs is positive, the patient is immune. No further testing or vaccination is recommended.
 - If anti-HBs is negative after 6 doses of vaccine, patient is a non-responder.

For non-responders: HCP who are non-responders should be considered susceptible to HBV and should be counseled regarding precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or probable parenteral exposure to hepatitis B surface antigen (HBsAg)-positive blood.¹ It is also possible that non-responders are persons who are HBsAg positive. Testing should be considered. HCP found to be HBsAg positive should be counseled and medically evaluated.

Note: Anti-HBs testing is not recommended routinely for previously vaccinated HCP who were not tested 1–2 months after their original vaccine series. These HCP should be tested for anti-HBs when they have an exposure to blood or body fluids. If found to be anti-HBs negative, the HCP should be treated as if susceptible.²

Influenza

All HCP, including physicians, nurses, paramedics, emergency medical technicians, employees of nursing homes and chronic care facilities, students in these professions, and volunteers, should receive annual vaccination against influenza. Live attenuated influenza vaccine (LAIV) may only be given to non-pregnant healthy HCP age 49 years and younger. Inactivated injectable influenza vaccine (TIV) is preferred over LAIV for HCP who are in close contact with severely immunosuppressed persons (e.g., stem cell transplant patients) when patients require protective isolation.

Measles, Mumps, Rubella (MMR)

HCP who work in medical facilities should be immune to measles, mumps, and rubella.

- HCP born in 1957 or later can be considered immune to measles, mumps, or rubella only if they have documentation of (a) laboratory confirmation of disease or immunity or (b) appropriate vaccination against measles, mumps, and rubella (i.e., 2 doses of live measles and mumps vaccines given on or after the first birthday and separated by 28 days or more, and at least 1 dose

of live rubella vaccine). HCP with 2 documented doses of MMR are not recommended to be serologically tested for immunity; but if they are tested and results are negative or equivocal for measles, mumps, and/or rubella, these HCP should be considered to have presumptive evidence of immunity to measles, mumps, and/or rubella and are not in need of additional MMR doses.

- Although birth before 1957 generally is considered acceptable evidence of measles, mumps, and rubella immunity, healthcare facilities should consider recommending 2 doses of MMR vaccine routinely to unvaccinated HCP born before 1957 who do not have laboratory evidence of disease or immunity to measles and/or mumps, and should consider one dose of MMR for HCP with no laboratory evidence of disease or immunity to rubella. For these same HCP who do not have evidence of immunity, healthcare facilities should recommend 2 doses of MMR vaccine during an outbreak of measles or mumps and 1 dose during an outbreak of rubella.

Varicella

It is recommended that all HCP be immune to varicella. Evidence of immunity in HCP includes documentation of 2 doses of varicella vaccine given at least 28 days apart, history of varicella or herpes zoster based on physician diagnosis, laboratory evidence of immunity, or laboratory confirmation of disease.

Tetanus/Diphtheria/Pertussis (Td/Tdap)

All HCPs who have not or are unsure if they have previously received a dose of Tdap should receive a one-time dose of Tdap as soon as feasible, without regard to the interval since the previous dose of Td. Then, they should receive Td boosters every 10 years thereafter.

Meningococcal

Vaccination is recommended for microbiologists who are routinely exposed to isolates of *N. meningitidis*. Use of MCV4 is preferred for persons age 55 years or younger; give IM. Use MPSV4 only if there is a permanent contraindication or precaution to MCV4. Use of MPSV4 (not MCV4) is recommended for HCP older than age 55; give SC.

References

1. CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 2011; 60(RR-7).
2. See Table 3 in "Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis," *MMWR*, 2001; 50(RR-11).

For additional specific ACIP recommendations, refer to the official ACIP statements published in *MMWR*. To obtain copies, visit CDC's website at www.cdc.gov/vaccines/pubs/ACIP-list.htm; or visit the Immunization Action Coalition (IAC) website at www.immunize.org/acip.

Adapted from the Michigan Department of Community Health

www.immunize.org/catg.d/p2017.pdf • Item #P2017 (7/12)

Technical content reviewed by the Centers for Disease Control and Prevention.

Presentation Pierre Loulergue : Survey of vaccination policies in French healthcare institutions.

Bouhour, D., G. Gavazzi, J. Gaillat, V. Gajdos, **P. Loulergue**, M. Paccalin, M. C. Ploy, L. de Pontual, C. Pulcini, O. Rogeaux, et al. "**Survey of vaccination policies in French healthcare institutions.**" Med Mal Infect **2012** 42(4): 161-166.

OBJECTIVE: The survey was implemented to describe vaccination policies for healthcare professionals in French healthcare institutions. METHODS: A cross-sectional survey based on questionnaires was sent to occupational physicians and chairpersons of hospital infection prevention and control committees (HIPC) of 38 institutions between November 2010 and January 2011. RESULTS: Twenty-nine occupational physicians and 26 hospital infection prevention and control committees chairpersons (HIPC), from 30 institutions answered (response rate: 79%), 70% of the institutions were university hospitals. Overall, 76% of occupational physicians and 85% of HIPC chairpersons reported that information and awareness campaigns about vaccination recommendations for healthcare professionals were usually conducted in their establishment. Fifty-nine percent of occupational physicians and 31% of HIPC chairpersons reported that they were aware of the vaccine coverage rates of professionals in their institution. The occupational physicians reported that they suggested diphtheria, tetanus, polio, influenza, and acellular pertussis vaccination to all staff at their annual visit in 100%, 97%, and 62% of cases, respectively. Varicella and measles vaccinations were never suggested in 31% and 17% of cases, respectively. Among respondents, 55% of physicians reported that they had already managed a pertussis epidemic, and 42% a measles epidemic, and in both of these cases an awareness campaigns were usually conducted (93% and 96%). CONCLUSIONS: The vaccine coverage rates of healthcare professionals in French healthcare institutions remain insufficiently documented and could be improved.

Presentation David Weber Immunization for vaccine-preventable diseases: why aren't we protecting our students in US?

Weber, D. J., W. A. Rutala and W. Schaffner. "**Immunization for vaccine-preventable diseases: why aren't we protecting our students?**" Infect Control Hosp Epidemiol **2011** 32(9): 912-914.

Extra recent publications on session 3 : Pubmed MEDLINE search on {(Healthcare workers OR HCW) AND (vaccine* OR Immuni*)} in all fields and published from 2007 on, was performed End-note search (policies OR policy OR recommendations). Only the relevant references are listed

Blank, P., M. Schwenkglens and T. D. Szucs. "**The impact of European vaccination policies on seasonal influenza vaccination coverage rates in the elderly.**" Hum Vaccin Immunother **2012** 8(3).

Despite strong recommendations, seasonal influenza vaccination coverage rates (VCRs) remain limited in Europe, even in high-priority groups. There is a need for understanding the impact of vaccination-related policy elements and barriers toward vaccination. We aimed at assessing essential elements of vaccination policies and the influence of policy-related driving factors on VCRs among elderly. Sixteen European National Vaccine Industry Groups (NVIGs) were included in a survey to make an inventory of vaccination policies implemented at national level

(2009). The questionnaire was structured around four topics: management of vaccination programs; influence of health care workers (HCWs); role of information/ communication campaigns; and access to vaccine. The information retrieved was put in relation to current VCRs among the elderly (≥ 65 y). Correlation coefficients between policy elements and vaccination rates were calculated. Several policy elements may be suitable to increase influenza vaccination uptake in the elderly, but only few countries make use of all alternatives. Countries with good monitoring systems regarding vaccine uptake rates (Spearman's $\rho = 0.639$, $p = 0.010$) or sending personal letters offering free vaccination ($\rho = 0.728$, $p = 0.002$) showed on average higher coverage among the elderly than countries with less developed vaccine management systems. The presence of additional policy elements (setting national objectives, HCW incentives, vaccination reimbursement systems, awareness campaigns and clear VCR objectives) led to numerically increased VCRs. The presence of several elements of vaccination policies at national level, including broad information and reminding systems, strong official recommendations and good access to the vaccine may help to achieve improved influenza vaccine coverage rates among elderly.

Spokes, P. J., M. J. Ferson and K. A. Ressler. "**Staff immunisation: policy and practice in child care.**" *J Paediatr Child Health* 2011 47(8): 530-534.

AIM: The aims of this study were to determine the level of knowledge among child-care centre directors regarding the National Health and Medical Research Council (NHMRC) recommendations for the immunisation of child-care workers, the extent to which this knowledge was translated into practice and any organisational barriers to the development and implementation of staff immunisation policy. METHODS: A cross-sectional survey, conducted in August 2006, in which a postal questionnaire was sent to a random sample of 784 NSW child-care centres. Centre directors were asked to complete the questionnaire on immunisation knowledge, policy and practice for the centre. A multivariate logistic-regression model was used to identify factors independently associated with centres with an immunisation policy for staff and centres that offered to pay all or part of the cost of vaccination of staff. RESULTS: Directors from 437 centres participated in the study for a response rate of 56%. Of these, 49% were aware of the NHMRC recommendations, and 57% had a staff immunisation policy in place. In the logistic regression model, centres with a written immunisation policy for staff were more likely to be aware of the NHMRC guidelines and offer long day care services. Centres that offered to pay all or part of the cost of immunisation for staff were more likely to be aware of the NHMRC guidelines, offer other child-care services and not operate for profit. Barriers to staff immunisation were related to the implementation of policy and included cost, time and access to information. CONCLUSIONS: The level of awareness of specific staff immunisation recommendations was relatively low. The transition of knowledge to policy was encouraging, although implementation of policies requires further commitment.

Miller, B. L., M. C. Lindley, F. Ahmed and P. M. Wortley. "**Student immunity requirements of health professional schools: vaccination and other means of fulfillment-United States, 2008.**" *Infect Control Hosp Epidemiol* 2011 32(9): 908-911.

US health professional schools with student immunity requirements for recommended vaccines frequently accept evidence of immunity other than vaccination but vary widely on the types of evidence that are accepted. Exemptions for nonmedical reasons and, to a lesser extent, medical reasons are often obtainable by a student-written document.

Miller, B. L., F. Ahmed, M. C. Lindley and P. M. Wortley. **"Increases in vaccination coverage of healthcare personnel following institutional requirements for influenza vaccination: a national survey of U.S. hospitals."** *Vaccine* 2011 29(50): 9398-9403.

BACKGROUND: Institutional requirements for influenza vaccination, ranging from policies that mandate declinations to those terminating unvaccinated healthcare personnel (HCP), are increasingly common in the U.S. Our objective was to determine HCP vaccine uptake following requirements for influenza vaccination at U.S. hospitals. METHODS: Survey mailed in 2011 to a nationally representative sample of 998 acute care hospitals. An institutional requirement was defined as an institutional policy that requires receipt or declination of influenza vaccination, with or without consequences for vaccine refusal. Respondents reported institutional-level, seasonal influenza vaccination coverage, if known, during two consecutive influenza seasons: the season prior to (i.e., pre-requirement), and the first season of requirement (i.e., post-requirement). Weighted univariate and multivariate analyses accounted for sampling design and non-response. RESULTS: 808 (81.0%) hospitals responded. Of hospitals with institutional requirements for influenza vaccination (n=440), 228 hospitals met analytic inclusion criteria. Overall, mean reported institutional-level influenza vaccination coverage among HCP rose from 62.0% in the pre-requirement season to 76.6% in the post-requirement season, representing a single-season increase of 14.7 (95% CI: 12.6-16.7) percentage points. After adjusting for potential confounders, single-season increases in influenza vaccination uptake remained greater among hospitals that imposed consequences for vaccine refusal, and among hospitals with lower pre-requirement vaccination coverage. Institutional characteristics were not associated with vaccination increases of differential magnitude. CONCLUSION: Hospitals that are unable to improve suboptimal influenza vaccination coverage through multifaceted, voluntary vaccination campaigns may consider institutional requirements for influenza vaccination. Rapid and measurable increases in vaccination coverage followed institutional requirements at hospitals of varying demographic characteristics.

Miller, B. L., F. Ahmed, M. C. Lindley and P. M. Wortley. **"Institutional requirements for influenza vaccination of healthcare personnel: results from a nationally representative survey of acute care hospitals--United States, 2011."** *Clin Infect Dis* 2011 53(11): 1051-1059.

BACKGROUND: Many health professional organizations now endorse influenza vaccination as a condition of employment in healthcare settings. Our objective was to describe institutional requirements for influenza vaccination of healthcare personnel (HCP) among US hospitals during the 2010-2011 influenza season. METHODS: A survey was mailed in 2011 to a nationally representative sample of 998 acute care hospitals. An institutional requirement was defined as "a policy that requires HCP to receive or decline influenza vaccination, with or without consequences for vaccine refusal." A weighted analysis included univariate analyses and logistic regression. RESULTS: Of responding hospitals (n = 808; 81.0%), 440 (55.6%) reported institutional requirements for influenza vaccination. Although employees were uniformly subject to requirements, nonemployees often were not. The proportion of requirements with consequences for vaccine refusal was 44.4% (n = 194); where consequences were imposed, nonmedical exemptions were often granted (69.3%). Wearing a mask was the most common consequence (74.2% of 194 requirements); by contrast, 29 hospitals (14.4%) terminated unvaccinated HCP. After adjustment for demographic factors, the following characteristics remained significantly associated with requirements: location in a state requiring HCP to receive or decline influenza vaccine, caring for inpatients that are potentially vulnerable to influenza, use of ≥ 9 Advisory Committee on Immunization Practices-recommended, evidence-based influenza

vaccination campaign strategies, and for-profit ownership. **CONCLUSIONS:** Influenza vaccination requirements were prevalent among hospitals of varying size and location. However, few policies were as stringent or as comprehensive as those endorsed by health professional organizations. Because influenza vaccination requirements are a viable alternative for hospitals unable to achieve high coverage through voluntary policies, there is still substantial room for improvement.

Miller, B. L., F. Ahmed, M. C. Lindley and P. M. Wortley. **"US hospital requirements for pertussis vaccination of healthcare personnel, 2011."** Infect Control Hosp Epidemiol **2011** 32(12): 1209-1212.

In 2011, institutional requirements for pertussis vaccination of healthcare personnel were reported by nearly one-third of surveyed US hospitals. Requirements often applied to personnel with certain clinical responsibilities, such as those caring for infants. Healthcare personnel who were not on an institution's payroll were rarely subject to pertussis vaccination requirements.

Miller, B. L., F. Ahmed, M. C. Lindley and P. M. Wortley. **"Institutional requirements for influenza vaccination of healthcare personnel: results from a nationally representative survey of acute care hospitals--United States, 2011."** Clin Infect Dis **2011** 53(11): 1051-1059.

BACKGROUND: Many health professional organizations now endorse influenza vaccination as a condition of employment in healthcare settings. Our objective was to describe institutional requirements for influenza vaccination of healthcare personnel (HCP) among US hospitals during the 2010-2011 influenza season. **METHODS:** A survey was mailed in 2011 to a nationally representative sample of 998 acute care hospitals. An institutional requirement was defined as "a policy that requires HCP to receive or decline influenza vaccination, with or without consequences for vaccine refusal." A weighted analysis included univariate analyses and logistic regression. **RESULTS:** Of responding hospitals (n = 808; 81.0%), 440 (55.6%) reported institutional requirements for influenza vaccination. Although employees were uniformly subject to requirements, nonemployees often were not. The proportion of requirements with consequences for vaccine refusal was 44.4% (n = 194); where consequences were imposed, nonmedical exemptions were often granted (69.3%). Wearing a mask was the most common consequence (74.2% of 194 requirements); by contrast, 29 hospitals (14.4%) terminated unvaccinated HCP. After adjustment for demographic factors, the following characteristics remained significantly associated with requirements: location in a state requiring HCP to receive or decline influenza vaccine, caring for inpatients that are potentially vulnerable to influenza, use of ≥ 9 Advisory Committee on Immunization Practices-recommended, evidence-based influenza vaccination campaign strategies, and for-profit ownership. **CONCLUSIONS:** Influenza vaccination requirements were prevalent among hospitals of varying size and location. However, few policies were as stringent or as comprehensive as those endorsed by health professional organizations. Because influenza vaccination requirements are a viable alternative for hospitals unable to achieve high coverage through voluntary policies, there is still substantial room for improvement.

Maltezou, H. C., S. Wicker, M. Borg, U. Heininger, V. Puro, M. Theodoridou and G. A. Poland. **"Vaccination policies for health-care workers in acute health-care facilities in Europe."** Vaccine **2011** 29(51): 9557-9562.

The aim of this study was to evaluate existing policies regarding recommended and mandatory occupational vaccinations for health-care workers (HCWs) in Europe. A standardized questionnaire was sent to experts in Infection Control or

Occupational Health in all 27 European Union Member States, as well as Norway, Russia, and Switzerland. All 30 countries have established policies about HCW vaccination against vaccine-preventable diseases. However significant gaps and considerable country-to-country variation were found, in terms of number of recommended vaccines and target subgroups of HCWs and health-care settings. Vaccination against hepatitis B and annual vaccination against seasonal influenza are almost universally recommended for HCWs in Europe (29 countries each, including eight countries where vaccination against hepatitis B is mandatory or required for employment). Policies regarding HCW vaccination also exist against mumps (12 countries), measles or rubella (15 countries), varicella (17 countries), diphtheria-tetanus (14 countries), pertussis (9 countries), poliomyelitis (11 countries), hepatitis A (11 countries), tuberculosis (BCG vaccine) (9 countries), and against meningococcus group C or meningococci groups A, C, W135, Y (tetraivalent vaccine) (in 4 countries each). Re-evaluation of occupational vaccine policies for HCWs in Europe on a consensus basis is imperative in order to promote HCW and patient safety.

Lindley, M. C., S. A. Lorick, J. R. Spinner, A. R. Krull, G. T. Mootrey, F. Ahmed, R. Myers, G. P. Bednash, T. C. Cymet, R. Maeshiro, et al. "**Student vaccination requirements of U.S. health professional schools: a survey.**" *Ann Intern Med* 2011 154(6): 391-400.

BACKGROUND: Unvaccinated health care personnel are at increased risk for transmitting vaccine-preventable diseases to their patients. The Advisory Committee on Immunization Practices (ACIP) recommends that health care personnel, including students, receive measles, mumps, rubella, hepatitis B, varicella, influenza, and pertussis vaccines. Prematriculation vaccination requirements of health professional schools represent an early opportunity to ensure that health care personnel receive recommended vaccines. **OBJECTIVE:** To examine prematriculation vaccination requirements and related policies at selected health professional schools in the United States and compare requirements with current ACIP recommendations. **DESIGN:** Cross-sectional study using an Internet-based survey. **SETTING:** Medical and baccalaureate nursing schools in the United States and its territories. **PARTICIPANTS:** Deans of accredited medical schools granting MD (n = 130) and DO (n = 26) degrees and of baccalaureate nursing programs (n = 603). **MEASUREMENTS:** Proportion of MD-granting and DO-granting schools and baccalaureate nursing programs that require that entering students receive vaccines recommended by the ACIP for health care personnel. **RESULTS:** 563 schools (75%) responded. More than 90% of all school types required measles, mumps, rubella, and hepatitis B vaccines for entering students; varicella vaccination also was commonly required. Tetanus, diphtheria, and acellular pertussis vaccination was required by 66%, 70%, and 75% of nursing, MD-granting, and DO-granting schools, respectively. Nursing and DO-granting schools (31% and 45%, respectively) were less likely than MD-granting schools (78%) to offer students influenza vaccines free of charge. **LIMITATIONS:** Estimates were conservative, because schools that reported that they did not require proof of immunity for a given vaccine were considered not to require that vaccine. Estimates also were restricted to schools that train physicians and nurses. **CONCLUSION:** The majority of schools now require most ACIP-recommended vaccines for students. Medical and nursing schools should adopt policies on student vaccination and serologic testing that conform to ACIP recommendations and should encourage annual influenza vaccination by offering influenza vaccination to students at no cost. **PRIMARY FUNDING SOURCE:** None.

Garattini, L., A. Padula and G. Casadei. "**Management of vaccinations in Italy: a national survey after healthcare regionalization.**" *J Med Econ* 2011 14(5): 527-541.

OBJECTIVES: The main aim of this study was to describe the effects of regional organization and performance in managing vaccinations, in the light of the institutional devolution recently introduced in Italy. **METHODS:** We analysed (1) the general organization of regions for vaccination programmes, (2) the management of four vaccination programmes (combined measles-rubella-parotitis, varicella for children, influenza, and pneumococcal 23-valent for adults). First, we conducted preliminary face-to-face interviews with 16 regional managers of the infective disease prevention departments. Subsequently, we sent them a standardized questionnaire to obtain comparable information on general organization and on the four specific vaccination programmes considered. In all, 14 regions were eventually included. **RESULTS:** The survey showed a widespread lack of regional staff involved in the management of vaccinations and a geographical variation in the availability of computerized data collection. We recorded poor coverage for varicella and pneumococcal 23-valent vaccinations compared to MRP and influenza. Prices of the four vaccines varied widely among regions, with only a weak correlation between prices and volumes. **LIMITATIONS AND CONCLUSIONS:** The major limitation of the survey was the lack of information available at regional level. The piecemeal diffusion of computerized systems and the widespread lack of sufficient staff should mainly explain this. Economic incentives could be offered to regions that achieve national targets. Such incentives should encourage collaboration between central and regional authorities consistent with institutional trends in regional devolution.

De Schryver, A., B. Claesen, A. Meheus, M. van Sprundel and G. Francois. "**European survey of hepatitis B vaccination policies for healthcare workers.**" Eur J Public Health 2011 21(3): 338-343.

BACKGROUND: The risk of transmission of hepatitis B virus (HBV) to healthcare workers (HCWs) is well known. Under current European Union (EU) legislation, all employers should perform a risk assessment to identify those exposed to HBV and offer vaccination. Immunization should happen early after the start of their career to avoid infection and development of carrier status. **METHODS:** Cross-sectional survey of country representatives, to find out how policies are put into practice in European countries. **RESULTS:** Answers were received from 17 countries, representing 89% of the population and 90% of HCWs in the EU-25. HBV vaccination was mandatory for medical, and nursing and other paramedical staff in five countries, and recommended in all other countries. It was mandatory for medical students and student nurses in five countries and recommended in nine other. Pre-vaccination serotesting was done in six countries. The vaccination schedule most often used was 0, 1, 6 months. Combined vaccine (hepatitis A virus /HBV) was used in 10 countries. Post-vaccination serotesting was done in 14 countries. Data on HBV vaccination coverage were available in 11 countries and published in five of them. Coverage was 85-93%. **CONCLUSION:** These results show the variation as to how EU legislation is translated into practice in European countries. More consultation between key actors at EU level could help to optimize the way this matter is dealt with. A battery of measures and interventions-including introduction of immunization programmes against HBV infection and increasing immunization coverage in HCWs-can contribute to further reducing HBV transmission to HCWs.

"**ACOG Committee Opinion No. 489: Hepatitis B, hepatitis C, and human immunodeficiency virus infections in obstetrician-gynecologists.**" Obstet Gynecol 2011 117(5): 1242-1246.

In the health care setting, bloodborne pathogens such as the hepatitis B virus (HBV), hepatitis C virus, and human immunodeficiency virus (HIV) may be transmitted from infected patients to health care workers as well as from infected

health care workers to patients. To reduce the risk of transmission, all practicing obstetrician-gynecologists should receive the HBV vaccine. Obstetrician-gynecologists infected with HBV, hepatitis C virus, or HIV are advised to follow the updated Society for Healthcare Epidemiology of America's recommendations, regarding infection-control measures, supervision, and periodic testing. These recommendations provide a framework within which to consider such cases; however, each case should be independently considered in context by the expert review panel.

"Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)." MMWR Recomm Rep 2011 60(RR-7): 1-45.

This report updates the previously published summary of recommendations for vaccinating health-care personnel (HCP) in the United States (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[No. RR-18]). This report was reviewed by and includes input from the Healthcare (formerly Hospital) Infection Control Practices Advisory Committee. These updated recommendations can assist hospital administrators, infection-control practitioners, employee health clinicians, and HCP in optimizing infection prevention and control programs. The recommendations for vaccinating HCP are presented by disease in two categories: 1) those diseases for which vaccination or documentation of immunity is recommended because of risks to HCP in their work settings for acquiring disease or transmitting to patients and 2) those for which vaccination might be indicated in certain circumstances. Background information for each vaccine-preventable disease and specific recommendations for use of each vaccine are presented. Certain infection-control measures that relate to vaccination also are included in this report. In addition, ACIP recommendations for the remaining vaccines that are recommended for certain or all adults are summarized, as are considerations for catch-up and travel vaccinations and for work restrictions. This report summarizes all current ACIP recommendations for vaccination of HCP and does not contain any new recommendations or policies. The recommendations provided in this report apply, but are not limited, to HCP in acute-care hospitals; long-term-care facilities (e.g., nursing homes and skilled nursing facilities); physician's offices; rehabilitation centers; urgent care centers, and outpatient clinics as well as to persons who provide home health care and emergency medical services.

Poland, G. A. **"Mandating influenza vaccination for health care workers: putting patients and professional ethics over personal preference."** Vaccine 2010 28(36): 5757-5759.

Michelin, A. and D. K. Henderson. **"Infection control guidelines for prevention of health care-associated transmission of hepatitis B and C viruses."** Clin Liver Dis 2010 14(1): 119-136; ix-x.

Viral hepatitis was first identified as an occupational hazard for health care workers more than 60 years ago. For the past few decades, hepatitis B has been one of the most significant occupational infectious risks for health care providers. With the increasing prevalence of hepatitis C infections around the world, occupational transmission of this flavivirus from infected patients to their providers has also become a significant concern. Several factors influence the risk for occupational blood-borne hepatitis infection among health care providers, among them: the prevalence of infection among the population served, the infection status of the patients to whom workers are exposed (ie, the source patient's circulating viral burden), the types and frequencies of parenteral and mucosal exposures to blood

and blood-containing body fluids, and whether the patient or provider has been immunized with the hepatitis B vaccine. This article reviews patient-to-provider, patient-to-patient, and provider-to-patient transmission of hepatitis B and C in the health care setting. Current prevention strategies, precautions, and guidelines are discussed.

Mereckiene, J., S. Cotter, F. D'Ancona, C. Giambi, A. Nicoll, D. Levy-Bruhl, P. L. Lopalco, J. T. Weber, K. Johansen, L. Dematte, et al. "**Differences in national influenza vaccination policies across the European Union, Norway and Iceland 2008-2009.**" Euro Surveill **2010** 15(44).

In 2009 the second cross-sectional web-based survey was undertaken by the Vaccine European New Integrated Collaboration Effort (VENICE) project across 27 European Union (EU) member states (MS), Norway and Iceland (n=29) to determine changes in official national seasonal influenza vaccination policies since a survey undertaken in 2008 and to compare the estimates of vaccination coverage between countries using data obtained from both surveys. Of 27 responding countries, all recommended vaccination against seasonal influenza to the older adult population. Six countries recommended vaccination of children aged between six months and <18 years old. Most countries recommended influenza vaccination for those individuals with chronic medical conditions. Recommendations for vaccination of healthcare workers (HCW) in various settings existed in most, but not all countries. Staff in hospitals and long-term care facilities were recommended vaccination in 23 countries, and staff in out-patient clinics in 22 countries. In the 2009 survey, the reported national estimates on vaccine coverage varied by country and risk group, ranging from 1.1% - 82.6% for the older adult population; to between 32.9% -71.7% for clinical risk groups; and from 13.4% -89.4% for HCW. Many countries that recommend the influenza vaccination do not monitor the coverage in risk groups. In 2008 and 2009 most countries recommended influenza vaccination for the main risk groups. However, despite general consensus and recommendations for vaccination of high risk groups, many countries do not achieve high coverage in these groups. The reported vaccination coverage still needs to be improved in order to achieve EU and World Health Organization goals.

MacCannell, T., A. K. Laramie, A. Gooma and J. F. Perz. "**Occupational exposure of health care personnel to hepatitis B and hepatitis C: prevention and surveillance strategies.**" Clin Liver Dis **2010** 14(1): 23-36, vii.

Ensuring the safety of personnel working in health care environments can be challenging and requires a multifaceted approach to target reductions in occupational exposures to blood-borne pathogens, such as hepatitis B or hepatitis C. This article reviews the epidemiology of occupational exposures to hepatitis B and hepatitis C in health care personnel in hospital settings. The nature and likelihood of risk to health care personnel are evaluated along with estimates of seroconversion risk. The review focuses on prevention programs and available surveillance programs to aid in monitoring and reducing occupational exposures to blood-borne pathogens.

Leask, J., C. M. Helms, M. Y. Chow, S. C. Robbins and P. B. McIntyre. "**Making influenza vaccination mandatory for health care workers: the views of NSW Health administrators and clinical leaders.**" N S W Public Health Bull **2010** 21(9-10): 243-247.

The challenges of maintaining high influenza vaccination rates in health care workers have focused worldwide attention on mandatory measures. In 2007, NSW Health issued a policy directive requiring health care workers to be screened/vaccinated for certain infectious diseases. Annual influenza vaccine continued to be recommended but not required. This paper describes the views of

NSW Health administrators and clinical leaders about adding influenza vaccination to the requirements. Of 55 staff interviewed, 45 provided a direct response. Of these, 23 supported inclusion, 14 did not and eight were undecided. Analysis of interviews indicated that successfully adding influenza vaccination to the current policy directive would require four major issues to be addressed: (1) providing and communicating a solid evidence base supporting the policy directive; (2) addressing the concerns of staff about the vaccine; (3) ensuring staff understand the need to protect patients; and (4) addressing the logistical challenges of enforcing an annual vaccination.

Babcock, H. M., N. Gemeinhart, M. Jones, W. C. Dunagan and K. F. Woeltje. "**Mandatory influenza vaccination of health care workers: translating policy to practice.**" Clin Infect Dis **2010** 50(4): 459-464.

BACKGROUND: Influenza vaccination of health care workers has been recommended since 1984. Multiple strategies to enhance vaccination rates have been suggested, but national rates have remained low. **METHODS:** BJC HealthCare is a large Midwestern health care organization with approximately 26,000 employees. Because organizational vaccination rates remained below target levels, influenza vaccination was made a condition of employment for all employees in 2008. Medical or religious exemptions could be requested. Predetermined medical contraindications include hypersensitivity to eggs, prior hypersensitivity reaction to influenza vaccine, and history of Guillan-Barre syndrome. Medical exemption requests were reviewed by occupational health nurses and their medical directors. Employees who were neither vaccinated nor exempted by 15 December 2008 were not scheduled for work. Employees still not vaccinated or exempt by 15 January 2009 were terminated. **RESULTS:** Overall, 25,561 (98.4%) of 25,980 active employees were vaccinated. Ninety employees (0.3%) received religious exemptions, and 321 (1.2%) received medical exemptions. Eight employees (0.03%) were not vaccinated or exempted. Reasons for medical exemption included allergy to eggs (107 [33%]), prior allergic reaction or allergy to other vaccine component (83 [26%]), history of Guillan-Barre syndrome (15 [5%]), and other (116 [36%]), including 14 because of pregnancy. Many requests reflected misinformation about the vaccine. **CONCLUSIONS:** A mandatory influenza vaccination campaign successfully increased vaccination rates. Fewer employees sought medical or religious exemptions than had signed declination statements during the previous year. A standardized medical exemption request form would simplify the request and review process for employees, their physicians, and occupational health and will be used next year.

Singhal, V., D. Bora and S. Singh. "**Hepatitis B in health care workers: Indian scenario.**" J Lab Physicians **2009** 1(2): 41-48.

Healthcare workers have a high risk of occupational exposure to many blood-borne diseases including HIV, Hepatitis B, and Hepatitis C viral infections. Of these Hepatitis B is not only the most transmissible infection, but also the only one that is preventable by vaccination. In developing countries, Hepatitis B vaccination coverage among healthcare workers is very low for various reasons, including awareness, risk assessment, and low priority given by the health managements of both government and private hospitals. Most of the hospitals lack post-exposure management strategies including the coordination among various departments for reporting, testing, and vaccination. This review, therefore, focuses on the current situation of Hepatitis B vaccine status in the healthcare workers of India, and provides updated guidelines to manage the accidental exposure to hepatitis B virus-infected biological materials in healthcare workers. The review also emphasizes on what options are available to a healthcare worker, in case of exposure and how they can respond to the standard vaccination schedules,

besides the need to educate the healthcare workers about Hepatitis B infection, available vaccines, post-vaccine immune status, and post-exposure prophylaxis.

Field, R. I. "**Mandatory vaccination of health care workers: whose rights should come first?**" P T 2009 34(11): 615-618.

Vagholkar, S., J. Ng, R. C. Chan, J. M. Bunker and N. A. Zwar. "**Healthcare workers and immunity to infectious diseases.**" Aust N Z J Public Health 2008 32(4): 367-371.

OBJECTIVE: In 2002, New South Wales (NSW) Health introduced an updated policy for occupational screening and vaccination against infectious diseases. This study describes healthcare worker (HCW) immunity to hepatitis B, measles, mumps, rubella (MMR) and varicella based on serological screening, following introduction of this policy. METHODS: HCW screening serology performed at two healthcare facilities in south western Sydney (Bankstown and Fairfield) was extracted for the period September 2003 to September 2005. Immunity to hepatitis B, MMR and varicella was quantitated and cross-tabulated against age, sex and staff risk category. RESULTS: A total of 1,320 HCWs were screened. Almost two thirds were immune to hepatitis B while immunity to MMR and varicella ranged from 88% to 94%. Age stratification showed lower levels of measles immunity in those born after 1965. CONCLUSIONS: Despite availability of vaccination for over two decades, a significant proportion of HCWs at these two facilities were non-immune to hepatitis B. This is of concern for those non-immune staff involved in direct clinical care, who are at risk of blood and body fluid exposures. The small group of HCWs non-immune to MMR and varicella pose a risk to themselves and others in the event of an outbreak. IMPLICATIONS: There is a need for improved implementation of the occupational screening and vaccination policy, including better education of HCWs about the risks of non-immunity to vaccine preventable diseases. The revised 2007 NSW Health policy may assist this process and will need evaluation to determine whether HCW immunity improves in the coming years.

Poland, G. A., C. L. Ofstead, S. J. Tucker and T. J. Beebe. "**Receptivity to mandatory influenza vaccination policies for healthcare workers among registered nurses working on inpatient units.**" Infect Control Hosp Epidemiol 2008 29(2): 170-173.

A survey that included questions about preferred methods of influenza prevention was completed by 513 registered nurses working on inpatient units. Vaccination was the preferred influenza prevention method among 83.0% of respondents. Of 506 respondents, 283 (56.0%) stated that mandatory influenza vaccination was appropriate for healthcare workers, and 394 (59.4%) of 512 RNs reported that they would support a policy requiring annual influenza vaccination for healthcare workers that allowed for informed declination.

Mah, C. L. "**What's public? What's private? Policy trade-offs and the debate over mandatory annual influenza vaccination for health care workers.**" Can J Public Health 2008 99(3): 192-194.

Policy decisions about public health services differ from those for personal health services. Both require trade-offs between such policy goals as liberty, security, efficiency, and equity. In public health, however, decisions about who will approve, pay for, and deliver services are often accompanied by decisions on when and how to compel individual behaviour. Policy becomes complex because different stakeholders interpret evidence differently: stakeholders may assign different weights to policy goals and may even define the same goals differently. In the debate over mandatory annual influenza vaccination for health care workers, for example, proponents as well as opponents of mandatory vaccination may convey arguments in security terms. Those in favour of mandatory vaccination emphasize

subclinical infections and duty of care (public security) while those opposed emphasize risk of adverse events (personal security). Proponents assert less worker absenteeism (efficiency) while opponents stress coercion and alternate personal infection control measures (liberty and individual rights/responsibilities). Consequently, stakeholders talk past each other. Determining the place of mandatory influenza vaccination for health care workers thus demands reconciling policy trade-offs and clarifying the underlying disputes hidden in the language of the policy debate.

Chapman, L. E., E. E. Sullivent, L. A. Grohskopf, E. M. Beltrami, J. F. Perz, K. Kretsinger, A. L. Panlilio, N. D. Thompson, R. L. Ehrenberg, K. F. Gensheimer, et al.

"Recommendations for postexposure interventions to prevent infection with hepatitis B virus, hepatitis C virus, or human immunodeficiency virus, and tetanus in persons wounded during bombings and other mass-casualty events--United States, 2008: recommendations of the Centers for Disease Control and Prevention (CDC)." MMWR Recomm Rep 2008 57(RR-6): 1-21; quiz CE21-24.

This report outlines recommendations for postexposure interventions to prevent infection with hepatitis B virus, hepatitis C virus, or human immunodeficiency virus, and tetanus in persons wounded during bombings or other events resulting in mass casualties. Persons wounded during such events or in conjunction with the resulting emergency response might be exposed to blood, body fluids, or tissue from other injured persons and thus be at risk for bloodborne infections. This report adapts existing general recommendations on the use of immunization and postexposure prophylaxis for tetanus and for occupational and nonoccupational exposures to bloodborne pathogens to the specific situation of a mass-casualty event. Decisions regarding the implementation of prophylaxis are complex, and drawing parallels from existing guidelines is difficult. For any prophylactic intervention to be implemented effectively, guidance must be simple, straightforward, and logistically undemanding. Critical review during development of this guidance was provided by representatives of the National Association of County and City Health Officials, the Council of State and Territorial Epidemiologists, and representatives of the acute injury care, trauma and emergency response medical communities participating in CDC's Terrorism Injuries: Information, Dissemination and Exchange (TIIDE) project. The recommendations contained in this report represent the consensus of U.S. federal public health officials and reflect the experience and input of public health officials at all levels of government and the acute injury response community.

Gazmararian, J. A., M. Coleman, M. Prill, A. R. Hinman, B. S. Ribner, M. L. Washington, A. Janssen and W. A. Orenstein. **"Influenza vaccination of health care workers: policies and practices of hospitals in a community setting." Am J Infect Control 2007 35(7): 441-447.**

BACKGROUND: The Advisory Committee on Immunization Practices has long recommended that health care workers receive annual influenza vaccinations to prevent transmission of disease to vulnerable patients, but HCW vaccination rates remain low, and there is little information about hospital policies promoting employee vaccination. **METHODS:** Our objective was to collect information about and compare hospital influenza vaccination policies and practices regarding health care workers in the metropolitan Atlanta community and identify relationships between policies and practices and employee coverage rates. Senior staff of infection control and of employee health programs at 12 hospitals in the metropolitan Atlanta community completed an in-person interview using a structured guide. **RESULTS:** All study hospitals provided vaccine free of charge to employees in on-site clinics. Seven of the 9 hospitals clustered between 34% and 47% of their employees vaccinated, with an average of 41%. The hospitals that

included flexibility and better accessibility, such as providing vaccination carts and adding more hours of vaccine availability, had somewhat higher hospital employee vaccination rates. Personal contact in the form of educational presentations appears to have more influence on employee decisions than distributing printed educational materials. CONCLUSION: Hospitals in the Atlanta community had several similar policies and practices to improve immunization coverage of their staff. Human interactions with employees as well as ease of vaccine access may be more successful at increasing coverage rates than mass approaches such as posters or flyers.

Baxter, D. "**Specific immunization issues in the occupational health setting.**" Occup Med (Lond) **2007** 57(8): 557-563.

This article looks at the components of an effective occupational health vaccination programme and also reviews the legal basis for them. It addresses the issue of vaccine licensing including pre-clinical, clinical and post-licensing studies. It explores screening for vaccine preventable diseases in the occupational health setting and then addresses particular issues around hepatitis B, chicken pox, tuberculosis, measles, rubella, diphtheria, polio, mumps and hepatitis A.

Session 4: Acceptance of vaccination by the healthcare workers

Presentation Baeyens, J. P. Ensuring the willingness to vaccinate and be vaccinated.

Baeyens, J. P., P. O. Lang and J. P. Michel. "**Willingness to vaccinate and to be vaccinated in adults.**" Aging Clin Exp Res **2009** 21(3): 244-249.

Vaccination may be mandated by regulation, as in some national infant vaccination programs, encouraged by health authorities, as in 'Flu vaccine campaigns for adults aged 60 years and older, or linked to the informed decision of individuals. Other methods include promotion by incentives to general practitioners, and recommendations from healthcare workers. All these factors contribute to variable vaccine coverage between countries and between different age and socio-economic groups. Many other factors, including providers' patient-oriented interventions and reimbursement issues play an important role in determining the level of vaccine uptake in a given population for a particular disease. However, the first step in vaccination campaigns is to give motivating information to healthcare workers that the benefits of being vaccinated outweigh possible inconvenience or adverse reactions. The information must be complete and accurate. When it has been ascertained that this information is understood and accepted, a system providing cheap and easy vaccination must be organised. Special groups such as the house-bound will need particular attention, appropriate information, and be included in free vaccination schemes. It should be acknowledged that social pressure often influences (positively or negatively) the decision of the individual. Lastly, a massive but objective information campaign is needed for the whole

population, each and every visit to a health clinic being treated as an opportunity to check vaccination status and to vaccinate immediately if necessary. Simultaneous vaccination with two or more vaccines increases the chances of reaching the required population cover.

Presentation Helena Maltezou Attitudes toward mandatory occupational vaccinations and vaccination coverage against vaccine-preventable diseases of health care workers in primary health care centers in Greece

Maltezou, H. C., P. Katerelos, S. Poufta, A. Pavli, A. Maragos and M. Theodoridou. **"Attitudes toward mandatory occupational vaccinations and vaccination coverage against vaccine-preventable diseases of health care workers in primary health care centers."** *Am J Infect Control* **2012**.

BACKGROUND: The aim of this study was to assess the attitudes regarding mandatory occupational vaccinations and the vaccination coverage against vaccine-preventable diseases among health care workers (HCWs) working in primary health care centers in Greece. **METHODS:** A standardized questionnaire was distributed to HCWs working in all primary health care centers in Greece (n = 185). **RESULTS:** A total of 2,055 of 5,639 HCWs (36.4% response rate) from 152 primary health care centers participated. The self-reported completed vaccination rates were 23.3% against measles, 23.3% against mumps, 29.8% against rubella, 3% against varicella, 5.8% against hepatitis A, 55.7% against hepatitis B, and 47.3% against tetanus-diphtheria; corresponding susceptibility rates were 17%, 25%, 18.6%, 16.7%, 87.5%, 35%, and 52.6%. Mandatory vaccinations were supported by 65.1% of 1,807 respondents, with wide differences by disease. Multiple logistic regression analysis revealed higher rates of acceptance of mandatory vaccination in physicians compared with other HCW categories. **CONCLUSIONS:** Despite the fact that two-thirds of HCWs working in primary health care centers in Greece support mandatory vaccination for HCWs, completed vaccination rates against vaccine-preventable diseases are suboptimal.

Maltezou, H. C., A. Lourida, A. Katragkou, I. N. Grivea, P. Katerelos, S. Wicker, G. A. Syrogiannopoulos, E. Roilides and M. Theodoridou. **"Attitudes regarding occupational vaccines and vaccination coverage against vaccine-preventable diseases among healthcare workers working in pediatric departments in Greece."** *Pediatr Infect Dis J* **2012** 31(6): 623-625.

We studied the attitudes with regard to occupational vaccines and vaccination coverage among healthcare workers in pediatric departments. Completed vaccination rates were 33%, 33%, 41.7%, 3%, 5.8%, 69.2% and 36.3% against measles, mumps, rubella, varicella, hepatitis A, hepatitis B and tetanus-diphtheria, respectively. Susceptibility rates were 14.2%, 15.7%, 14.6%, 7.6%, 87.4%, 22.6% and 61.8% for measles, mumps, rubella, varicella, hepatitis A, hepatitis B and tetanus-diphtheria, respectively. Mandatory vaccinations were supported by 70.6% of healthcare workers, with considerable differences by target disease.

Maltezou, H. C., P. Gargalianos, P. Nikolaidis, P. Katerelos, N. Tedoma, E. Maltezos and M. Lazanas. **"Attitudes towards mandatory vaccination and vaccination coverage against vaccine-preventable diseases among health-care workers in tertiary-care hospitals."** *J Infect* **2012** 64(3): 319-324.

OBJECTIVE: To assess the attitudes about mandatory vaccination and vaccination coverage against vaccine-preventable diseases among health-care workers (HCWs) working in tertiary-care hospitals in Greece. **METHODS:** A questionnaire was distributed to HCWs working in four tertiary-care hospitals. **RESULTS:** In total, 505 HCWs participated in the survey. Self-reported completed

vaccination rates were 18.8% against measles, 18.8% against mumps, 22.2% against rubella, 1.9% against varicella, 3.6% against hepatitis A, 56.5% against hepatitis B, and 35.7% against tetanus-diphtheria. Younger age groups had higher completed vaccination rates against measles, mumps, rubella, varicella, and hepatitis B compared with older HCWs (p-value < 0.001). Self-reported susceptibility rates were 12.7% for measles, 18.9% for mumps, 15.8% for rubella, 15.2% for varicella, 89.9% for hepatitis A, 34.2% for hepatitis B, and 64.3% for tetanus-diphtheria. Sixty three percent of 451 HCWs who answered this question supported mandatory vaccinations for HCWs, with significant differences per target disease. Physicians more frequently supported a mandatory vaccination policy compared to nurses and other professions (72.1% versus 61.9% and 54.2%, respectively; p-value = 0.028). **CONCLUSIONS:** Approximately two thirds of HCWs working in tertiary-care hospitals in Greece support mandatory vaccinations for HCWs, however suboptimal vaccination rates against vaccine-preventable diseases were recorded.

Maltezou, H. C. and A. Tsakris. "Vaccination of health-care workers against influenza: our obligation to protect patients." *Influenza Other Respi Viruses* 2011 5(6): 382-388.

Nosocomial influenza poses a threat for specific groups of patients and is associated not only with the disruption of health-care services but also excess costs. Although vaccination of health-care workers (HCWs) has been recommended for almost three decades and constitutes the most convenient and effective means to prevent nosocomial transmission, vaccine uptake within this group remains unacceptably low worldwide. In regard to the pandemic influenza A H1N1, HCWs constitute a priority group for immunization. Nevertheless, low vaccination rates have been documented regarding the influenza pandemic and associated with the onset of nosocomial cases and outbreaks. HCWs, health-care institutions, and public health bodies have the moral obligation to protect vulnerable patients and therefore weigh the benefits of mandatory vaccination. Key effective interventions, such as the education of HCWs concerning the benefits and safety of influenza vaccination, the reinforcement of on-site, free of charge vaccinations, and the use of mobile vaccination teams in conjunction with incentives, should be widely implemented.

Maltezou, H. C., X. Dedoukou, S. Patrinos, A. Maragos, S. Poufta, P. Gargalianos and M. Lazanas. "Determinants of intention to get vaccinated against novel (pandemic) influenza A H1N1 among health-care workers in a nationwide survey." *J Infect* 2010 61(3): 252-258.

A nationwide survey was conducted in October-November 2009 to investigate determinants of intention to get vaccinated against novel (pandemic) influenza A H1N1 among health-care workers (HCWs) in Greece. Out of 12,879 participating HCWs (response rate: 12.1%) working in 152 (40%) of 380 health-care facilities in Greece, 2814 (21.8%) reported that they intend to get vaccinated against novel influenza A N1H1. Intention rates to get vaccinated increased with age, male sex, being a physician, history of vaccination against seasonal influenza, training in use of personal protective equipment and hand hygiene, and training and involvement in the management of novel influenza cases. Main reasons for refusing vaccination were concerns about vaccine safety (43.1%), inadequate information about the vaccine (27.8%), and perception that they were not at risk for contracting novel influenza (10.7%). Given the low rates of acceptance of pandemic vaccination among HCWs, as found in this study, public health bodies should consider the

implementation of a mandatory vaccination policy for HCWs for future pandemics, in order to prevent nosocomial transmission and to protect patients at high-risk for influenza-related complications and death, and to assure the continuity of the essential health-care infrastructure. New strategies should be explored to built safety perception towards influenza vaccines and enhance vaccination rates among HCWs.

Presentation Pierre Loulergue Knowledge, attitudes and vaccination coverage of healthcare workers regarding occupational vaccinations in France

Loulergue, P., F. Moulin, G. Vidal-Treca, Z. Absi, C. Demontpion, C. Menager, M. Gorodetsky, D. Gendrel, L. Guillevin and O. Launay. **"Knowledge, attitudes and vaccination coverage of healthcare workers regarding occupational vaccinations."** *Vaccine* **2009** 27(31): 4240-4243.

OBJECTIVES: Immunization of healthcare workers (HCWs) is a major issue for infection control in healthcare facilities. The aim of this study was to evaluate knowledge regarding occupational vaccinations, HBV, varicella and influenza vaccination rates and attitudes towards influenza vaccine among HCWs. **DESIGN AND SETTING:** A cross-sectional survey was conducted in two wards (Medicine and Paediatrics) of a 1182-bed teaching hospital in Paris, France. **METHODS:** A standardized, anonymous, self-administered questionnaire was used. **RESULTS:** Of 580 HCWs, 395 (68%) completed the questionnaire. Knowledge about the occupational vaccinations of HCWs was low. HBV (69%), tuberculosis (54%) and influenza (52%) were the most cited vaccinations. Paediatric staff was more aware of influenza and pertussis immunizations ($p < .05$). HBV vaccination rate was 93%, among whom 65% were aware of their immune status. Influenza vaccination rate for 2006-2007 was 30% overall, ranging from 50% among physicians to 20% among paramedical staff ($p < .05$). Physicians based their refusal on doubts about vaccine efficacy, although paramedics feared side effects. Influenza vaccination was associated with knowledge of vaccine recommendations [OR=1.75, 95% CI: 1.13-2.57] and contact with patients [OR=3.05, 95% CI: 1.50-5.91]. **CONCLUSIONS:** Knowledge of recommended occupational vaccinations is insufficient in HCWs, except for HBV and influenza. Although the HBV vaccine coverage of HCWs is satisfactory, a large proportion of them is unaware of immune status. Influenza vaccine coverage remains low, especially among paramedical staff because of fear of side effects. As vaccine coverage is associated with knowledge, educational campaigns should be strengthened to increase the adhesion of HCWs to vaccinations.

Presentation George Kamkamidze Barriers to hepatitis B vaccine coverage among healthcare workers in the Republic of Georgia: An international perspective.
George Kamkamidze

Topuridze, M., M. Butsashvili, G. Kamkamidze, M. Kajaia, D. Morse and L. A. McNutt. **"Barriers to hepatitis B vaccine coverage among healthcare workers in the Republic of Georgia: An international perspective."** *Infect Control Hosp Epidemiol* **2010** 31(2): 158-164.

BACKGROUND: While the Republic of Georgia has a high prevalence of hepatitis B virus (HBV) infection (3.4% of blood donors tested positive for HBV surface antigen [HBsAg]), relatively few healthcare workers (HCWs) are thought to be immunized. **OBJECTIVE:** To measure rates of HBV vaccination coverage and identify predictors of vaccine acceptance among HCWs. **DESIGN:** Cross-sectional survey. **METHODS:** A study was conducted among full-time physicians and nurses at 2 large hospitals. Self-administered questionnaires included questions about

demographic characteristics, HBV vaccine status, willingness to recommend vaccination to other HCWs, and barriers to vaccination. Laboratory tests were conducted for identification of HBsAg and antibody to hepatitis B core antigen. RESULTS: A total of 297 (91%) of 325 randomly selected HCWs provided information for the study (124 physicians and 173 nurses). The rate of HBV vaccination coverage was 12%, and 54% of respondents indicated that they would recommend vaccination to other HCWs. Perception of vaccine safety was identified as the most important predictor for acceptance (prevalence ratio [PR], 3.3 [95% confidence ratio {CI}, 1.2-8.9]) and for willingness to recommend HBV vaccination to other HCWs (PR, 5.5 [95% CI, 3.1-9.4]). Vaccinated HCWs were more likely to recommend vaccination to other healthcare personnel (PR, 1.7 [95% CI, 1.5-2.1]), as were those younger than 40 years of age (PR, 6.0 [95% CI, 2.8-12.6]). Multivariate analyses identified 2 additional factors associated with vaccine acceptance and willingness to recommend vaccination: the hospital at which the HCW was employed and the perception of risk of infection for HCWs. CONCLUSION: Georgia plans a major HBV vaccination campaign for HCWs in 2009. The campaign's success will depend on addressing vaccine safety concerns identified in this study and educating HCWs about risk factors for infection and benefits of immunization.

Extra recent publications on session 4 : Pubmed MEDLINE search on {(Healthcare workers OR HCW) AND (vaccine* OR Immuni*)} in all fields and published from 2010 on, was performed. End-note search (attitude). Only the relevant references are listed

Wicker, S., H. F. Rabenau, W. Betz and H. C. Lauer. "Attitudes of dental healthcare workers towards the influenza vaccination." *Int J Hyg Environ Health* 2012 215(4): 482-486.

Influenza viruses are highly contagious. Medical personnel are at risk of occupational exposure to influenza. Data on dental healthcare workers (DHCWs) immunization status has not been published. We conducted a cross-sectional survey of DHCWs and dental students at a German dental university hospital. Surveys, completed between October 2010 and March 2011, focused on reasons of DHCWs for accepting or declining the influenza vaccination. Furthermore, we characterized attitudes towards influenza infection due to the emergence of the H1N1/2009. Compliance rates with the influenza vaccination among DHCWs were low (31.6%). The main reason for not getting vaccinated against the pandemic influenza A/H1N1 virus in the 2009/2010 season was the objection to the AS03-adjuvants (48.5%). Of the DHCWs surveyed, 30.6% (74/242) cited that the H1N1/2009 pandemic influenced their attitudes towards vaccination in general. Our findings confirm the importance of a comprehensive approach to the influenza vaccination, ensuring that DHCWs are correctly informed about the vaccine and that it is convenient to receive it. It could be shown that an immunization campaign at the workplace seems to be capable of improving vaccination rates, one-third of the vaccinees have been vaccinated for the first time.

Llupia, A., A. L. Garcia-Basteiro, G. Mena, J. Rios, J. Puig, J. M. Bayas and A. Trilla. "Vaccination behaviour influences self-report of influenza vaccination status: a cross-sectional study among health care workers." *PLoS One* 2012 7(7): e39496.

BACKGROUND: Published influenza vaccination coverage in health care workers (HCW) are calculated using two sources: self-report and vaccination records. The objective of this study was to determine whether self-report is a good proxy for recorded vaccination in HCW, as the degree of the relationship is not known, and

whether vaccine behaviour influences self-reporting. METHODS: A cross-sectional study was conducted using a self-administered survey during September 2010. Considering the vaccination record as the gold standard of vaccination, the properties of self-report as a proxy of the record (sensitivity, specificity, positive predictive value, negative predictive value) were calculated. Concordance between the vaccination campaigns studied (2007-2010) was made using the Kappa index, and discordance was analyzed using McNemar's test. RESULTS: 248 HCW responded. The 95% confidence intervals of coverage according to the vaccination record and to self-report overlapped, except for 2007, and the Kappa index showed a substantial concordance, except for 2007. McNemar's test suggested that differences between discordant cases were not due to chance and it was found that the proportion of unvaccinated discordant cases was higher than that of vaccinated discordant cases. CONCLUSIONS: In our study population, self-reported influenza vaccination coverage in HCW in the previous two years is a good proxy of the vaccination record. However, vaccination behaviour influences the self-report and explains a trend to overestimate coverage in self-reporting compared to the vaccination record. The sources of coverage should be taken into account whenever comparisons are made.

de Perio, M. A., D. M. Wiegand and S. M. Evans. "**Low influenza vaccination rates among child care workers in the United States: assessing knowledge, attitudes, and behaviors.**" *J Community Health* 2012 37(2): 272-281.

Influenza can spread quickly among children and caregivers in child day care settings. Vaccination is the most effective method to prevent influenza. We determined 2009 pandemic influenza A (H1N1) (pH1N1) and seasonal influenza vaccination rates during the 2009-2010 influenza season among child care center employees, assessed knowledge and attitudes regarding the vaccines, and determined factors associated with vaccine receipt. Using a cross-sectional study design, from January 30-March 1, 2010, we surveyed 384 (95%) of 403 employees at 32 licensed child centers in the United States about personal and work characteristics, vaccine receipt, and knowledge and attitudes regarding each vaccine. Forty-five (11%) and eighty five (22%) respondents reported receiving the pH1N1 and seasonal influenza vaccines, respectively. The most common reasons cited for not getting either vaccine were "I don't think I need the vaccine," "I don't think the vaccine will keep me from getting the flu," and "the vaccine is not safe." Factors independently associated with receipt of either vaccine included belief in its efficacy, having positive attitudes towards it, and feeling external pressure to get it. Child care center employees had low rates of pH1N1 and seasonal influenza vaccination largely due to misconceptions about the need for and efficacy of the vaccine. Public health messages should address misconceptions about vaccines, and employers should consider methods to maximize influenza vaccination of employees as part of a comprehensive influenza prevention program.

Baron-Epel, O., S. Bord, B. Madjar, S. Habib and S. Rishpon. "**What lies behind the low rates of vaccinations among nurses who treat infants?**" *Vaccine* 2012 30(21): 3151-3154.

BACKGROUND: In most countries rates of immunizations of health care workers with recommended vaccines are not satisfactory. OBJECTIVES: To identify reasons behind the low rates of compliance of Israeli nurses in Mother and Child Healthcare Centers (MCHC) with an official request for pertussis vaccination. METHODS: Three focus groups were conducted. Qualitative analysis identified themes that could explain the nurses' non-compliance. RESULTS: Trust in health authorities was low, mainly following the A/H1N1 purported influenza pandemic. In addition, nurses did not see the importance of being role models for the public and demanded the autonomy to decide whether to receive vaccinations. The nurses

differentiated between their role as nurses and their personal life, expressed fear of new vaccines and exhibited low levels of risk perception. Misconceptions regarding vaccinations were expressed by the nurses. **CONCLUSIONS:** Antivaccinationist ideas were expressed by MCHC nurses and these attitudes may have led to non-compliance with vaccination guidelines.

Ward, K., H. Seale, N. Zwar, J. Leask and C. R. Macintyre. "**Annual influenza vaccination: coverage and attitudes of primary care staff in Australia.**" Influenza Other Respi Viruses **2011** 5(2): 135-141.

BACKGROUND: Annual influenza vaccination is recommended for all Australian health care workers (HCWs) including those working in primary health care. There is limited published data on coverage, workplace provision, attitudes and personal barriers to influenza vaccination amongst primary health care staff. The aim of this study was to contribute to the limited literature base in this important area by investigating these issues in the primary health care setting in New South Wales (NSW), Australia. **METHODS:** A postal survey was sent to general practitioners (GPs) and practice nurses (PNs) from inner city, semi-urban and rural areas of NSW, Australia. There were 139 responses in total (response rate 36%) from 79 GPs (response rate 30%) and 60 PNs (response rate 46%). **RESULTS:** Reported influenza vaccination coverage in both 2007 and 2008 was greater than 70%, with GPs reporting higher coverage than PNs in both years. The main barriers identified were lack of awareness of vaccination recommendations for general practice staff and concern about adverse effects from the vaccine.

CONCLUSIONS: Rates of influenza vaccination coverage reported in this study were higher than in previous studies of hospital and institutional HCWs, though it is possible that the study design may have contributed to these higher results. Nevertheless, these findings highlight that more needs to be done to understand barriers to vaccination in this group, to inform the development of appropriate strategies to increase vaccination coverage in primary health care staff, with a special focus on PNs.

Vic, P. and J. Puech. "**[Health care workers' knowledge and vaccination coverage against pertussis in a French pediatric and maternity ward].**" Arch Pediatr **2011** 18(12): 1339-1340.

Tanguy, M., C. Boyeau, S. Pean, E. Marijon, A. Delhumeau and S. Fanello. "**Acceptance of seasonal and pandemic a (H1N1) 2009 influenza vaccination by healthcare workers in a french teaching hospital.**" Vaccine **2011** 29(25): 4190-4194.

INTRODUCTION: The aim of this study was to highlight the perceived risks, behavioural changes and the rate of acceptance of seasonal and pandemic (H1N1) 2009 influenza vaccines by healthcare workers (HCWs) in a French Teaching Hospital. **METHODS:** We sampled HCWs from the Angers French Teaching Hospital (France) using a cross-sectional intercept design during phase 5A of the 2009 French National Plan for the Prevention and Control of 'Pandemic Influenza'. From November 2009 to February 2010, HCWs were approached in the workplace to undertake the survey. The primary endpoint assessed immunization coverage among HCWs who had contact with at-risk-patients. **RESULTS:** Of the 532 HCWs who answered the questionnaire, 119 (22.4%) had received a seasonal vaccine and 194 (36.5%) the H1N1 pandemic vaccine. Coverage rate was significantly higher among physicians (45% for the seasonal vaccine, 61% for the H1N1 vaccine). The main reasons given for acceptance of the seasonal vaccine were "protection of the patient" and "self-protection", whereas the main arguments against were "low risk of being infected" and "doubts about vaccine safety". For the H1N1 vaccine, reasons for vaccination were to "protect the patient" and "protect the family". The main arguments against were "fear of side effects" and "doubts

about vaccine safety". CONCLUSION: This study emphasizes the lack of perception by HCWs of the importance of being immunized against seasonal and pandemic A (H1N1) 2009 Influenza. In the future, particular efforts are needed, during vaccination campaigns, to provide more information to HCWs regarding development process and safety of such vaccines.

Hopman, C. E., J. Riphagen-Dalhuisen, I. Looijmans-van den Akker, G. Frijstein, A. D. Van der Geest-Blankert, M. B. Danhof-Pont, H. J. De Jager, A. A. Bos, E. Smeets, M. J. De Vries, et al. "**Determination of factors required to increase uptake of influenza vaccination among hospital-based healthcare workers.**" J Hosp Infect 2011 77(4): 327-331.

A questionnaire study was performed in all eight University Medical Centers in The Netherlands to determine the predictors of influenza vaccination compliance in hospital-based healthcare workers (HCWs). Demographical, behavioural and organisational determinants were assessed based on behavioural and implementation models. Multivariable regression analysis was applied to assess the independent predictors for influenza vaccine uptake. Age >40 years, the presence of a chronic illness, awareness of personal risk and awareness of risk of infecting patients, trust in the effectiveness of the vaccine to reduce the risk of infecting patients, the HCWs' duty to do no harm and their duty to ensure continuity of care, finding vaccination useful despite the constant flow of visitors and having knowledge of the Health Council's advice, social influence and convenient time for vaccination were all independently associated with vaccine uptake. The accuracy of the prediction model was very high (area under the receiver operating curve: 0.95). Intervention programmes to increase influenza vaccine uptake among HCWs should target the relevant determinants identified in this study.

Gavazzi, G., Y. Filali-Zegzouti, A. C. Guyon, B. De Wazieres, B. Lejeune, J. L. Golmard, J. Belmin, F. Piette and M. Rothan-Tondeur. "**French healthcare workers in geriatric healthcare settings staunchly opposed to influenza vaccination: the VESTA study.**" Vaccine 2011 29(8): 1611-1616.

The observational diagnosis phase of the VESTA study was aimed to determine the composite profiles of vaccinated/non-vaccinated HCWs by analyzing reasons to accept/decline influenza vaccination. Between June and September 2005, 2485 HCWs (female: 82.9%; nursing auxiliaries: 42.1%; vaccination coverage: 23.4%) from 53 French geriatric HCSs were included in the study. Cluster analysis determined 3 composite profiles: HCWs for whom information programs on vaccination can be useful (59%), HCWs staunchly opposed to vaccination (36%), and skeptical HCWs (5%). Qualitative analysis provided some aspects of influenza vaccine reluctance. Effective programs would be multidimensional and target the most susceptible group.

Falato, R., S. Ricciardi and G. Franco. "**[Influenza risk perception and vaccination attitude in medical and nursing students during the vaccination campaigns of 2007/2008 (seasonal influenza) and 2009/2010 (H1N1 influenza)].**" Med Lav 2011 102(2): 208-215.

BACKGROUND: The Italian law on health and safety at work requires that (i) employers provide workers with safe and efficient vaccines, (ii) occupational physicians inform workers about the benefits and inconveniences deriving from immunization. OBJECTIVE: To assess risk perception of influenza and attitudes to vaccination among medical and nursing students of the School of Medicine of Modena during two vaccination campaigns. METHODS: The study, including 598 medical and nursing students (212 vaccinated and 386 non-vaccinated) exposed to influenza virus, was performed in October 2007-April 2008 (during the seasonal

influenza campaign), in October-November 2009 and in March-May 2010 (during and after the H1N1 influenza campaign, respectively). Information on influenza risk perception and attitude towards vaccination, as well as perception of different risk factors (smoking, traffic pollution, driving, mobile phones, nuclear power, alcoholic beverages) was collected by a self-administered 4-point Likert scales (1 = low risk, 4 high risk) questionnaire. RESULTS: The students perceived the risk of both influenza and of influenza immunization at a lower level compared with other risks. Whereas overall risk perception (excluding influenza and vaccination) was similar within the groups, influenza risk perception was significantly lower in the 2007/2008 group whereas the risk of immunization increased in the 2010 group. Age, gender and being a medical or nursing student did not influence risk perception and vaccination attitude. CONCLUSION: Although influenza vaccination is recommended, its coverage in medical and nursing students is generally low due to different factors, including underestimation of a preventable disease, lack of knowledge about the benefits of immunization and, according to this study, to the perception of risk associated both with the disease and immunization practice.

Blasi, F., P. Palange, G. Rohde, T. Severin, G. Cornaglia and R. Finch. **"Healthcare workers and influenza vaccination: an ERS-ESCMID Web-based survey."** Clin Microbiol Infect 2011 17(8): 1223-1225.

We performed a Web-based survey on attitudes and uptake of H1N1 influenza vaccination among members of two European societies, namely the European Respiratory Society and the European Society of Clinical Microbiology and Infectious Diseases. A multidisciplinary panel developed a questionnaire that examined physicians' and members' knowledge, attitudes and practice about seasonal and pandemic (H1N1) influenza vaccination. In all, 1334 healthcare workers from 83 countries (785 men and 549 women, mean age 45 +/- 7 years) accessed and completed the survey. Safety concerns about vaccines was the main reason reported by 451/1285 respondents for not being vaccinated. More than 30% of 1282 respondents considered the management of communication on the flu pandemic by health authorities to be insufficient. The results of this survey should help health authorities to better design future steps for the successful vaccination of healthcare workers.

Arda, B., R. Durusoy, T. Yamazhan, O. R. Sipahi, M. Tasbakan, H. Pullukcu, E. Erdem and S. Ulusoy. **"Did the pandemic have an impact on influenza vaccination attitude? A survey among health care workers."** BMC Infect Dis 2011 11: 87.

BACKGROUND: Health care workers' (HCWs) influenza vaccination attitude is known to be negative. The H1N1 epidemic had started in mid 2009 and made a peak in October-November in Turkey. A national vaccination campaign began on November 2nd, 2009. Despite the diligent efforts of the Ministry of Health and NGOs, the attitudes of the media and politicians were mostly negative. The aim of this study was to evaluate whether HCWs' vaccination attitudes improved during the pandemic and to assess the related factors. METHODS: This cross-sectional survey was carried out at the largest university hospital of the Aegean Region-Turkey. A self-administered questionnaire with 12 structured questions was applied to 807 HCWs (sample coverage 91.3%) before the onset of the vaccination programme. Their final vaccination status was tracked one week afterwards, using immunization records. Factors influencing vaccination rates were analyzed using ANOVA, t-test, chi-square test and logistic regression. RESULTS: Among 807 participants, 363 (45.3%) were doctors and 293 (36.6%) nurses. A total of 153 (19.0%) had been vaccinated against seasonal influenza in the 2008-2009 season. Regarding H1N1 vaccination, 143 (17.7%) were willing to be vaccinated vs. 357 (44.2%) unwilling. The number of indecisive HCWs was 307

(38.0%) one week prior to vaccination. Only 53 (11.1%) stated that they would vaccinate their children. Possible side effects (78%, n = 519) and lack of comprehensive field evaluation before marketing (77%, n = 508) were the most common reasons underlying unwillingness or hesitation. Among the 749 staff whose vaccination status could be tracked, 228 (30.4%) actually received the H1N1 vaccine. Some of the 'decided' staff members had changed their mind one week later. Only 82 (60%) of those willing, 108 (37%) of those indecisive and 38 (12%) of those unwilling were vaccinated. Indecisive HCWs were significantly younger ($p = 0.017$). Females, nurses, and HCWs working in surgical departments were more likely to reject vaccination ($p < 0.05$). Doctors, HCWs working in medical departments, and HCWs previously vaccinated against seasonal influenza were more likely to accept vaccination ($p < 0.05$). Being younger than 50 and having been vaccinated in the previous season were important predictors of attitude towards pandemic influenza vaccination. **CONCLUSIONS:** Vaccination rates increased substantially in comparison to the previous influenza season. However, vaccination rates could have been even higher since hesitation to be vaccinated increased dramatically within one week (only 60% of those willing and the minority of those indecisive were finally vaccinated). We speculate that this may be connected with negative media at the time.

Alkuwari, M. G., N. A. Aziz, Z. A. Nazzal and S. A. Al-Nuaimi. "**Pandemic influenza A/H1N1 vaccination uptake among health care workers in Qatar: motivators and barriers.**" *Vaccine* 2011 29(11): 2206-2211.

Influenza A/H1N1 new vaccine helps control disease spread. Cross-sectional survey was conducted at PHC & Emergency Departments in Qatar to determine influenza A/H1N1 vaccination rate among HCWs and associated factors, 523 HCWs were enrolled. The study showed that 13.4% HCWs received vaccination. Feeling protected strongly influenced vaccination decision (OR = 14.5). Uncertainty about vaccine efficacy and fear of side effects strongly influenced decision to reject the vaccine (OR = 0.3 and 0.2 respectively). Vaccination coverage was very low. The most common barriers were uncertainty about vaccine efficacy and fear of side effects. Health authorities should build message highlighting how the benefit of vaccination outweighs risk.

Wicker, S., H. F. Rabenau, R. Gottschalk, G. Krause and S. McLennan. "**[Low influenza vaccination rates among healthcare workers. Time to take a different approach].**" *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2010 53(12): 1298-1303.

Despite decades of effort to encourage healthcare workers (HCWs) to be immunized against influenza, vaccination levels remain insufficient in Germany, with only one in five HCWs receiving the annual influenza vaccination. To prevent nosocomial influenza outbreaks and to ensure the protection of patients and HCWs, new approaches to increase vaccination rates are needed. The experience in the USA has shown that declination forms have increased vaccination coverage. One possible approach for Germany would be a combination of declination forms with the exclusive use of vaccinated staff in defined areas. This approach would respect a HCWs decision to refuse medical treatment, while at the same time protecting vulnerable patients. In addition, the influenza vaccination rates of HCWs should be collected in order to evaluate the implementation of vaccination policies. Similar to the setting of desired vaccination coverage for the chronically ill, a clearly defined vaccination goal should be established for HCWs.

Top, K. A., B. A. Halperin, D. Baxendale, D. MacKinnon-Cameron and S. A. Halperin. "**Pertussis immunization in paediatric healthcare workers: knowledge, attitudes, beliefs, and behaviour.**" *Vaccine* 2010 28(10): 2169-2173.

Healthcare workers' (HCWs) knowledge, attitudes, and beliefs regarding pertussis immunization were assessed and compared to the rate of vaccine uptake. A questionnaire was distributed to employees at a paediatric and maternity tertiary care centre. Respondents were then offered a dose of the tetanus, diphtheria, and acellular pertussis vaccine (Tdap) at a free vaccine clinic. In total, 529 out of 3051 (17%) employees completed the survey and 61 received the Tdap vaccine. Although 76% of participants were willing to be immunized, only 15% presented to the clinic. There is a widespread acceptance of pertussis immunization among paediatric HCWs. Stated intentions may be poorly predictive of behaviour. Education and institutional or public funding may improve vaccine uptake.

Thoon, K. C. and C. Y. Chong. "**Survey of healthcare workers' attitudes, beliefs and willingness to receive the 2009 pandemic influenza A (H1N1) vaccine and the impact of educational campaigns.**" Ann Acad Med Singapore 2010 39(4): 307-306.

INTRODUCTION: Vaccination against the 2009 pandemic influenza A (H1N1) represents the best method of controlling spread, morbidity and mortality due to the pandemic. While this has been recommended for all healthcare-workers locally, it is unclear if they are willing to accept the vaccination. MATERIALS AND METHODS: A cross-sectional survey was conducted before and after an educational talk on pandemic influenza and vaccines to ascertain responses and stated reasons, as well as identify associated factors. RESULTS: For 235 returned forms prior to the talk, 182 (77.4%) responded positively, while 161 of 192 (83.8%) who returned forms after the talk responded positively. Importantly, 12 of 47 (25.5%) initially negative responses turned positive after education. The desire to protect family, self and patients were the 3 most important reasons for staff wanting to receive the vaccine, while the concern regarding potential side effects was the most important reason for refusal. CONCLUSIONS: A high rate of willingness to receive pandemic influenza vaccine was found, which was in contrast to acceptance rates elsewhere and during previous influenza seasons. Education can play an important role in altering vaccine acceptance behaviour, with an emphasis on addressing concerns with regard to potential side effects.

Seale, H., J. Leask and C. R. MacIntyre. "**Attitudes amongst Australian hospital healthcare workers towards seasonal influenza and vaccination.**" Influenza Other Respi Viruses 2010 4(1): 41-46.

BACKGROUND: Amongst healthcare workers (HCWs), compliance rates with influenza vaccination are traditionally low. Although a safe and effective vaccine is available, there is little Australian data on reasons for poor compliance, especially amongst allied health and ancillary support staff. METHODS: Cross-sectional investigation of a sample of clinical and non-clinical HCWs from two tertiary-referral teaching hospitals in Sydney, Australia was conducted between June 4 and October 19, 2007. The self-administered questionnaire was distributed to hospital personal from 40 different wards and departments. The main outcome measures were personal beliefs about influenza vaccination and self-reported vaccination status. RESULTS: Respondents (n = 1079) were categorized into four main groups by occupation: nurses (47.5%, 512/1079), physicians (26.0%, 281/1079), allied health (15.3%, 165/1079) and ancillary (11.2%, 121/1079). When asked whether they felt the influenza vaccine was safe or effective, 81% (879/1079) and 68% (733/1079), respectively, replied in the affirmative. Participants felt that it was more important to get vaccinated to protect patients (74%, 796/1079) than family (68%, 730/1079) or self-protection (66%, 712/1079). However, only 22% (241/1079) of the HCWs who replied reported receiving the vaccine the year the survey was conducted. CONCLUSIONS: Although HCWs had an adequate level of knowledge towards influenza vaccination, only 22% of them were vaccinated. The approach to improving influenza vaccination rates amongst

HCWs and to tackling misconceptions must be multifaceted, adaptable and must evolve regularly to increase coverage.

Rhudy, L. M., S. J. Tucker, C. L. Ofstead and G. A. Poland. "**Personal choice or evidence-based nursing intervention: nurses' decision-making about influenza vaccination.**" Worldviews Evid Based Nurs 2010 7(2): 111-120.

BACKGROUND: Nursing interventions are actions taken by nurses to enhance patient outcomes. Little is known about nursing interventions such as influenza vaccination in which the nurse's decision to adopt a health behavior impacts patient outcomes. There is strong evidence that immunization of health care workers (HCWs) against influenza is effective in preventing the spread of this disease and lowers mortality among patients. Yet, worldwide influenza vaccination rates among HCWs are low, with nurse vaccination rates among the lowest. AIM: To understand the factors influencing nurses' decision-making about personally receiving immunization against influenza. METHODS: A qualitative descriptive design in which data were collected using semistructured interviews was used. Participants were 14 RNs who indicated on a prior survey that they were uncertain about, or would not receive an influenza vaccine during the next vaccination season. Data were analyzed using content analysis. FINDINGS: The overarching theme is that influenza immunization is a low priority for nurses. Subthemes include a sense of good health, skepticism of the vaccine's value, fear of vaccine side effects, hand washing as prevention, and inconvenient immunization locations. CONCLUSIONS: The nurse participants in this study viewed influenza vaccination as a personal health choice, not as an evidence-based nursing intervention. As a result, the decision to decline influenza vaccination was made in the context of personal health choice and/or risk of injury or illness to the nurse. Patient safety outcomes were not expressed as a factor in making the decision to decline influenza vaccination.

Polgreen, P. M., E. Septimus, T. R. Talbot, S. E. Beekmann and C. Helms. "**Results of a national survey of infectious diseases specialists regarding influenza vaccination programs for healthcare workers.**" Infect Control Hosp Epidemiol 2010 31(10): 1063-1065.

A minority of infectious diseases consultants currently work in healthcare institutions requiring influenza vaccination for healthcare workers, and in approximately half of these institutions, the healthcare workers who refuse vaccination do not face substantial consequences for their refusal. Although true mandatory policies are not common, a majority of infectious diseases consultants support such policies.

Muhammad, H. S. and B. Hayes. "**Factors determining uptake of influenza vaccine among healthcare workers in a hospital setting.**" J Hosp Infect 2010 76(1): 90-91.

Mouzon, M. E., F. M. Munoz, A. J. Greisinger, B. J. Brehm, O. A. Wehmanen, F. A. Smith, J. A. Markee and W. P. Glezen. "**Improving influenza immunization in pregnant women and healthcare workers.**" Am J Manag Care 2010 16(3): 209-216.

OBJECTIVE: To evaluate the effect of several strategies to increase influenza immunization in a multispecialty clinic. STUDY DESIGN: Retrospective electronic database analysis of influenza vaccinations in a 6-year period at Kelsey-Seybold Clinic in Houston, Texas. METHODS: We evaluated immunization rates in pregnant women and healthcare workers during 6 influenza seasons (2003-2004 to 2008-2009) after implementing the following strategies for pregnant women: assessing baseline immunization rates for obstetric providers, followed by direct encouragement and behavior modeling; implementing standing orders for influenza vaccination in pregnancy; and offering vaccination training to

obstetricians and nurses. Further strategies implemented for healthcare workers included the following: conducting an employee survey about influenza knowledge, providing employee education based on survey findings and Centers for Disease Control and Prevention recommendations, making employee vaccines readily available and free of charge, designating immunization nurses to serve as clinical champions, monitoring and reporting the employee influenza vaccination rate, and recognizing the clinic with the highest employee vaccination rate. RESULTS: Influenza vaccination coverage rates in pregnant women increased from 2.5% at baseline to 37.4% in 2008-2009. Employee influenza vaccination coverage rates increased from 36.0% in 2003-2004 to 64.0% in 2008-2009. CONCLUSION: Low influenza vaccination rates in pregnant women and healthcare workers can be substantially improved using methods shown to be effective in other clinical settings.

Douville, L. E., A. Myers, M. A. Jackson and J. D. Lantos. "**Health care worker knowledge, attitudes, and beliefs regarding mandatory influenza vaccination.**" Arch Pediatr Adolesc Med **2010** 164(1): 33-37.

OBJECTIVE: To determine the attitudes, beliefs, and knowledge of children's hospital health care workers toward mandatory influenza vaccination. DESIGN: Self-administered, Web-based questionnaire. SETTING: A large, tertiary children's hospital. PARTICIPANTS: A random sample of 585 health care workers, including physicians, nurses, and all other hospital employees. Outcome Measure Attitudes of health care workers toward mandatory policies for annual influenza vaccination of health care workers as related to their opinions on safety, effectiveness, and knowledge about influenza and influenza vaccination. RESULTS: Many employees (70%) thought influenza vaccination should be mandatory for health care workers who did not have a medical contraindication. Nearly everyone, 363 of 391 (94%), who favored mandatory immunization had been immunized themselves. Of those who opposed mandatory immunization, 45 of 81 (55.6%) had been immunized ($P < .001$). Individuals who supported mandatory policies were more likely to believe that the vaccine is safe for both children and adults. There was no significant difference between the percentages of promandate and antimandate employees who believed influenza was dangerous for the patients where they work (66.5% and 62%, respectively, $P = .07$). Only 29% of antimandate employees believed they were at high risk of contracting influenza, compared with 51% of promandate employees ($P < .001$). CONCLUSIONS: Approval of mandatory influenza vaccine policies was high; however, attitudes about the dangers of influenza for patients were not associated with acceptance of mandatory vaccination policies for health care workers. Educational efforts targeting health care workers' fears and misconceptions about influenza vaccines might help to decrease the reservoir of unimmunized health care workers.

Session 5: Best practices to increasing vaccination rates among healthcare workers

Presentation Carmen Montaña HproImmune: European project for the promotion of Immunization for health professionals

HProImmune is a 3-year project funded by the DG SANCO Public Health Program 2008 - 2013 aiming to promote immunization among Health Care Workers (HCWs) in Europe
<http://www.hproimmune.eu/>



Presentation Helene Maltezou Strategies to increase influenza vaccine uptake among health care workers in Greece

Maltezou, H. C., A. Maragos, V. Raftopoulos, K. Karageorgou, T. Halharapi, H. Remoudaki, T. Papadimitriou and I. N. Pierroutsakos. "**Strategies to increase influenza vaccine uptake among health care workers in Greece.**" *Scand J Infect Dis* 2008 40(3): 266-268.

The aim of the current study was to investigate the contribution of various strategies to increase influenza vaccine uptake among health care workers (HCWs) working in hospitals in Greece during the 2005-2006 season. A total of 132 Greek public hospitals participated in the study. The mean HCWs vaccination rate against influenza during 2005-2006 was 16.36% compared with 1.72% during the previous season. Logistic regression analysis showed that the implementation of the following strategies was significantly associated with influenza vaccination rates above the mean vaccination rate: a mobile vaccination team (OR 2.942, 95% CI 1.154-5.382, p-value 0.016) and lectures on influenza and influenza vaccine (OR 2.386, 95% CI 0.999-5.704, p-value 0.036). In conclusion, in Greece influenza vaccination rates among HCWs remain low; however, the implementation of specific strategies was associated with increased vaccine uptakes. (see session 4)

Presentation Eelko Hak Can a successful implementation program be developed to increase influenza vaccine uptake among Hospital Care Workers?

Looijmans-van den Akker, I., M. E. Hulscher, T. J. Verheij, J. Riphagen-Dalhuisen, J. J. van Delden and **E. Hak**. "**How to develop a program to increase influenza vaccine uptake among workers in health care settings?**" *Implement Sci* 2011 6: 47.

BACKGROUND: Apart from direct protection and reduced productivity loss during epidemics, the main reason to immunize healthcare workers (HCWs) against influenza is to provide indirect protection of frail patients through reduced transmission in healthcare settings. Because the vaccine uptake among HCWs remains far below the health objectives, systematic programs are needed to take full advantage of such vaccination. In an earlier report, we showed a mean 9% increase of vaccine uptake among HCWs in nursing homes that implemented a systematic program compared with control homes, with higher rates in those homes that implemented more program elements. Here, we report in detail the process of the development of the implementation program to enable researchers and practitioners to develop intervention programs tailored to their setting. **METHODS:** We applied the intervention mapping (IM) method to develop a theory- and

evidence-based intervention program to change vaccination behaviour among HCWs in nursing homes. RESULTS: After a comprehensive needs assessment, we were able to specify proximal program objectives and selected methods and strategies for inducing behavioural change. By consensus, we decided on planning of three main program components, i.e., an outreach visit to all nursing homes, plenary information meetings, and the appointment of a program coordinator -- preferably a physician -- in each home. Finally, we planned program adoption, implementation, and evaluation. CONCLUSION: The IM methodology resulted in a systematic, comprehensive, and transparent procedure of program development. A potentially effective intervention program to change influenza vaccination behaviour among HCWs was developed, and its impact was assessed in a clustered randomised controlled trial.

Hopman, C. E., J. Riphagen-Dalhuisen, I. Looijmans-van den Akker, G. Frijstein, A. D. Van der Geest-Blankert, M. B. Danhof-Pont, H. J. De Jager, A. A. Bos, E. Smeets, M. J. De Vries, et al. "**Determination of factors required to increase uptake of influenza vaccination among hospital-based healthcare workers.**" J Hosp Infect **2011** 77(4): 327-331.

A questionnaire study was performed in all eight University Medical Centers in The Netherlands to determine the predictors of influenza vaccination compliance in hospital-based healthcare workers (HCWs). Demographical, behavioural and organisational determinants were assessed based on behavioural and implementation models. Multivariable regression analysis was applied to assess the independent predictors for influenza vaccine uptake. Age >40 years, the presence of a chronic illness, awareness of personal risk and awareness of risk of infecting patients, trust in the effectiveness of the vaccine to reduce the risk of infecting patients, the HCWs' duty to do no harm and their duty to ensure continuity of care, finding vaccination useful despite the constant flow of visitors and having knowledge of the Health Council's advice, social influence and convenient time for vaccination were all independently associated with vaccine uptake. The accuracy of the prediction model was very high (area under the receiver operating curve: 0.95). Intervention programmes to increase influenza vaccine uptake among HCWs should target the relevant determinants identified in this study.

Riphagen-Dalhuisen, J., G. Gefenaite and **E. Hak**. "**Predictors of seasonal influenza vaccination among healthcare workers in hospitals: a descriptive meta-analysis.**" Occup Environ Med **2012** 69(4): 230-235.

OBJECTIVE: Vaccinating healthcare workers (HCWs) against influenza is one of the most important methods of decreasing influenza transmission among at-risk patients in healthcare facilities. However, despite recommendations, the rate of uptake of influenza vaccine among HCWs remains low. The objective of this meta-analysis was to determine the most important predictors of seasonal influenza vaccine acceptance among HCWs in hospitals. METHOD: A literature search of PubMed and Embase resulted in 4586 hits. Screening of the titles, abstracts and full text identified 13 studies eligible for inclusion in the meta-analysis. Based on the crude data, pooled risk ratios (Mantel-Haenszel risk ratios, mhRR) and their 95% CIs were calculated using Mantel-Haenszel analysis to estimate the associations of predictors with influenza vaccination status. RESULTS AND CONCLUSION: Knowing that the vaccine is effective (mhRR 2.22; 95% CI 1.93 to 2.54), being willing to prevent influenza transmission (mhRR 2.31; 95% CI 1.97 to 2.70), believing that influenza is highly contagious (RR 2.25; 95% CI 1.66 to 3.05), believing that influenza prevention is important (mhRR 3.63; 95% CI 2.87 to 4.59) and having a family that is usually vaccinated (RR 2.32; 95% CI 1.64 to 3.28) were statistically significantly associated with a twofold higher vaccine uptake. We therefore recommend targeting these predictors when developing new influenza vaccination implementation strategies for hospital HCWs.

Looijmans-van den Akker, I., J. J. van Delden, T. J. Verheij, M. A. van der Sande, G. A. van Essen, J. Riphagen-Dalhuisen, M. E. Hulscher and **E. Hak**. **"Effects of a multi-faceted program to increase influenza vaccine uptake among health care workers in nursing homes: A cluster randomised controlled trial."** *Vaccine* 2010 28(31): 5086-5092.

Despite the recommendation of the Dutch association of nursing home physicians (NVVA) to be immunized against influenza, vaccine uptake among HCWs in nursing homes remains unacceptably low. Therefore we conducted a cluster randomised controlled trial among 33 Dutch nursing homes to assess the effects of a systematically developed multi-faceted intervention program on influenza vaccine uptake among HCWs. The intervention program resulted in a significantly higher, though moderate, influenza vaccine uptake among HCWs in nursing homes. To take full advantage of this measure, either the program should be adjusted and implemented over a longer time period or mandatory influenza vaccination should be considered.

van den Dool, C., M. J. Bonten, **E. Hak** and J. Wallinga. **"Modeling the effects of influenza vaccination of health care workers in hospital departments."** *Vaccine* 2009 27(44): 6261-6267.

Nowadays health care worker (HCW) vaccination is widely recommended. Although the benefits of this strategy have been demonstrated in long-term care settings, no studies have been performed in regular hospital departments. We adapt a previously developed model of influenza transmission in a long-term care nursing home department to study the effects of HCW vaccination in hospital wards. We study both the effectiveness and efficiency in reducing the hazard rates of influenza virus infection for patients. Most scenarios under study show a similar or higher impact of hospital HCW vaccination than has been predicted for the long-term care nursing home department. Therefore, it seems justified to extend the recommendations for HCW vaccination, based on results in the long-term care setting, to short-term care settings as well.

Looijmans-van den Akker, I., J. J. van Delden, T. J. Verheij, G. A. van Essen, M. A. van der Sande, M. E. Hulscher and **E. Hak**. **"Which determinants should be targeted to increase influenza vaccination uptake among health care workers in nursing homes?"** *Vaccine* 2009 27(34): 4724-4730.

Although health care workers (HCWs) have been recommended to be immunized against influenza, vaccine uptake remains low. So far, research on determinants of influenza vaccination among HCWs has been limited by design, population or theoretical framework. Therefore we conducted a questionnaire study in Dutch nursing homes to assess which demographical, behavioural and organisational determinants were associated with influenza vaccine uptake among HCWs. We were able to accurately predict vaccine uptake based on a 13-item prediction model including two demographical, nine behavioural and two organisational determinants developed with data from 1,125 respondents (response rate 60%). To further increase influenza vaccine uptake, implementation programs should target these determinants.

Looijmans-van den Akker, I., B. Marsaoui, **E. Hak** and J. J. van Delden. **"Beliefs on mandatory influenza vaccination of health care workers in nursing homes: a questionnaire study from the Netherlands."** *J Am Geriatr Soc* 2009 57(12): 2253-2256.

OBJECTIVES: To assess whether nursing homes (NHs) made organizational improvements to increase influenza vaccination rates in healthcare workers (HCWs) and to quantify the beliefs of NH administrators on the arguments used in favor of implementation of mandatory influenza vaccination of HCWs. DESIGN: Anonymous questionnaire study. SETTING: Dutch NHs. PARTICIPANTS: Dutch NH administrators. MEASUREMENTS: Influenza vaccination rates in NH residents and NH HCWs, organizational aspects of influenza vaccination of HCWs, and

agreement of respondents with arguments in favor of implementation of mandatory influenza vaccination in HCWs. RESULTS: Of the 310 distributed questionnaires, 185 were returned (response rate 59.7%). The average vaccination rate in NH HCWs was 18.8% and in NH residents was 91.6%. In all, 126 (68.1%) NHs had a written policy, 161 (87.0%) actively requested that their employees be immunized, and 161 (87.0%) offered information to HCWs in any way. Despite the fact that the majority of NH administrators (>69%) agreed with all arguments in favor of implementation of mandatory influenza vaccination, only a minority (24.3%) agreed that mandatory vaccination should be implemented if voluntary vaccination fails to reach sufficient vaccination rates. CONCLUSION: Despite the low vaccination rate of NH HCWs, most NH administrators did not support mandatory influenza vaccination of NH HCWs.

van den Dool, C., M. J. Bonten, **E. Hak**, J. C. Heijne and J. Wallinga. "**The effects of influenza vaccination of health care workers in nursing homes: insights from a mathematical model.**" *PLoS Med* 2008 5(10): e200.

BACKGROUND: Annual influenza vaccination of institutional health care workers (HCWs) is advised in most Western countries, but adherence to this recommendation is generally low. Although protective effects of this intervention for nursing home patients have been demonstrated in some clinical trials, the exact relationship between increased vaccine uptake among HCWs and protection of patients remains unknown owing to variations between study designs, settings, intensity of influenza seasons, and failure to control all effect modifiers. Therefore, we use a mathematical model to estimate the effects of HCW vaccination in different scenarios and to identify a herd immunity threshold in a nursing home department. METHODS AND FINDINGS: We use a stochastic individual-based model with discrete time intervals to simulate influenza virus transmission in a 30-bed long-term care nursing home department. We simulate different levels of HCW vaccine uptake and study the effect on influenza virus attack rates among patients for different institutional and seasonal scenarios. Our model reveals a robust linear relationship between the number of HCWs vaccinated and the expected number of influenza virus infections among patients. In a realistic scenario, approximately 60% of influenza virus infections among patients can be prevented when the HCW vaccination rate increases from 0 to 1. A threshold for herd immunity is not detected. Due to stochastic variations, the differences in patient attack rates between departments are high and large outbreaks can occur for every level of HCW vaccine uptake. CONCLUSIONS: The absence of herd immunity in nursing homes implies that vaccination of every additional HCW protects an additional fraction of patients. Because of large stochastic variations, results of small-sized clinical trials on the effects of HCW vaccination should be interpreted with great care. Moreover, the large variations in attack rates should be taken into account when designing future studies.

Presentation Anna Llupia Influenza vaccination: how to reach health care workers.

Llupia, A., A. L. Garcia-Basteiro, V. Olive, L. Costas, J. Rios, S. Quesada, P. Varela, J. M. Bayas and A. Trilla. "**New interventions to increase influenza vaccination rates in health care workers.**" *Am J Infect Control* 2010 38(6): 476-481.

BACKGROUND: The most effective strategy for avoiding nosocomial influenza outbreaks is through vaccination of health care workers (HCWs). In Spain, HCW vaccination coverage rarely exceeds 25%. The objective of this study was to determine whether an active vaccination campaign promoting communication among HCWs increased influenza vaccination coverage rates and permitted a shorter campaign. METHODS: This was a before-after trial, comparing free mobile

vaccination teams without and with strategies promoting HCW involvement by means of weekly educational and promotional messages through electronic mail, including 2 prize draws for vaccinated HCWs and a Web page including pictures of vaccinated HCWs and all senior hospital management. Weekly coverages were publicized, the staff of mobile units was increased, and their routes in the hospital were advertised. The study population was >4500 HCWs (permanent and temporary staff) at a Spanish university hospital during the 2007-08 and 2008-09 influenza seasons. RESULTS: Coverage was 23% (95% confidence interval [CI], 22.5%-24.9%) in the 2007-08 season and 37% (95% CI, 34.7%-37.4%) in 2008-09 season. The vaccination rate was highest in HCWs aged > or =65 years and in physicians. The weekly vaccination rates were significantly higher for the 2008-09 season compared with the 2007-08 season except for the first and third weeks; for example, in week 2, the rate was 1.7 HCWs per 100 persons-week (95% CI, 1.3-2.1) in 2007-08, compared with 3.7 HCWs per 100 persons-week (95% CI, 3.2-4.4) in 2009-09. Rate increases were concentrated in the first weeks of the program, with a peak occurring in week 3 during the 2007-08 season and in week 2 during the 2008-09 season. CONCLUSION: This intervention improved influenza vaccination coverage of HCWs and allowed more rapid achievement of higher coverage.

Presentation Sheila Huynh. Mandatory influenza vaccination of healthcare workers: A successful implementation by a community healthcare system.

Huynh, S., P. Poduska, T. Mallozzi and F. Culler. "Mandatory influenza vaccination of health care workers: A first-year success implementation by a community health care system." *Am J Infect Control* 2012.

Poudre Valley Health System is a private, not-for-profit health care system of more than 5,300 employees. Poudre Valley Health System increased its influenza vaccination coverage rate among health care workers from 68% in 2009 to 95.5% in 2010 after implementing a mandatory influenza vaccination program.

Presentation Klaus Schmid Obligatory occupational health check increases vaccination rates among medical students.

Schmid, K., K. Merkl, K. Hiddemann-Koca and H. Drexler. "Obligatory occupational health check increases vaccination rates among medical students." *J Hosp Infect* 2008 70(1): 71-75.

In October 2002 an obligatory occupational health check for all preclinical students at the University of Erlangen-Nuremberg was introduced. Over the period 2005 to 2007, medical students started their clinical year either with or without a health check during their preclinical years. The aim of the study was to evaluate the efficacy of health checks for preclinical students with respect to vaccination rates. At the beginning of the clinical year we examined 242 consecutive students, 121 with and 121 without a preceding preclinical occupational health check. The immunisation rate against hepatitis B increased during medical education from 50% to 96% in women and from 58% to 96% in men. In medical students without an initial occupational health check, vaccination rates were significantly lower (85% in women and 81% in men). A significant benefit from the preclinical check was seen in men regarding immunisation status for hepatitis B, tetanus, diphtheria, polio, rubella and mumps and in women for hepatitis B and rubella. This study demonstrates that it is possible to significantly increase vaccination rates, particularly for men. Even in medical students starting their clinical training, an individual occupational health check is necessary to optimise immunisation against

infectious diseases. Routine occupational health checks could make an important contribution to closing gaps in vaccination coverage.

Extra recent publications on session 5 : Pubmed MEDLINE search on {(Healthcare workers OR HCW) AND (vaccine* OR Immuni*)} in all fields and published from 2010 on, was performed. Manual selection in End-note was performed

Mena, G., A. Llupia, A. L. Garcia-Basteiro, M. Aldea, V. G. Sequera and A. Trilla. "**The willingness of medical students to use Facebook as a training channel for professional habits: the case of influenza vaccination.**" Cyberpsychol Behav Soc Netw 2012 15(6): 328-331.

The low acceptance of influenza vaccination by both medical students and healthcare workers (HCWs) signals the need for innovative strategies. We administered an anonymous questionnaire to 410 University of Barcelona medical students who were asked about using the Internet to find information on influenza vaccination of HCWs and about their willingness to use technical and informal Facebook pages as an information channel on this topic. Of the 410 participants, 74.1 percent were female and 58.3 percent were in the first preclinical 3-year university cycle. A total of 7.6 percent participants reported using the Internet for queries on influenza vaccination, 89.8 percent reported that they were Facebook users, and 275 (67.1 percent) would accept an invitation from the technical or informal Facebook pages. The technical Web site would be actively followed by 77, or by 30.0 percent of those who would accept the invitation and the informal site by 116 (43.6 percent of those who would accept). The marked willingness to use Facebook to obtain information on the influenza vaccination of HCWs potentially opens a new window in health education: social networks could be used to help create professional habits. Students would be more likely to engage with this type of Facebook page if the contents were informal rather than highly technical.

Chen, S. C., G. Hawkins, E. Aspinall and N. Patel. "**Factors influencing uptake of influenza A (H1N1) vaccine amongst healthcare workers in a regional pediatric centre: lessons for improving vaccination rates.**" Vaccine 2012 30(2): 493-497.

BACKGROUND: Influenza A (H1N1) vaccination has been recommended for all frontline healthcare workers (HCWs) in the UK since October 2009, to protect individuals and their patients from infection. Understanding the factors influencing vaccine uptake by HCW may improve future vaccination programmes in current and subsequent years. AIMS: To assess the uptake of influenza A (H1N1) vaccine, and factors affecting vaccine uptake, in frontline healthcare workers in a large pediatric hospital. METHOD: A cross-sectional questionnaire survey conducted in a regional Pediatric Hospital in Scotland incorporating intensive care and ECMO services. One page, anonymised questionnaires were distributed to all frontline HCW in high risk departments of the hospital. RESULTS: 260 questionnaires were completed, capturing an estimated 52% of all staff. Vaccination rate was 49.6%, and was significantly higher amongst doctors (OR 2.4, 95% CI 1.3-4.5, P=0.005). Commonest reasons for vaccine uptake were high risk of contact with H1N1 (88%) and responsibility to protect patients (71%). Uncertainty about vaccine side-effects (47%), concern about vaccine safety (33%) and being too busy to attend the vaccine clinic (22%) were the commonest reasons for non-vaccination. Reasons for vaccination varied between staff grouping and department. 36% of non-vaccinated staff would accept the vaccine if

offered. CONCLUSIONS: Vaccine uptake may be increased by addressing HCW knowledge and attitudes and access to vaccine. Future vaccination programmes should include targeted education and vaccine delivery, at the convenience of staff, and in their own department.

Tagajdid, M. R., H. El Annaz, B. Belefquih, T. Doblali, J. S. Casalegno, Y. Mekki and S. Mrani. "**Factors influencing uptake of influenza vaccine amongst healthcare workers in a regional center after the A(H1N1) 2009 pandemic: lessons for improving vaccination rates.**" *Int J Risk Saf Med* **2011** 23(4): 249-254.

BACKGROUND: Vaccination of health-care workers (HCWs) against seasonal influenza has been consistently recommended worldwide in order to prevent nosocomial transmission and ensure delivery of health-care services during outbreaks. Overall, immunization rates were low across all nation, including among HCWs. Little is known about the acceptability and compliance with seasonal influenza vaccine among HCWs after the A(H1N1) 2009 pandemic.

PARTICIPANTS AND SETTING: Between 1st and 31 January 2011, we conducted a questionnaire-based survey at the Ibn Sina regional center (Rabat, Morocco). Seven hundred twenty one HCWs have answered about their influenza immunization during the 2010/2011 season, as well as the reasons for accepting or declining this vaccine. Finally, we compare our results with previous moroccan survey. RESULTS: A total of 122 HCWs (17%) reported having received the 2010/2011 seasonal vaccine; "self-protection" and "protection of the patient" were the most frequently adduced reasons for acceptance of the influenza vaccination, whereas media controversy during the pandemic was the main argument for refusal. DISCUSSION: The post pandemic seasonal influenza vaccination coverage among the HCWs in our institution was very low. The role of media, specific attitudinal barriers and misconceptions about immunization in a global pandemic scenario is clear. The nearly constant media coverage of the A (H1N1) 2009 pandemic, reported with varying degrees of accuracy, and sometimes portraying dramatic scenarios caused some to question whether unnecessary alarm and public panic resulted. We suggest that international or national health authorities have a clear speech over looked media and to own these institutions, which will air fair and real time information about the disease.

Seale, H., J. Leask and C. R. Macintyre. "**Awareness, attitudes and behavior of hospital healthcare workers towards a mandatory vaccination directive: two years on.**" *Vaccine* **2011** 29(21): 3734-3737.

In 2007, the state of New South Wales, Australia instituted a policy directive with compulsory provisions for health care workers to be vaccinated. This study sought to identify staff awareness and attitudes two years after it was implemented. It involved a self administered paper-based questionnaire of HCWs in two tertiary-referral teaching hospitals in Sydney, Australia in 2009. In the early phase, general awareness of the policy was incomplete and detailed knowledge was poor. However, support levels were high. Two years later, while the respondents indicated that they were aware that there was a policy in place, very few of the respondents were able to accurately describe its requirements. Regardless of the level of knowledge, support for the policy was still high (83% vs. 91%, respectively). Despite the high levels of general support for the vaccine policy directive in NSW, this study indicates that including influenza vaccination into the policy could be challenging.

Ottenberg, A. L., J. T. Wu, G. A. Poland, R. M. Jacobson, B. A. Koenig and J. C. Tilburt. "**Vaccinating health care workers against influenza: the ethical and legal rationale for a mandate.**" *Am J Public Health* **2011** 101(2): 212-216.

Despite improvements in clinician education, symptom awareness, and respiratory

precautions, influenza vaccination rates for health care workers have remained unacceptably low for more than three decades, adversely affecting patient safety. When public health is jeopardized, and a safe, low-cost, and effective method to achieve patient safety exists, health care organizations and public health authorities have a responsibility to take action and change the status quo. Mandatory influenza vaccination for health care workers is supported not only by scientific data but also by ethical principles and legal precedent. The recent influenza pandemic provides an opportunity for policymakers to reconsider the benefits of mandating influenza vaccination for health care workers, including building public trust, enhancing patient safety, and strengthening the health care workforce.

Helms, C., J. Leask, S. C. Robbins, M. Y. Chow and P. McIntyre. "**Implementation of mandatory immunisation of healthcare workers: observations from New South Wales, Australia.**" Vaccine **2011** 29(16): 2895-2901.

OBJECTIVE: To identify factors influencing implementation of a state-wide mandatory immunisation policy for healthcare workers (HCWs) in New South Wales (NSW), Australia, in 2007. Vaccines included were measles, mumps, rubella, varicella, hepatitis B, diphtheria, tetanus and pertussis, but not influenza. **METHODS:** We evaluated the first 2 years of this policy directive in 2009. A qualitative study was conducted among 4 stakeholder groups (the central health department, hospitals, health professional associations, and universities). 58 participants were identified using maximum variation sampling and data were analysed using a hierarchical thematic framework. Quantitative data on policy compliance were reviewed at the regional level. **RESULTS:** Success in policy implementation was associated with effective communication, including support of clinical leaders, provision of free vaccine, access to occupational health services which included immunisation, and appropriate data collection and reporting systems. Achieving high vaccine uptake was more challenging with existing employees and with smaller institutions. **CONCLUSION:** These findings may apply to other jurisdictions in Australia or internationally considering mandatory approaches to HCW vaccination.

Greer, A. L. and D. N. Fisman. "**Use of models to identify cost-effective interventions: pertussis vaccination for pediatric health care workers.**" Pediatrics **2011** 128(3): e591-599.

OBJECTIVE: Acellular pertussis vaccine is safe and effective in adults. An explicit recommendation for pertussis booster vaccination in pediatric health care workers is based on the importance of health care workers as a potential source of infection for patients. However, limited information is available on the economic attractiveness of this intervention. We sought to evaluate the health-economic attractiveness of a diphtheria-tetanus-acellular pertussis booster vaccination program for health care workers in a pediatric intensive care setting. **METHODS:** We developed a Markov model to calculate the cost-effectiveness of vaccinating NICU health care workers in different proportions ranging from the current strategy of no pertussis booster vaccination program to a vaccination program that achieves between 25% and 95% vaccine coverage. **RESULTS:** Implementation of a vaccination program that achieves 25% coverage was projected to be cost-saving compared with no vaccine program. At all coverage levels the intervention reduced costs, increased life expectancy, and was cost-effective. Projections were most sensitive to the risk of a pertussis introduction via an infected health care worker. Once the monthly risk of an introduction exceeded approximately 0.3%, implementation of an immunization program with at least 25% coverage provided both greater health and greater economic benefits than having no vaccine program. **CONCLUSIONS:** The implementation of a hospital-based and funded

diphtheria-tetanus-acellular pertussis vaccine program administered through an occupational health program is cost-effective or cost-saving in the context of pediatric health care facilities in which many of the patients are at risk of serious morbidity and mortality should they acquire pertussis while hospitalized.

Glaser, M. S., S. Chui, M. P. Webber, J. Gustave, R. Lee, M. T. McLaughlin, V. Ortiz, D. Prezant and K. Kelly. "**Predictors of acceptance of H1N1 influenza vaccination by FDNY firefighters and EMS workers.**" *Vaccine* 2011 29(34): 5675-5680.

BACKGROUND: There is a widely recognized need for vaccination of health care workers (HCWs). We undertook this study to assess the 2009-2010 H1N1 vaccination rates in approximately 14,000 firefighters and emergency medical service (EMS) workers at the Fire Department of New York (FDNY) and to determine predictors of H1N1 vaccine acceptance. METHODS: After 9/11/01, FDNY developed a bio-preparedness drill where units are dispatched to FDNY-BIOPOD (biologic points of distributions) for rapid distribution of medications/vaccines in the event of a biological disaster. Since 2005, FDNY offers free, voluntary seasonal influenza vaccination during routine medical monitoring/treatment examinations and at FDNY-BIOPOD. In 2009, FDNY-BIOPOD instead offered the H1N1 vaccine. We report on FDNY H1N1 vaccination rates and on predictors of acceptance using bivariate and multivariable techniques. RESULTS: Overall, 10,612 (77%) FDNY workers were offered H1N1 vaccination, of whom 5831 (55%) accepted. Acceptance was 57.2% during FDNY-BIOPOD compared with 34.4% during medical monitoring/treatment exams ($p=0.0001$). Workers who accepted prior seasonal influenza vaccinations were 4 times more likely to accept H1N1 vaccination (AOR=4.4, CI(95)=4.0-4.8). CONCLUSION: FDNY offered H1N1 vaccination to 77% of its workforce during the 2009-2010 season. Prior seasonal vaccine acceptance and vaccination in a group setting such as FDNY-BIOPOD dramatically increased acceptance of the H1N1 vaccine. However, within a voluntary program, additional strategies are needed to further increase vaccine acceptance in first responders and other HCWs.

Feemster, K. A., P. Prasad, M. J. Smith, C. Feudtner, A. Caplan, P. Offit and S. E. Coffin. "**Employee designation and health care worker support of an influenza vaccine mandate at a large pediatric tertiary care hospital.**" *Vaccine* 2011 29(9): 1762-1769.

AIM: Determine predictors of support of a mandatory seasonal influenza vaccine program among health care workers (HCWs). SCOPE: Cross-sectional anonymous survey of 2443 (out of 8093) randomly selected clinical and non-clinical HCWs at a large pediatric network after implementation of a mandatory vaccination program in 2009-10. RESULTS: 1388 HCWs (58.2%) completed the survey and 75.2% of respondents reported agreeing with the new mandatory policy. Most respondents (72%) believed that the policy was coercive but >90% agreed that the policy was important for protecting patients and staff and was part of professional ethical responsibility. When we adjusted for attitudes and beliefs regarding influenza and the mandate, there was no significant difference between clinical and nonclinical staff in their support of the mandate (OR 1.08, 95% C.I. 0.94, 1.26). CONCLUSIONS: Attitudes and beliefs regarding influenza and the mandate may transcend professional role. Targeted outreach activities can capitalize on beliefs regarding patient protection and ethical responsibility.

Cadena, J., T. Prigmore, J. Bowling, B. A. Ayala, L. Kirkman, A. Parekh, T. Scepanski and J. E. Patterson. "**Improving influenza vaccination of healthcare workers by means of quality improvement tools.**" *Infect Control Hosp Epidemiol* 2011 32(6): 616-618.

For a healthcare worker seasonal influenza vaccination quality improvement project, interventions included support of leadership, distribution of vaccine kits, grand rounds, an influenza website, a screensaver, e-mails, phone messages, and

audit feedback. Vaccination rates increased from 58.8% to 76.6% ($P < .01$). Quality improvement increased the voluntary vaccination rate but did not achieve a rate more than 80%.

Boccia, A., D. Di Thiene, M. De Giusti and G. La Torre. "**Seasonal and pandemic influenza: the role of communication and preventive strategies.**" J Prev Med Hyg 2011 52(3): 124-126.

Appropriate, timely, and data-driven health information is a very important issue in preventive strategies against influenza. Intuitively, a link between willingness to be vaccinated against seasonal influenza and against pandemic influenza exists, given the similarities in decision-making for this vaccine. International and national literature reviews suggest that progress has been made in order to incorporate and disseminate crisis risk communication principles into public health practice, as such investments in public health could be important for building capacity and practice which aid in the realization of countermeasures in response to a future pandemic and epidemic situation. This study emphasizes the lack of perception by Health Care Workers (HCWs) of the importance of being immunized against seasonal and pandemic influenza and the doubts concerning safety. In the future, particular efforts are needed during vaccination campaigns, to provide more information to HCWs and the general population regarding role and safety of such vaccines.

Amodio, E., F. Tramuto, G. Maringhini, R. Ascianto, A. Firenze, F. Vitale, C. Costantino and G. Calamusa. "**Are medical residents a "core group" for future improvement of influenza vaccination coverage in health-care workers? A study among medical residents at the University Hospital of Palermo (Sicily).**" Vaccine 2011 29(45): 8113-8117.

Despite international recommendations, vaccination coverage among European healthcare workers, including physicians, is widely recognized as unsatisfactory. In order to plan tailored vaccination campaigns and increase future coverage, we investigated reasons for refusing vaccination and determinants associated with influenza vaccine uptake among young health care workers. A survey was carried out during September and October 2010 on medical residents attending post-graduate Schools of the Medical Faculty at the University of Palermo (Italy). Each participant completed an anonymous web-based questionnaire including items on demographic and occupational characteristics, knowledge, attitudes and behaviours with regard to influenza and influenza vaccination, and main sources of information. A total of 202 (66.9%) out of 302 medical residents participated in the survey. During the 2009-2010 influenza vaccine campaign, 44 residents (21.8%) were vaccinated against seasonal influenza and 84 (41.6%) against pandemic influenza A (H1N1) 2009. For the impending 2010-2011 influenza season, 45 (22.3%) stated their intention to get vaccinated against seasonal influenza, 40 (19.8%) were uncertain and 117 (57.9%) were opposed. Considering themselves to be a high risk group for developing influenza was significantly associated with vaccination against both 2009-2010 seasonal (adj-OR=1.46; 95% CI=1.05-2.04) and pandemic A (H1N1) influenza (adj-OR 1.38; 95% CI=1.08-1.75). Intention to get vaccinated against 2010-2011 seasonal influenza was significantly more frequent in participants who had a high perception of efficacy/safety (adj-OR=1.49; 95% CI=1.05-2.12). After adjusting for confounding, vaccinations against seasonal 2009-2010 influenza, pandemic influenza A (H1N1) 2009 and seasonal 2010-2011 influenza were significantly more frequent in residents who were vaccinated against influenza at least once in the previous five influenza seasons. Influenza vaccination among medical residents appears to be habitual, with little comprehension of the rationale and logic for vaccination, including the need to be vaccinated to protect patients from nosocomial influenza infection. Our study

suggests the importance of prioritizing residents for vaccination campaigns, as they represent "the future" and include a core group that habitually accepts vaccination.

Yassi, A., K. Lockhart, J. A. Buxton and I. McDonald. "**Vaccination of health care workers for influenza: promote safety culture, not coercion.**" Can J Public Health **2010** 101 Suppl 1: S41-45.

OBJECTIVES: In British Columbia (BC), Canada, all health care facilities must have a written staff policy on influenza immunization that includes notice that non-immunized staff can be excluded from work without pay during an influenza outbreak in the facility. In light of this policy, our objectives were to explore the views of BC health care workers (HCWs) regarding how best to promote vaccine uptake. **METHODS:** Long-term care, and acute and community health sites in three of six health regions were divided into thirds, according to their previous season's vaccine uptake rates, and the upper and lower thirds targeted. Ten focus groups were held. NVivo software (QSR International) and a separate editing style were used for analysis. **RESULTS:** Four dominant themes emerged: knowledge, communication, perceived punitive nature of workplace policy, and safety climate. HCWs across all focus groups noted that influenza campaign communications should include reinforcement of basic infection control, workplace health and healthy lifestyle choices that affect overall health. HCWs indicated that they wanted a workplace policy that is easy to understand, respectful of individual choice and not punitive. **CONCLUSIONS:** Our findings highlight the importance of comprehensive approaches, a message that has not appeared as strongly in previous literature. Focus group participants pointed out the importance of health and safety at work generally and felt that creating a healthy workplace culture is necessary to promoting vaccine uptake. Future vaccine promotion initiatives should be integrated into facility-wide workplace health campaigns and care taken to ensure that vaccination campaigns do not appear coercive to HCWs.

Wicker, S., G. Marckmann, G. A. Poland and H. F. Rabenau. "**Healthcare workers' perceptions of mandatory vaccination: results of an anonymous survey in a German University Hospital.**" Infect Control Hosp Epidemiol **2010** 31(10): 1066-1069.

Despite decades of effort to encourage healthcare workers (HCWs) to be immunized, vaccination rates remain insufficient. Among German HCWs, 831 (68.4%) of 1,215 respondents supported mandatory vaccinations for HCWs in general. However, acceptance of mandatory vaccination varied significantly between physicians and nurses and also depended on the targeted disease.

Tao, X. G., J. Giampino, D. A. Dooley, F. E. Humphrey, D. M. Baron and E. J. Bernacki. "**Description of an influenza vaccination campaign and use of a randomized survey to determine participation rates.**" Infect Control Hosp Epidemiol **2010** 31(2): 151-157.

OBJECTIVES: To describe the procedures used during an influenza immunization program and the use of a randomized survey to quantify the vaccination rate among healthcare workers with and without patient contact. **DESIGN:** Influenza immunization vaccination program and a randomized survey. **SETTING:** Johns Hopkins University and Health System. **METHODS:** The 2008/2009 Johns Hopkins Influenza Immunization Program was administered to 40,000 employees, including 10,763 healthcare workers. A 10% randomized sample (1,084) of individuals were interviewed to evaluate the vaccination rate among healthcare workers with direct patient contact. **RESULTS:** Between September 23, 2008, and April 30, 2009, a total of 16,079 vaccinations were administered. Ninety-four percent (94.5%) of persons who were vaccinated received the vaccine in the first 7 weeks of the campaign. The randomized survey demonstrated an overall vaccination rate of 71.3% (95% confidence interval, 68.6%-74.0%) and a

vaccination rate for employees with direct patient contact of 82.8% (95% confidence interval, 80.1%-85.5%). The main reason (25.3%) for declining the program vaccine was because the employee had received documented vaccination elsewhere. CONCLUSIONS: The methods used to increase participation in the recent immunization program were successful, and a randomized survey to assess participation was found to be an efficient means of evaluating the workforce's level of potential immunity to the influenza virus.

Rice, R. "Is mandatory influenza vaccination for health care workers ethically permissible?" JAAPA 2010 23(6): 56, 58.

Rakita, R. M., B. A. Hagar, P. Crome and J. K. Lammert. "Mandatory influenza vaccination of healthcare workers: a 5-year study." Infect Control Hosp Epidemiol 2010 31(9): 881-888.

BACKGROUND: The rate of influenza vaccination among healthcare workers (HCWs) is low, despite a good rationale and strong recommendations for vaccination from many health organizations. OBJECTIVE: To increase influenza vaccination rates by instituting the first mandatory influenza vaccination program for HCWs. DESIGN AND SETTING: A 5-year study (from 2005 to 2010) at Virginia Mason Medical Center, a tertiary care, multispecialty medical center in Seattle, Washington, with approximately 5,000 employees. METHODS: All HCWs of the medical center were required to receive influenza vaccination. HCWs who were granted an accommodation for medical or religious reasons were required to wear a mask at work during influenza season. The main outcome measure was rate of influenza vaccination among HCWs. RESULTS: In the first year of the program, there were a total of 4,703 HCWs, of whom 4,588 (97.6%) were vaccinated, and influenza vaccination rates of more than 98% were sustained over the subsequent 4 years of our study. Less than 0.7% of HCWs were granted an accommodation for medical or religious reasons and were required to wear a mask at work during influenza season, and less than 0.2% of HCWs refused vaccination and left Virginia Mason Medical Center. CONCLUSION: A mandatory influenza vaccination program for HCWs is feasible, results in extremely high vaccination rates, and can be sustained over the course of several years.

O'Neal, D. J., 3rd. "Point counterpoint: mandatory flu vaccination for health care workers." Am J Nurs 2010 110(1): 26.

Lam, P. P., L. W. Chambers, D. M. MacDougall and A. E. McCarthy. "Seasonal influenza vaccination campaigns for health care personnel: systematic review." CMAJ 2010 182(12): E542-548.

BACKGROUND: In Canada, vaccination coverage for seasonal influenza among health care personnel remains below 50%. The objective of this review was to determine which seasonal influenza vaccination campaign or campaign components in health care settings were significantly associated with increases in influenza vaccination among staff. METHODS: We identified articles in eight electronic databases and included randomized controlled trials, controlled before-and-after studies and studies with interrupted time series designs in our review. Two reviewers independently abstracted the data and assessed the risk of biases. We calculated risk ratios and 95% confidence intervals for randomized controlled trials and controlled before-and-after studies and described interrupted time series studies. RESULTS: We identified 99 studies evaluating influenza vaccination campaigns for health care workers, but only 12 of the studies were eligible for review. In nonhospital health care settings, including long-term care facilities, campaigns with a greater variety of components (including education or promotion, better access to vaccines, legislation or regulation and/or role models) were

associated with higher risk ratios (i.e, favouring the intervention group). Within hospital settings, the results reported for various types of campaigns were mixed. Many of the criteria for assessing risk of bias were not reported.

INTERPRETATION: Campaigns involving only education or promotion resulted in minimal changes in vaccination rates. Further studies are needed to determine the appropriate components and combinations of components in influenza vaccination campaigns for health care personnel.

Heininger, U., M. Gambon, V. Gruber and D. Margelli. **"Successful hepatitis B immunization in non- and low responding health care workers."** Hum Vaccin 2010 6(9).

Health care workers (HCW) are at increased risk for acquisition of hepatitis B virus (HBV) infection from occupational exposure. This can be prevented by active immunization. We performed a retrospective chart review of HCW who were persistent low (anti-HBs antibody values <100 U/L) or non responders (<10 U/L) after 6 active immunizations and demonstrate successful immunization (anti-HBs \geq 100 U/l) after a total of 8-14 vaccine doses in 13 such HCW by use of various vaccination schedules. This "proof of principle" should encourage occupational health care providers to convince HCW to accept further vaccine doses until the targeted threshold considered to be the correlate of immunity has been reached. Prospective studies should be performed to determine the optimal schedule of further booster doses for HCW who are persistent non or low responders.

Crupi, R. S., D. Di John, P. M. Mangubat, D. Asnis, J. Devera, P. Maguire and S. L. Palevsky. **"Linking emergency preparedness and health care worker vaccination against influenza: a novel approach."** Jt Comm J Qual Patient Saf 2010 36(11): 499-503.

BACKGROUND: Health care workers (HCWs) can acquire and transmit influenza to their patients and coworkers, even while asymptomatic. The U.S. Healthy People 2010 initiative set a national goal of 60% coverage for HCW influenza vaccination by 2010. Yet vaccination rates remain low. In the 2008-2009 influenza season, Flushing Hospital Medical Center (FHMC; New York) adopted a "push/pull" point-of-dispensing (POD) vaccination model that was derived from emergency preparedness planning for mass vaccination and/or prophylaxis to respond to an infectious disease outbreak, whether occurring naturally or due to bioterrorism. LAUNCH OF THE HCW VACCINATION PROGRAM: In mid-September 2008, a two-week HCW vaccination program was launched using a sequential POD approach. In Push POD, teams assigned to specific patient units educated all HCWs about influenza vaccination and offered on-site vaccination; vaccinated HCWs received a 2009 identification (ID) validation sticker. In Pull POD, HCWs could enter the hospital only through one entrance; all other employee entrances were "locked down." A 2009 ID validation sticker was required for entry and to punch in for duty. Employees without the new validation sticker were directed to a nearby vaccination team. After the Push/Pull POD was completed, the employee vaccination drive at FHMC was continued for the remainder of the influenza season by the Employee Health Service. RESULTS: Using this model, in two days 72% of the employees were reached, with 54% of those reached accepting vaccination. CONCLUSIONS: This model provides a novel approach for institutions to improve their HCW influenza vaccination rates within a limited period through exercising emergency preparedness plans for infectious disease outbreaks.

Converso, A. R. **"Point counterpoint: mandatory flu vaccination for health care workers."** Am J Nurs 2010 110(1): 27.

Ajenjo, M. C., K. F. Woeltje, H. M. Babcock, N. Gemeinhart, M. Jones and V. J. Fraser. **"Influenza vaccination among healthcare workers: ten-year experience of a large healthcare organization."** *Infect Control Hosp Epidemiol* 2010 31(3): 233-240.

OBJECTIVE: To describe the results of different measures implemented to improve adherence to the healthcare worker (HCW) influenza immunization program at BJC HealthCare during the period from 1997 through 2007. DESIGN: Descriptive retrospective study. SETTING: BJC HealthCare, a 13-hospital nonprofit healthcare organization in the Midwest. METHODS: We reviewed and analyzed HCW influenza vaccination data from all BJC HealthCare Occupational Health Services and hospitals during the period from 1997 through 2007. Occupational health staff, infection prevention personnel, and key influenza vaccination campaign leaders were also interviewed regarding implementation measures during the study years. RESULTS: At the end of 2007, BJC HealthCare had approximately 26,000 employees. With the use of multiple progressive interventions, influenza vaccination rates among BJC employees increased from 45% in 1997 to 72% in 2007 ($P < .001$). The influenza vaccination rate in 2007 was significantly higher than in 2006: 72%, compared with 54% ($P < .001$). Five hospitals had influenza vaccination rates that exceeded the target goal of 80% in 2007. The most successful interventions were adding influenza vaccination rates to the quality scorecard incentive program and the use of declination statements, both of which were implemented in 2007. The most important barriers to success identified by interview respondents were HCWs' misconceptions about influenza vaccination and a perceived lack of leadership support. CONCLUSIONS: Influenza vaccination rates among HCWs significantly improved with multiple interventions over the years. However, the BJC HealthCare influenza vaccination target of 80% was not attained at all hospitals with these measures. More aggressive interventions, such as implementing mandatory influenza vaccination policies, are needed to achieve higher vaccination rates.

Abramson, Z. H., O. Avni, O. Levi and I. N. Miskin. **"Randomized trial of a program to increase staff influenza vaccination in primary care clinics."** *Ann Fam Med* 2010 8(4): 293-298.

PURPOSE: Although vaccination of health care workers against influenza is widely recommended, vaccination uptake is low. Data on interventions to increase staff immunization in primary care are lacking. We examine the effect of a promotional and educational intervention program, not addressing vaccine availability, to raise the influenza vaccination rate among staff in primary care clinics. METHODS: The study included all 344 staff members with direct patient contact (physicians, nurses, pharmacists, and administrative and ancillary staff) in 27 primary care community clinics in the Jerusalem area during the 2007-2008 influenza season. Thirteen clinics were randomly selected for an intervention that consisted of a lecture session given by a family physician, e-mail-distributed literature and reminders, and a key figure from the local staff who personally approached each staff member. RESULTS: Influenza immunization rate was 52.8% (86 of 163) in the intervention group compared with 26.5% (48 of 181) in the control group ($P < .001$). When compared with the rate of immunization for the previous season, the absolute increase in immunization rate was 25.8% in the intervention clinics and 6.6% in the control clinics. Multivariate analysis showed a highly significant ($P < .001$) independent association between intervention and immunization, with an odds ratio of 3.51 (95% confidence interval, 2.03-6.09). CONCLUSION: We have developed an effective intervention program to increase previously low vaccination rates among primary health care workers. This simple intervention could be reproduced easily in other clinics and organizations with an expected substantial increase in influenza immunization rates.

2. Bibliography of the Speakers

List of publications achieved via speakers form when this form was not available a Pubmed MEDLINE search was performed on Name of the speaker in [Author]-field and 'vaccin' in [all fields]. If more than 10 references only the most recent articles are shown.

LORENZO PEZZOLI (Epidemiology consultant)

1. Chaibou MS, Bako H, Salisou L, Yaméogo TM, Sambo M, Kim SH, Djingarey MH, Zuber PLF, Perea WA, **Pezzoli L**. Monitoring adverse events following immunization with a new conjugate vaccine against group A meningococcus in Niger, September 2010. *Vaccine*. 2012 Jul 27;30(35):5229-34. Epub 2012 Jun 16. <http://www.ncbi.nlm.nih.gov/pubmed/22709955>
2. **Pezzoli L**, Conteh I, Kamara W, Gacic-Dobo M, Ronveaux O, Perea WA, Lewis RF. Intervene before leaving: clustered lot quality assurance sampling to monitor vaccination coverage at health district level before the end of a yellow fever and measles vaccination campaign in Sierra Leone in 2009. *BMC Public Health*. 2012 Jun 7;12(1):415. <http://www.ncbi.nlm.nih.gov/pubmed/22676225>
3. Kim SH, **Pezzoli L**, Yacouba H, Coulibaly T, Djingarey MH, Perea WA, Wierzba TF. Whom and Where Are We Not Vaccinating? Coverage after the Introduction of a New Conjugate Vaccine against Group A Meningococcus in Niger in 2010. *PLoS One*. 2012;7(1):e29116. Epub 2012 Jan 20. <http://www.ncbi.nlm.nih.gov/pubmed/22276104>
4. Ouandaogo CR, Yaméogo TM, Diomandé FV, Sawadogo C, Ouédraogo B, Ouédraogo-Traoré R, **Pezzoli L**, Djingarey MH, Mbakuliyemo N, Zuber PL. Adverse events following immunization during mass vaccination campaigns at first introduction of a meningococcal A conjugate vaccine in Burkina Faso, 2010. *Vaccine*. 2012 Jan 6. <http://www.ncbi.nlm.nih.gov/pubmed/22230584>
5. Greenland K, Rondy M, Chevez A, Sadozai N, Gasasira A, Abanida EA, Pate MA, Ronveaux O, Okayasu H, Pedalino B, **Pezzoli L**. Clustered lot quality assurance sampling: a pragmatic tool for timely assessment of vaccination coverage. *Trop Med Int Health*. 2011 Jul;16(7):863-8. doi: 10.1111/j.1365-3156.2011.02770.x. Epub 2011 Apr 11. <http://www.ncbi.nlm.nih.gov/pubmed/21481106>
6. **Pezzoli L**, Tchio R, Dzossa AD, Ndjomo S, Takeu A, Anya B, Ticha J, Ronveaux O, Lewis RF. Clustered lot quality assurance sampling: a tool to monitor immunization coverage rapidly during a national yellow fever and polio vaccination campaign in Cameroon, May 2009. *Epidemiol Infect*. 2012 Jan;140(1):14-26. Epub 2011 Mar 22. <http://www.ncbi.nlm.nih.gov/pubmed/21418714>
7. **Pezzoli L**, Andrews N, Ronveaux O. Clustered lot quality assurance sampling to assess immunisation coverage: increasing rapidity and maintaining precision. *Trop Med Int Health*. 2010 May;15(5):540-6. <http://www.ncbi.nlm.nih.gov/pubmed/20214765>
8. Pezzoli L, Campbell C, Lamagni TL, Johnson E, Saei A, Duckworth G. A methodological approach to investigating a nationwide clinical specimen

contamination problem in England. Euro Surveill. 2009 Jun 11;14(23):19234. <http://www.ncbi.nlm.nih.gov/pubmed/19531341>

9. **Pezzoli L**, Noakes K, Gates P, Begum F, Pebody RG. Can we know the immunization status of healthcare workers? Results of a feasibility study in hospital trusts, England, 2008. Epidemiol Infect. 2010 Jan;138(1):45-52. Epub 2009 Jun 4. <http://www.ncbi.nlm.nih.gov/pubmed/19493371>
10. **Pezzoli L**, Marotta V, Sattanino G, Griglio B. Toxoplasmosis in Italian Pregnant Women: Results of a Survey on Perception of Foodborne Risks. J Food Prot. 2009 Mar;72(3):680-4. <http://www.ncbi.nlm.nih.gov/pubmed/19343964>

PATRICIA BLANK (Institute of Social and Preventive Medicine, University of Zurich, Zurich, Switzerland)

1. **Blank PR**, Bonnelye G, Ducastel A, **Szucs TD** (2012): Attitudes of the General Public and General Practitioners in Five Countries towards Pandemic and Seasonal Influenza Vaccines during Season 2009/2010. PLoS One. 2012;7(10):e45450. Epub 2012 Oct 11.
2. **Blank PR**, Schwenkglenks M, Szucs TD (2012): The impact of European vaccination policies on seasonal influenza vaccination coverage rates in the elderly. Human Vaccines, 8 (3).
3. **Blank PR** and Szucs TD (2012): Cost-effectiveness of 13-valent pneumococcal conjugate vaccine in Switzerland. Vaccine, April 19 (Epub ahead of print).
4. Michel JP, Gusmano M, **Blank PR**, Philp I (2010): Vaccination and healthy ageing: How to make life-course vaccination a successful public health strategy. European Geriatric Medicine, article in press.
5. **Blank PR** and Szucs TD (2009): "Increasing influenza vaccination coverage in recommended population groups in Europe". Expert Rev Vaccines 8(4): 425-33.
6. Endrich MM., **Blank PR**, Szucs TD (2009): "Influenza vaccination uptake and socioeconomic determinants in eleven European countries". Vaccine 27:4018-24.
7. **Blank PR**, Schwenkglenks M, Szucs TD (2009): "Vaccination coverage rates in eleven European countries during two consecutive influenza seasons". Journal of Infection, 58:446-58.
8. **Blank PR**, Schwenkglenks M, Szucs TD (2009): "Disparities in vaccination coverage rates by target group in five European countries during the influenza season 2007/08". Infection 37(5):390-400.
9. Nicoll A, Ciancio B, **Blank PR** et al. (2008): "The scientific basis for offering seasonal influenza immunisation to risk groups in Europe". Euro Surveill 13(43).
10. **Blank PR**, Schwenkglenks M, Szucs TD (2008): "Influenza vaccination coverage rates in five European countries during season 2006/07 and trends over six consecutive seasons". BMC Public Health 8: 272.

SILVIO TAFURI (Department of Biomedical Science and Human Oncology, Aldo Moro University of Bari, Italy)

1. Santoro V, Roca R, De Donno A, Fiandaca C, Pinto G, **Tafari S**, Introna F. Applicability of Greulich and Pyle and Demirijian aging methods to a sample of Italian population. Forensic Sci Int. 2012 Sep 10: 221 (1-3); 153 e1-5

2. Notarnicola A, Fischetti F, Vicenti G, Laricchia L, Guastamacchia R, **Tafari S**, Moretti B. Improved mental representation of space in beginner orienteers. *Percept Mot Skills.* 2012 Feb;114(1):250-60.
3. **Tafari S**, Martinelli D, Prato R, Germinario C. Obbligo vaccinale e diritto alla salute: il valore della giurisprudenza nella pratica di sanità pubblica italiana. *Ann Ig* 2012; 24; 191-196
4. Prato R, Martinelli D, Marchetti F, Fortunato F, **Tafari S**, Germinario CA. Feasibility of a Cocoon Strategy for Prevention of Pertussis in Italy: A Survey of Prevention Department Healthcare Providers. *Pediatr Infect Dis J.* 2012 Aug 3.
5. Chironna M, **Tafari S**, De Robertis AL, Sallustio A, Morea A, Napoli A, Martinelli D, Prato R, Germinario C. Prevalence of HPV Infection and Genotype Distribution in Women From Africa Seeking Asylum in Puglia, Italy. *J Immigr Minor Health.* 2012 Aug 7.
6. Notarnicola A, Pesce V, Vicenti G, **Tafari S**, Forcignanò M, Moretti B. SWAAT Study: Extracorporeal Shock Wave Therapy and Arginine Supplementation and Other Nutraceuticals for Insertional Achilles Tendinopathy. *Adv Ther.* 2012 Sep; 29(9): 798-814.
7. **Tafari S**, Prato R, Martinelli D, Germinario C. Prevalence of Carriers of Neisseria meningitidis Among Migrants: Is Migration Changing the Pattern of Circulating Meningococci? *J Travel Med.* 2012 Sep; 19(5):311-13
8. Toto M, Margari F, Simone M, Craig F, Petruzzelli MG, **Tafari S**, Margari L. Antibasal Ganglia Antibodies and Antistreptolysin O in Noncomorbid ADHD. *J Atten Disord.* 2012 Sep 24.
9. Notarnicola A, Fischetti F, Gallone D, Moretti L, Pignataro P, **Tafari S**, Moretti B. Overload and neovascularization of shoulder tendons in volleyball players. *BMC Research Notes* 2012, 5:397
10. Tafari S, Martinelli D, Prato R, Germinario C. Vaccine effectiveness evaluation during a varicella outbreak among children of primary schools and day-care centers in a Region which adopted UMV. *Human vaccines.* 01/2013; 9(1).

ANDREA TREVISAN (Department of Molecular Medicine, University of Padova, Italy)

1. **Trevisan A**, Stocco E, Fanelli G, Bicciato F, Paruzzolo P (1999) Seroprevalence of hepatitis A markers in subjects exposed to biological risk. *Int Arch Occup Environ Health* 72: 125-127
2. **Trevisan A**, Bicciato F, Fanelli G, Stocco E, Paruzzolo P (1999) Risk of hepatitis C virus infection in a population exposed to biological materials. *Am J Ind Med* 35: 532-535
3. **Trevisan A**, Paruzzolo P (2000) Prevalence of hepatitis B virus infection in a population exposed to biological risk. *J Occup Health* 42: 341-344
4. **Trevisan A**, Morandin M, Frasson C, Paruzzolo P, Davanzo E, Di Marco L, Fabrello A, Borella-Venturini M (2006) Prevalence of childhood exanthematic disease markers in paramedical students: need of vaccination. *Vaccine* 24: 171-176
5. **Trevisan A**, Frasson C, Morandin M, Beggio M, Bruno A, Davanzo E, Di Marco L, Simioni L, Amato G (2007) Immunity against infectious disease: predictive value of self-reported history of vaccination and disease. *Infect Control Hosp Epidemiol* 28: 564-569
6. Davanzo E, Frasson C, Morandin M, **Trevisan A** (2008) Occupational blood and body fluid exposure of university health care workers. *Am J Infect Control* 36: 757-760
7. **Trevisan A**, Bruno A, Mongillo M, Morandin M, Pantaleoni A, Borella-Venturini M, Giraldo M (2008) Prevalence of markers for hepatitis B virus and vaccination compliance among medical school students in Italy. *Infect Control Hosp Epidemiol* 29: 1189-1191

8. Mongillo M, Ranzato M, Chiara F, **Trevisan A** (2010) Strategy for hepatitis A seroprevalence survey in a population of young people. Vaccine 28: 6985-6988
9. Baldo V, Baldovin T, Cocchio S, Lazzari R, Saracino E, Bertoncello C, Buja A, **Trevisan A** (2012) Sero-epidemiology of polioviruses among university students in northern Italy. Clin Vaccine Immunol 19: 1292-1295
10. Scaggiante R, Chemello L, Rinaldi R, Bartolucci GB, **Trevisan A** (....) Acute hepatitis C virus infection in a nurse trainee after a needle stick injury. World J Gastroenterol in press

SABINE WICKER (Occupational Health Service, Hospital of the Johann Wolfgang Goethe University of Frankfurt)

1. Betsch C, **Wicker S** (2012): E-Health Use, Vaccination Knowledge and Perception of Own Risk: Drivers of Vaccination Uptake in Medical Students. Vaccine 30(6):1143-1148
2. Brandt C, Rabenau HF, Bornmann S, Gottschalk R, **Wicker S** (2011): The impact of the 2009 influenza A(H1N1) pandemic on attitudes of healthcare workers toward seasonal influenza vaccination 2010/11 Euro Surveill 16(17): pii=19854
3. Kok G, van Essen GA, **Wicker S**, Llopia A, Mena G, Correia R, Ruiters RAC (2011): Influenza Vaccination in Health Care Workers: An Intervention Mapping Approach. Vaccine 29(47): 8512-8519
4. Maltezou HC, **Wicker S**, Borg M, Heining U, Puro V, Theodoridou M, Poland GA (2011): Vaccination policies for health-care workers in acute health-care facilities in Europe. Vaccine 29(51): 9557-9562
5. **Wicker S**, Marckmann G, Poland GA, Rabenau HF (2010): Health Care Workers' Perceptions of Mandatory Vaccination. Infection Control Hosp Epidemiol 31:1066-1069
6. McLennan S, **Wicker S** (2010): Reflections on the influenza vaccination of healthcare workers. Vaccine 28:8061-8064
7. **Wicker S** (2009) Unvaccinated healthcare workers must wear masks during flu season – a possibility to improve influenza vaccination rates? Vaccine 27:2631-2632
8. **Wicker S**, Allwinn R, Gottschalk R, Rabenau HF (2008) Reliability of medical students' vaccination histories for immunizable diseases. BMC Public Health 8:121
9. **Wicker S**, Cinatl J, Berger A, Doerr HW, Gottschalk R, Rabenau HF (2008) Determination of risk of infection with bloodborne pathogens following a needlestick injury in hospital workers. Ann Occup Hyg 52:615-622
10. **Wicker S**, Zielen S, Rose MA (2008) Attitudes of healthcare workers toward pertussis vaccination. Expert Rev Vaccine 7:1325-1328

FORTUNATO PAOLO D'ANCONA (National Centre of Epidemiology, Surveillance and Health Promotion, Istituto Superiore di Sanita, Rome, Italy)

1. **D'Ancona F**; Venice II Group., VENICE II: Go on combining our efforts towards a European common vaccination policy! Euro Surveill. 2009 Mar 26;14(12). pii: 19161.
2. Mereckiene J, Cotter S, Lopalco P, **D'Ancona F**, Levy-Bruhl D, Giambi C, Johansen K, Dematte L, Salmaso S, Stefanoff P, O'Flanagan D. Hepatitis B

- immunisation programmes in European Union, Norway and Iceland: where we were in 2009? *Vaccine*. 2010 Jun 17;28(28):4470-7. Epub 2010 May 6.
3. Zanetti AR, Romanò L, Giambi C, Pavan A, Carnelli V, Baitelli G, Malchiodi G, Valerio E, Barale A, Marchisio MA, Montù D, Tozzi AE, **D'Ancona F**; study group. Hepatitis B immune memory in children primed with hexavalent vaccines and given monovalent booster vaccines: an open-label, randomised, controlled, multicentre study. *Lancet Infect Dis*. 2010 Nov;10(11):755-61. Epub 2010 Sep 29.
 4. Haverkate M, **D'Ancona F**, Johansen K, van der Velden K, Giesecke J, Lopalco PL Assessing vaccination coverage in the European Union: is it still a challenge?. *Expert Rev Vaccines*. 2011 Aug;10(8):1195-205.
 5. Alfonsi V, **D'Ancona F**, Rota MC, Giambi C, Ranghiasi A, Iannazzo S Immunisation registers in Italy: a patchwork of computerisation. *Euro Surveill* 2012;17(17).
 6. E. E. Kanitz, L. A. Wu, C. Giambi, R. A. Strikas, D. Levy-Bruhl, P. Stefanoff, J. Mereckiene, E. Appelgren, and **F. D'Ancona**. Variation in adult vaccination policies across Europe: an overview from VENICE network on vaccine recommendations, funding and coverage *Vaccine* 30 (35):5222-5228, 2012.
 7. M. Haverkate, **F. D'Ancona**, C. Giambi, K. Johansen, P. L. Lopalco, V. Cozza, and E. Appelgren. Mandatory and recommended vaccination in the EU, Iceland and Norway: results of the VENICE 2010 survey on the ways of implementing national vaccination programmes. *Euro.Surveill* 17 (22), 2012.
 8. VENICE Network Reports. Available at http://venice.cineca.org/project_outputs.html

SARAH SCHILLIE (Centers for Disease Control and Prevention)

1. **Schillie, S., P.** Spradling, T. Murphy. Immune Response of Hepatitis B Vaccine Among Persons with Diabetes: A Systematic Review of the Literature. *Diabetes Care*, 2012; accepted for publication.
2. Benson, R., S. Crowley, C. Dusek, J. Lazaroff, K. Onye, E. Smith, T. Walker, S. Schillie, T. Murphy, J. Zucker. Postvaccination Serologic Testing Results for Infants Aged ≤24 Months Exposed to Hepatitis B Virus at Birth – United States, 2008-2011 [MMWR Sep 28, 2012 / 61:768-771].
3. Hoerger, T., **S. Schillie**, J. Wittenborn, C. Bradley, F. Zhou, K. Byrd, T. Murphy. Cost-Effectiveness of Hepatitis B Vaccination in Adults with Diagnosed Diabetes. *Diabetes Care*, 2012 epub.
4. Reilly, M., **S. Schillie**, E. Smith, T. Poissant, C. Vonderwahl C, K. Gerard, J. Baumgartner, L. Mercedes, K. Sweet, D. Muleta, D. Zaccaro, M. Klevens, T. Murphy. Increased Risk of Acute Hepatitis B among Adults with Diagnosed Diabetes Mellitus. *J Diabetes Sci Technol*, 2012;6:858-66.
5. **Schillie, S.**, J. Xing, T. Murphy, D. Hu. Prevalence of hepatitis B virus infection among persons with diagnosed diabetes mellitus in the United States, 1999-2010. *J Viral Hepat*, 2012;19:674-6.
6. Sawyer, M., T. Hoerger, T. Murphy, **S. Schillie**, D. Hu, P. Spradling, K. Byrd, J. Xing, M. Reilly, R. Tohme, A. Moorman, E. Smith, B. Baack, R. Jiles, M. Klevens, J. Ward, H. Kahn, F. Zhou. Use of Hepatitis B Vaccination for Adults with Diabetes Mellitus: Recommendations of the Advisory Committee on Immunization Practices (ACIP) [MMWR Dec 23, 2011/60(50)1709-11].

JULIETTA RODRÍGUEZ-GUZMÁN (Pan American Health Organisation)

1. **Rodriguez-Guzman, J.** Occupational health services for Healthcare Workers in the Americas. In: Proceedings OH&S Forum 2011. International Forum on Occupational health and safety: Policies Profiles and services. 20-22 June 2011, Hanasaari Cultural Centre, Espoo Finland. ISBN 978-952-261-203-1. Finnish Institute of Occupational Health and editors, 2012
http://www.ttl.fi/en/news/Pages/Proceedings_of_the_international.aspx
2. Rebman, R (Ed.), **Rodriguez-Guzman**, et al. Protecting the health of Healthcare workers: A global perspective. Proceedings of the 2007 State-of-the-Art Conference, Pre-conference workshop. Vancouver 25, 2007, Vancouver, Canada. International Commission of Occupational Health ICOH, American College of Occupational and Environmental medicine ACOEM. National Institute for Occupational Safety and Health NIOSH, USA, 2008
<http://www2.paho.org/hq/dmdocuments/2009/Protecting%20the%20health%20of%20health%20care%20workers%20-%20a%20global%20perspective.pdf>
3. Pan-American Health Organization (2005) Workers' Health and Safety in the Health Sector: A manual for managers and Administrators. Contributor and reviewer. Washington DC OP, 2005
4. **Rodriguez-Guzman, J.** Riesgos ocupacionales de los Trabajadores de la SALUD. En Memorias: II Congreso Centro Americano y del caribe de Salud Ocupacional FECACSO, San Jose, Costa Rica, 2002.

PIERRE LOULERGUE (Université Paris Descartes, Assistance Publique Hôpitaux de Paris, France)

1. Duval X, Caplanusi A, Laurichesse H, Deplanque D, **Loulergue P**, Vaman T, Launay O, Gillard P. Flexibility of interval between vaccinations with AS03X- adjuvanted influenza A (H1N1) 2009 vaccine in adults aged 18-60 and >60 years: a randomized trial. BMC Infect Dis. 2012 Jul 23;12(1):162.
2. Méchai F, **Loulergue P**, Bouchaud O. [Immunization against malaria]. Rev Prat.2012;62(5):605-10.
3. Bouhour D, Gavazzi G, Gaillat J, Gajdos V, **Loulergue P**, Paccalin M, Ploy MC, de Pontual L, Pulcini C, Rogeaux O, Sana C, Caulin E; group "Avancées Vaccinales". Survey of vaccination policies in French healthcare institutions. Med Mal Infect. 2012 Apr;42(4):161-6.
4. Mir O, Adam J, Gaillard R, Gregory T, Veyrie N, Yordanov Y, Berveiller P, Chousterman B, **Loulergue P.** Vaccination coverage among medical residents in Paris, France. Clin Microbiol Infect. 2012 May;18(5):E137-9.
5. **Loulergue P**, Guthmann JP, Fonteneau L, Armengaud JB, Levy-Brühl D, Launay O. Susceptibility of health care students to measles, Paris, France. Emerg Infect Dis. 2011 Sep;17(9):1766-7.
6. Freund R, Le Ray C, Charlier C, Avenell C, Truster V, Tréluyer JM, Skalli D, Ville Y, Goffinet F, Launay O; Inserm COFLUPREG Study Group. Determinants of non-vaccination against pandemic 2009 H1N1 influenza in pregnant women: a prospective cohort study. PLoS One. 2011;6(6):e20900.
7. Launay O, Desaint C, Durier C, **Loulergue P**, Duval X, Jacomet C, Pialoux G, Ghosn J, Raffi F, Rey D, Ajana F, Colin de Verdière N, Reynes J, Foubert V, Roman F, Devaster JM, Delfraissy JF, Aboulker JP; ANRS 151 HIFLUVAC Study Group and the French Clinical Vaccinology Network (Réseau National d'Investigation Clinique en Vaccinologie REIVAC). Safety and immunogenicity of a monovalent 2009 influenza A/H1N1v vaccine adjuvanted with AS03A or unadjuvanted in HIV-infected adults: a randomized, controlled trial. J Infect Dis. 2011 Jul 1;204(1):124-34.
8. Rousseau B, **Loulergue P**, Mir O, Krivine A, Kotti S, Viel E, Simon T, de Gramont A, Goldwasser F, Launay O, Tournigand C. Immunogenicity and safety

of the influenza A H1N1v 2009 vaccine in cancer patients treated with cytotoxic chemotherapy and/or targeted therapy: the VACANCE study. Ann Oncol. 2012 Feb;23(2):450-7.

9. **Louergue P**, Alexandre J, Iurisci I, Grabar S, Medioni J, Ropert S, Dieras V, Le Chevalier F, Oudard S, Goldwasser F, Lebon P, Launay O. Low immunogenicity of seasonal trivalent influenza vaccine among patients receiving docetaxel for a solid tumour: results of a prospective pilot study. Br J Cancer. 2011 May 24;104(11):1670-4.
10. Marchand-Janssen C, **Louergue P**, Mouthon L, Mahr A, Blanche P, Deforges L, Lebon P, Cohen P, Pagnoux C, Le Guern V, Bienvenu B, Aouba A, Guillevin L, Launay O. Patients with systemic inflammatory and autoimmune diseases are at risk of vaccine-preventable illnesses. Rheumatology (Oxford). 2011 Jun;50(6):1099-105.

DAVID WEBER (USA Department of Medicine, University of North Carolina, USA)

1. Talbot TR, Babcock H, Cotton D, Maragakis LL, Poland GA, Septimus EJ, Tapper ML, **Weber DJ**. The use of live attenuated influenza vaccine (LAIV) in healthcare personnel (HCP): guidance from the Society for Healthcare Epidemiology of America (SHEA). Infect Control Hosp Epidemiol 2012;33:981-983.
2. McGrath LJ, Kshirsaga AV, Cole SR, Wang L, **Weber DJ**, Sturmer T, Brookhart MA. Influenza vaccine effectiveness in patients on hemodialysis: an analysis of a natural experiment. Arch Intern Med 2012;172:548-554.
3. **Weber DJ**, Consoli SA, Sickbert-Bennett E, Rutala WA. Assessment of mandatory tetanus, diphtheria and pertussis vaccination requirement on vaccine uptake over time. Infect Control Hosp Epidemiol 2012;33:81-83.
4. Becker-Dreps S, Paniagua M, Zambrana LE, Bucardo F, Hudgens MG, **Weber DJ**, Mortan DR, Espinoza F. Rotavirus prevalence in the primary care setting in Nicaragua after universal infant rotavirus immunization. Am J Trop Med Hygiene 2011;85:957-960.
5. **Weber DJ**, Rutala WA, Schaffner W. Immunization for vaccine-preventable diseases: why aren't we protecting our students? Infect Control Hosp Epidemiol 2012;32:912-914.
6. Shimokura G, Chai F, **Weber DJ**, Samsa GP, Xia GL, Nainan OV, Tobler LH, Bursch MP, Alter MJ. Patient-care practices associated with an increased prevalence of hepatitis C virus infection among chronic hemodialysis patients. Infect Control Hosp Epidemiol 2011;32:415-424.
7. Talbot TR, Babcock H, Caplan AL, Cotton D, Maragakis LL, Poland GA, Septimus EJ, Tapper ML, **Weber DJ**. Revised SHEA position paper: influenza vaccination of healthcare personnel. Infect Control Hosp Epidemiol 2010;31:987-95.
8. **Weber DJ**, Rutala WA, Schaffner W. Lessons learned: protection of healthcare workers from infectious disease risks. Crit Care Med 2010;38(suppl 8):S306-14.
9. Henderson DK, Dembry L, Fishman NO, Grady C, Lundstrom T, Palamore TN, Sepkowitz KA, **Weber DJ**. SHEA Guidelines for management of healthcare workers who are infected with hepatitis B virus, hepatitis C virus, and/or human immunodeficiency virus. Infect Control Hosp Epidemiol 2010;31:203-232.
10. Weber DJ, Hoffmann KK, Rutala WA. Management of the healthcare worker infected with human immunodeficiency virus: lessons from nosocomial transmission of hepatitis B virus. Infect Control Hosp Epidemiol 1991;12:706.

EMSA – European medical student association

www.emsa.be

EMSA stands for 'European Medical Student's Organisation'. EMSA-Antwerp is the EMSA-wing at the University of Antwerp (UA), through and for medical students at this university.

EMSA-Antwerp has its parts in many facets of a student's career at the UA:

- We organize a monthly lecture in which an expert presents his or her investigations in a lesser known area to the regular medical student. These topics do not always get the attention they deserve in the curriculum. One of these topics, for instance, is the tough and amazing surgery needed in gender transition. Another example is the call for help which Doctors Without Borders answer every day, while we are unaware of the high price these volunteers have to pay.
- Every year we pick a good cause which we will support financially by organizing a benefit action. In doing so, we hope to give some help to those who need it most.
- We also help high school students to prepare for their admittance exam which they need to pass if they want to enroll in a medical study at a Flemish university. We do this by organizing workshops in which example questions are being solved.
- In order to improve international contacts between medical students, EMSA - Antwerp organizes an annual Congress, of which the first edition took place in September 2007. We are very confident that this congress will become a tradition at the Antwerp medical faculty. The 2008 edition of the Antwerp Medical Student's Congress was indeed a success, and we are all very enthusiastic to repeat it!

BAEYENS, J. P (University Luxemburg)

1. Baeyens JP, Lang PO, Michel JP. **Willingness to vaccinate and to be vaccinated in adults.** *Aging Clin Exp Res* 2009,**21**:244-249.

(reference list from Pubmed search { (Author name)})

2. **Baeyens JP.** The European Medicines Agency discovers the geriatric patient. *Drugs Aging* 2011,**28**:849-851.
3. **Baeyens JP.** Belgian care programme for older patients. *J Nutr Health Aging* 2010,**14**:474-475.
4. **Baeyens JP.** Ensuring the willingness to vaccinate and be vaccinated. *Expert Rev Vaccines* 2010,**9**:11-14.
5. **Baeyens JP,** Van Glabbeek F, Goossens M, Gielen J, Van Roy P, Clarys JP. In vivo 3D arthrokinematics of the proximal and distal radioulnar joints during active pronation and supination. *Clin Biomech (Bristol, Avon)* 2006,**21** Suppl 1:S9-12.
6. **Baeyens JP,** Cattrysse E, Van Roy P, Clarys JP. Measurement of three-dimensional intra-articular kinematics: methodological and interpretation

problems. *Ergonomics* 2005;**48**:1638-1644.

7. **Baeyens JP**, Van Roy P, De Schepper A, Declercq G, Clarijs JP. Glenohumeral joint kinematics related to minor anterior instability of the shoulder at the end of the late preparatory phase of throwing. *Clin Biomech (Bristol, Avon)* 2001;**16**:752-757.

HELENA MALTEZOU (Department for Interventions in Health-Care Facilities, Hellenic Center for Disease Control and Prevention, Athens, Greece)

1. **Maltezos HC**, Katerelos P, Poufta S, Maragos A, Theodoridou M. Attitudes towards mandatory vaccination and vaccination coverage against vaccine-preventable diseases of health-care workers in primary health-care centers. *Am J Infect Control* 2012
2. **Maltezos HC**, Lourida A, Katragkou A, Katerelos P, Wicker S, Syrogiannopoulos GA, Roilides E, Theodoridou M. Attitudes regarding occupational vaccines and vaccination coverage against vaccine-preventable diseases among health-care workers working in Pediatric Departments in Greece. *Pediatr Infect Dis J* 2012
3. **Maltezos HC**, Gargalianos P, Nikolaidis P, Katerelos P, Tedoma N, Maltezos E, Lazanas M. Attitudes towards mandatory vaccination and vaccination coverage against vaccine-preventable diseases among health-care workers in tertiary-care hospitals. *J Infect* 2012;**64**:319-324
4. **Maltezos HC**, Wicker S, Borg M, Heininger U, Puro V, Theodoridou M, Poland GA. Vaccination policies for health-care workers in acute health-care facilities in Europe. *Vaccine* 2011;**29**:9557-9562
5. **Maltezos HC**, Tsakris A. Vaccination of health-care workers against influenza: our obligation to protect patients. *Influenza and Other Respiratory Viruses* 2011;**5**:382-388
6. **Maltezos HC**, Dedoukou X, Patrinos S, Maragos A, Poufta S, Gargalianos P, Lazanas M. Determinants of intention to get vaccinated against novel (pandemic) influenza A H1N1 among health-care workers in a nationwide survey. *Journal of Infection* 2010;**61**:252-258
7. Dedoukou X, Nikolopoulos G, Maragos A, S. Giannoulidou, **Maltezos HC**. Attitudes towards vaccination against seasonal influenza of health-care workers in primary health-care settings in Greece. *Vaccine* 2010;**28**:5931-5933
8. **H.C. Maltezos**, A. Maragos, V. Raftopoulos, K. Karageorgou, T. Charhalapi, H. Remoudaki, T. Papadimitriou, I.N. Pierroutsakos. Strategies to increase influenza vaccine uptake among health-care workers in Greek hospitals. *Scandinavian Journal of Infectious Diseases* 2008;**40**:266-268
9. **H.C. Maltezos**, A. Maragos, P. Katerelos, A. Paisi, K. Karageorgou, T. Papadimitriou, I.N. Pierroutsakos. Influenza vaccination acceptance among health-care workers: a nationwide survey. *Vaccine* 2008;**26**:1408-1410
10. **H.C. Maltezos**. Nosocomial influenza: new concepts and practice. *Current Opinion in Infectious Diseases* 2008;**21**:337-343

GEORGE KAMKAMIDZE (Georgian Maternal and Child Care Union, Tbilisi, Georgia)

1. Butsashvili M, **Kamkamidze G**, Kajaia M, Morse DL, Triner W, Dehovitz J, McNutt LA. Occupational exposure to body fluids among health care workers in Georgia. *Occup Med.* 2012 Aug 6. [Epub ahead of print].
2. Butsashvili M, **Kamkamidze G**, Kajaia M, Kandelaki G, Zhorzholadze N. Circumstances Surrounding the Community Needle-Stick Injuries in Georgia. *J Community Health.* 2011; **36**(6): 1050-2.
3. Butsashvili M, **Kamkamidze G**, Umikashvili L, Gvinjilia L, Kankadze K, Berdzuli N. Knowledge of health care-associated infections among Georgian obstetricians and gynecologists. *J Infect Dev Ctries.* 2010; **4**(5): 329-33.

4. Topuridze M, Butsashvili M, **Kamkamidze G**, Kajaia M, Morse D, McNutt LA. Barriers to hepatitis B vaccine coverage among healthcare workers in the Republic of Georgia: An international perspective. *Infect Control Hosp Epidemiol*. 2010; 31(2): 158-64.
5. Orne-Gliemann J, Tchendjou PT, Miric M, Gadgil M, Butsashvili M, Eboko F, Perez-Then E, Darak S, Kulkarni S, **Kamkamidze G**, Balestre E, du Loû AD, Dabis F. Couple-oriented prenatal HIV counseling for HIV primary prevention: an acceptability study. *BMC Public Health*. 2010; 10: 1
6. Butsashvili M, Kourbatova E, Macharashvili N, **Kamkamidze G**, McNutt LA, Dehovitz J, Leonard MK. Risk factors of mortality in septic newborns in neonatal intensive care units (NICUs) in Tbilisi, the Republic of Georgia. *European Journal of Epidemiology* 2009; 24(8): 477-9.
7. Norman PJ, Abi-Rached L, Gendzekhadze K, Hammond JA, Moesta AK, Sharma D, Graef T, McQueen KL, Guethlein LA, Carrington CV, Chandanayingyong D, Chang YH, Crespí C, Saruhan-Direskeneli G, Hameed K, **Kamkamidze G**, Koram KA, Layrisse Z, Matamoros N, Milà J, Park MH, Pitchappan RM, Ramdath DD, Shiau MY, Stephens HA Struik S, Tyan D, Verity DH, Vaughan RW, Davis RW, Fraser PA, Riley EM, Ronaghi M, Parham P. Meiotic recombination generates rich diversity in NK cell receptor genes, alleles, and haplotypes. *Genome Research* 2009; 19(5): 757-69.
8. Butsashvili M, Preble E, **Kamkamidze G**, Robinson J, Chubinishvili O, Sukhiashvili R. Uptake of an HIV voluntary counseling and testing program for pregnant women in Georgia. *AIDS Care* 2008; 20(9):1125-7.
9. Butsashvili M, Triner W, **Kamkamidze G**, Kajaia M, McNutt LA. Knowledge and anticipated behaviour of health-care workers in response to an outbreak of pandemic influenza in Georgia. *World Hosp Health Serv*. 2008; 44(2): 24-6.
10. **Kamkamidze G**, Capoulade-Metay C, Butsashvili M, Dudoit Y, Chubinishvili O, Debre P, Theodorou L. 32-nucleotide deletion, associated with defence against hiv/aids, is a predominant mutation of CCR5 gene in the population of Georgia. *Georgian Med News*. 2005; 118: 74-9.

CARMEN MONTAÑO (EPIET fellow ECDC / National Centre of Epidemiology, Surveillance and Health Promotion, Istituto Superiore di Sanità, Rome, Italy.)

Representative of **HproImmune**

HProImmune is a 3-year project funded by the DG SANCO Public Health Program 2008 - 2013 aiming to promote immunization among Health Care Workers (HCWs) in Europe
<http://www.hproimmune.eu/>



1. CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMRW* 2011; 60(RR07): 1-45. Available online: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm>
2. Haverkate M, D'Ancona F, Giambi C, Johansen K, Lopalco PL, Cozza V, Appelgren E, on behalf of the VENICE project gatekeepers and contact points. Mandatory and recommended vaccination in the EU, Iceland and Norway: results of the VENICE 2010 survey on the ways of implementing national vaccination

programmes. Euro Surveill. 2012;17(22):pii=20183. Available online:
<http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20183>

EELKO HAK (PharmacoEpidemiology & PharmacoEconomics, University of Groningen, The Netherlands)

1. Riphagen-Dalhuisen J, Gefenaite G, **Hak E**. Predictors of seasonal influenza vaccination among healthcare workers in hospitals: a descriptive meta-analysis. Occup Environ Med. 2012 Apr;69(4):230-5.
2. Looijmans-van den Akker I, Hulscher ME, Verheij TJ, Riphagen-Dalhuisen J, van Delden JJ, **Hak E**. How to develop a program to increase influenza vaccine uptake among workers in health care settings? Implement Sci. 2011 May 19;6:47.
3. Hopman CE, Riphagen-Dalhuisen J, Looijmans-van den Akker I, Frijstein G, Van der Geest-Blankert AD, Danhof-Pont MB, De Jager HJ, Bos AA, Smeets E, De Vries MJ, Gallee PM, Lenderink AF, **Hak E**. Determination of factors required to increase uptake of influenza vaccination among hospital-based healthcare workers. J Hosp Infect. 2011 Apr;77(4):327-31.
4. Looijmans-van den Akker I, van Delden JJ, Verheij TJ, van der Sande MA, van Essen GA, Riphagen-Dalhuisen J, Hulscher ME, **Hak E**. Effects of a multi-faceted program to increase influenza vaccine uptake among health care workers in nursing homes: A cluster randomised controlled trial. Vaccine. 2010 Jul 12;28(31):5086-92.

ANNA LLUPIA (Preventive Medicine and Epidemiology Unit, Hospital Clinic of Barcelona, Spain)

1. **Llupià A**, García-Basteiro AL, Olivé V, Costas L, Ríos J, Quesada S, Varela P, Bayas JM, Trilla A: New interventions to increase influenza vaccination rates in health care workers. Am J Infect Control 2010, 38: 476-81.
2. Kok G, van Essen GA, Wicker S, **Llupià A**, Mena G, Correja R, Ruiters RA: Planning for influenza vaccination in health care workers: an Intervention Mapping approach. Vaccine 2011, 29:8512-9.
3. **Llupià A**, García-Basteiro AL, Mena G, Ríos J, Puig J, Bayas JM, Trilla A: Vaccination Behaviour Influences Self-Report of Influenza Vaccination Status: A Cross-Sectional Study among Health Care Workers. PLoS ONE 2012, 7: e39496. doi:10.1371/journal.pone.0039496 .
4. Alberto L García-Basteiro, **Anna Llupià**, Guillermo Mena, José M Bayas, Antoni Trilla Quantifying the efficacy of influenza vaccines. The Lancet infectious diseases. 09/2012; 12(9):657-8; author reply 660-1.
5. Guillermo Mena, **Anna Llupià**, Alberto L García-Basteiro, Marta Aldea, Victor-Guillermo Sequera, Antoni Trilla. The willingness of medical students to use Facebook as a training channel for professional habits: the case of influenza vaccination. Cyberpsychology, behavior and social networking. 06/2012; 15(6):328-31.

SHEILA HUYNH (Infection Preventionist, Medical Center of The Rockies Rocky, Loveland, USA)

1. **Huynh S**, Poduska P, Mallozzi T, Culler F. Mandatory influenza vaccination of health care workers: A first-year success implementation by a community health care system. Amer J of Infect Cont 2012, 40: 771-3.

2. **Huynh S**, Culler F, Gustafson D, Murray S. At the table: A communication network model for local public health, acute care, long-term care, and community partners. *Amer J of Infect Cont* July 2012, online text.

KLAUS SCHMID (Institute and Outpatient Clinic of Occupational, Social and Environmental Medicine, University of Erlangen-Nuremberg, Erlangen, Germany)

1. Wallaschofski H, Drexler H, **Schmid K**. Was wissen Medizinstudenten über ihren Impfstatus und wie ist ihr Impfschutz wirklich? *Deutsche Medizinische Wochenschrift* 130 (2005); 1429-1433.
2. **Schmid K**, Schwager C, Drexler H. Needle stick injuries and other occupational exposures to body fluids amongst employees and medical students of a German university – incidence and follow-up. *Journal of Hospital Infection*. 65 (2007) 124-130.
3. **Schmid K**, Merkl K, Hiddemann-Koca K, Drexler H. A required occupational health check increases vaccination rates among medical students. *Journal of Hospital Infection* 2008; 70:71-74.
4. **Schmid K**, Korn K, Drexler H. Chronische Hepatitis-B-Infektion bei einem geimpften Medizinstudenten – Zur Notwendigkeit von serologischen Kontrolluntersuchungen auf Hepatitis B im arbeitsmedizinischen Bereich- Arbeitsmed.Sozialmed.Umweltmed. 39, 6 (2004) 350-352.
5. **Schmid K**, Strebl H, Heck KJ, Weltle D, Raithel HJ. Wirksamkeit und Verträglichkeit gentechnologisch hergestellter Impfstoffe gegen Hepatitis B - eine vergleichende Gegenüberstellung. *Gesundh.-Wes.* 1992; 54: 219-222.
6. **Schmid K**, Wallaschofski H, Drexler H. Student health policy of a German medical school – results of a cross sectional study concerning students' immunity to vaccine-preventable diseases. *Int. J. Hyg. Environ. Health* 207 (2004); 595-600.

DAVID FITZSIMONS, *rapporteur, Prévessin, France*

1. **FitzSimons D**, Hendrickx G, Vorsters A, Van Damme P. Identification and management of persons with chronic viral hepatitis in Europe. *European Gastroenterology & Hepatology* 2012;8(1).
2. **Fitzsimons D**, Kojouharova M, Hallauer J, Hendrickx G, Vorsters A, Van Damme P. Burden and prevention of viral hepatitis in Bulgaria. *Vaccine* 2011,29:8471-8476.
3. **FitzSimons D**, Hendrickx G, Vorsters A, Van Damme P. **Hepatitis A and E: update on prevention and epidemiology**. *Vaccine*. 2010 Jan 8;28(3):583-8. Epub 2009 Nov 17.
4. FitzSimons DW. **Prevention and control of viral hepatitis: the role and impact of patient and advocacy groups in and outside Europe**. *Vaccine*. 2008 Oct 23;26(45):5669-74. Epub 2008 Aug 30.
5. FitzSimons D, François G, De Carli G, Shouval D, Prüss-Ustün A, Puro V, Williams I, Lavanchy D, De Schryver A, Kopka A, Ncube F, Ippolito G, Van Damme P. **Hepatitis B virus, hepatitis C virus and other blood-borne infections in healthcare workers: guidelines for prevention and management in industrialized countries**. *Occup Environ Med*. 2008 Jul;65(7):446-51.
6. FitzSimons D, Vorsters A, Hoppenbrouwers K, Van Damme P; **Viral Hepatitis Prevention Board (VHPB); European Union for School and University Health and Medicine (EUSUHM)**. **Prevention and control of viral hepatitis**

- through adolescent health programmes in Europe.** *Vaccine*. 2007 Dec 17;25(52):8651-9. Epub 2007 Oct 23.
7. Fitzsimons D, François G, Alpers K, Radun D, Hallauer J, Jilg W, Gerlich W, Rombo L, Blystad H, Nøkleby H, van Damme P. **Prevention of viral hepatitis in the Nordic countries and Germany.** *Scand J Infect Dis*. 2005;37(8):549-60. Review.
 8. Fitzsimons D, François G, Hall A, McMahon B, Meheus A, Zanetti A, Duval B, Jilg W, Böcher WO, Lu SN, Akarca U, Lavanchy D, Goldstein S, Banatvala J, Damme PV. **Long-term efficacy of hepatitis B vaccine, booster policy, and impact of hepatitis B virus mutants.** *Vaccine*. 2005 Jul 14;23(32):4158-66. Epub 2005 Apr 13.
 9. FitzSimons D, François G, Bonanni P, Mele A, Zanetti A, Stroffolini T, Crovari P, Van Damme P. **Prevention of viral hepatitis in Italy.** *Vaccine*. 2004 Sep 28;22(29-30):4092-6.
 10. FitzSimons D, François G, Emiroğlu N, Van Damme P. **Combined hepatitis B vaccines.** *Vaccine*. 2003 Mar 28;21(13-14):1310-6.