

Pre-meeting document

Prevention and Control of Viral Hepatitis through adolescent health programmes in Europe

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Alp H, Altinkaynak S, Arikan D, Ozyazicioglu N. Adolescent immunization rates and the effect of socio-demographic factors on immunization in a cosmopolitan city (ERZURUM) in the eastern Turkey. *Health-Policy*. 2006; 76: 179-85

OBJECTIVE: Pediatric vaccinations have decreased the incidence and mortality from infectious diseases in children, but adolescents continue to be adversely affected by vaccine preventable disease. The present study was performed to determine the status of adolescents immunization and to investigate the effect of several socio-demographic factors on immunization. **MATERIAL AND METHOD:** Using the cluster-sampling method, 817 adolescents were selected in 24 high schools (15,000 students) in central district of Erzurum (Turkey). Adolescents were categorized as completely vaccinated, incompletely vaccinated, unvaccinated or vaccination status unknown. **RESULTS:** Of the 817 adolescents, 6.9% were completely vaccinated, 24.4% were incompletely vaccinated and 64.1% were unvaccinated. The vaccination status of 4.6% of adolescents was unknown. A significantly correlation was seen between the number of siblings, the level of mother and father education, the level of parent's socio-economics status, health insurance and immunization status. **CONCLUSION:** Our findings indicated a small percentage of adolescents receive all of the recommended vaccine. In immunization programs in Turkey, priority should be given to increase adolescent immunization rate with a middle school and/or adolescents, vaccination.

Amela C, Pachón I, de-Ory F. Evaluation of the measles, mumps and rubella immunisation programme in Spain by using a sero-epidemiological survey. *Eur-J-Epidemiol*. 2003; 18(1): 71-9

In Spain, measles, mumps and rubella vaccination was introduced in 1981, with one dose at the age of 15 months and another at the age of 11 years being administered since 1995. Reported disease incidence was less than one case per 100,000 people for measles and rubella, and 23 cases per 100,000 people for mumps. A seroepidemiological survey was undertaken to estimate the frequency of susceptible individuals by age and environment; and vaccination coverage and efficacy of the vaccines administered. A population-based cross-sectional study was then conducted, covering the population aged 2-39 years, residing in Spain (excluding Catalonia). The sample was stratified by age and rural/ urban environment and informed consent obtained to take blood specimens from subjects attending blood-extraction centres. The final sample totalled 3,932 persons. IgG antibodies were detected by an enzyme-linked immunosorbent assay. Estimated vaccination coverage was 96% for children aged 2-5 years; vaccine efficacies were 96.7% for measles, 97.2% for rubella and 79.3% for mumps. Immunity was the lowest in the 6-9 year age group for measles (90.8%) and in males aged between 15 and 24 years for rubella (86 and 89.8%, respectively). In the case of mumps, this proved the lowest in the 2-5 year age group (76.7%) and in those autonomous regions in which only the Rubini strain had been administered. The incidence of measles has enabled the National Measles Elimination Plan to be implemented by which the elimination of congenital rubella syndrome could now be initiated. A possible explanation for the higher susceptibility observed for mumps might lie in the Rubini strain's low efficacy.

Anonymous. Vaccine-preventable diseases: improving vaccination coverage in children, adolescents, and adults. A report on recommendations from the Task Force on Community Preventive Services. *MMWR-RecComm-Rep.* 1999 Jun 18; 48(RR-8): 1-15

The delivery and acceptance of recommended vaccinations is an ongoing challenge for health-care providers and health-care and public health systems, but specific interventions can increase levels of vaccination coverage. The Task Force on Community Preventive Services has conducted systematic reviews of 17 interventions designed to raise vaccination coverage levels in children, adolescents, and adults and made recommendations regarding the use of those interventions. This report provides a summary of the recommendations; informs readers of sources from which they can obtain the full review of the interventions and more detail regarding the application of the interventions at the local level; and informs readers regarding other work of the Task Force.

Averhoff FM, Williams WW, Hadler SC. Immunization of adolescents. *Am-Fam-Physician.* 1997 Jan; 55(1): 159-67

This report concerning the immunization of adolescents (i.e., persons 11 to 21 years of age, as defined by the American Medical Association [AMA] and the American Academy of Pediatrics [AAP]) is a supplement to previous publications (i.e., MMWR 1994;43[No. RR-1]1-38; the AAP 1994 Red Book: Report of the Committee on Infectious Diseases; Summary of Policy Recommendations for Periodic Health Examination, August 1996 from the American Academy of Family Physicians; and AMA Guidelines for Adolescent Preventive Services: Recommendations and Rationale). This report presents a new strategy to improve the delivery of vaccination services to adolescents and to integrate recommendations for vaccination with other preventive services provided to adolescents. This new strategy emphasizes vaccination of adolescents 11 to 12 years of age by establishing a routine visit to their health care providers. Specifically, the purposes of this visit are to (1) vaccinate adolescents who have not been previously vaccinated with varicella virus vaccine, hepatitis B vaccine, or the second dose of the measles, mumps and rubella vaccine; (2) provide a booster dose of tetanus and diphtheria toxoids; (3) administer other vaccines that may be recommended for certain adolescents, and (4) provide other recommended preventive services. The recommendations for vaccination of adolescents are based on new or current information for each vaccine.

Averhoff FM, Brink E, Pollard B, Resha K, Bryan G, Vaillancourt MV. Adolescent immunization: focus on implementation. *J-Sch-Health.* 1997 Sep; 67(7): 304-8

On March 11-12, 1996, a workshop on how to implement new adolescent immunization (AI) recommendations was held in Atlanta, Ga. Sponsored by the Centers for Disease Control and Prevention, it was a collaborative effort of the National Immunization Program, the Division of Adolescent and School Health/National Center for Chronic Disease Prevention and Health Promotion, and the Hepatitis Branch/National Center for Infectious Diseases. The workshop brought together organizations and individuals interested in adolescent health and immunizations so they could address how new AI recommendations can be implemented most effectively. This article offers an overview of their discussions and suggestions, including issues of cooperation, education, legislation, and AI program development among health provider organizations, health department, schools, community groups and various other agencies relating to adolescent health services.

Averhoff F, Linton L, Peddecord KM, Edwards C, Wang W, Fishbein D. A middle school immunization law rapidly and substantially increases immunization coverage among adolescents. *Am-J-Public-Health.* 2004; 94: 978-984

Objectives. This study assessed the effectiveness of a middle school vaccination requirement for raising second-dose measles, mumps, and rubella vaccine and hepatitis B vaccine coverage among adolescents. Methods. Random-digit-dialed telephone surveys were conducted before (1998) and after (1999) the implementation of a vaccination requirement for entry into the seventh grade in San Diego, Calif. Results. Vaccination coverage was higher among children subject to the vaccination requirement (seventh-grade students; 60%) than among fifth- and sixth-grade students 1 year before the requirement (13%, $P<.001$), and 8th- through 12th-grade students not subject to the requirement (27%, $P<.0001$). Conclusions. Middle school-entry vaccination requirements can rapidly and substantially raise vaccination coverage among students subject to the law.

Baglio G, Cacciani L, Napoli PA, Geraci S, Motta F, Rossano R, D'Ascanio I, Trillo ME, Ciuta TS, Grandolfo ME, Guasticchi G. A vaccination campaign for gypsy children in Rome. *Ann-Ig.* 2005 May-Jun; 17(3): 197-207

Several studies conducted in Rome have shown low levels of vaccination coverage in gypsy communities. Thus a vaccination campaign targeting to 2400 gypsy children aged 0-13 years, present in 32 settlements in Rome, was conducted in 2002. The campaign was related to vaccinations required and recommended in Italy: diphtheria, tetanus, hepatitis B, pertussis (whooping cough), haemophilus influenzae and measles. In the majority of cases it was decided to carry out the vaccinations directly in the gypsy settlements, in accordance with the methods of pulse immunisation. In the case of small settlements a strategy for reorienting the population to vaccination centres was adopted. Around 2000 children were vaccinated, equivalent to 80% of the paediatric population present during the period. The number of children who have never been vaccinated has decreased from 40% prior to the campaign to 9% after the third week. Vaccination coverage in medium- and small-sized settlements (<200 inhabitants) after the campaign shows values of over 70%; in the large settlements, more modest increases have been recorded and coverage has rarely exceeded 50%. This experience has highlighted the importance of networking between public healthcare institutions and non-profit organisations. The mobilisation of a wide range of competences has thus enabled the attainment of a high level of effectiveness.

Barale A, Malaspina S, Rivetti D, Demicheli V, Moiraghi-Ruggenini A. Satisfaction of parents or accompanying persons with vaccination services for children and youngsters being vaccinated. *Ann-Ig.* 2004 Jan-Apr; 16(1-2): 179-86

A patient satisfaction survey aimed to assess the quality of immunization services was carried out as part of the new regional vaccination plan launched in Piemonte in 1999 to comply with the targets of the national immunization program. In January and February 2001, persons accompanying children for vaccination at the outpatient clinics were requested to fill a self-administered questionnaire with questions on the organization of the immunization services, the health care facilities, the attitude of the health care workers and the quality of the information provided. The response rate was 93%. Overall, satisfaction with the immunization services scored generally high, except for the quality of the information provided to the public. Many interviewees complained that the written/verbal information about the vaccination schedules was either lacking or insufficient. The survey

results indicate a need for better training and updating of health care workers so that they can give immunization service users correct information as requested.

Beh HG, Pietsch JH. Legal implications surrounding adolescent health care decision-making in matters of sex, reproduction, and gender. *Child-Adolesc-Psychiatr-N-Am.* 2004; 13: 675-+

This article focuses on the thorny and evolving legal issues and implications of health care decision-making for children and adolescents in matters of gender, sexual identity, sexual conduct, and reproduction. In treating minors, health care professionals increasingly experience competing duties and responsibilities to their patient, the parents or guardians, and to the state. This article gives health care professionals a foundation for understanding the legal concepts of adolescent health care decision-making and provides an approach for balancing the potential competing interests of these stakeholders while complying with professional standards, the law, and their own ethical and moral convictions.

Bennett DL, Tonkin RS. International developments in adolescent health care: A story of advocacy and achievement. *J-Adolesc-Health.* 2003; 33: 240-251

The contemporary health problems of young people occur within the context of the physical, social, cultural, economic, and political realities within which they live. There are commonalities and differences in this context among developed and developing countries, thus differing effects on the individual's personal as well as national development. Internationally, the origins and evolution of health care for adolescents can be viewed as an unfolding saga taking place particularly over the past 30 years. It is a story of advocacy and subsequent achievement in all corners of the world. This paper reviews the important developments in the international arena, recognizes major pioneers and milestones, and explores some of the current and future issues facing the field. The authors draw heavily on their experiences with the major nongovernmental adolescent health organizations. The special roles of the World Health Organization, Pan American Health Organization, and United Nations Children's Fund (UNICEF) are highlighted, and special consideration is given to the challenge of inclusion through youth participation.

Beutels P, Edmunds WJ, Antoñanzas F, De Wit GA, Evans D, Feilden R, Fendrick AM, Ginsberg GM, Glick HA, Mast E, Pechevis M, Van Doorslaer EK, van Hout BA. Economic evaluation of vaccination programmes: a consensus statement focusing on viral hepatitis. *Viral-Hepatitis-Prevention-Board. Pharmacoeconomics.* 2002; 20(1): 1-7

The methods that have been used to estimate the clinical and economic impact of vaccination programmes are not always uniform, which makes it difficult to compare results between economic analyses. Furthermore, the relative efficiency of vaccination programmes can be sensitive to some of the more controversial aspects covered by general guidelines for the economic evaluation of healthcare programmes, such as discounting of health gains and the treatment of future unrelated costs. In view of this, we interpret some aspects of these guidelines with respect to vaccination and offer recommendations for future analyses. These recommendations include more transparency and validation, more careful choice of models (tailored to the infection and the target groups), more extensive sensitivity analyses, and for all economic evaluations (also nonvaccine related) to be in better accordance with general guidelines. We use these recommendations to interpret the evidence provided by economic evaluation applied to viral hepatitis vaccination. We conclude that universal hepatitis B

vaccination (of neonates, infants or adolescents) seems to be the most optimal strategy worldwide, except in the few areas of very low endemicity, where the evidence to enable a choice between selective and universal vaccination remains inconclusive. While targeted hepatitis A vaccination seems economically unattractive, universal hepatitis A vaccination strategies have not yet been sufficiently investigated to draw general conclusions.

Bitsori M, Ntokos M, Kontarakis N, Sianava O, Ntouros T, Galanakis E. Vaccination coverage among adolescents in certain provinces of Greece. *Acta-Paediatr.* 2005 Aug; 94(8): 1122-5

AIM: To estimate the vaccination coverage in a sample of adolescents in Greece. METHODS: Vaccination status was estimated in 483 adolescents aged 15-19 y in four prefectures. The criteria for full vaccination were based on the recommendations of the Greek National Vaccination Schedule. RESULTS: The participation rate in the study was 78.7% (380/483 adolescents). The rates of full vaccination were 94.2% for poliomyelitis, 78.4% for hepatitis B, 77.4% for BCG, 65.0% for tetanus and 54.4% for diphtheria. The rates of full vaccination for measles, rubella and mumps were 65.0%, 57.6%, and 56.0%, respectively. For pertussis, the full vaccination rate was only 36.0%, and 7.1% of the study population was totally unvaccinated. The most missed dose for all vaccines was the final booster dose, which is usually administered in older children or adolescents. CONCLUSION: Adolescent vaccination coverage was not satisfactory in this study, mainly due to non-compliance to the final booster dose. Completion of missing vaccines at this age represents the last opportunity for massive intervention and would be of essential value for individual and community protection against common preventable diseases.

Bonanni P, Colombai R, Gasparini R, Lo Nostro A, Tiscione E, Tomei A, Montomoli E, Comodo N. Impact of routine infant and adolescent hepatitis B vaccination in Tuscany, Central Italy. *Pediatr-Infect-Dis-J.* 1999 Aug; 18(8): 677-82

BACKGROUND: In Italy routine infant and adolescent immunization against hepatitis B was introduced in 1991. OBJECTIVE: Evaluation of (1) coverage with three doses of hepatitis B vaccine in infants and adolescents; (2) seroconversion to anti-hepatitis B surface antigen antibody (anti-HBs) in adolescents receiving three doses of vaccine; (3) concordance of coverage rates in infants with prevalence of neutralizing antibodies in sera from anonymous children; (4) trend of notified cases of acute hepatitis B. METHODS: A sample of infants and adolescents living in Tuscany was studied during 6 years (1992 through 1997) by matching birth records and immunization certificates. Sera from 139 adolescents who completed the vaccination course and from 159 anonymous children belonging to immunized cohorts (1 to 5 years) were tested with a quantitative anti-HBs assay. Incidence of acute hepatitis B by age was calculated from regional statistics on notified infectious diseases between 1992 and 1996. RESULTS: Overall 10,606/11,164 (95%) infants and 10,599/11,100 (95%) adolescents received 3 doses of vaccine. Seroconversion to anti-HBs was detected in 98% of adolescent vaccinees. Anti-HBs titers ≥ 10 IU/l were detected in 87% of children. A 49% decline of acute hepatitis B cases was registered between 1992 and 1996 in 15- to 24-year-olds living in Tuscany. No case occurred in vaccinated adolescents. CONCLUSIONS: Coverage against hepatitis B is excellent in cohorts subject to mandatory immunization. If efforts to vaccinate are maintained at these levels, elimination of hepatitis B virus transmission could occur within few decades in Italy.

Bonanni P, Pesavento G, Bechini A, Tiscione E, Mannelli F, Benucci C, Lo Nostro, A. Impact of universal vaccination programmes on the epidemiology of hepatitis B: 10 years of experience in Italy. *Vaccine*. 2003; 21: 685-691

Ten years have elapsed since routine vaccination of infants and of 12-year-old adolescent was implemented in Italy. In this period, evidence has accumulated on the epidemiological impact of universal immunisation. Coverage is on average >90% and is greater than or equal to 95% in many areas of the country. Incidence of acute hepatitis B, that was already declining before 1991, was further decreased by routine vaccination programmes. This is particularly evident in adolescents and young adults (cohorts involved by mandatory vaccination), while incidence shows little changes in older subjects according to data of the last years. Prevalence of hepatitis B virus (HBV) markers detected by sero-epidemiological studies on anonymous sera confirms both the very high coverage with hepatitis B vaccination and the virtual absence of chronic HBsAg carriers in cohorts involved by routine vaccination programmes. The system of passive surveillance on adverse events following hepatitis B vaccination supports the excellent safety record of hepatitis B vaccines. In a hyperendemic area of Southern Italy, where a pilot programme was firstly implemented, it was also possible to document the decline of the involvement of hepatitis B in chronic liver pathologies (from 48% in 1982 to 18% in 1997). If coverage rates are maintained at the present levels, elimination of HBV transmission in Italy may be envisaged in few decades. (C) 2002 Elsevier Science Ltd. All rights reserved.

Brabin L, Roberts SA, Farzaneh F, Kitchener HC. Future acceptance of adolescent human papillomavirus vaccination: A survey of parental attitudes. *Vaccine*. 2006; 24: 3087-3094

The main target group for vaccination against human papillomavirus (HPV), the sexually transmitted virus that causes cervical cancer, will be young adolescents. We undertook a population-based survey to assess parental consent and potential HPV vaccine uptake in eight secondary schools using stratified randomisation according to school type and ethnicity. Our results suggest that in socially and ethnically mixed populations such as Manchester, an HPV vaccine uptake rate of 80% may be achievable if the vaccine is perceived to be safe and effective. However, most parents lack knowledge about HPV and some are concerned about sexual health issues that would arise as part of a HPV vaccine programme. It will be important to raise general awareness of the role of HPV in cervical cancer without stigmatizing the vaccine. (c) 2006 Elsevier Ltd. All rights reserved.

Brabin L, Roberts SA, Kitchener HC. A semi-qualitative study of attitudes to vaccinating adolescents against human papillomavirus without parental consent. *BMC Public Health*. 2007; 7: 20: 1-7

BACKGROUND: The first vaccine to prevent human papillomavirus (HPV) and cervical cancer has been licensed, and in future, vaccination may be routinely offered to 10-14 year old girls. HPV is a sexually transmitted virus and some parents may refuse consent for vaccination. Under-16s in the UK have a right to confidential sexual health care without parental consent. We investigated parents' views on making available HPV vaccination to adolescent minors at sexual health clinics without parental consent. **METHODS:** This was a semi-qualitative analysis of views of parents of 11-12 year old school children collected as part of a population-based survey of parental attitudes to HPV vaccination in Manchester. Parents were firstly asked if they agreed that a well-informed child should be able to request vaccination at a sexual health clinic without parental consent, and secondly, to provide a

reason for this answer. Ethical perspectives on adolescent autonomy provided the framework for descriptive analysis. RESULTS: 307 parents answered the question, and of these, 244 (80%) explained their views. Parents with views consistent with support for adolescent autonomy (n=99) wanted to encourage responsible behaviour, protect children from ill-informed or bigoted parents, and respected confidentiality and individual rights. In contrast, 97 parents insisted on being involved in decision-making. They emphasised adult responsibility for a child's health and guidance, erosion of parental rights, and respect for cultural and moral values. Other parents (n=48) wanted clearer legal definitions governing parental rights and responsibilities or hoped for joint decision-making. Parents resistant to adolescent autonomy would be less likely to consent to future HPV vaccination, (67%) than parents supporting this principle (89%; $p < 0.001$).

CONCLUSION: In the UK, the principle of adolescent autonomy is recognised and logically should include the right to HPV vaccination, but this may concern parents who would otherwise approve vaccination.

Bramley JC, Wallace LA, Ahmed S, Duff R, Carman WF, Cameron SO, Kitchin NR, Watson MW, Goldberg DJ. Universal hepatitis B vaccination of UK adolescents: a feasibility and acceptability study. *Commun-Dis-Public-Health*. 2002 Dec; 5(4): 318-20

The feasibility of introducing universal hepatitis B immunisation was assessed by offering the vaccine to all 11-12 year old pupils in Greater Glasgow (approximately 10,800). Consent was received from 92% of the school roll, and 91.3%, 89.2% and 80.3% received at least 1, at least 2, and 3 doses respectively. The findings of this study constitute key evidence for the ongoing debate in the UK on hepatitis B vaccination.

Britto MT, Pandzik GM, Meeks CS, Kotagal UR. Combining evidence and diffusion of innovation theory to enhance influenza immunization. *Jt-Comm-J-Qual-Patient-Saf*. 2006; 32: 426-32

BACKGROUND: Children and adolescents with chronic conditions such as asthma, diabetes, and HIV are at high risk of influenza-related morbidity, and there are recommendations to immunize these populations annually. At Cincinnati Children's Hospital Medical Center, the influenza immunization rate increased to 90.4% (5% declined) among 200 patients with cystic fibrosis (CF). Diffusion of innovation theory was used to guide the design and implementation of spread to other clinics. METHOD: The main intervention strategies were: (1) engagement of interested, nurse-led teams, (2) A collaborative learning session, (3) A tool kit including literature, sample goals, reminder postcards, communication strategies, and team member roles and processes, (4) open-access scheduling and standing orders (5) A simple Web-based registry, (6) facilitated vaccine ordering, (7) recall phone calls, and (8) weekly results posting. RESULTS: Clinic-specific immunization rates ranged from 32.7% to 92.8%, with the highest rate reported in the CF clinic. All teams used multiple strategies; with six of the seven using four or more. Overall, 60.0% (762/1,269) of the population was immunized. Barriers included vaccine shortages, lack of time for reminder calls, and lack of physician support in one clinic. DISCUSSION: A combination of interventions, guided by evidence and diffusion of innovation theory, led to immunization rates higher than those reported in the literature.

Broder KR, Cortese MM, Iskander JK, Kretsinger K, Slade BA, Brown KH, Mijalski CM, Tiwari T, Weston EJ, Cohn AC, Srivastava PU, Moran JS, Schwartz B, Murphy TV. Preventing tetanus, diphtheria, and pertussis among adolescents: use of tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccines recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR-RecComm-Rep.* 2006; 24: 55: 1-34

During spring 2005, two tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine (Tdap) products formulated for use in adolescents (and, for one product, use in adults) were licensed in the United States (BOOSTRIX, GlaxoSmithKline Biologicals, Rixensart, Belgium [licensed May 3, 2005, for use in persons aged 10-18 years], and ADACEL, sanofi pasteur, Toronto, Ontario, Canada [licensed June 10, 2005, for use in persons aged 11-64 years]). Prelicensure studies demonstrated safety and efficacy against tetanus, diphtheria, and pertussis when Tdap was administered as a single booster dose to adolescents. To reduce pertussis morbidity in adolescents and maintain the standard of care for tetanus and diphtheria protection, the Advisory Committee on Immunization Practices (ACIP) recommends that: 1) adolescents aged 11-18 years should receive a single dose of Tdap instead of tetanus and diphtheria toxoids vaccine (Td) for booster immunization against tetanus, diphtheria, and pertussis if they have completed the recommended childhood diphtheria and tetanus toxoids and whole cell pertussis vaccine (DTP)/ diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) vaccination series (five doses of pediatric DTP/DTaP before the seventh birthday; if the fourth dose was administered on or after the fourth birthday, the fifth dose is not needed) and have not received Td or Tdap. The preferred age for Tdap vaccination is 11-12 years; 2) adolescents aged 11-18 years who received Td, but not Tdap, are encouraged to receive a single dose of Tdap to provide protection against pertussis if they have completed the recommended childhood DTP/DTaP vaccination series. An interval of at least 5 years between Td and Tdap is encouraged to reduce the risk for local and systemic reactions after Tdap vaccination. However, an interval less than 5 years between Td and Tdap can be used; and 3) vaccine providers should administer Tdap and tetravalent meningococcal conjugate vaccine (Menactra, sanofi pasteur, Swiftwater, Pennsylvania) to adolescents aged 11-18 years during the same visit if both vaccines are indicated and available. This statement 1) reviews tetanus, diphtheria and pertussis vaccination policy in the United States, with emphasis on adolescents; 2) describes the clinical features and epidemiology of pertussis among adolescents; 3) summarizes the immunogenicity, efficacy, and safety data of the two Tdap vaccines licensed for use among adolescents; and 4) presents recommendations for tetanus, diphtheria, and pertussis vaccination among adolescents aged 11-18 years.

Bruneau A, Haley N, Valiquette L. Evaluation of a program to promote hepatitis B vaccination among adolescents in a school environment of Central Montreal. *Can-J-Public-Health.* 2001 Sep-Oct; 92(5): 348-52

OBJECTIVE: We developed a hepatitis B vaccination promotion project aimed at Montreal-area adolescents. A student leaflet, teacher's guide and classroom poster were developed. Our objectives were to have 25% of teachers give a course on hepatitis B and 25% of students begin vaccination against hepatitis B. **METHOD:** The promotional campaign was aimed at 100,000 students in 225 public and private secondary schools. The evaluation was carried out six months after the beginning of the campaign. Data were collected through self-administered questionnaires to students (n = 206), teachers (n = 128) and school nurses (n = 30). **RESULTS:** Two thirds of teachers used the material and 45% gave a course on the subject. The teachers who gave the course felt knowledgeable about teaching the subject and felt that the subject was important. Six months after the beginning of the campaign, 38% of secondary students had received at least one dose of vaccine.

CONCLUSION: The promotional material was appreciated by both students and teachers and used during secondary school classes. Teachers, when given appropriate tools and supported by school nurses, are highly motivated to pass on preventive health messages to their students.

Campins-Marti M, Cheng HK, Forsyth K, Guiso N, Halperin S, Huang LM, Mertsola J, Oselka G, Ward J, Wirsing von Konig CH, Zepp F. Recommendations are needed for adolescent and adult pertussis immunisation: rationale and strategies for consideration. International-Consensus-Group-on-Pertussis-Immunisation. *Vaccine*. 2001 Dec 12; 20(5-6): 641-6

Pertussis vaccination of infants has dramatically reduced disease, complications and deaths in infancy and early childhood. But there is still a major public health challenge--to deal with the morbidity and economic burden of illness in older children, adolescents and adults. Furthermore, it is these groups that form a major source of infection for non-immunised and partially immunised infants who are at high risk of severe complications. Adult-type acellular pertussis vaccine confers safe and effective protection against pertussis. There are several strategies to consider for immunising older individuals. Universal vaccination of all age groups would be the best available strategy for protecting individuals. It would also reduce the potential for transmitting the disease to other susceptibles, particularly infants. However, such a policy may be difficult both logistically and economically at this time. More easily achievable as a first step would be a strategy of universal adolescent booster vaccination combined with a programme targeted at adults most likely to have contact with very young babies including healthcare and childcare workers, parents and close family contacts. There is also potential for offering vaccination to adults (and their carers and close contacts) whose medical conditions or advanced age may place them at increased risk of more severe pertussis disease. Specific details of immunisation programmes must be made on a country by country basis depending on local circumstances.

Cassidy W. School-based adolescent hepatitis B immunization programs in the United States: strategies and successes. *Pediatr-Infect-Dis-J*. 1998 Jul; 17(7 Suppl): S43-6

BACKGROUND: To increase hepatitis B vaccination coverage of adolescents, a public/private partnership was organized in the greater Baton Rouge area of Louisiana in 1992 to fund and implement school-based vaccination programs. METHODS: Initial programs utilized schools with existing school-based clinics and administered 2 to 3 doses of hepatitis B vaccine to up to 76% of eligible students. During 1996 to 1997, expansion from 4 schools to 68 schools was facilitated by the use of temporary clinics set up in open school space. This multifaceted program administered 3 doses of hepatitis B vaccine to 3232 students (75%) and 2 doses to 171 students (4%). Administration of the 3-dose regimen of hepatitis B vaccine was aided by the use of a dosing schedule at 0, 2 and 4 months. This accelerated dosing has been shown to provide seroprotection for greater than 95% of healthy adolescents. RESULTS: In the Baton Rouge area, the hepatitis B adolescent vaccination program has immunized approximately 5000 adolescents during a 5-year period with minimal use of financial and personnel resources. CONCLUSIONS: The success and growth of this program demonstrate that school-based vaccination programs can be highly efficient and effective.

Cohn AC, Broder KR, Pickering LK. Immunizations in the United States: A rite of passage. *Pediatr-Clin-N-Am.* 2005; 52: 669- +

Today, vaccination is a cornerstone of pediatric preventive health care and a rite of passage for nearly all of the approximately 11,000 infants born daily in the United States. This article reviews the US immunization program with an emphasis on its role in ensuring that vaccines are effective, safe, and available and highlights several new vaccines and recommendations that will affect the health of children and adolescents and the practice of pediatric medicine in future decades.

Denis F. Hepatitis B vaccination in France: vaccination coverage in 2002. *Bull-Acad-Natl-Med.* 2004; 188(1): 115-23

In parts of Europe where the relevant data are available, the vaccinal coverage rate of children against hepatitis B virus ranges from 27.5 to 99.0% and that of adolescents from 52 to 98%. In France, an exhaustive population survey conducted in 2002 revealed an overall vaccine coverage rate of over 21.7% and very low three-dose coverage rates among infants (19.8%), children (23.3%), and adolescents (46.2%) which are inadequate to protect future generations from HBV infection and its consequences. Unless major efforts are made to vaccinate these populations and high-risk groups, complete elimination of HBV transmission might take another 20 years to achieve.

Denis F, Levy-Bruhl D. Mass vaccination against hepatitis B: The French example. *Curr-Top-Microbiol-Immunol.* 2006; 304: 115-129

Mainland France is considered as a low endemicity area for hepatitis B, but the French Caribbean and Pacific territories are classified into areas of intermediate and high endemicity. In France vaccination programmes aimed at high-risk groups were started in 1982 (including health care workers and patients receiving blood products) and the immunization of babies born of hepatitis B virus surface antigen (HB sAg)-positive mothers was reinforced in 1992. Considering the drawbacks and limited effect of targeted vaccination policies, universal vaccination targeted particularly to the preadolescent and adolescent population was initiated in 1994. In 1995, hepatitis B virus (HBV) vaccination was included in the infant immunization schedule. However, the emotion generated by the claim that HBV vaccination could have led to the development of central nervous system demyelinating disorders resulted in a marked decline of HBV vaccine use, both in the pediatric (23.3% vaccination coverage in children less than 13 years old) and in the adult population. The current coverage rates are likely to be insufficient to bring about a significant reduction in the control of hepatitis B in France. The success of universal immunization is highly dependent on reinstating the confidence of the public and health care professionals in the safety and efficacy of hepatitis B vaccines.

Deuson RR, Hoekstra EJ, Sedjo R, Bakker G, Melinkovich P, Daeke D, Hammer AL, Goldsman D, Judson FN. The Denver school-based adolescent hepatitis B vaccination program: a cost analysis with risk simulation. *Am-J-Public-Health.* 1999 Nov; 89(11): 1722-7

OBJECTIVES: This study sought to compare the cost-effectiveness of a school-based hepatitis B vaccine delivery program with that of a vaccine delivery program associated with a network health maintenance organization (HMO). **METHODS:** The vaccination program

enrolled 3359 sixth-grade students from 18 middle schools in Denver, Colo. Immunization status and direct and indirect program costs were compiled. The sensitivity of the outcomes was assessed by simulation methods. RESULTS: The per-dose cost-effectiveness ratio for the school-based delivery system was \$31. This cost-effectiveness ratio remained stable when the model was simulated with costs that were underestimated or overestimated by 20%. In the network HMO, the direct cost per dose was \$68 and the societal cost was \$118 when the child's father worked full-time and the mother worked part-time. There is less than a 5% chance that the network HMO-based vaccination program could be more cost-effective than the school-based program. CONCLUSIONS: The cost per dose of the school-based program was significantly less than that of the network HMO-based program, because in the school program government-purchased vaccine was available at a lower cost and parents did not incur work-loss costs.

Diaz A, Neal WP, Nucci AT, Ludmer P, Bitterman J, Edwards S. Legal and ethical issues facing adolescent health care professionals. *Mt-Sinai-J- Med.* 2004; 71: 181-185

This article reviews the legal standards and ethical dilemmas surrounding the provision of care to adolescent patients. Uncertainty and ambiguity in this area has contributed to the underserving of the adolescent population. Usually, the legal right to consent to treatment resides with the adolescent's parent or legal guardian; however, there are many cases in which adolescents may provide their own consent. The determination that the adolescent is "mature" is one important factor. The law generally upholds a provider's determination of maturity of a patient. Minors also have the right to confidentiality in almost all situations in which they have the right to consent. The issue of confidentiality poses legal and ethical challenges to the provider in five discussed areas. Providers should be aware of the laws specific to their state, while keeping foremost the best interest of their patients. Providers should also encourage parental involvement and communication concerning treatment, while respecting adolescents' right to confidentiality.

Dinelli MIS, Fisberg M, de Moraes-Pinto MI. Tetanus and diphtheria immunity in adolescents from Sao Paulo, Brazil *Brazilian J-Med-Biol-Res.* 2007; 40: 259-263

Tetanus and diphtheria vaccines are of special concern in adolescents because boosters are necessary for adequate maintenance of protection and are often omitted. We assessed serum levels of tetanus and diphtheria antibodies in adolescents and their association with vaccination status. From May to October 2001, we evaluated the vaccination records of 208 adolescents aged 10 to 20 years in Sao Paulo, Brazil. Antibodies to tetanus and diphtheria were detected using double-antigen ELISA and vaccination records were analyzed according to the guidelines of the Brazilian National Immunization Program. All adolescents had received complete primary vaccinations against tetanus and diphtheria, but 23.1% of them had not received a booster dose in the last 10 years. All adolescents were immune to tetanus and 88.9% were fully protected (antibodies ≥ 0.1 IU/mL). One individual (0.5%) was non-immune to diphtheria and 86% were fully protected against the disease. Adolescents with up-to-date vaccination records had higher antibody levels than those with not up-to-date records for tetanus (0.763 vs 0.239 IU/mL, t-test: $P < 0.0001$) and diphtheria (0.366 vs 0.233 IU/mL, t-test: $P = 0.014$). Full immunity against tetanus (antibodies ≥ 0.1 IU/mL) was higher among individuals with up-to-date vaccination (93.1%) when compared to those with not up-to-date records (75%, Fisher's exact test: $P = 0.001$). All adolescents had received basic immunization in childhood and were protected against tetanus and diphtheria. However, these data indicate that more emphasis should be placed on the tetanus-diphtheria booster in order to avoid a decay in antibody levels.

Donaghy M, Cameron JC, Friederichs V. Increasing incidence of mumps in Scotland: Options for reducing transmission. *J-Clin-Virol.* 2006; 35: 121-129

Background: There has been a dramatic increase in mumps in Scotland since November 2003, with cases primarily in adolescents and young adults. Objectives: This paper describes mumps epidemiology in Scotland, undertakes a risk assessment and considers option for reducing transmission. Results: Mumps is primarily a risk for the 13-25 year age group, as they have neither been offered two routine doses of measles, mumps and rubella MMR vaccine, nor been exposed to wild virus. Transmission is facilitated by a high degree of social mixing, with enclosed settings (school, universities etc.) being higher risk. On the basis of susceptibility and risk of transmission, three categories of higher (17-20 years), intermediate (21-22; 15-16 years), and low (23-25-, 13-14 years) risk were defined, all in higher risk enclosed settings. Herd immunity would be very difficult to achieve, as it would require unrealistically high MMR uptake (an additional 45-80% in 17-20 year olds). A risk management strategy of reducing transmission and decreasing the likelihood of outbreaks was therefore proposed. Action would be targeted at the higher risk group (17-20 years) in higher risk settings. Three options were considered: do nothing; opportunistic immunisation through GPs; a mass campaign. The 'do nothing' option was discounted. The preferred option was to alert GPs to the need to offer MMR vaccine to 17-20 year olds in higher risk settings. The rationale for this was that it had the lowest cost, avoided disruption to services, and primarily that it would reduce the probability of mumps transmission in higher risk settings. Conclusions: The Chief Medical Officer issued a letter to all health professionals in Scotland encouraging them to offer MMR vaccine to 13-15 year olds, who had not previously received two doses, and particularly those aged 17-20 years in higher risk settings.

Duval B, Gilca V, Boulianne N, Deceuninck G, Rochette L, De-Serres G. Immunogenicity of two paediatric doses of monovalent hepatitis B or combined hepatitis A and B vaccine in 8-10-year-old children. *Vaccine.* 2005 Jul 1; 23(31): 4082-7

Hepatitis A and B vaccines are highly immunogenic in three-dose schedules. To obtain an equivalent result in children with two paediatric doses would be of significant benefit. The purpose of this study was to measure the immunogenicity of a two-dose schedule in children with two licensed recombinant HBsAg containing vaccines given at paediatric doses, one of them combined with hepatitis A. Seven-hundred and four healthy school children aged 8-10 years were recruited in an open label study to receive either Twinrix Pediatric (360 EI.U HAV antigen; 10 microg HBsAg) or Recombivax (2.5 microg HBsAg) vaccine intramuscularly 6 months apart. The seroconversion (≥ 1 mIU/ml for anti-HBs antibodies and ≥ 33 mIU/ml for anti-HAV antibodies), seroprotection (anti-HBs ≥ 10 mIU/ml) rates and the geometric mean titers (GMTs) were determined 4-8 weeks after the second dose. The anti-HBs seroconversion rate was 97.1% with Twinrix and 97.2% with Recombivax. The seroprotection rates were 96.5 and 94.4%, respectively ($P = 0.17$). The GMT was higher with Twinrix than with Recombivax (3248 mIU/ml versus 742 mIU/ml, $P < 0.0001$). All the children vaccinated with Twinrix seroconverted to HAV and the GMT was 5168 mIU/ml. The obtained results suggest that two paediatric doses of hepatitis vaccines are highly immunogenic in 8-10-year-old children. This schedule could facilitate a greater vaccine acceptance and the addition of hepatitis A vaccine to existing adolescent universal hepatitis B virus immunization programs.

Edwards S, Diaz A. Adolescents and immunization: tips for the primary care provider. *Mt-Sinai-J-Med.* 2004 May; 71(3): 162-5

Despite high immunization rates in this country, many adolescents do not receive all of the recommended vaccines. Each year, more than 3.5 million adolescents in the U.S. enter adulthood lacking recommended immunizations. This article will review the current recommendations for immunization for adolescents, including those for the meningococcal vaccine. The vaccine schedule is continually changing, and it is important that health care providers be up to date and utilize available resources with current information. Primary care providers should review and update immunization records with their adolescent patients on a routine basis.

Eisenberg ME, Swain C, Bearinger LH, Sieving RE, Resnick MD. Parental notification laws for minors' access to contraception - What do parents say? *Arch-Pediatr-Adolesc-Med.* 2005; 159: 120-125

Background: Recent years have seen new challenges to laws protecting minors' confidential access to reproductive health services. Little research has explored parental views on the issue. Objective: To examine parents' views about laws requiring parental notification (PNLs) when minor children seek to obtain prescription contraceptives, the exceptions parents would endorse, and the consequences they would expect. Design: Fifteen-minute telephone surveys conducted in 2002. Setting: Minnesota and Wisconsin. Participants: Population-based sample of 1069 parents of adolescents aged 13 to 17 years with a working telephone number. An additional 1095 eligible parents declined and 360 were not available to participate. Main Outcome Measures: Views about PNLs ("Do you think a law requiring notification of parents when a teen requests birth control from a clinic is a good idea, a bad idea, or neither a good nor a bad idea?"). Results: Of the eligible parents, 42.4% completed the survey. More than half (55.1%) of participants thought PNLs were a good idea. However, 96.1% of parents expected at least 1 negative consequence and 47.6% expected 5 or more negative consequences to result with the enactment of PNLs. For exceptions to PNLs, 85.5% of parents endorsed at least 1, and 29.7% endorsed 5 to 6. Each additional anticipated positive consequence of enacting PNLs was significantly associated with more than twice the odds of favoring PNLs (odds ratio [OR], 2.28), and each additional negative consequence was associated with lower odds of supporting PNLs (OR, 0.87). Likewise, each additional exception endorsed was associated with lower odds of supporting PNLs (OR, 0.71). Conclusions: Many parents hold complex views on the need for confidentiality and the appropriate involvement of parents in adolescent health care services. Educating parents about the potential negative consequences of parental notification could change their support of PNLs.

Ellsasser G. Prevention by vaccination of children and young people. Obstacles and examples of effective measures in the Federal State of Brandenburg. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz.* 2004 Dec; 47(12): 1196-203

This article identifies successful vaccination strategies, obstacles to such strategies and the role that schools can play in terms of health education by analysing vaccination rates among children in the Federal State of Brandenburg. The analysis is based on the vaccination status of Brandenburg's children at day care centres and schools in relation to the social status of their parents, the extent to which preventive examinations (U up to J1) is taken advantage of and regional location. Furthermore, an evaluation is rendered of the vaccination

awareness campaign which has been carried out in sixth grade students since 2002 to assess the impact of health promotion at schools. In the Federal State of Brandenburg vaccination coverage among infants and toddlers is good, with approximately 94% having received complete basic vaccination in 2003. By contrast, there are marked deficits among tenth grade schoolchildren in terms of refresher vaccinations, basic hepatitis B vaccinations and the second measles, mumps and rubella (MMR) vaccinations. Vaccination status is strongly dependent on the social status of parents and the extent to which preventive medical examinations and regional medical health-care provision are utilized. Systematic checking of vaccination documents by the public health services promotes vaccination awareness. Prevention by vaccination is most effective when combined with preventive medical examinations, effective local vaccination management and interdisciplinary interventions: education at schools, systematic tracking of vaccination documents combined with the provision of vaccinations in doctors' surgeries and additionally by the public health services.

Erickson LJ, De Wals P, Farand L. An analytical framework for immunization programs in Canada. *Vaccine*. 2005; 23:2470-2476

Recent years have seen an increase in the number of new vaccines available on the Canadian market, and increasing divergence in provincial and territorial immunization programs as jurisdictions must choose among available health interventions with limited funding. We present an analytical framework, which we have developed to assist in the analysis and comparison of potential immunization programs. The framework includes 58 criteria classified into 13 categories, including the burden of disease, vaccine characteristics and immunization strategy, cost-effectiveness, acceptability, feasibility, and evaluability of program, research questions, equity, ethical, legal and political considerations. To date this framework has been utilized in a variety of different contexts, such as to structure expert presentations and reports and to examine the degree of consensus and divergence among experts, and to establish priorities. It can be transformed for a variety of other uses such as educating health professionals and the general public about immunization. (c) 2004 Elsevier Ltd. All rights reserved.

Fair E, Murphy TV, Golaz A, Wharton M. Philosophic objection to vaccination as a risk for tetanus among children younger than 15 years. *Pediatrics*. 2002 Jan; 109(1): E2

OBJECTIVES: Although safe and effective vaccines are available to protect against tetanus in the United States and vaccination rates are high, cases of tetanus among children continue to occur. The objectives of this article are to describe reported cases of tetanus in children in the United States and to identify the reasons for lack of protection against tetanus. **METHODS:** We reviewed all cases of tetanus in children <15 years of age that were reported to the National Notifiable Diseases Surveillance System from 1992 through 2000. Cases were defined by physician diagnosis. We verified the information in the case reports with state and local health departments. **RESULTS:** From 1992 through 2000, 15 cases of tetanus in children <15 years of age were reported from 11 states. Twelve cases were in boys. Two cases were in neonates <10 days of age; the other 13 cases were in children who ranged in age from 3 to 14 years. The median length of hospitalization was 28 days; 8 children required mechanical ventilation. There were no deaths. Twelve (80%) children were unprotected because of lack of vaccination, including 1 neonate whose mother was not vaccinated. Among all unvaccinated cases, objection to vaccination, either religious or philosophic, was the reported reason for choosing not to vaccinate. **CONCLUSION:** The majority of recent cases of tetanus among children in the United States were in unvaccinated children whose parents objected to vaccination. Parents who choose not to

vaccinate their children should be advised of the seriousness of the disease and be informed that tetanus is not preventable by means other than vaccination.

Fogarty KJ, Massoudi MS, Gallo W, Averhoff FM, Yusuf H, Fishbein D. Vaccine coverage levels after implementation of a middle school vaccination requirement, Florida, 1997-2000. *Public-Health-Rep.* 2004 Mar-Apr; 119(2): 163-9

OBJECTIVE: Little information is available about the effectiveness of school entry vaccination requirements at the middle school level. This study examined coverage levels among students entering seventh grade in Florida following implementation of a school entry vaccination requirement in 1997. **METHODS:** The authors analyzed county-specific vaccination coverage levels (three doses of hepatitis B vaccine, a second dose of measles, mumps, and rubella [MMR] vaccine, and a booster dose of tetanus and diphtheria toxoids [Td]) among students entering public and private schools in Florida from 1997 through 2000. In 1998, a survey of all county health departments was conducted, and the resulting data were linked to county-specific vaccination rates. **RESULTS:** During the 1997-1998 school year, the first year the requirement went into effect, at school entry 121,219 seventh-grade students (61.8%) were fully vaccinated, 72,275 seventh grade students (36.9%) lacked one or more doses of vaccine but were considered in process, 1,817 were non-compliant (0.9%), and 763 had medical or religious exemptions (0.4%). In the 2000-2001 school year, the proportions of students reported fully vaccinated at school entry had increased to 66%. Most of this change was related to an increase in hepatitis B coverage. There was a significant inverse relationship between the proportion of students fully vaccinated and the size of the county's seventh grade population. **CONCLUSIONS:** The seventh grade vaccination entry requirement was associated with sustained high levels of vaccination coverage. Passing a school entry vaccination requirement appears may be sufficient to increase coverage, but other strategies may be required to achieve full immunization of middle school students.

Franco E, Giambi C, Ialacci R, Maurici M. Pertussis vaccination for adolescents and adults. *Expert-Opin-Biol-Ther.* 2004 Oct; 4(10): 1669-76

Following the introduction of vaccines, the incidence of pertussis declined; however, since 1990, a progressive increase was noted, even in highly immunised populations. Periodic pertussis outbreaks are due to suboptimal efficacy of the vaccine and waning immunity with increasing age. A significant proportion of adolescents and adults with a prolonged cough present *Bordetella pertussis*, and infection is often transmitted to infants too young to be vaccinated. A high vaccination coverage in the whole population would be necessary to interrupt the circulation of *B. pertussis*, but immunisation programmes for adolescents and adults have been introduced recently and are accepted with difficulty. The lack of cost-benefit analysis and consistent epidemiological data makes it difficult to assess the role of pertussis elimination among public health priorities. At present, programmes targeted at risk groups for close contacts with infants are the most convenient for adult population, as more epidemiological and economic evidence is needed before a universal strategy can be discussed.

Gagnon MP, Godin G. Young adults and HIV vaccine: determinants of the intention of getting immunized. *Can-J-Public-Health*. 2000 Nov-Dec; 91(6): 432-4

The aim of this study was to evaluate the acceptability of a hypothetical HIV vaccine and to identify the psychosocial determinants of the intention of receiving HIV immunization, based upon Ajzen's Theory of Planned Behaviour (TPB). Of the 136 young adults surveyed, 120 (88%) had a moderate to high intention to receive the HIV vaccine. A logistic regression was performed and two psychosocial factors from the TPB were significant predictors of the young adults' intention of getting HIV immunization: their attitude towards getting HIV immunization (OR = 4.80, CI 95% = 2.08; 13.05) and the perceived behavioural control of getting HIV immunization (OR = 2.52, CI 95% = 1.17; 6.05). These results show that HIV immunization is well accepted by young adults. This finding is particularly relevant because the effectiveness of HIV immunization programs will depend on an individual's acceptance of this vaccine. Also, our results suggest that psychosocial determinants can influence a young adult's decision to receive the HIV vaccine once it becomes available.

Gilca V, Duval B, Boulianne N, Dion R, De Serres G. Impact of the quebec school-based hepatitis B immunization program and potential benefit of the addition of an infant immunization program. *Pediatr-Infect-Dis-J*. 2006; 2: 372-4

Ten years after a school-based hepatitis B immunization program was implemented, we conducted a study to assess the impact of the program, vaccine failures, risk factors and the number of cases potentially preventable by the addition of an infant vaccination program. The preteen vaccination program is highly effective. An infant immunization program would bring additional benefits.

Glik D, Macpherson F, Todd W, Stone K, Ang A, Jones MC. Impact of an immunization education program on middle school adolescents. *Am-J-Health-Behav*. 2004; 28: 487-497

Objectives: To raise middle school student awareness, attitudes, and proactive behaviors about immunization, and to increase immunization rates among middle school students through implementation of a comprehensive integrated immunization promotion curriculum (Immunization Plus!) Methods: Evaluation used a quasi-experimental non-equivalent comparison groups design conducted in a sample of 40 classrooms in 22 schools in California. Results: Sixth-grade students exposed to the curriculum developed more positive knowledge and attitudes, and were more likely to be immunized, to intend to obtain newly required immunizations, and to tell parents about immunizations. Conclusion: Infectious disease control and immunizations are under-developed subject areas within school-based health promotion in the United States that can be effectively taught to middle school students.

Gold RS. The World Health Organization: school health initiatives. *J-Sch-Health*. 1990 Sep; 60(7): 370-8

The United Nations and its family of operational agencies have existed for almost five decades. For school health personnel, to understand how these agencies operate--in particular, the World Health Organization (WHO)--is worthwhile. To understand how WHO influenced the practice of health education for school-aged youth, some critical events that have occurred during the past five decades are reviewed and several current and future activities are identified and described.

The UN and its family of operational agencies have existed for almost 5 decades. For school health personnel, to understand how these agencies operate--in particular, the World Health Organization (WHO)--is worthwhile. To understand how WHO influenced the practice of health education for school aged youth, some critical events that have occurred during the past 5 decades are reviewed and several current and future activities are identified and described. Austria, England, Norway, and Finland designed and conducted the WHO Cross-National Survey: Health Behavior of School aged Children. A core survey was set up and each country could add optional questions according to its own needs. The 2nd round of survey was done during the 1985 school year with 11 countries taking part. In May, 1989, more than 17 European nations and Canada decided to take part in the 3rd round, conducted during the next academic year. WHO has been working on Acquired Immunodeficiency Syndrome (AIDS)/Sexually Transmitted Diseases (STDs) education. In 1988, the WHO Division of Health Education and Health Promotion was established. WHO is working with the US Centers for Disease Control's Division of Adolescent and School Health to set up a collaborating center emphasizing school health education. Recently in 3rd world countries, there has been a dramatic drop in infant mortality through the expanded program of immunization, increases in breast feeding, improvement of weaning practices, and oral rehydration therapy. This is the Child Survival Revolution. These efforts should be continued beyond infancy. This is known as the Child Development Revolution. An Action-Oriented Prototype Curriculum has been developed. It is used in teacher training and contains material on diarrheal disease control, expanded immunization programs, breast feeding, AIDS, and family planning. The strategy is to learn by action and discovery.

Gonzalez IM, Averhoff FM, Massoudi MS, Yusuf H, DeStefano F, Kramarz P, Maher JE, Mullooly JP, Chun C, Davis RL, Black SB, Shinefield HR. Hepatitis B vaccination among adolescents in 3 large health maintenance organizations. Vaccine-Safety-Datalink-Team. *Pediatrics*. 2002 Nov; 110(5): 929-34

OBJECTIVE: In 1995, the Advisory Committee on Immunization Practices (ACIP) recommended routine hepatitis B (HB) vaccination of all unvaccinated 11- to 12-year-old adolescents. Little is known about the implementation of these recommendations in a managed care setting. The objective of this study was to determine the impact of ACIP recommendations on HB vaccination among adolescents in 3 managed care settings. **METHODS:** We assessed HB vaccination coverage among adolescents who were enrolled in 3 large health maintenance organizations (HMOs) and who turned 13 years old after the 1995 ACIP recommendations. Children who were 8 to 10 years of age during May 1993 and were continuously enrolled through December 1998 were eligible. We used the HMOs' computerized immunization tracking system to collect HB vaccination dates. The percentage of adolescents who received 3 doses of HB vaccine was determined. **RESULTS:** In HMOs A, B, and C, coverage levels for 3 doses of HB vaccine were 43.4%, 65.5%, and 25.7%, respectively, among 13-year-olds in 1998 compared with 26.1%, 50.4%, and 5.5% among 13-year-olds in 1996. Between the ages of 11 and 13 years, coverage rates among adolescents aged 13 in 1998 rose more than the coverage among adolescents aged 13 in 1996. The proportion of 13-year-olds in 1998 who received the first dose of HB vaccine by December 1998 was much higher at 89.6%, 65.2%, and 56.6% in HMOs A, B, and C, respectively, compared with the proportion who completed the 3-dose series (43.4%, 65.5%, and 25.7%, respectively). **CONCLUSIONS:** After the 1995 ACIP recommendations, HB vaccination coverage levels among 13-year-olds increased in each of the HMOs, suggesting adherence with national recommendations. Differences among the 3 HMOs may reflect differences in internal policies. More effective strategies may be needed to achieve the Healthy People 2010 goal of 90% vaccination coverage rates among adolescents.

Gordon TE, Zook EG, Averhoff FM, Williams WW. Consent for adolescent vaccination: issues and current practices. *J-Sch-Health*. 1997 Sep; 67(7): 259-64

To identify and describe implementation of state-level informed consent requirements for adolescent immunizations, current state regulations on informed consent and immunization services for children and adolescents were identified through the LEXIS-NEXIS legal data base. Regulations were coded for informed consent characteristics, consent exemptions, and current immunization requirements. State immunization program directors, project managers, and state hepatitis coordinators were surveyed to catalogue how regulations were implemented and document new policies or regulations under consideration. Parental consent for immunizations is standard practice in 43 states. Most states (n = 34) require separate consent for each injection when more than one injection is required to complete a vaccination, but only for a limited number of medical procedures. Nine states allow adolescents to self-consent for hepatitis B vaccination in sexually transmitted disease clinics and family planning clinics as part of the exemption for minors' receipt of sexual health services. Most states require consent for vaccination services provided to adolescents. Parental consent requirements are a potential barrier to vaccinating adolescents in some settings.

Grace JA. Adolescent immunization: challenges and opportunities. *J-Sch-Nurs*. 2006; 22: 87-93

Immunization is one of the greatest public health achievements of the past century. Vaccines are responsible for the worldwide eradication of smallpox, the elimination of polio in the western hemisphere, and most recently the elimination of rubella as a public health threat in the United States. Childhood vaccination rates are at an all-time high, but immunization falls off dramatically during adolescence (ages 11-19). With increased attention being paid to adolescent health and the new vaccines available for adolescents, efforts to increase adolescent immunization rates are moving to the forefront. Improving adolescent immunization rates requires advocacy on the part of all health professionals. School nurses, whose mission is to enhance the well-being of adolescents, are in a unique position to work with students, parents, and local health professionals to improve the adolescent immunization rate.

Guay M, Clouatre AM, Blackburn M, Baron G, De Wals P, Roy C, Desrochers J, Milord F. Effectiveness and cost comparison of two strategies for hepatitis B vaccination of schoolchildren. *Can. J. Public Health-Rev. Can. Sante Publ*. 2003; 94: 64-67

Context: In 1994, immunization against hepatitis B was implemented in schools in Quebec, targeting grade 4 students. In 1996-1997 and 1997-1998, one Local Community Service Centre (CLSC) replaced the school-based program in its district with vaccination offered in community clinics after school hours. The aim of the current study was to compare the effectiveness and costs of school-based and clinic-based programs. Methods: Vaccination coverage data were collected in the CLSC with the clinic-based program (CBP), and in three matched CLSCs with a school-based program (SBP), from 1994 to 2000. Surveys were conducted to estimate costs to parents, to schools and to CLSCs in 1997-1998. Results: With the implementation of the CBP, the vaccination coverage fell to 73%, compared with over 90% in the SBPs. Coverage increased to 90% when the CBP was abandoned. Costs to the CLSC were not much lower in the CBP. Societal costs were \$63 per student vaccinated in the CBP, and less than or equal to \$40 in the SBPs. Conclusion: Results demonstrate the advantage of a school-based program for the immunization of schoolchildren.

Haavet OR, Straand J, Hjortdahl P, Saugstad OD. Do negative life experiences predict the health-care-seeking of adolescents? A study of 10th-year students in Oslo, Norway. *J-Adolesc-Health*. 2005; 37: 128-134

Purpose: To analyze associations among the negative life experiences and health-care-seeking of adolescents during the 12 months before the study. Methods: Cross-sectional questionnaire study among 10th-year students at all secondary schools in Oslo. Results: In 2000 and in 2001, 7329 (88%) of Oslo's 8316 secondary-school students responded to the questionnaire. Some contacts with primary health care during the previous year were reported by 71% of respondents, and 6% had seen a mental health practitioner (psychologist or psychiatrist). Health care utilization was not correlated with the family's financial situation as reported by the student (boys = 1019; girls = 1258), or with a parent's unemployment (boys = 253; girls = 325). The 2112 boys (59% of all) and 2378 girls (64%) who reported feeling strong pressure from others to succeed, had more contacts with all primary health care services. Girls, but not boys, who reported being bullied by others reported more psychologist or psychiatrist visits than did their nonbullied peers. Exposure to physical violence was associated with a significant increase in visits to the School Health Service, family physician, and emergency medical service, and was related to more than doubling the probability of visiting a mental health practitioner. Being sexually violated during the previous year increased the likelihood of boys visiting mental health practitioner more than four times (odds ratio [OR] 4.6 95% confidence interval [CI] 1.7-12.2). and visiting School Health Service by nearly four times, (OR 3.7; 95% CI 1.0-13.5). Conclusion: Variation in adolescent health care seeking can, by and large, be predicted by negative life experiences. (c) 2005 Society for Adolescent Medicine. All rights reserved.

Hall S, Galil K, Watson B, Seward J. The use of school-based vaccination clinics to control varicella outbreaks in two schools. *Pediatrics*. 2000 Jan; 105(1): e17

School-based vaccination clinics were offered in 2 schools experiencing varicella outbreaks. The clinics raised coverage of susceptible children from 52.9% to 92.2% and from 68.8% to 85.3% in the 2 schools, respectively. Although routine immunization and school-entry requirements are the best strategies for preventing outbreaks, school-based vaccination clinics may greatly increase coverage and shorten outbreaks.

Hanratty B, Holt T, Duffell E, Patterson W, Ramsay M, White JM, Jin L, Litton P. UK measles outbreak in non-immune anthroposophic communities: the implications for the elimination of measles from Europe. *Epidemiol-Infect*. 2000 Oct; 125(2): 377-83

We describe the epidemiology of the first nationwide outbreak of measles infection in the UK since the implementation of a mass vaccination campaign. Notifications of infectious diseases, interview and postal questionnaire identified 293 clinical cases, 138 of which were confirmed by salivary IgM, measles virus isolation and PCR. Twelve were epidemiologically linked to confirmed cases. The outbreak began in London, after contact with measles infection probably imported from Italy. Measles genotyping determined by sequence analysis confirmed spread to other unimmunized anthroposophic communities in the north, south west and south coast of England. Only two cases had been vaccinated against measles infection, and 90% of cases were aged under 15 years. Measles virus can selectively target non-immune groups in countries with high vaccine uptake and broader herd immunity. Without harmonization of vaccination policies and uniform high coverage across Europe, the importation and spread of measles virus amongst non-immune groups may prevent the elimination of measles.

Hansen LF. The knowledge about measles, mumps and rubella among parents in the county of Roskilde. *Ugeskr-Laeger*. 2002 Dec 2; 164(49): 5748-52

INTRODUCTION: The aim was to determine how much knowledge parents have of MMR diseases and the side effects of the vaccine, and what influence this has on acceptance of the vaccination programme. **MATERIALS AND METHODS:** Sampling three districts of Roskilde County was done by the distribution of 1867 questionnaires to the parents of children aged 0-15 years in 22 institutions and schools (1 January to 28 February 2000). **RESULTS:** Of the 878 (47%) replies, 825 (94%) had followed the vaccination programme. There was no difference between those who had followed the programme and those who had not with respect to reports of complications to the diseases, but the latter group reported more complications to the vaccine. In the vaccinated group, there were significantly more who stated that the doctor's opinion of the vaccine was positive, and acceptance of the remaining vaccination programme was also greater in this group. More children in the non-vaccinated group were involved in the decision about vaccination. **DISCUSSION:** Though knowledge of the diseases does not seem to influence the decision about vaccination, the responses raise the question of how information is to reach the general public. An open debate is needed on vaccination complications, as it is these or uncertainty about them that seem to influence the parents' choice. For 70% of parents, the doctor is their source of information, and it is therefore important for acceptance of the MMR vaccine that doctors have a positive view and are able to communicate this view to the parents.

Hay JW, Ward JI. Economic considerations for pertussis booster vaccination in adolescents. *Pediatr-Infect-Dis-J*. 2005; 24: S127-S133

Background: Despite good acellular pertussis vaccine safety and protective efficacy, as well as high vaccination rates among young children, the incidence of pertussis in the United States has steadily increased since the 1980s. This is especially true for adolescents and adults who are susceptible because of waning immunity, which is not long lived. Other populations are at increased risk for morbidity of infection, although infants younger than 6 months of age who have not completed the primary immunization series have the greatest morbidity and mortality. Other groups who might benefit from booster immunizations include hospital workers, family contacts, and individuals with compromised health. Although older individuals generally have milder illnesses, they are often the source of infection for younger children. An adolescent/adult formulation of acellular pertussis vaccine requires a lower dose of pertussis antigens and can be combined with currently recommended diphtheria and tetanus toxoids (Tdap). These new vaccines for adolescents and adults are safe, immunogenic, and protective. **Methods:** Through an extensive review of the literature, the direct and indirect costs associated with pertussis and its complications are examined, cost-benefit analyses of pertussis booster vaccination are evaluated for different groups, and the economic considerations involved in implementing a pertussis booster vaccination program in adolescents are discussed. **Results:** Pertussis infections cause outbreaks in schools, families, and workplaces, resulting in prolonged morbidity and significant costs for medical care, lost time, and wages. Physician visits, chest radiographs, and antibiotics comprise the majority of direct costs, and costs associated with work loss often comprise the majority of indirect costs related to pertussis illness. Adolescents and adults also transmit their infections to nonimmune children. A cost-benefit analysis evaluated the health and economic benefits of seven strategies for administering a pertussis booster. The most economical strategy is to immunize all adolescents 10-19 years of age, which may prevent 0.4-1.8 million cases of pertussis and save \$0.3-1.6 billion in a decade. A tetanus and diphtheria booster (Td) is currently recommended for children 11-12 years of age. The Tdap vaccine offers an enhancement for the Td booster by providing protection against pertussis,

and it will not require an additional injection or office visit. Conclusions: Immunizing adolescents with a pertussis booster in the form of Tdap is the most economical and easiest-to-implement strategy and should provide significant health and economic benefits.

Heininger U, Loos K, Lorenz I, Rascher W. Compliance with recommended immunizations in adolescents. *Eur-J-Pediatr.* 2006; 165: 671-6

INTRODUCTION: Little is known about the completeness and timely administration of recommended standard immunizations in Germany. The goal of this study was to determine compliance with official standard immunization recommendations in adolescents attending secondary schools in the city of Erlangen, Germany. **METHODS:** Adolescents who were attending 5th grade (at approximately 11 years of age), 8th grade (14 years), or 10th and 11th grade (16-17 years) classes at any of the 13 of 14 schools that had agreed to participate were eligible to be enrolled. **RESULTS:** While coverage for the primary series of diphtheria, tetanus and poliomyelitis immunizations was satisfactory (98%), coverage for measles-mumps-rubella immunizations (dose 1: 89-96%; dose 2: 60-76%) and hepatitis B (doses 1-3: 61%) was suboptimal. Of note, 39% of students had not received any immunization against pertussis. Completion of immunization series generally was significantly delayed. Furthermore, rates for recommended booster doses in adolescence were disappointingly low with 21% for tetanus component vaccines and <10% for the fifth dose of pertussis. **CONCLUSIONS:** Significant immunization gaps for all recommended standard immunizations in adolescents were detected. This puts individuals at risk for serious vaccine-preventable diseases, contributes to suboptimal herd immunity in the population under study leaving the potential for future epidemics, and impedes national and international targets of disease reduction or elimination.

Heininger U, Cherry JD. Pertussis immunisation in adolescents and adults-Bordetella pertussis epidemiology should guide vaccination recommendations. *Expert-Opin-Biol-Ther.* 2006 Jul; 6(7): 685-97

Pertussis, or whooping cough, is an infectious disease that is caused by *Bordetella pertussis*, affects all age groups and is vaccine preventable. Recently, an increase in reported cases of pertussis in adolescents and adults has been noted in many countries despite high immunisation rates in children. Today pertussis outnumbers all other paediatric vaccine-preventable diseases in some countries. This observation can best be explained by an increased awareness of the disease, the availability of new diagnostic tests and, perhaps, suboptimal efficacy of some pertussis vaccines. In general, *B. pertussis* infections in adolescents and adults are of concern as they are the most important source of transmission of *B. pertussis* infections to young, unprotected infants. Many studies with diphtheria and tetanus toxoid, acellular pertussis component combination vaccines, specifically designed for use in adolescents and adults, have been performed and excellent tolerability and immunogenicity have been demonstrated. With the availability of two such products, booster doses in adolescents have been introduced in Canada, Austria, Australia, France, Germany and the US, and many other countries are considering similar expansion of their immunisation programmes at present. In addition, universal immunisation of adults (Austria, every 10 years) or targeting high risk groups (e.g., parents of newborns and other caregivers to children; Germany) have been recommended. If lifelong regular booster doses against pertussis were to be recommended and universal implementation was obtained, the authors believe that the morbidity of pertussis and its spread to infants can be dramatically reduced, and it is possible that the circulation of *B. pertussis* could be eliminated.

Hellenbrand W, Siedler A, Tischer A, Meyer C, Reiter S, Rasch G, Teichmann D, Santibanez S, Altmann D, Claus H, Kramer M. Progress toward measles elimination in Germany. *J-Infect-Dis.* 2003 May 15; 187 Suppl 1: S208-16

While the former East Germany (FEG) achieved a reduction of measles incidence to <1 case per 100,000 population before reunification in 1990, the former West Germany (FWG) experienced significant measles morbidity. In 2001, according to statutory surveillance data, the incidence of measles was still higher in FWG than in FEG (8.7 vs. 0.7 cases/100,000 population). This article describes the development of the vaccination strategies in FEG and FWG, vaccination coverage, results of seroprevalence studies, measles surveillance in Germany, the epidemiology of a recent outbreak, and the role of laboratory diagnosis for measles control in Germany. Recent establishment of comprehensive nationwide surveillance and prevention programs to attain higher vaccine coverage have led to a decrease in measles incidence. However, further improvement of age-appropriate vaccine coverage and closure of immunity gaps in school-age children are necessary to eliminate measles in Germany.

Hethcote HW, Horby P, McIntyre P. Using computer simulations to compare pertussis vaccination strategies in Australia. *Vaccine.* 2004; 22: 2181-2191

High levels of notified pertussis in adolescents and adults, persisting severe disease (hospitalization and deaths) in infants despite high childhood immunization coverage, together with the availability of adult-formulated pertussis vaccines, have made alternate strategies for vaccine control of pertussis an important issue in Australia. An age-structured computer simulation model was used to compare the likely effects of adopting different vaccination strategies in Australia on pertussis transmission by age group over a 50 year time period. Epidemiological parameters and vaccination coverage in Australia were estimated from previous pertussis modeling studies and existing data. In the simulations, replacing the pertussis booster at 18 months with a booster dose for adolescents at an age between 12 and 17 years, assuming 80% coverage, led to decreases in pertussis cases of 30% in children of ages 0-23 months (who have the highest complication rates) and of 25% in adolescents, but an increase of 15% in cases in 2-4-year-old children. The simulations did not suggest any shift of pertussis cases into the adult child-bearing years. Varying parameter values in the simulations in a series of sensitivity analyses showed the model predictions to be robust over a plausible range. The results of these simulations suggest that the recent change in the Australian pertussis vaccination schedule, replacing the 18 month dose with a pertussis booster in 15-17-year-old adolescents, is very likely to reduce overall pertussis incidence in Australia without increasing the cost of the current vaccine program. (C) 2003 Elsevier Ltd. All rights reserved.

Hinds A, Cameron JC. Acceptability of universal hepatitis B vaccination among school pupils and parents. *Commun-Dis-Public-Health.* 2004 Dec; 7(4): 278-82

The World Health Organisation (WHO) recommends universal hepatitis B (hepB) vaccination for all countries, but this policy has not been adopted in the UK and its acceptability there is unknown. We investigated the attitudes of secondary one (S1) school pupils aged 12-13 years (n = 50) and parents (n = 39) using semi-structured focus group discussions. There was a lack of awareness of hepB among most participants prior to the study. Parents sought further information, including the risks of infection and vaccine side effects. No participants identified cultural or socioeconomic barriers to being vaccinated against hepB. The majority of pupils and nearly all parents were in favour of universal hepB vaccination. Offering hepB

vaccination to all S1 pupils, in school, should therefore be highly acceptable, providing that sufficient information on the risk of hepB infection and vaccine safety is provided. A facility for answering questions and a forum for pupil education should also be offered.

Hofmann F. Environmentally and occupationally acquired diseases in adolescents and adulthood: control of diphtheria, tetanus, pertussis, and poliomyelitis through regular booster vaccinations-a European perspective. *Rev-Environ-Health*. 2005 Oct-Dec; 20(4): 303-17

Despite the success of childhood vaccination in industrialized countries, diphtheria, tetanus, pertussis (whooping cough), and poliomyelitis (polio) still affect adults and adolescents whose immunity has waned. The resurgence in the 1990s of diphtheria in the area of the former Soviet Union and its subsequent control with immunization campaigns, demonstrates the value of continued adult vaccination. Tetanus cannot be eradicated from the soil reservoir, necessitating routine primary vaccination and regular booster doses to maintain protective immunity. Although Europe has been certified endogenous polio-free since June 2002, polio imported from endemic areas continues to pose a serious threat for vulnerable populations. Booster polio vaccination is required in adolescence and adulthood. Pertussis among adults and adolescents is underestimated, representing a considerable health burden. The consequences can be more serious as this pool of susceptible adolescents and adults is a major source of pertussis transmission to newborns not yet protected by vaccination. The now available acellular pertussis-based combination vaccine covering diphtheria, tetanus, polio, and pertussis, suitable for adults and adolescents, provides the ideal tool for implementing booster immunization programs. Strong recommendations for adolescent and adult boosters are needed to overcome the continued threat of these diseases.

Howsam R, Dunn A. An adolescent hepatitis B immunisation program. The Preston experience. *Aust-Fam-Physician*. 1996 Mar; 25(3): 352-4

An adolescent hepatitis B immunisation program was conducted in all post primary schools in the City of Preston, Melbourne, Victoria, in 1993. The program was funded entirely by the City of Preston using SmithKline Beecham, Engerix B Adult Vaccine. A total of 857 Year 9 students in 8 schools were offered a three-dose course of Hepatitis B vaccine; 85% of all students elected to enter the program; 78% of all students completed the program; 95% of students who started the program completed the three-dose schedule. No side effects from the 2041 doses were reported. The program was well accepted and tolerated by the students with minimum side effects at a total cost of \$34 per completed course.

Hsu LD, DeJong W, Hsia R, Chang M, Ryou M, Yeh E. Student leadership in public health advocacy: lessons learned from the hepatitis B initiative. *Am-J-Public-Health*. 2003 Aug; 93(8): 1250-2

Increasing hepatitis B vaccination rates for Asian Americans and Pacific Islanders is a priority. Laws requiring vaccination prior to school enrollment have helped, yet many youths remain unvaccinated. The Hepatitis B Initiative (HBI), launched in 1997 and operated by public health and medical school students, provides free screenings and vaccinations to Boston's Asian American/Pacific Islander community, with a focus on youths. By October 2002, 997 HBI patients from Boston's Chinatown had received free hepatitis B screenings.

Of these, 384 patients (39%) were deemed susceptible to the hepatitis B virus and provided with free vaccination.

Huerta M, Davidovitch N, Ankol OE, Zaaide Y, Grotto I, Balicer RD, Zangvil E. Declining seroprevalence of rubella antibodies among young Israeli adults: a 12-year comparison. *Prev-Med.* 2004; 39: 1223-1226

Background. In March 2000, the Israel Defense Force (IDF) experienced an outbreak of rubella. No population-based rubella seroepidemiologic data were available for the 13-year period preceding the epidemic. **Methods.** We conducted a population-based seroprevalence study of rubella antibodies among 289 IDF recruits drafted in 1999. **Results.** We found that 69.2% of males and 90.8% of females in service were seropositive at recruitment in 1999, immediately before the outbreak. These rates were significantly lower than those last measured in 1987 (88% among males and 98.1% among females). **Conclusions.** Our findings indicate that this rubella outbreak among young adults was facilitated by a decrease in immunity to levels below those required for herd immunity, at which epidemic virus transmission was no longer blocked. This is most likely due to widespread pediatric vaccination coverage with incomplete catch-up immunization among adolescents and young adults. These findings serve as a reminder that changes to childhood vaccination programs may affect the epidemiology of disease among older segments of the population several years after the change is implemented. (C) 2004 The Institute For Cancer Prevention and Elsevier Inc. All rights reserved.

Humiston SG, Rosenthal SL. Challenges to vaccinating adolescents - Vaccine implementation issues. *Pediatr-Infect-Dis-J.* 2005; 24: S134-S140

Background: Adolescent immunization is a growing field, with many new vaccines in development and new or expanded immunization recommendations on the horizon. **Methods:** Characteristics of adolescents and their health care are discussed, focusing specifically on the challenges of incorporating a potential recommendation to replace tetanus-diphtheria toxoid with tetanus-diphtheria-acellular pertussis vaccine during early or middle adolescence as part of routine preventive care. Using the framework created by the Centers for Disease Control and Prevention's Task Force on Community Preventive Services, three overlapping levels at which there are opportunities for vaccine intervention are reviewed: (1) health care systems (enhancing access to vaccination services); (2) health care providers (provider-based interventions); and (3) patients and families ("increasing community demand"). **Results:** There are several barriers to vaccine implementation that make achieving high immunization coverage rates among adolescents a challenge. Promising interventions for improving vaccination rates at the health care system level include reducing out-of-pocket costs, expanding access to immunizations, and implementing vaccination programs in schools. Provider-based interventions for improving vaccination rates include regular assessments of immunization rate with feedback to all office personnel, provider reminders, and standing orders. Client recall and reminders, education, and requirements for school entry can assist in "increasing community demand" for vaccinations in that they motivate parents and adolescents to follow through with immunizations. **Conclusions:** Adolescents are unique from other populations. Previously studied interventions need to be tested in this age group as immunization becomes a more salient issue in adolescent health care.

Iskedjian M, Walker JH, De Serres G, Einarson TR. Economic evaluation of an extended acellular pertussis vaccine program for adolescents in Quebec, Canada. *Paediatr-Drugs*. 2005; 7(2): 123-36

OBJECTIVE: Pertussis is a frequent cause of cough illness in adolescents. In Canada, immunization against pertussis in public programs has been restricted to children under 7 years of age. The purpose of this analysis was to estimate the health and economic impact of an additional booster dose of the acellular vaccine in adolescents in Quebec. **METHOD:** We performed a cost-effectiveness analysis, based on a predictive spreadsheet dynamic model following a cohort of 90,929 adolescents in Quebec from the age of 14 years over a 10-year period from the Quebec Ministry of Health (MOH) and societal (SOC) perspectives. The model was used to compare costs (2003 values) and benefits of an adolescent vaccination program (AVP), including a diphtheria, tetanus, and acellular pertussis (dTacp) vaccine administered at age 14 years, with current practice. **RESULTS:** From the MOH perspective, a booster vaccination of dTacp at age 14 years via the AVP would produce a yearly additional expected cost of Can dollars 1.06 per adolescent with an incremental cost-effectiveness ratio (ICER) of Can dollars 480 per pertussis case avoided based on a 10-year period. When outcomes are discounted at 3%, the ICER rises to Can dollars 527 per discounted pertussis case avoided. From the SOC perspective, the AVP would cost Can dollars 0.83 per adolescent per year with an additional cost per avoided pertussis case of Can dollars 377 (Can dollars 414 per additional discounted case of pertussis avoided). Over the 10-year period, 2012 non-discounted cases of pertussis would be prevented with approximately two hospital admissions averted. **CONCLUSION:** This study suggests that administering a booster dose of dTacp at age 14 years to replace the diphtheria and tetanus vaccination will slightly increase the economic burden from MOH and SOC perspectives; however, the number of pertussis cases and the number of hospital admissions will decrease.

Jacobs RJ, Saab S, Meyerhoff AS. The cost effectiveness of hepatitis immunization for US college students. *J-Am-Coll-Health*. 2003 May; 51(6): 227-36

Hepatitis B immunization is recommended for all American children, and hepatitis A immunization is recommended for children who live in areas with elevated disease rates. Because hepatitis A and B occur most commonly in young adults, the authors examined the cost effectiveness of college-based vaccination. They developed epidemiologic models to consider infection risks and disease progression and then compared the cost of vaccination with economic, longevity, and quality of life benefits. Immunization of 100,000 students would prevent 1,403 acute cases of hepatitis A, 929 cases of hepatitis B, and 144 cases of chronic hepatitis B. Hepatitis B vaccination would cost the health system \$7,600 per quality-adjusted life year (QALY) gained but would reduce societal costs by 6%. Hepatitis A/B vaccination would cost the health system dollar 8,500 per QALY but would reduce societal costs by 12%. Until childhood and adolescent vaccination can produce immune cohorts of young adults, college-based hepatitis immunization can reduce disease transmission in a cost-effective manner.

Jogiste A, Ching P, Trei T, Kreysler J. Diphtheria in Estonia, 1991-1996. *J-Infect-Dis*. 2000 Feb; 181 Suppl 1: S65-8

Clinical diphtheria reappeared in Estonia in 1991. Between 1991 and 1996, 61 cases and 5 deaths occurred; 19 cases were among children 5-9 years of age, and 11 were among persons 40-49 years of age. From 1993-1995, vaccine supplies donated by Finland were used in vaccination programs. In 1995, the International Federation of Red Cross and Red

Crescent Societies and the Estonian Red Cross launched a mass vaccination campaign targeting the adult population. By the end of 1997, it was estimated that 46% of adults had received at least one dose of vaccine. Although the vaccination campaigns did not target the pediatric population, vaccination coverage in school-aged children remained high due to continuing routine vaccination programs. The reappearance and epidemic of clinical diphtheria cases and the mass vaccination campaign efforts demonstrated that preventive measures are important and must be maintained in order to keep diphtheria under control.

Karakoc, GB, Altintas DU, Kilinc B, Karabay A, Mungan NO, Yilmaz M, Evliyaoglu N. Seroprevalence of rubella in school girls and pregnant women. *Eur-J-Epidemiol.* 2003; 18(1): 81-4

Many studies have been assigned to investigate the surveillance of congenital rubella syndrome, acquired rubella and seroprevalence in different countries to determine the new vaccination program and national vaccination schedules. Seroprevalence of rubella in Turkey is still insufficient and national immunization schedules do not include routine rubella vaccination. In this study we aimed to investigate the seroprevalence of rubella at child bearing age in an unvaccinated population in Adana, southern Turkey, to help determine whether routine rubella vaccination is necessary, if so when it should be administered. Ninety-four school girls aged 12-18 years living in Adana were selected for the study and stratified according to the socioeconomic status of their parents and evaluated for rubella antibodies. One hundred pregnant women aged 18-25 years and 100 pregnant women aged 26-35 years were sampled rubella antibodies. Rubella specific IgG antibody was measured qualitatively and quantitatively by using microparticle enzyme immune assay technology. Rubella specific IgG antibody was positive in 87-94 school girls (92.5%). The geometric mean rubella specific IgG antibody value was found to be 148.14 IU/ml. No correlation was found between socioeconomic status and rubella seropositivity ($p = 0.6521$). In all pregnant women rubella specific IgG antibody was found to be positive. In conclusion rubella vaccination should be considered carefully in developing countries. Because of the high seropositivity to rubella in our region we do not recommend rubella vaccination in early childhood. Yet this is a preliminary study and further studies with larger population size are needed to determine the national immunization policy for rubella.

Kennedy AM, Brown CJ, Gust DA. Vaccine beliefs of parents who oppose compulsory vaccination. *Public-Health-Rep.* 2005 May-Jun; 120(3): 252-8

OBJECTIVES: Our objectives were the following: (1) to describe the sociodemographic factors, vaccine beliefs, and behaviors that are associated with parental opposition to compulsory vaccination, and (2) to determine if the availability of a philosophical exemption in a parent's state of residence is associated with parental opposition to compulsory vaccination. **METHODS:** Data from the 2002 HealthStyles survey were analyzed. Chi-square analysis was used to identify significant associations between belief and behavior questions and opposition to compulsory vaccination for school entry. Multivariate logistic regression was conducted using significant variables from the bivariate analysis to identify independent predictors of opposition to compulsory vaccination among surveyed parents. **RESULTS:** Of respondents with at least one child aged $< \text{or} = 18$ years living in the household ($n=1,527$), 12% were opposed to compulsory vaccination. Survey results indicate that a parent's belief regarding compulsory vaccination for school entry is significantly associated with beliefs in the safety and utility of vaccines, as well as intention to have the youngest child fully vaccinated. Residence in a state that permits philosophical exemption to vaccination also was significantly associated with a parent's opposition to compulsory vaccination for school

entry. **CONCLUSIONS:** Providing basic information to parents regarding vaccines and vaccine-preventable diseases may help reduce opposition to compulsory vaccination by reinforcing the safety and importance of routine childhood vaccinations.

Klostermann BK, Slap GB, Nebrig DM, Tivorsak TL, Britto MT. Earning trust and, losing it: Adolescents' views on trusting physicians. *J-Fam-Pract.* 2005; 54: 679- +

Objective To explore how adolescents with and without chronic illness perceive patient-physician trust and to identify physician behaviors related to these perceptions that might be modified to promote adolescent health care. **Methods** Fifty-four adolescents recruited from the community (healthy subjects) and from hospital-based clinics (subjects with chronic illnesses) participated in 12 focus groups divided by age (11-14 or 15-19 years old), gender, and health status. Major themes related to preferred physician characteristics and trusting one's doctor were derived through a multistep, team-based qualitative analytic process. **Results** Adolescents hold varied perspectives of trust in their physicians. They describe elements of patient-physician trust similarly to the comprehensive model developed with adults, including fidelity, confidentiality, competency, honesty, and a global perspective intersecting several of the more specific domains. However, adolescents differ in the relative importance of these dimensions. Younger adolescents express more concern about confidentiality of their health information, and adolescents with chronic illnesses are more interested in involving parents in their care than are adolescents without chronic illnesses. Examples of specific behaviors to improve trust include asking for adolescent's opinion, keeping private information confidential, not withholding information, and engaging in small talk to show concern. **Conclusion** Understanding the importance of trust and listening to recommendations about behaviors to improve it, in the words of the adolescents, may help physicians build positive relationships with their adolescent patients.

Knishkowsky B, Schein M, Kiderman A, Velber A, Edman R, Yaphe J. Preventive adolescent health care in family practice: A program summary. *The-Scientific-World-journal* 2006; 6: 619-627

The American Medical Association Guidelines for Adolescent Preventive Services (GAPS) has been the cornerstone of preventive care for teenagers since its publication in 1994. Despite this, there has been little documentation of their implementation in the family medicine literature. This article gives an overview of a family practice-based adolescent preventive health program based on GAPS recommendations, and reports on compliance, feasibility, and health issues. A Community-Oriented Primary Care (COPC) program targeted all adolescent patients aged 12-18 years in two Israeli family practices. Every 7th and 10th grader was invited for a preventive health visit with the family physician and nurse; 321 teenagers were invited to participate. The visits included a medical evaluation, screening and counseling regarding health issues recommended by GAPS, and counseling regarding personal health concerns. Parents were also invited to meet with the staff. 184 (57%) of the adolescents invited for health visits attended. The overall visit time was 47 min, including 12 min for a questionnaire and 35 min with providers. Common biomedical problems included overweight, acne, and dysmenorrhea. Health risk behaviors and psychosocial problems included cigarette or alcohol use, dieting, infrequent/ never seatbelt use, and feeling depressed; 78% wanted to discuss at least one personal health issue, and 27% were invited for follow-up visits. Only 3% of the parents came for visits. A community-oriented approach facilitates bringing adolescents for preventive health visits. Many previously undetected health issues, particularly psychosocial and behavioral, are revealed during these visits. A concerns checklist aids in addressing personal health concerns.

Kramer A, Prufer-Kramer L. Experience with the new German hepatitis B vaccination strategy since 1995. *Int-J-STD-AIDS*. 2002 Dec; 13 Suppl 2: 35-7

In Germany general hepatitis B (HB) vaccination for newborns and adolescents was introduced in all federal states following the recommendation of the STIKO (Permanent Vaccination Commission) of 1995. In 1998 serological studies of the German National Health Survey showed that at least 9.8% in the age group of 18 to 19 years had been vaccinated against HBV infection. By 1996 the vaccine doses sold for children rose dramatically and started to reach a plateau of approximately five million per year in 1997. Data from the kassenärztliche Vereinigung of the Oberpfalz region in Bavaria also indicate that the new policy started to be implemented in 1996. At school entry, however, in 1997 only 10% of the children in seven West German states showed serological evidence of HB vaccination coverage. According to observations of virologists, paediatricians and public health experts the current acceptance of the HB vaccination recommendations is 80%-90% in children below the age of six years but only 30% to 40% in adolescents. To achieve high HB vaccination coverage rates in Germany more rapidly a modern surveillance system providing detailed data about vaccination coverage in the different age and population groups is needed. Based on those data additional targeted vaccination strategies for those that can only be contacted by the traditional health care system, such as teenagers and vulnerable groups, should be developed, involving the public health service, local communities and other agencies.

Kurugol Z, Mutlubas F, Ozacar T. A two-dose schedule for combined hepatitis A and B vaccination in children aged 6-15 years. *Vaccine*. 2005 Apr 22; 23(22): 2876-80

A combined hepatitis A and B vaccine, Twinrix, in a paediatric formulation for ages 1-15 years and in an adult formulation for those ages 16 years and older, became commercially available in Turkey as well as in many countries. It is administered according to a three-dose schedule (0, 1 and 6 months). A reduction in the number of doses would improve the compliance rate and reduce administration costs. Therefore, we planned a trial evaluation of the immunogenicity, safety and reactogenicity profile of a high-dose combined hepatitis A and B vaccine, administered in two doses, compared with the profile of a paediatric-dose combined vaccine, administered in three doses, in healthy children aged 6-15 years. One hundred children were randomly attributed to the two study groups. The first group (paediatric-dose vaccine group) received the licensed Twinrix Paediatric, at months 0, 1 and 6; the second group (high-dose vaccine group) received the high-dose vaccine, following a 0, 6 months schedule. The reactogenicity was assessed after each vaccine dose. The immunogenicity was evaluated by testing for anti-HBs and anti-HAV antibodies. Seroconversion rates and geometric mean titres (GMTs) were compared. Both formulations of the combined vaccine were well tolerated. The high-dose combined vaccine administered in two doses, elicits satisfactory immunogenicity profiles, similar to those elicited by the paediatric vaccine administered in three doses. On completion of the vaccination schedule in the two groups all children were protected against hepatitis B and immune for hepatitis A. Anti-HAV GMTs after completion of the vaccination schedule were 7163 mIU/ml in the paediatric-dose group, 8241 mIU/ml in the high-dose group; anti-HBs GMTs were 8679 and 4583 mIU/ml, respectively. These results indicate that a two-dose schedule, compared with the standard three-dose schedule, offers fewer injections for satisfactory protection against the two infections. This means fewer clinic visits, lower administration costs, better compliance, and higher coverage rate. Therefore, this two-dose schedule can be considered an appropriate regimen for the immunization of children and adolescents against hepatitis A and B infection, in the context of school-based immunization programmes.

Lancman H, Pastore DR, Steed N, Maresca A. Adolescent hepatitis B vaccination: comparison among 2 high school-based health centers and an adolescent clinic. *Arch-Pediatr-Adolesc-Med.* 2000 Nov; 154(11): 1085-8

OBJECTIVE: To compare the completion rate of hepatitis B vaccination among adolescents who receive primary care at 2 comprehensive high school-based health centers (SBHCs) and a hospital-based adolescent health center (AHC) to assess predictors for successful immunization. **METHODS:** A retrospective chart review of patients seen for comprehensive history and physical examinations from September 1997 to March 1998 at 2 SBHCs and an AHC was conducted to determine the immunization status for hepatitis B. One SBHC (SBHC-A) had previously implemented an outreach strategy consisting of advertising through the school's loudspeaker, whereas the other SBHC (SBHC-B) and the AHC did not. Completion rates were assessed among all students requesting comprehensive history and physical examinations. A subset analysis among those without prior immunizations was performed. **RESULTS:** Of 510 records reviewed, 406 had documented data for hepatitis B immunization status, and 191 (37 for SBHC-A, 59 for SBHC-B, 95 for AHC) did not have any prior hepatitis immunizations. The completion rate of hepatitis B vaccination was significantly higher at SBHC-A (76%) compared with the other 2 sites (29% for SBHC-B and 24% for AHC) ($P < .001$). **CONCLUSION:** Patients with access to SBHC services that strongly emphasize outreach were more likely to complete the hepatitis B vaccination series.

Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J-Viral-Hepat.* 2004 Mar; 11(2): 97-107

Hepatitis B virus (HBV) infection is a serious global health problem, with 2 billion people infected worldwide, and 350 million suffering from chronic HBV infection. The 10th leading cause of death worldwide, HBV infections result in 500 000 to 1.2 million deaths per year caused by chronic hepatitis, cirrhosis, and hepatocellular carcinoma; the last accounts for 320 000 deaths per year. In Western countries, the disease is relatively rare and acquired primarily in adulthood, whereas in Asia and most of Africa, chronic HBV infection is common and usually acquired perinatally or in childhood. More efficacious treatments, mass immunization programs, and safe injection techniques are essential for eliminating HBV infection and reducing global HBV-related morbidity and mortality. Safe and effective vaccines against HBV infection have been available since 1982. The implementation of mass immunization programs, which have been recommended by the World Health Organization since 1991, have dramatically decreased the incidence of HBV infection among infants, children, and adolescents in many countries. However, not all countries have adopted these recommendations and there remains a large number of persons that were infected with HBV prior to the implementation of immunization programs. Antiviral treatment is the only way to reduce morbidity and mortality from chronic HBV infection. Conventional interferon alfa and lamivudine have been the primary treatments to date. Conventional interferon alfa produces a durable response in a moderate proportion of patients but has undesirable side-effects and must be administered subcutaneously three times per week. Lamivudine also produces a response in a modest proportion of patients and causes few side-effects. However, prolonged treatment is often necessary to prevent relapse on cessation of therapy, and continuous treatment can lead to the development of lamivudine resistance. Promising emerging new treatments include adefovir, entecavir and peginterferon alfa-2a (40 kDa).

Lee GM, LeBaron C, Murphy TV, Lett S, Schauer S, Lieu, TA. Pertussis in adolescents and adults: Should we vaccinate? *Pediatrics*. 2005; 115: 1675-1684

Background. The incidence of reported pertussis among adolescents, adults, and young infants has increased sharply over the past decade. Combined acellular pertussis vaccines for adolescents and adults are available in Canada, Australia, and Germany and may soon be considered for use in the United States. **Objective.** To evaluate the potential health benefits, risks, and costs of a national pertussis vaccination program for adolescents and/or adults. **Design, Setting, and Population.** The projected health states and immunity levels associated with pertussis disease and vaccination were simulated with a Markov model. The following strategies were examined from the health care payer and societal perspectives: (1) no vaccination; (2) 1-time adolescent vaccination; (3) 1-time adult vaccination; (4) adult vaccination with boosters; (5) adolescent and adult vaccination with boosters; and (6) postpartum vaccination. Data on disease incidence, costs, outcomes, vaccine efficacy, and adverse events were based on published studies, recent unpublished clinical trials, and expert panel input. **Main Outcome Measures.** Cases prevented, adverse events, costs (in 2004 US dollars), cost per case prevented, and cost per quality-adjusted life-year (QALY) saved. **Results.** One-time adolescent vaccination would prevent 30 800 cases of pertussis (36% of projected cases) and would result in 91 000 vaccine adverse events (67% local reactions). If pertussis vaccination cost \$15 and vaccine coverage was 76%, then 1-time adolescent vaccination would cost \$1100 per case prevented (or \$1200 per case prevented) or \$20 000 per QALY (or \$23 000 per QALY) saved, from the societal (or health care payer) perspective. With a threshold of \$50 000 per QALY saved, the adolescent and adult vaccination with boosters strategy became potentially cost-effective from the societal perspective only if 2 conditions were met simultaneously, ie, (1) the disease incidence for adolescents and adults was ≥ 6 times higher than base-case assumptions and (2) the cost of vaccination was less than \$10. Adult vaccination strategies were more costly and less effective than adolescent vaccination strategies. The results were sensitive to assumptions about disease incidence, vaccine efficacy, frequency of vaccine adverse events, and vaccine costs. **Conclusions.** Routine pertussis vaccination of adolescents results in net health benefits and may be relatively cost-effective.

Levaux HP, Schonfeld WH, Pellissier JM, Cassidy WM, Sheriff SK, Fitzsimon C. Economic evaluation of a 2-dose hepatitis B vaccination regimen for adolescents. *Pediatrics*. 2001 Aug; 108(2): 317-25

OBJECTIVE: To investigate the economic implications of a 2-dose hepatitis B virus vaccination regimen compared with the current 3-dose vaccination regimen for adolescents in 3 settings: public schools, public health clinics, and private sector settings in the United States. **METHODS:** To measure resource utilization and costs associated with the administration of the 3-dose regimen and to assess vaccination compliance rates with this regimen, primary data were collected with the use of questionnaires tailored for each setting. Conservative modeling assumptions were used to derive 2-dose compliance rates from 3-dose compliance data. The results were incorporated into a decision analytic model, which was used to examine short-term and lifetime scenarios for an adolescent cohort receiving the 2-dose versus the 3-dose regimen. In the short-term analysis, the vaccination program costs were compared for the 2 regimens. In the lifetime analysis, the model also incorporated long-term disease costs for those individuals who contract hepatitis B. **RESULTS:** Predicted increases in compliance with a 2-dose vaccination regimen contributed to a higher probability of seroprotection in each setting. In the lifetime analysis, this positive impact of improved compliance resulted in a lower infection rate and greater cost-effectiveness for the 2-dose regimen in all settings, including private sector settings, where

it cost an average of only \$964 per year of life gained, and in public schools, costing an average of \$1246 per year of life gained. In public health clinics, the 2-dose regimen had both lower expected lifetime costs and better clinical outcomes than the 3-dose regimen. In the short-term analysis, costs were higher for the 2-dose regimen, reflecting higher total vaccine acquisition costs without the long-term offset of cost savings from reduced infection. Sensitivity analyses identified cost per dose of vaccine and the probability of completing the regimens as the most sensitive model variables. CONCLUSIONS: Improved compliance with a 2-dose regimen would contribute to a higher probability of adolescents' achieving seroprotection. When the long-term consequences of hepatitis B virus infection are included, the 2-dose regimen would be cost-effective compared with the 3-dose regimen in all settings and cost saving in public health clinic settings.

Liau A, Zimet GD. The acceptability of HIV immunization: examining vaccine characteristics as determining factors. *AIDS-Care*. 2001 Oct; 13(5): 643-50

The acceptance of a future HIV vaccine may be influenced, in part, by the characteristics of the vaccine itself. This study evaluated the relationship of vaccine characteristics to acceptability of hypothetical HIV immunization. Subjects were 549 undergraduates (18-56 years of age); 70.3% were female, and 80.4% were non-Hispanic white. Subjects completed a self-administered questionnaire assessing a series of 12 hypothetical vaccines that varied along the dimensions of efficacy (80 or 50%), cost (free or \$300) and social saturation or percentage of the population already vaccinated (10, 50 or 90%). The vaccines were each rated on an 11-point scale ranging from zero ('I will never get this vaccine') to 100 ('I will definitely get this vaccine'), in increments of ten. All three dimensions were significantly associated with probability of vaccine acceptance, particularly vaccine efficacy and cost. The highest rated vaccine (free, 80% efficacious, 90% saturation level) received a mean acceptability score of 83.4, whereas the lowest rated vaccine (\$300, 50% efficacious, 10% saturation level) received a mean score of 32.8. The mean acceptability rating across all 12 vaccines was 55.14. These findings indicate the potential importance of considering the influence of vaccine characteristics in future HIV immunization programmes.

Linton LS, Peddecord, KM, Seidman RL, Edwards C, Ross S, Gustafson K, Averhoff F, Fishbein DB. Implementing a seventh grade vaccination law: school factors associated with completion of required immunizations. *Prev-Med*. 2003; 36: 510-517

Objectives. We investigated school factors associated with successful implementation of a seventh grade vaccination requirement. Methods. The proportion of students vaccinated with hepatitis B vaccine and measles containing vaccine was determined from records of schools in San Diego County, California. A school survey identified compliance strategies. Analysis identified factors associated with coverage. Results. In October 1999, 67.2% of 38,875 students had received the required vaccine doses. Of 315 schools, coverage was less than 40% in 60 schools and exceeded 80% in 111 schools. Factors associated with high coverage included private schools, early and frequent notice to parents, and, for public schools, higher overall socioeconomic status of students. Conclusions. In preparation for a middle school vaccination requirement, early and frequent notification of parents improves coverage. Schools with a high percentage of low socioeconomic status students may require extra resources to support implementation. (C) 2003 American Health Foundation and Elsevier Science (USA). All rights reserved.

Lopalco PL, Salleras L, Barbuti S, Germinario C, Bruguera M, Buti M, Dominguez A. Hepatitis A and B in children and adolescents--what can we learn from Puglia (Italy) and Catalonia (Spain)? *Vaccine*. 2000 Oct 15; 19(4-5): 470-4

Viral hepatitis remains a major contributor to the global disease burden. Mass immunisation strategies against hepatitis B have been adopted by more than 90 developing and industrialised countries. Countries with low hepatitis A endemicity are experiencing cyclical outbreaks and an epidemiological shift, with larger numbers of individuals at risk of infection at an older age, resulting in increased morbidity. The high cost of outbreaks in these countries has made immunisation strategies cost-effective. The development of a vaccine against hepatitis A and a combined vaccine against hepatitis A and hepatitis B offers potentially exciting opportunities for a preventative approach in areas of both low and high endemicity. Existing mass immunisation programmes against hepatitis B will facilitate the adoption of joint strategies illustrated by the examples of Puglia (Italy) and Catalonia (Spain).

Maayan-Metzger A, Kedem-Friedrich P, Kuint J. To vaccinate or not to vaccinate-that is the question: why are some mothers opposed to giving their infants hepatitis B vaccine? *Vaccine*. 2005; 23: 1941-1948.

OBJECTIVE: To identify the characteristics of mothers who prevent their newborn babies from receiving the hepatitis B vaccine. **METHODS:** Women who gave birth and prevented the administration of routine hepatitis B vaccine to their newborn infants (study group) were compared to women who complied with vaccination (control group). During their hospital stay, both groups were asked to answer a questionnaire constructed to evaluate relevant demographic data, knowledge and attitudes liable to differ between the two groups.

RESULTS: The 51 women in the Prevent (study) group were more educated and had a higher income level. They expressed more knowledge about the vaccine, and held more naturalistic and less conventional medical attitudes than did the women in the Comply (control) group (153 women). Some of the reasons given by the Prevent group for vaccine rejection included the following: 'The child is too young'; 'vaccines are dangerous'; 'Doctors vaccinate without consideration'; 'Vaccines causes trauma to the baby'. The Comply group's reasons for giving the vaccine were mainly 'to protect the baby' and 'trust in the doctors'. Differences between the groups were also found with respect to their future intended behavior. The study group planned to breastfeed for a longer period than the control group. Only 16% of the study group compared to 98% of the control group stated they intended to comply with the full vaccination program offered to developing children. On the basis of the answers to the questionnaire, the Comply group was further subdivided into two groups: those with knowledge and those lacking knowledge (determined by subjective evaluation). This subdivision showed that the differences between the Prevent Group and the Comply group exist, even though knowledge was controlled for. **CONCLUSIONS:** Mothers prevent administration of the hepatitis B vaccine to their newly born children based upon their overall approach, and not due to ignorance. In order to overcome this harmful trend, the medical community must supply counter information that encourages vaccinations.

Maradiegue A. Minor's rights versus parental rights: Review of legal issues in adolescent health care. *J-Midwifery-Women-Health*. 2003; 48:170-177

The right of adolescents to access confidential health care is sensitive and controversial. Recent challenges in the court system to adolescents' right to access abortion and contraception are eroding current law, including the Roe v Wade decision. The prospect of more than a million pregnancies in individuals under the age of 20 years in the United States with increasingly fewer alternatives to pregnancy is concerning. New regulations under the Health Insurance Portability and Accountability Act are adding yet another layer of complexity to the care of adolescents. Understanding legal issues surrounding adolescent rights to care can help the health care provider make appropriate care available to this age group. Keywords previously identified in CINAHL and MEDLINE were used to perform the literature search. LexisNexis was the search engine used to identify the laws and statutes. (C) 2003 by the American College of Nurse-Midwives.

Maurer, AM, Muhlemann K, Seiler AJ. Vaccination of young children, at school entrance and completion in the Bern canton 1998 *Schweiz-Rundsch-Med-Prax*. 2001 Sep 27; 90(39): 1676-84

Vaccine coverage and role of school physicians for vaccination was evaluated among 1260 and 840 children respectively, in the State of Berne, in 1998. Vaccine coverage (three doses) was sufficient for diphtheria, tetanus and poliomyelitis (95%), but unsatisfactory for pertussis (90%) and measles-mumps-rubella (MMR, 78-80%). The situation was stable in comparison to the year 1995, only vaccine coverage against Haemophilus influenzae Typ b increased (15-20%). School children of non-Swiss origin, especially those born outside Switzerland had partially low vaccination coverage. The percentage vaccinated was 88%, 84% and 68% for MMR. There was no association between vaccine coverage and school examination by family or school physician. The Swiss Public Office of Health should be more involved with the promotion of vaccinations.

Mays RM, Sturm LA, Zimet GD. Parental perspectives on vaccinating children against sexually transmitted infections. *Soc-Sci-Med*. 2004 Apr; 58(7): 1405-13

Several vaccines for sexually transmitted infections (STI) are presently in development and the eventual availability of such vaccines is expected to result in the prevention of a significant number of burdensome conditions. Young adolescents are presumed to be likely targets for these vaccines since adolescents' risk for STI increases as they age and become sexually active. It is unclear, however, to what extent parents will agree to having adolescents receive STI vaccines. Inasmuch as acceptance is the foundation for effective immunization programs, an understanding of parental perspectives about this issue is required to inform future STI vaccine program strategies. This paper presents findings from a qualitative study that used in-depth interviews to elicit attitudes from 34 parents about accepting vaccines for genital herpes, human immunodeficiency virus, human papillomavirus and gonorrhea for their children (aged 8-17). Data were collected from parents bringing their children for care at an urban clinic and a suburban private office. Content analysis of the responses revealed that most parents (>70%) approved the administration of all four of the STI vaccines proposed. Parents' reasons for acceptance included wanting to protect their children, being concerned about specific disease characteristics, and previous experience with the infections. Parents who declined the vaccines did so primarily because they perceived their children to be at low risk for the infections or they had low concern about features of the diseases. Most parents thought they should be the decision-maker regarding

children receiving an STI vaccine. Results from this study will be used to plan subsequent investigations of the determinants of STI vaccine acceptance by parents.

Mays RM; Zimet GD. Recommending vaccination to parents of adolescents: The attitudes of nurse practitioners. *Sex-Transm-Dis.* 2004; 31: 428-432

Background: Future successful sexually transmitted infection (STI) vaccine programs will depend on health professionals' readiness to vaccinate adolescents.

Goal: The goal was to examine nurse practitioners' willingness to recommend Svaccines to parents of adolescent patients.

Study Design: Participants rated 13 hypothetical vaccine scenarios, each of which was defined along 4 dimensions: infection; patient age, patient gender, and American Academy of Pediatrics (AAP) endorsement. Conjoint analysis was used to determine the relative contribution of each dimension to the ratings.

Results: Generally, participants were amenable to recommending Svaccines. Conjoint analysis indicated that AAP recommendation, infection, and patient age most strongly influenced ratings. There was particular interest in an HIV vaccine, but there was reluctance to vaccinate younger adolescents or to vaccinate without AAP endorsement.

Conclusions: Nurse practitioners are willing to recommend Svaccines to parents of adolescents. Professional organization endorsement plays an important role in this decision. Younger-aged adolescents were not viewed as candidates for these vaccines.

Mele A, Stroffolini T, Zanetti AR. Hepatitis B in Italy: where we are ten years after the introduction of mass vaccination. *J-Med-Virol.* 2002 Jul; 67(3): 440-3

In Italy, a program of vaccination against hepatitis B targeted at the immunisation of persons at high risk began in 1983. In 1991, vaccination became mandatory for all newborns and adolescents. Since then, the vaccine has been given to more than 10 million children, with an outstanding record of safety and efficacy. The coverage rate is globally around 94%, with differences between the Northern and Southern regions, with the latter having the lower acceptance rate. According to the National Surveillance System (SEIEVA), the incidence of acute hepatitis B per 10(5) inhabitants declined from 5.4 in 1990 to 2 in 2000. The reduction was even greater among 15-24-year-old individuals, where the incidence rate per 10(5) decreased from 17.3 to 2 in the same period. In parallel with the decline of hepatitis B, hepatitis delta has also declined significantly. Catch-up immunisation of unvaccinated adolescents, as well as an effort to improve the vaccination coverage rate in high-risk groups, are required to ameliorate the efficacy of the vaccination campaign. Routine administration of booster doses of vaccine is not considered necessary to sustain immunity in immunocompetent persons.

Middleman AB. Race/ethnicity and gender disparities in the utilization of a school-based hepatitis B immunization initiative. *J-Adolesc-Health.* 2004 May; 34(5): 414-9

OBJECTIVE: To determine if participation and completion rates in a school-based hepatitis B vaccination program differ based on individual demographic factors including insurance status, race, and gender. METHODS: From 1998 through 2001, a school-based adolescent hepatitis B immunization initiative targeted elementary schools with a high percentage of free lunch and "at risk" students and provided free hepatitis B immunization (0,1, and 4 month schedule) during school hours. Demographic data were collected regarding potential enrollees in the project. The rate of return of consent/refusal forms, participation rates, and

immunization completion rates were determined. Analyses were completed using the z statistic, frequencies, and stratified Chi-square analyses. RESULTS: Families of female children ($p < .0001$) and those with insurance or Medicaid were more likely than those with no insurance ($p < .0001$) to respond by returning a consent or refusal form and were also more likely to participate in the program by receiving at least one immunization dose ($p < .0001$ for both analyses). Participation rates also varied by race ($p < .0001$) with black and Hispanic potential enrollees participating more frequently than white and Asian potential enrollees. Females among black ($p = .012$) and Hispanic ($p < .0001$) participants and participants of Asian race/ethnicity ($p < .0001$) were more likely to complete the vaccination series. CONCLUSIONS: Even when access issues are eliminated as a potential barrier to hepatitis B immunization, gender and race disparities exist in the participation in, and completion of, the hepatitis B immunization series given in the schools. Race and gender clearly play separate and distinct roles in health care utilization, unrelated to the traditional variables of socioeconomic status often associated with access to care.

Milne B, Raman S, Thomas P, Shah S. Immunisation of refugee and migrant young people: can schools do the job? *Aust-N-Z-J-Public-Health*. 2006; 30: 526-8

OBJECTIVES: To assess immunisation needs, primary health care (PHC) use and trial a school-based immunisation service for refugee and migrant young people attending an Intensive English Centre (IEC) high school in Western Sydney. METHODS: We surveyed students attending an IEC in Western Sydney, assessing self-reported immunisation status and use of PHC services via questionnaires translated in six languages. Those students who were not immunised for hepatitis B and measles-mumps-rubella (MMR) were provided the first and second dose of a three-dose hepatitis B immunisation schedule and a single dose of MMR vaccine. We compared the immunisation requirements for MMR and hepatitis B with utilisation of PHC. RESULTS: One-hundred and sixty-five students (85%) returned the questionnaire. Forty-nine students (30%) reported previous immunisation with MMR and 29 (18%) with hepatitis B. As part of the school immunisation program, 142 (74%) received MMR vaccine, 151 (78%) received the first dose of hepatitis B vaccine, 144 (95%) received the second dose of hepatitis B, and 34 (23%) received the third hepatitis B dose elsewhere. Sixty-six students (40%) reported seeing a doctor in the past year. Students who had not seen a doctor in the previous year were significantly more likely to request immunisation ($p < 0.01$). CONCLUSIONS AND IMPLICATIONS: Refugee and migrant young people attending an IEC in Western Sydney report low immunisation rates. Our study highlights the urgent need for education and health to work together to provide specialised immunisation services for refugee and migrant young people.

Nardone A, Pebody RG, van-den-Hof S, Levy-Bruhl D, Plesner AM, Rota MC, Tischer A, Andrews N, Berbers G, Crovari P, Edmunds WJ, Gabutti G, Saliou P, Miller E. Sero-epidemiology of mumps in western Europe. *Epidemiol-Infect*. 2003 Aug; 131(1): 691-701

Six countries (Denmark, England and Wales, France, Germany, Italy and The Netherlands) conducted large serological surveys for mumps, in the mid-1990s, as part of the European Sero-Epidemiology Network (ESEN). The assay results were standardized and related to the schedules and coverage of the immunization programmes and the reported incidence of mumps. Low incidence of disease and few susceptibles amongst adolescents and young adults was observed in countries with high mumps vaccine coverage (e.g. The Netherlands). High disease incidence and large proportions of mumps virus antibody negative samples in adolescent and young adult age groups was noted in countries with poor vaccine coverage

(e.g. Italy). The build-up of susceptibles in older children and adolescents in England and Wales, France, the former West Germany and Italy indicate the possibility of further mumps outbreaks in secondary school environments. To control mumps in western Europe, current MMR immunization programmes will need to be strengthened in a number of countries. Sero-surveillance of mumps is an important component of disease control and its usefulness will be enhanced by the development of an international mumps standard.

O'Hallahan J, Lennon D, Oster P, Lane R, Reid S, Mulholland K, Stewart J, Penney L, Percival T, Martin D. From secondary prevention to primary prevention: a unique strategy that gives hope to a country ravaged by meningococcal disease. *Vaccine*. 2005 Mar 18; 23(17-18): 2197-201

New Zealand has been affected by an epidemic of group B meningococcal disease dominated by a strain defined as, B:4:P1.7b,4. Over 5550 cases and 222 deaths have been reported since 1991 in a population of 4 million people. Meningococcal disease cases notified on EpiServ database operated by Institute of Environmental Science and Research Limited through to 30 September 2004. Through the collaborative efforts of a government agency, vaccine company, university and laboratory institute, clinical trials of the Chiron produced outer membrane vesicle (OMV) strain-specific MeNZB vaccine were run in rapid succession. The delivery of MeNZB will be New Zealand's largest immunisation programme with three doses given at 6-week intervals to over 1 million people aged 6 weeks-19 year olds inclusive. Planning, co-ordinating and delivering the immunisation programme is a challenging project for the New Zealand Health Sector.

Orenstein WA. The role of measles elimination in development of a national immunization program. *Pediatr-Infect-Dis-J*. 2006; 25: 1093-101

The U.S. Immunization Program has been one of the most successful efforts in preventive medicine. Since its beginning with passage of the Vaccination Assistance Act in 1962, polio, measles and rubella have been eliminated and many other vaccine-preventable diseases are at record or near record lows. In 1966, 3 years after licensure of the first measles vaccines, the Centers for Disease Control and Prevention began an effort to eliminate measles within the United States, an on-and-off effort that was to last more than 30 years. With measles elimination as the primary driver, fundamental components of today's immunization program were built that affected not only measles, but all of the vaccines and vaccine-preventable diseases of childhood. Some of the major contributions were the enactment and enforcement of immunization requirements for school attendance in all 50 states, enactment of an entitlement program for vaccine purchase, the Vaccines for Children Program, support for health services research to determine reasons for nonimmunization and interventions to improve coverage, development of standards for immunization practices and the measurement system for immunization coverage in all 50 states and 28 major urban areas. Key lessons have been: (1) the program must rest on a sound base of vaccine science and health services science; (2) having a limited number of measurable goals allows program focus, but consider strategies that have crosscutting impact; (3) accountability is critical to program performance at all levels-state, local and individual practice; and (4) establishing and maintaining political support is essential.

Orenstein WA, Hinman AR. The immunization system in the United States - the role of school immunization laws. *Vaccine*. 1999 Oct 29; 17 Suppl 3: S19-24

School immunization laws have had a remarkable impact on vaccine-preventable diseases in the United States, particularly in school-aged populations. Enforcement of laws through the exclusion of unvaccinated children from school is a critical factor in assuring success. All laws have exemptions for medical contraindications, 47 states have exemptions for persons with strong religious beliefs against vaccination and 15 states have exemptions for persons philosophically opposed to vaccination. Fewer than 1% of students have any type of exemption in most states. School laws harness the resources of other programs such as education to the immunization effort. They establish a safety net to assure high levels of coverage each and every year. But they cannot replace efforts to assure age appropriate immunization in the first two years of life.

Patrick DM, Bigham M, Ng H, White R, Tweed A, Skowronski DM. Elimination of acute hepatitis B among adolescents after one decade of an immunization program targeting Grade 6 students. *Pediatr-Infect-Dis-J*. 2003 Oct; 22(10): 874-7

BACKGROUND: British Columbia introduced a preadolescent hepatitis B (HB) immunization program in 1992. This study documents trends in the reported rate of acute HB disease since 1992 and examines factors bearing on the rate of infection throughout the period of program implementation. METHODS: All Grade 6 students were eligible for immunization. Vaccine uptake was reported annually for every school. Acute HB infections were reported by physicians and by biomedical laboratories. Year-to-year trends were analyzed overall and by age group using the electronic public health information system and S-plus. Likelihood ratio tests were used to establish whether a variable was associated with the rate of acute HB in a given cohort. Poisson regression was applied to determine which variables were independently associated with the rate of acute HB. RESULTS: Immunization coverage ranged between 90 and 93% for each year between 1993 and 2001. The overall rate of reported acute HB declined from 7 per 100,000 to just more than 2 per 100,000, whereas that in 12- to 21-year-olds declined from 1.7 to 0 per 100,000 over this one decade period. In the final Poisson regression model, the rate of acute HB infection was significantly associated with year, urban region and lower vaccine uptake. There was an interaction between region and vaccine uptake such that higher vaccine uptake appeared more protective in rural than in urban regions. CONCLUSIONS: Acute HB has been eliminated in the immunized adolescent cohort. A higher carrier rate in urban regions most likely explains the apparent difference in program effectiveness between urban and rural regions.

Peddecord KM, Linton LS, Edwards C, Simmes D, Fink N, Wang W, Averhoff F, Fishbein DB. Comparing telephone and written surveys to assess local adolescent immunization coverage rates. *J-Public-Health-Manag-Pract*. 2004 Jan-Feb; 10(1): 54-62

To identify adolescent hepatitis B coverage levels, a survey was conducted of seventh grade parents in San Diego County, California, using a random digit-dial telephone survey. A written survey was fielded also that was distributed at selected schools. Results were validated using data from a mandated report from all schools. Both survey methods overestimated the proportion completing the hepatitis B series by about 10%. Parents accurately reported immunization shot dates from the child's parent-held immunization shot record on the telephone and written surveys. The written survey, in addition to having a somewhat lower cost, may be useful when focusing on a localized area, whereas the telephone survey permits a more representative sample of a larger county-wide population.

Ramsay ME, Jin L, White J, Litton P, Cohen B, Brown D. The elimination of indigenous measles transmission in England and Wales. *J-Infect-Dis.* 2003 May 15; 187 Suppl 1: S198-207

Following a school-based measles-rubella vaccination campaign in November 1994, enhanced surveillance of measles, including IgM antibody testing of oral fluid from clinically diagnosed case-patients, was introduced in England and Wales. Between 1995 and 2001, 665 cases of measles were confirmed, including 371 (56%) confirmed only by IgM detection in oral fluid. Two hundred thirty-nine cases (36%) were sporadic and 426 (64%) were associated with 61 clusters. Fifty-four (23%) of the 239 sporadic cases and 26 (43%) of the 61 clusters were associated with a probable or possible importation of infection from overseas, and a wide variety of genotypes were identified in each calendar year. The effective reproduction number for measles over the period was estimated to be below 0.7. These data suggest that most measles in the UK is acquired following limited transmission from an imported infection, and they confirm that measles elimination has been achieved and sustained over this period.

Rickert D, Deladisma A, Yusuf H, Averhoff F, Brink E, Shih S. Adolescent immunizations, are we ready for a new wave? *Am-J-Prev-Med.* 2004 Jan; 26(1): 22-8

CONTEXT: Factors associated with vaccination coverage rates for the 20% of U.S. adolescents enrolled in managed care organizations (MCOs) are not known. OBJECTIVES: To examine recent trends in receipt of two doses of measles-mumps-rubella (MMR2) and three doses of hepatitis B (Hep B3) among U.S. adolescents enrolled in managed care organizations (MCOs); to determine whether specific characteristics of MCOs are associated with higher vaccination rates; and to assess the impact of state middle school immunization requirements on these rates. DESIGN: Longitudinal (1996-1999) and cross-sectional (1999) analyses of National Committee for Quality Assurance (NCQA) data to estimate adolescent vaccination coverage rates for MMR2 and Hep B3. In 2002, using 1999 data only, a cross-sectional analysis examined the relationship of specific plan characteristics and state immunization laws with immunization coverage. MAIN OUTCOME MEASURES: Percentage of 13 year olds in MCOs with documented receipt of MMR2 and Hep B3. RESULTS: From 1996 to 1999, MMR2 rates increased from 56% to 64%, and from 1997 to 1999, Hep B3 rates increased from 23% to 38%. By 1999, higher rates for both vaccines had been achieved in larger plans ($p < 0.001$ and $p < 0.003$ for MMR2 and Hep B3, respectively), those with the highest NCQA accreditation status ($p < 0.003$), those in New England ($p < 0.001$), and those in states with middle school immunization requirements ($p < 0.001$). CONCLUSIONS: Despite encouraging increases, adolescent immunization rates are significantly below the Healthy People 2010 goal of 90%. State laws and accreditation incentives are effective. Research is needed to identify additional interventions to increase vaccination coverage in the adolescent population.

Rishpon, S. Recent improvements in polio and pertussis vaccination policy in Israel, 2005. *Isr-Med-Assoc-J.* 2006; 8: 319-321

For children born after 1 January 2005, use of the Sabin oral polio vaccine in combination with the enhanced-potency Salk inactivated polio vaccine as part of the routine vaccination schedule was discontinued. The schedule now includes only IPV. In September 2005, a fifth dose of pertussis vaccine was added for pupils in their second year of elementary school. This article describes the reasons for these changes, which have rendered Israel's routine vaccination program one of the most effective in the world.

Rosenthal SL, Kottenhahn RK, Biro FM, Succop PA. Hepatitis B Vaccine Acceptance Among Adolescents and Their Parents. *J-Adol-Health*. 1995; 17: 248-254.

PURPOSE: To employ theoretic health decision models to determine strategies that may facilitate acceptance of hepatitis vaccination programs among adolescents and their parents/guardians. METHODS: The research was conducted in a hospital-based adolescent clinic between January and September 1994. Eighty adolescents and 65 parents participated in a survey that was administered to new patients. Two groups (those who accepted the vaccine and those who rejected it) were compared for each variable and potential predictor. RESULTS: The majority of adolescents and parents indicated that their clinic care provider was the initial contact to initiate discussion about the vaccine. Significant predictors for parents' acceptance of the vaccination were their perception of the vaccine's importance to the care provider and concern about the general risk of the disease. Predictors for adolescents' acceptance of the vaccine was their perception that their parents felt it was important and the extent to which they believed it was for 'everyone' to be vaccinated. CONCLUSIONS: Providers should be aware that adolescents are influenced by their parent's opinions and that the care provider's endorsement of the vaccine may be a key factor in parental acceptance of the vaccine. Results of this study have potential implications for public health approaches to facilitate vaccine acceptance.

Rupp R, Rosenthal SL, Middleman AB. Vaccination: an opportunity to enhance early adolescent preventative services. *J-Adolesc-Health*. 2006 Oct; 39(4): 461-4

New vaccines are being developed that will be recommended for adolescents Adolescence is a time period when adolescent-parent dynamics change and when adolescents may be confronted with increasing opportunities to engage in risk-taking behaviors such as sexual behavior and substance use. Despite clear recommendations regarding preventative counseling, many adolescents do not receive adequate preventive care. In this manuscript, we provide suggestions as to how a new vaccination schedule can be used to enhance preventative services to both adolescents and their parents.

Sabella C. Pertussis. Old foe, persistent problem *Clevel. Clin-J-Med*. 2005; 72: 601-608

Although a safe and effective vaccine is available, pertussis continues to be an important cause of morbidity and mortality. Immunity acquired from natural infection or vaccination wanes within 5 years, making older children, adolescents, and adults important reservoirs of infection. Many neonates and infants contract pertussis from older people with mild symptoms and are at risk for developing severe, life-threatening illness. Immunization programs are being considered for adolescents and for adults who live with or care for infants.

Salleras L, Dominguez A, Bruguera A, Cardenosa N, Batalla J, Carmona G, Navas E, Taberner JL. Dramatic decline in acute hepatitis B infection and disease incidence rates among adolescents and young people after 12 years of a mass hepatitis B vaccination programme of pre-adolescents in the schools of Catalonia (Spain). *Vaccine*. 2005; 23: 2181-2184

The aim of the study was to describe the impact of hepatitis B vaccination and disease incidence in adolescents and young people 12 years after the launching of a mass hepatitis B vaccination of pre-adolescents in schools. Vaccination coverage was assessed using

administrative and serological data. Infection trends were evaluated by means of seroepidemiological surveys. High levels of vaccination coverage and vaccine-induced immunity were achieved. The resulting low proportions of susceptible adolescents and young people have undoubtedly contributed to the substantial reduction in the prevalence of hepatitis B infection in the 15-24 years age group (0.9 per 100 in 2001 versus 9.3 per 100 in 1986) and in the reported incidence of hepatitis B cases (80% reduction). Over the last 3 years, the declining trend seems to have been halted, although 35% of cases reported during this period corresponded to immigrants. (c) 2005 Elsevier Ltd. All rights reserved.

Salmon DA, Haber M, Gangarosa EJ, Phillips L, Smith NJ, Chen RT. Health consequences of religious and philosophical exemptions from immunization laws: individual and societal risk of measles. *JAMA*. 1999 Jul 7; 282(1): 47-53

CONTEXT: All US states require proof of immunization for school entry. Exemptions are generally offered for medical, religious, or philosophical reasons, but the health consequences of claiming such exemptions are poorly documented. OBJECTIVES: To quantify the risk of contracting measles among individuals claiming religious and/or philosophical exemptions from immunization (exemptors) compared with vaccinated persons, and to examine the risk that exemptors pose to the nonexempt population. DESIGN, SETTING, AND PARTICIPANTS: Population-based, retrospective cohort study of data from 1985 through 1992, collected by the Measles Surveillance System of the Centers for Disease Control and Prevention, as well as from annual state immunization program reports on prevalence of exemptors and vaccination coverage. The study group was restricted to individuals aged 5 to 19 years. To empirically determine and quantify community risk, a mathematical model was developed that examines the spread of measles through communities with varying proportions of exemptors and vaccinated children. MAIN OUTCOME MEASURES: Relative risk of contracting measles for exemptors vs vaccinated individuals based on cohort study data. Community risk of contracting measles derived from a mathematical model. RESULTS: On average, exemptors were 35 times more likely to contract measles than were vaccinated persons (95% confidence interval, 34-37). Relative risk varied by age and year. Comparing the incidence among exemptors with that among vaccinated children and adolescents during the years 1985-1992 indicated that the 1989-1991 measles resurgence may have occurred 1 year earlier among exemptors. Mapping of exemptors by county in California indicated that exempt populations tended to be clustered in certain geographic regions. Depending on assumptions of the model about the degree of mixing between exemptors and nonexemptors, an increase or decrease in the number of exemptors would affect the incidence of measles in nonexempt populations. If the number of exemptors doubled, the incidence of measles infection in nonexempt individuals would increase by 5.5%, 18.6%, and 30.8%, respectively, for intergroup mixing ratios of 20%, 40%, and 60%. CONCLUSIONS: These data suggest the need for systematic review of vaccine-preventable incidents to examine the effect of exemptors, increased surveillance of the number of exemptors and cases among them, and research to determine the reasons why individuals claim exemptions.

Sanci L, Coffey C, Patton G, Bowes G. Sustainability of change with quality general practitioner education in adolescent health: a 5-year follow-up. *Med. Educ.* 2005; 39: 557-560

OBJECTIVE: To determine whether improvements gained in general practitioners' (GPs') self-perceived competency, attitudes and knowledge after an intervention in adolescent health care designed with evidence-based strategies in continuing medical education, are maintained longterm, 5 years post intervention. The intervention was designed with evidence-based strategies in continuing medical education. **DESIGN** We carried out a follow-up postal survey of the cohort of metropolitan Australian GPs trained in the intervention 5 years previously. **MEASURES** Subsets of the original measures, used in the randomised controlled trial of the intervention, were selected to re-assess the GPs by postal survey. Self-perceived competency, attitude and knowledge were measured. Doctors were also asked about further training in adolescent health over the 5 years since the intervention and about self-reported practice. **RESULTS** A total of 46 of 54 (85%) of the original intervention group returned a questionnaire. Scores at 5 years were all higher than at baseline ($P < 0.01$) and improvements were sustained in all measures from 12 months to 5 years after the intervention. In all, 25/46 (54%) doctors had received further training in related areas over the 5 years, but this did not improve sustainability. A total of 45/46 (98%) reported maintaining their clinical approach to youth and 22/46 (46%) reported maintaining practices to address systemic barriers to adolescent health care access. **CONCLUSIONS** Quality education designed according to evidence-based strategies of effectiveness has advantages for longterm sustainability.

Sanci L, Glover S, Coffey C. Adolescent health education programmes: Theoretical principles in design and delivery. *Ann-Acad-Med-Singap.* 2003; 32: 78-85

The patterns of health need in youth have changed over the last three decades with increasing rates of psychosocial problems compromising adolescent development and affecting the patterns of morbidity and mortality in adult years. This has increased the public health interest in health promotion, early detection and preventive health care for adolescents. Yet, young people report significant barriers to accessing the health care system, and health professionals report a self-perceived lack of competency and prior training in adolescent health, especially in these areas of youth health need. There is an imperative to provide quality professional development for existing health professionals and undergraduates in adolescent health care. This paper will discuss a model of professional knowledge in adolescent health and the evidence-based principles in design and delivery of effective education programmes. It will also review the published evaluations of adolescent education programmes and outcomes that still require evaluation in the future.

Schaffer SJ, Humiston SG, Shone LP, Averhoff FM, Szilagyi PG. Adolescent immunization practices: a national survey of US physicians. *Arch-Pediatr-Adolesc-Med.* 2001 May; 155(5): 566-71

BACKGROUND: Adolescent immunization rates remain low. Hence, a better understanding of the factors that influence adolescent immunization is needed. **OBJECTIVE:** To assess the adolescent immunization practices of US physicians. **DESIGN AND SETTING:** A 24-item survey mailed in 1997 to a national sample of 1480 pediatricians and family physicians living in the United States, randomly selected from the American Medical Association's Master List of Physicians. **PARTICIPANTS:** Of 1110 physicians (75%) who responded, 761 met inclusion criteria. **OUTCOME MEASURES:** Immunization practices and policies, use of tracking and

recall, opinions about school-based immunizations, and reasons for not providing particular immunizations to eligible adolescents. RESULTS: Seventy-nine percent of physicians reported using protocols for adolescent immunization, and 82% recommended hepatitis B immunization for all eligible adolescents. Those who did not routinely immunize adolescents often cited insufficient insurance coverage for immunizations. While 42% of physicians reported that they review the immunization status of adolescent patients at acute illness visits, only 24% immunized eligible adolescents during such visits. Twenty-one percent used immunization tracking and recall systems. Though 84% preferred that immunizations be administered at their practice, 71% of physicians considered schools, and 63% considered teen clinics to be acceptable alternative adolescent immunization sites. However, many had concerns about continuity of care for adolescents receiving immunizations in school. CONCLUSIONS: Most physicians supported adolescent immunization efforts. Barriers preventing adolescent immunization included financial barriers, record scattering, lack of tracking and recall, and missed opportunities. School-based immunization programs were acceptable to most physicians, despite concerns about continuity of care. Further research is needed to determine whether interventions that have successfully increased infant immunization rates are also effective for adolescents.

Schmitt HJ, Booy R, Weil-Olivier C, Van Damme P, Cohen R, Peltola H. Child vaccination policies in Europe: a report from the Summits of Independent European Vaccination Experts. *Lancet-Infect-Dis.* 2003 Feb; 3(2): 103-8

Despite the proven safety and efficacy of vaccines, common vaccine-preventable diseases such as measles are not yet controlled in all European countries. This is largely due to three factors. First, vaccination systems differ widely throughout Europe and they vary between highly centralised and totally decentralised systems. Both have advantages and disadvantages, but without doubt they can all work locally. "Harmonisation" in this field is neither a prerequisite nor a guarantee for success. Second, perception of vaccination--and this includes education of the public--is most crucial. In this field the media play an important part, but their ability or will to communicate complicated scientific matters in an appropriate way to the public is often insufficient. Third, political will may be the single most important factor for success in vaccination. Only if the European Union comes up with and implements common vaccination goals with firm deadlines can the best health through vaccination of all Europeans be accomplished. The system as well as the schedule used would then be of minor importance.

Schmidt JV, Kroger AT, Roy SL. Vaccines in women. *J-Womens-Health.* 2004; 13: 249-257

Women's healthcare providers are encouraged to incorporate immunizations into their clients' care. Because women often rely on their healthcare provider for primary and preventive care, that provider may dramatically improve clients' quality of life by decreasing the risk of vaccine-preventable diseases. Women often assume responsibility for the entire family's health, and educating women can prevent disease in the household. Women's healthcare providers should offer and promote these vaccines: hepatitis B, varicella, measles/mumps/rubella, and combined tetanus/diphtheria toxoids for adolescent and young adult women, inactivated influenza vaccine during pregnancy, and pneumococcal, influenza, and tetanus/diphtheria vaccines for the adult or elderly woman. Education should include the importance of vaccines and the rationale for their necessity during each stage of life. Several strategies for implementing and supporting an immunization program have been shown to improve adult immunization rates. These include employing such protocols as standing

orders, screening for adult immunizations at each office encounter, and using previously developed immunization documentation forms. The Advisory Committee on Immunization Practices (ACIP) recommendations, vaccine information statements (VIS), and storage and handling guidelines are readily available at low or no cost through CDC and professional organizations or immunization interest group websites. The current adult vaccine schedule assists providers to determine the need for vaccines by displaying graphically both age and medical risk factors.

Seid M, Simmes DR, Linton LS, Leah CE, Edwards CC, Peddecord KM. Correlates of vaccination for hepatitis B among adolescents: results from a parent survey. *Arch-Pediatr-Adolesc-Med.* 2001 Aug; 155(8): 921-6

OBJECTIVE: To identify correlates of hepatitis B vaccination status in sixth-grade students in the year prior to implementation of a requirement mandating immunization for seventh-grade entry. **METHODS:** A survey of parents of sixth-graders in 5 schools in San Diego County. Two logistic regression models were tested to predict the outcome variables: initiation and completion of the vaccination series. **RESULTS:** Factors associated with initiating the series included a recent nonacute medical visit, white race, hearing about the vaccination law from a health care provider, and the availability of a school-based vaccination clinic. Factors associated with completing the series included English as the primary language spoken at home, hearing about the law from a health care provider, a school-based vaccination clinic, and higher socioeconomic status. Health insurance was not significantly related to either outcome. **CONCLUSIONS:** There was a clear benefit for hepatitis B immunization status to have had a recent nonacute medical visit, to have heard about the law from a health care provider, and to have a school-based vaccination clinic. The factors associated with starting vs completing the vaccination series were not identical. However, both health care provider and school characteristics were related to starting and completing the vaccination series. Thus, a multifaceted strategy may be most appropriate for successful coverage of an adolescent population with a vaccination series such as hepatitis B.

Shah NK. Adolescent vaccination. *J-Indian-Med-Assoc.* 2005 Nov; 103(11): 626, 628

Indian Academy of Pediatrics (IAP) has taken an important step towards adolescent vaccination. In the present article, the author has briefly described the needs for adolescent immunisation along with the IAP vaccination schedule for adolescents, in details.

Shui I, Kennedy A, Wooten K, Schwartz B, Gust D. Factors influencing African-American mothers' concerns about immunization safety: a summary of focus group findings. *J-Natl-Med-Assoc.* 2005 May; 97(5): 657-66

OBJECTIVE: To examine the vaccine safety concerns of African-American mothers who, despite concerns, have their children immunized. **METHODS:** Six focus groups of Atlanta-area African-American mothers who were very concerned about vaccine safety but whose children were fully vaccinated were conducted. **RESULTS:** Major factors influencing participants' concerns about immunizations included: lack of information and mistrust of the medical community and government. Factors that convinced parents to have their child immunized despite their concerns included social norms and/or laws supporting immunization and fear of the consequences of not immunizing. Suggestions given to reduce concerns included improving available information that addressed their concerns and

provider-patient communication. **CONCLUSIONS:** Addressing mothers' concerns about immunization is important both from an ethical perspective, in assuring that they are fully informed of the risks and benefits of immunizations, as well as from a practical one, in reducing the possibility that they will decide not to immunize their child. Changes in the childhood immunization process should be made to reduce parental concern about vaccine safety. Some changes that may be considered include improved provider communication about immunizations and additional tailored information about the necessity and safety of vaccines.

Skinner R, Nolan T. Adolescent hepatitis B immunisation--should it be the law? *Aust-N-Z-J-Public-Health.* 2001 Jun; 25(3): 230-3

Universal hepatitis B immunisation of young adolescents was included in the Australian Standard Vaccination Schedule in 1998. However, rates of immunisation among adolescents world-wide have often been inadequate. Australia's experience in this area is no exception, particularly in States where school-based delivery is not carried out. Legislation for pre-school immunisation certification currently exists in several States and this legislation is distinctly different from the compulsory or mandatory immunisation that exists in several other developed countries. There have been demonstrable gains in uptake as a result of mandatory immunisation requirements in the United States and there is evidence to suggest that immunisation certification in Australia has also been beneficial. However, it is important to recognise that both certification and mandatory immunisation legislation have inherent difficulties. In this paper, we argue that legislation for high school immunisation certification, as part of a multi-faceted vaccine delivery strategy tailored to adolescents, is required to achieve the uptake that will lead to interruption of transmission of the hepatitis B virus in Australia. Not only will it substantially reduce incident cases of hepatitis B for the next decade, it will also provide a framework for the successful introduction of future adolescent vaccine initiatives in Australia.

Skinner SR, Imberger A, Nolan T, Lester R, Glover S, Bowes G. Randomised controlled trial of an educational strategy to increase school-based adolescent hepatitis B vaccination. *Aust-N-Z-J-Public-Health.* 2000 Jun; 24(3): 298-304

OBJECTIVES: This study aimed to evaluate a specifically designed hepatitis B education/promotion curriculum package as part of a successful hepatitis B vaccination delivery system to adolescents. **METHODS:** A randomised-controlled trial was used to evaluate the effect of the curriculum package (or intervention) on uptake of vaccine. Schools were randomly selected from the metropolitan region of Melbourne to intervention (66 schools or 7,588 students) or control groups (69 schools or 9,823 students). Class teachers administered the intervention to students over 4 class periods before the vaccination course. **RESULTS:** The difference in mean school uptake between intervention and control was small at 1-2% per dose. 95% confidence intervals around the differences were -5% to 2% per dose and not significant. Intervention schools taught an average of 7 items out of 12 from the curriculum package. Immunisation rates increased by 4-10% per dose between low and high implementation schools, but this trend was not significant. Impact evaluation demonstrated significantly greater knowledge of hepatitis B and vaccination among students in the intervention than the control group. **CONCLUSION:** Hepatitis B vaccination of pre-adolescents was not increased by the implementation of a curriculum package that successfully increased knowledge and awareness of hepatitis B in a school-based vaccination program. Additional strategies directed at the education of parents, the cooperative role of schools and pro-active providers might also be required to maximise vaccine uptake in this age group.

Soldano C, Markell G. Parent involvement in health concerns for youth: the issue of adolescent immunization. *J-Sch-Health*. 1997 Sep; 67(7): 292-3

Parents play a primary role in the health and health education of their children. In particular, parent involvement in planning and promoting adolescent immunization campaigns is critical to successful efforts. Parents serve as their children's primary educators on health issues, but where can they get accurate health information? To help guide local PTA units in their programmatic efforts, the National PTA maintains positions and policy statements on multiple health issues: alcohol and other drug abuse; emergency preparedness; environmental issues; family life education; firearm safety; HIV prevention; health screenings; immunization (measles, mumps, rubella, and hepatitis B); lead poisoning; nutrition; protective helmet use; sexual assault prevention; TB testing; tobacco use and access; violence prevention; and youth suicide prevention. Likewise, the school-home partnership is key to promoting the health of adolescents. Comprehensive school health programs and integrated services are necessary to support parent and community efforts to promote adolescent health issues, including immunization programs. Techniques for effective parent involvement, based on the National Standards for Family/Parent Involvement issued by the National PTA January 1997, are discussed.

Sporton RK, Francis SA. Choosing not to immunize: are parents making informed decisions? *Fam-Pract*. 2001 Apr; 18(2): 181-8

BACKGROUND: Childhood immunization is an important aspect of childhood preventive health, world wide, with programmes such as the Expanded Programme on Immunization organized by the World Health Organization. Unlike other countries, the immunization programme is not compulsory in the UK, and the decision whether to immunize a child or not is parental. **OBJECTIVE:** The objective of this study was to explore the decision-making process of parents who have chosen not to have their children immunized. **METHODS:** This was a qualitative study, using semi-structured interviews with parents either in their own homes or at their places of work. The study was set in an inner city area with a high level of deprivation. The district immunization co-ordinator and health visitors within the area referred parents to the researcher. Parents subsequently were selected using purposive maximum variation sampling. Data were analysed using consistent and systematic review. An initial coding frame that was derived from the first few transcripts was revised and developed through its application to subsequent transcripts. The final stage of analysis involved comparing the data using the revised coding frame for drawing conclusions and verification. **RESULTS:** Interviews were completed with 13 parents. Parents discussed their perceptions of childhood diseases and immunization, and the risk-benefit analysis that occurred between the two. All parents identified the risk of side effects as a reason for choosing not to immunize. A proposed model of the decision-making process that represented the experiences of the parents in this study is presented. In response to the question of immunization, three actions were described by parents: a routine response, an emotional response and delaying the decision by entering a questioning stage followed by a cyclical process of seeking and evaluating information. Key to this model was a stage of reflection that most parents described irrespective of their initial action in response to the question of immunization. Parents also discussed their responsibilities in terms of the consequences of their decisions. Health professionals were perceived as providing unbalanced information that was an obstacle in decision making. **CONCLUSION:** The parents included in this study had chosen not to immunize at least one of their children. Most parents felt they had made an informed decision, based on an assessment of the risks and benefits of immunization and an acceptance of responsibility for that decision. Health professionals were not perceived as providers of balanced information. It is therefore

important that parents have easy access to accurate information concerning the pros and cons of treatment, and have the opportunity to discuss their concerns with health professionals.

Stevens W, Walker D. Adolescent vaccination in the developing world: time for serious consideration? *Vaccine*. 2004 Jan 26; 22(5-6): 781-5

The number of vaccinations and vaccine boosters that are becoming relevant to delivery among adolescents is growing. For sexually transmitted infections (STIs) in particular, such as HIV, vaccine delivery in this (pre-sexually active) age group is going to be an integral component of the strategy to control these diseases in the future. Currently, however, adolescent vaccination does not routinely occur because the traditional method of delivery is through secondary schools, and in developing countries school attendance has historically been low. But with school attendance growing rapidly throughout the developing world, the cost of vaccines falling over time, and an increasing number of current and future vaccines targeted at adolescents, it is an ideal opportunity to place this route of delivery on the national and international health agenda. Therefore, this paper examines the rationale for adolescent vaccination, looks at the success of other adolescent-targeted health care interventions, and finally, considers the challenges associated with future adolescent vaccination programmes in developing countries.

Stevenson J, Murdoch G, Riley A, Duncan B, McWhirter M, Christie P. Implementation and evaluation of a measles/rubella vaccination campaign in a campus university in the UK following an outbreak of rubella. *Epidemiol-Infect*. 1998 Aug; 121(1): 157-64

An age shift in rubella infection to young adults has occurred in Scotland since the introduction of a first dose measles, mumps and rubella (MMR) vaccination in 1988 and a second dose measles/rubella (MR) vaccination in 1994/95. The Health Board was alerted to an outbreak of rubella at Stirling University by the notification of 6 cases amongst male students aged 18-28 years with dates of onset between 3 March and 21 March 1996. In response, a MR vaccination campaign was conducted to enhance population immunity to rubella within the university population and to reduce the likelihood of further cases. A total of 1795 students, staff and visitors were vaccinated. Vaccine coverage of 46% was estimated to be sufficient to boost rubella immunity in full time male students in university accommodation to 88.7-91.0%, just above the upper critical level of herd immunity for rubella of 85-88%. Students in colleges and universities in the UK will remain at increased risk of outbreaks of rubella and measles until the cohort who have received a two dose schedule of MR form the bulk of the college population. It may be prudent for tertiary education colleges and other institutions in the UK with young adults living in shared residential accommodation to offer MR vaccination to new entrants, targeting those who have not previously received the vaccine, between now and the year 2000.

Stringer M, Ratcliffe SJ, Gross R. Acceptance of hepatitis B vaccination by pregnant adolescents. *MCN-Am. J. Matern.-Child Nurs*. 2006; 31: 54-60

Purpose: To determine (1) the rate of prenatal hepatitis B virus (HBV) vaccine acceptance in HBV nonimmune pregnant adolescents, (2) if postulated behavioral and attitudinal factors are associated with HBV vaccine, and (3) the rate of actual receipt of HBV vaccine postpartum in eligible subjects. Design and Methods: During 1999-2000, at an inner-city tertiary-care center prenatal clinic, 160 HBV nonimmune adolescents < 18 years who were

receiving prenatal and delivery care at the center were identified. The research nurse provided an HBV information pamphlet and offered immediate in-hospital postpartum HBV vaccination. Risk factors for nonacceptance of the vaccine were measured with structured questionnaires and medical record review documenting care attendance. Subsequently, all subjects, irrespective of prenatal acceptance of vaccine, were offered vaccine before postpartum discharge, and the rate of actual acceptance was determined. Results: In these predominantly African American (95%) adolescents, the rate of vaccine acceptance was 91%. Actual vaccination rate was 86%, but it was not associated with prior acceptance of vaccination or behavioral or attitudinal factors. Clinical Implications: Acceptance of vaccination and actual vaccination were high in this population of high-risk adolescents. The authors found that reoffering vaccine was a successful intervention, even with adolescents who had less-than-optimal attendance at prenatal visits. Given the high rate of acceptance and vaccination in this setting, the authors would encourage public health programs to implement vaccination programs in adolescent prenatal clinics and to offer vaccination postpartum to those who do not receive it prenatally.

Sturm LA, Mays RM, Zimet GD. Parental Beliefs and Decision Making About Child and Adolescent Immunization: From Polio to Sexually Transmitted Infections. *J-Dev-Behav-Pediatr.* 2005; 26: 441-452.

Over the past 150 years, innovations in immunization practices have dramatically improved the health of children, and parents are increasingly asked to consider and accept new childhood vaccines. We present a conceptual model to frame a review of research on the role of parental attitudes and beliefs in decision making about child and adolescent immunization and describe the historical context of vaccine-related decision-making research. This review focuses on theory-based Social-environmental and parent-specific personal factors as potential influences on vaccine decision making. Relevant Social-environmental issues discussed include media coverage of vaccines, perceived social norms, and the persuasive influence of peer groups. Health care provider recommendations are presented as an exemplar of factors related to the family's interface with the health care system. Personal factors addressed include parental health beliefs, attitudes, and knowledge related to vaccine preventable diseases and immunization, as well as cognitive heuristics that are employed in the decision-making process (e.g., omission bias, protected values, framing of information). Last, promising directions for research and suggestions for clinical practice are presented.

Szucs TD, Smala A, Berger K, Windorfer A. Economic evaluation of various hepatitis B vaccination strategies in children and adolescents. *Med-Klin-(Munich).* 1998 Aug 15; 93(8): 468-77

AIM: In this cost-effectiveness study 4 different vaccination strategies against hepatitis B in children and adolescents are evaluated and compared with the situation without immunization. EXAMINATION: Projections are made for the population of the today's adolescents underage 15 and the newborns of the next 30 years. The number of avoided hepatitis B virus (HBV) infections and the cases of disease as well as the costs associated with treatment and vaccination are determined. The course of incidence of the hepatitis B virus is observed for different age groups. RESULTS: Compared to the situation without any vaccination against hepatitis B, a decrease of the remaining infections of at least 18,900 up to 46,600 could be expected during the next 30 years. The treatment costs for the remaining cases of disease could be reduced by 0.4 up to 1.6 billions DM. The remaining expenditures for treatment and vaccination would be limited to 2.3 up to 3.4 billions DM.

The net costs of a vaccination are determined as about 14,200 up to 63,000 DM per avoided case of infection. Considering the commonly accepted number of unreported cases of hepatitis B as to be the 5- to 10 fold of the known incidence, all of the 4 compared vaccination strategies will be cost-effective and associated with net savings of about 5,900 up to 36,400 DM per avoided case of hepatitis B virus infection during 30 years. The epidemiological situation will be positive influenced by such a mass vaccination. The minimization of incidence is shown for the different age groups. CONCLUSION: Considering these economical arguments, first the vaccination of all adolescents between age 11 to 15 and second the vaccination of all children/adolescents between age 0 to 15 are the preferable strategies. The immunization of all children/adolescents between age 0 to 15 is the most effective strategy from an epidemiological point of view.

Tepper ML. Universal hepatitis B immunization: young adolescent immunization. *Vaccine*. 1998; S23-S26.

Hepatitis B (HB) vaccines are safe and effective. To control HB infection at a population level, use of this vaccine in a routine immunization programme targeted at specific age groups has been recommended. Young adolescents (10 to 13 yr of age) are a group which may well be considered for such a programme, especially if school-based. This paper outlines some of the rationale, advantages and disadvantages of targeting this age group for HB vaccine as well as providing some recommendations regarding operational matters related to such a programme.

Thiry N, Beutels P, Van Damme P, Van Doorslaer E. Economic evaluations of varicella vaccination programmes - A review of the literature. *Pharmacoeconomics*. 2003; 21: 13-38

Chickenpox infections are generally mild but due to their very high incidence among healthy children they give rise to considerable morbidity and occasional mortality. With the development of a varicella vaccine in the early 1970s and its progressive licensing in many countries, interest in the efficiency of varicella immunisation programmes grew. The objective of this review was to discuss the methodological aspects and results of published economic evaluations of varicella vaccination. From this, we attempted to make recommendations. A computerised search was carried out; 17 full economic evaluations of varicella vaccination were retrieved. The review identified the methodological divergences and similarities between the articles in four areas: study design, epidemiological data, economic data and model characteristics. We assessed to what extent the applied methods conform to general guidelines for the economic evaluation of healthcare interventions and compared the studies' results. The desirability of a universal vaccination programme depends on whose perspective is taken. Despite variability in data and model assumptions, the studies suggest that universal vaccination of infants is attractive to society because large savings occur from averted unproductive days for parents. For the healthcare payer, universal vaccination of infants does not generate savings. Vaccination of susceptible adolescents has been proposed by some authors as a viable alternative; the attractiveness of this is highly dependent on the negative predictive value of anamnestic screening. Targeted vaccination of healthcare workers and immuno-compromised individuals appears relatively cost effective. Findings for other target groups are either contradictory or provide insufficient evidence for any unequivocal recommendations to be made. High sensitivity to vaccine price was reported in most studies. This review highlights that some aspects of these studies need to be further improved before final recommendations can be made. First, more transparency, completeness and compliance to general methodological guidelines are required. Second, because of the increasing severity of varicella with age, it is preferable

and in some cases essential to use dynamic models for the assessment of universal vaccination strategies. Third, most studies focused on the strategy of vaccinating children only while their results depended heavily on disputable assumptions (regarding vaccine effectiveness and impact on herpes zoster). Since violation of these assumptions could have important adverse public health effects, we suggest pre-adolescent vaccination as a more secure alternative. This option deserves more attention in future analyses.

Thwaite P, Bennett DL, Pynor H, Zigmund H. Art and "the language of well-being" in adolescent health care. *Ann-Acad-Med-Singap.* 2003; 32:71-77

Feeling effective as a young person depends on a capacity to draw upon one's own resources in the service of healthy living and development. In adolescent health care, there is the need to call upon the talents and creativity of young people, to introduce new and exciting experiences, and to facilitate involvement in their own care in order to nurture optimal growth and development on a physical and psychological level. While hospitalisation can represent a major crisis point in adolescence, the provision of a stimulating environment and the opportunity for creative activities offers an exciting, transformative and healing experience. Art allows adolescents to use alternative languages beyond illness, to engage in endeavours that are distanced from overt therapeutic intent, and to embrace attributes of self-esteem and resilience. Through the process and production of art, and the inclusion of music, poetry, film or theatre, young people can experience personal growth, acquire skills, develop socially and contribute to environmental change. In seeking to illustrate the value and importance of such approaches, this paper draws upon the experiences of a youth arts program attached to an adolescent ward. In a project called Art Injection art students worked with adolescents to make sculptures from old hospital equipment, with startling results. More recently, the development of personal totem poles and an imaginative mosaic mural has powerfully engaged creativity and community in care. Group and individual art sessions, including the media arts project Creative Well are offered on weekdays as part of the general hospital routine, enabling hospitalised young people to experience creativity as a daily part of their lives.

Trotter CL, Edmunds WJ. Modelling cost effectiveness of meningococcal serogroup C conjugate vaccination campaign in England and Wales. *BMJ.* 2002 Apr 6; 324(7341): 809

OBJECTIVES: To assess the cost effectiveness of a meningococcal serogroup C conjugate vaccination campaign in 0-17 year olds. **DESIGN:** Cost effectiveness analysis from the perspective of the healthcare provider. **Setting:** England and Wales. **MAIN OUTCOME MEASURE:** Cost per life year saved. **RESULTS:** In 1998-9, immediately before the introduction of meningococcal C vaccination, the burden of serogroup C disease was considerable, with an estimated 1137 cases in people aged 0-17 years and at least 72 deaths. The vaccination campaign is estimated to have cost between 126m pound sterling (\$180m, 207m) and 241 pound sterling 3m, 395m), depending on the price of the vaccine. Under base case assumptions the cost per life year saved from the vaccination campaign is estimated to be 6259 pound sterling. School based vaccination was more cost effective than general practice based vaccination because of lower delivery costs. Immunisation of infants aged under 1 year was the least cost effective component of the campaign because, although this maximises the life years gained, the three dose schedule required is more expensive than other methods of delivery. Estimates of the cost per life year saved were sensitive to assumptions on the future incidence of disease and the case fatality ratio. **CONCLUSIONS:** Meningococcal C vaccination is likely to be more cost effective in all age groups when the incidence of disease is high. It is also more cost effective when given to

children aged 1-4 (by general practitioners) and to children and young people aged 5-17 years at school than when administered to infants under 12 months of age or young people aged 16-17 years who are not at school.

Tung CS, Middleman AB. An evaluation of school-level factors used in a successful school-based hepatitis B immunization initiative. *J-Adolesc-Health*. 2005 Jul; 37(1): 61-8

PURPOSE: To examine the effect of different school-level factors on the percent return of consent or refusal forms, the percent student participation/enrollment rate, and the percent completion rate of all 3 immunizations in the vaccination series in a school-based hepatitis B immunization initiative. **METHODS:** The Houston Hepatitis B Immunization Initiative (HBII) was conducted from 1998 through 2001 to provide free hepatitis B immunizations to elementary school students in low socioeconomic areas. At the end of each academic school year, the nurse from each school participating in the initiative was asked to complete a survey evaluating the different strategies utilized in each school to aid in the program's success. The effect of different organizational methods on rate of return of consent/refusal forms, participation rates, and immunization completion rates from the program year 1999-2000 was determined using frequencies, Mann-Whitney analyses, Kruskal-Wallis analyses, and Spearman's correlations. **RESULTS:** An increase in percent return of signed consent/refusal forms was more likely when teachers helped in publicity/promotion ($p=.012$) and educational packet distribution ($p = .041$). Additionally, when teachers assumed responsibility for collecting the forms, the percent return of signed consent/refusal forms ($p=.018$) and the percent of students receiving all 3 vaccines in the series through HBII ($p=.030$) were more likely to increase. An increase in signed consent/refusal forms returned was also associated with increased rates of student participation in the program for each school. In schools where students helped specifically with educational packet distribution ($p=.039$), the percent of students receiving at least 1 vaccine dose from the program was more likely to be higher. **CONCLUSIONS:** The involvement of teachers in vaccination programs is very important for program success, especially in the enrollment and return of consent/refusal form phases of immunization initiatives. Student involvement may empower the students and encourage other students to participate in the program. Future school-based immunization initiatives can utilize these data to incorporate the most effective school-level factors into their programs to maximize the number of students immunized.

Van Damme P, Vorsters A. Hepatitis B control in Europe by universal vaccination programmes: the situation in 2001. *J-Med-Virol*. 2002 Jul; 67(3): 433-9

In the nine years since the Global Advisory Group of the Expanded Programme on Immunisation (WHO) set 1997 as the target for integrating hepatitis B vaccination into national immunisation programmes worldwide, 129 countries have included hepatitis B vaccine as part of their routine infant or adolescent immunisation programmes (June 2001). By the end of 2002, 41 out of the 51 countries of the WHO European Region will be implementing universal hepatitis B immunisation. The rewards of effective implementation of the programmes in countries that started 10 years ago are becoming apparent; and their success offers an exemplary model for other countries. Some other countries, however, have difficulties to incorporate hepatitis B vaccine into universal childhood immunisation programmes, because of major economic constraints and the inability to procure a constant vaccine supply. The next decade will be characterised by expanded use of hepatitis B vaccines and the increasing efforts to sustain vaccine programmes and make the vaccine available to those countries and regions that cannot afford it. In Europe, as well as in the

rest of the world, work still remains to be done to support and implement interventions that will bring us closer to the WHO goal and to eradicate hepatitis B.

Vernon ME, Bryan G, Hunt P, Allensworth D, Bradley B. Immunization services for adolescents within comprehensive school health programs. *J-Sch-Health*. 1997 Sep; 67(7): 252-5

Every school day, more than 95% of the nation's five- to 17-year-olds attend one of almost 110,000 elementary and secondary schools where they receive instruction in how to avoid major health-threatening behaviors. School is also the place where children and adolescents can be given preventive health care services, including administration of vaccines and monitoring of immunization levels. This article addresses how expanding school health services could improve immunization levels of school-aged youth.

Wallace LA, Young D, Brown A, Cameron JC, Ahmed S, Duff R, Carman WF, Kitchin NR, Nguyen Van Tam JS, Goldberg DJ. Costs of running a universal adolescent hepatitis B vaccination programme. *Vaccine*. 2005 Dec 1; 23(48-49): 5624-31

In the first UK study to examine feasibility and acceptability of universal adolescent hepatitis B vaccination, the costs associated with the administration and uptake (80.2 and 89.3% for three doses and at least two doses, respectively), of a three-dose regimen in pupils in Glasgow schools (2001/2002) were measured. These data were used to estimate the economic outlay for the delivery of a routine, ongoing three-dose and two-dose hepatitis B vaccine programme in schools. Vaccine, accounting for almost 70% of the overall costs, was the largest cost item for both the pilot and routine programmes, using either regimen. However, the ongoing, two-dose regimen was the cheapest option in this analysis, irrespective of vaccine price. Cost data from this study may be useful for other countries wishing to implement a similar programme.

Webb PM, Zimet GD, Mays R, Fortenberry JD. HIV immunization: acceptability and anticipated effects on sexual behavior among adolescents. *J-Adolesc-Health*. 1999 Nov; 25(5): 320-2

Adolescents rated hypothetical human immunodeficiency virus vaccines described as 90% and 50% efficacious and discussed how immunization might influence behavior of their peers. The low-efficacy vaccine was largely unacceptable and most believed immunization with the high-efficacy vaccine would cause increased risk behaviors. Immunization programs will need to address vaccine acceptability issues and behavioral responses to immunization.

Wilson TR, Fishbein DB, Ellis PA, Edlavitch SA. The impact of a school entry law on adolescent immunization rates. *J-Adolesc-Health*. 2005 Dec; 37(6): 511-6

PURPOSE: Middle school entry laws increase coverage with recommended vaccines, but their effect on vaccines that are not required is unknown. We compared vaccination coverage for hepatitis B, tetanus and diphtheria (Td), and measles, mumps and rubella (MMR) in areas of states with discordant middle school, hepatitis B school entry laws, and evaluated the relationship between demographic characteristics and adolescent immunization rates. **METHODS:** Retrospective design with purposive school sampling, using location of residence to determine study group. In each school, immunization records from a random sample of

up to 75 students in ninth grade (affected by a new hepatitis B law) and 12th grade (not affected by the law) from 11 schools in two areas discordant for the law were analyzed. All areas had long standing two-dose MMR and Td requirements. RESULTS: Ninth graders in schools with the law had hepatitis B rates higher (72.8%) than those without the law (18.6%) ($U = 2.0, p < .01$). There were no significant differences between grades or schools for MMR and Td. However, even in the presence of the law, rates were significantly lower in schools with lower socioeconomic indicators. CONCLUSIONS: Middle school immunization laws are effective at raising adolescent hepatitis B, but in this study there wasn't enough power to discern the effect on rates for other vaccines or the influence of demographic variables on rates. Results suggested that laws did not appear to completely overcome disparities. For school mandates to be more effective, additional efforts, presumably on enforcement, especially in areas with lower socioeconomic indicators, are needed.

Wilson T, Luther R. Impact on health departments after a seventh grade hepatitis B immunization requirement. *Public-Health-Rep.* 2002 Jan-Feb; 117(1): 78-83

OBJECTIVES: This research was designed to evaluate the impact on health departments of the implementation of a 1999 policy requiring hepatitis B (HBV) vaccination for seventh grade school entry in the state of Missouri. METHODS: The authors employed a retrospective descriptive design using data from the Missouri Health Strategic Architectures and Information Cooperative (MOHSAIC) system. They based their assessment of the impact of the new policy on six outcome variables: total immunizations administered, HBV immunizations administered, HBV immunizations given to children ages 10 to 14, percentage of total immunizations that were HBV, percentage of total HBV immunizations that were given to children ages 10 to 14, and percentage of total immunizations that were HBV given to children ages 10 to 14. Outcome variables from the months of July through September 1998 were compared to similar data from the same period in 1999. RESULTS: Statewide, there was a significant increase in all outcome variables. Health departments in non-rural settings, however, did not have a significant increase in total immunizations ($t = -1.49, p = 0.158$). The number of HBV immunizations did increase at health departments where alternative strategies (e.g., school-based programs) were used, but the increase was not as dramatic as for sites where no such strategies were employed. CONCLUSIONS: Implementation of a state policy requiring additional immunizations can be expected to have a significant impact on the resources of health departments statewide. The use of alternative strategies for managing immunizations outside the traditional health department setting can limit that impact.

Wilson T. Economic evaluation of a metropolitan-wide, school-based hepatitis B vaccination program. *Public-Health-Nurs.* 2000 May-Jun; 17(3): 222-7

The results of an evaluation of a large metropolitan-wide, school-based hepatitis B vaccination program provide further evidence that such programs are effective and cost-beneficial. The percentage of 6th grade students fully immunized against hepatitis B rose from approximately 8% to 82% in the program. Administering the vaccine at school was \$1.46 per dose less than traditional methods. Over \$24 million of potential health care costs have been avoided through the program.

Wirsing von Konig CH, Campins-Marti M, Finn A, Guiso N, Mertsola J, Liese J. Pertussis immunization in the global pertussis initiative European region: recommended strategies and implementation considerations. *Pediatr-Infect-Dis-J.* 2005 May; 24(5 Suppl): S87-92

Approaches to pertussis diagnosis, surveillance and immunization vary widely across Europe. Nonetheless most countries report high levels of vaccine coverage in infants and toddlers, and significant reductions in infant morbidity and mortality have been achieved. As a consequence of the effective protection of infants and toddlers, the absolute incidence of pertussis has substantially decreased, but the relative proportion of older age groups, adolescents and adults in particular, has increased. These groups, however, are a relevant source of infection of unimmunized or incompletely immunized infants. In addition to efficient childhood vaccination, other approaches to pertussis immunization are required. Among the various strategies evaluated, 3 were recommended by the European participants in the Global Pertussis Initiative that might be adapted to each country's specific needs: the reinforcement of implementation of current schedules, the addition of an extra dose of vaccine to current immunization schedules and the selective immunization of health care workers, which is already included in a European Commission directive. The main barriers to the acceptance of these strategies are low awareness of pertussis in immunized populations, poor recognition of the disease in adults and adolescents, lack of standardized diagnostic criteria and poor access to laboratory confirmation of the diagnosis. These obstacles have led to underreporting of pertussis and an underestimation of the disease burden. Actions to overcome these issues are crucial to the implementation of new or improved immunization strategies to combat pertussis in Europe.

Woodruff BA, Unti L, Coyle K, Boyer-Chuanroong L. Parent's Attitudes Toward School-based Hepatitis B Vaccination of Their Children. *Pediatrics.* 1996; 98: 410-413

OBJECTIVE: As part of a larger hepatitis B vaccination program in San Francisco, hepatitis B vaccine is offered to seventh-grade students in selected middle schools. We investigated attitudes and beliefs about hepatitis B, hepatitis B vaccine, and school-based vaccination among parents of eligible students. **METHODS:** A survey was conducted of random samples of parents who consented, refused, or did not respond to a request for vaccination consent. **RESULTS:** A larger proportion of persons who signed a vaccination consent or refusal form were biological parents and were Asian or white than parents who did not return a signed form. The most common reason for refusing vaccination, given by 84% of refusing parents, was that their children had already been vaccinated against hepatitis B. These parents recognized the severity and duration of hepatitis B virus infection as much as parents consenting to vaccination. About one third of parents who refused vaccination did not agree that schools were good places to vaccinate children. Overall, 116 parents (40%) consulted someone before deciding to consent or refuse; 95 (33%) spoke with a health professional. Most parents not returning signed consent or refusal forms reported that they never received forms from their children or that they returned signed forms to their children, who never delivered them to school. **CONCLUSIONS:** Most parents accepted school-based vaccination, and obtaining parental consent for school-based vaccination was possible. Nonetheless, new approaches may be needed for those students and parents who do not comply with the consent process.

Woringer V. Vaccination against hepatitis B in school: factors influencing acceptance and evaluation of general vaccination coverage. *Soz-Praventivmed.* 2000; 45(6): 267-73

The second vaccination campaign against Hepatitis B in Lausanne concerned 1243 students of the seventh grade. This campaign was actively supported by personalized information given to each adolescent in the class room. The decisions were collected in the same way, and in necessary the nurse phoned the parents for further information. In comparison with the previous year, the coverage had grown from 63.5% to 78.5%, but varied in each class between 42% and 92%, whatever the class type. The factors which influence acceptance of the vaccination are coverage for the other vaccines, origin, and class, which has up to five times more effect than the other factors. Assessment of the vaccination coverage against Diphtheria, Tetanus, Poliomyelitis, Pertussis, Measles and MMR is given in relation to the acceptance of the Hepatitis B vaccination and the class type.

Zimet GD. Improving adolescent health: Focus on HPV vaccine acceptance. *J-Adolesc-Health.* 2005; 37: S17-S23

The success of future human papillomavirus (HPV) vaccination programs will depend on individuals' willingness to accept vaccination, parents' willingness to have their preadolescent and early adolescent children vaccinated, and health care providers' willingness to recommend HPV vaccination. The purpose of this article is to provide a qualitative review of the relevant literature, including research on knowledge and attitudes about HPV infection and its clinical sequelae, the acceptability of HPV vaccination to individuals and parents, and health care providers' attitudes about recommending HPV vaccination. Additionally, strategies are suggested by which providers of adolescent health care can discuss and recommend HPV vaccines with parents and their children. The research published to date suggests that there is a good deal of misunderstanding about HPV infection, cervical cancer screening, and the sequelae of HPV infection. However, the majority of research studies to date indicate that young women, parents, and health care providers are interested in vaccines that prevent HPV and other sexually transmitted infections (STIs). Of particular note are the consistent findings that providers are less comfortable vaccinating younger versus older adolescents and that endorsement of vaccination by a professional organization is of great importance. Furthermore, research suggests that most parents are interested in having their preadolescent and adolescent children vaccinated against HPV. Parents value the information and recommendations provided by their children's health care providers. To the extent that providers are concerned about potential negative reactions of parents to a recommendation of HPV vaccination, these findings should provide reassurance. At the same time, health care providers will need to be prepared to provide patients and parents with information about HPV and HPV immunization and to respond productively to the rare parent who expresses opposition to HPV vaccine or any other vaccine. (c) 2005 Society for Adolescent Medicine. All rights reserved.

Zimet GD, Blythe MJ, Fortenberry JD. Vaccine characteristics and acceptability of HIV immunization among adolescents. *Int-J-STD-AIDS.* 2000 Mar; 11(3): 143-9

HIV immunization programmes will only be effective if sufficient numbers of persons accept the vaccine. Our aims were to evaluate HIV vaccine acceptability among adolescents and to examine how vaccine characteristics influence acceptability. We recruited 661 adolescents from community health clinics in Indianapolis, Indiana, USA to complete either written or computerized questionnaires, both of which assessed HIV vaccine acceptability as a function

of efficacy, cost, type of vaccine, mode of delivery, and parental permission for immunization (required or not required). For both the written and computer methods, efficacy had the strongest effect on acceptability, followed by type of vaccine and cost. Low efficacy, high cost, and live-attenuated vaccines were associated with lower acceptability. These findings suggest that as efforts to develop HIV vaccines continue, it will be important, in parallel, to anticipate potential obstacles to vaccine acceptance, including the belief that a less efficacious HIV vaccine is unacceptable.

Zimet GD, Mays RM, Sturm LA, Ravert AA, Perkins SM, Juliar BE. Parental Attitudes About Sexually Transmitted Infection Vaccination for Their Adolescent Children. *Arch-Pediatr-Adolesc-Med.* 2005; 159: 132-137.

OBJECTIVES: To evaluate parental attitudes about adolescent vaccination as a function of vaccine characteristics, including whether the vaccine prevented a sexually transmitted infection (STI), and to explore possible sociodemographic predictors of acceptability of STI vaccines. **DESIGN:** Participants were 278 parents who accompanied their children (69.1% female, aged 12-17 years) to appointments at medical clinics. By using computer-based questionnaires, parents rated 9 hypothetical vaccine scenarios, each of which was defined along 4 dimensions: mode of transmission (STI or non-STI), severity of infection (curable, chronic, or fatal), vaccine efficacy (50%, 70%, or 90%) and availability of behavioral methods for prevention (available or not available). Willingness by parents to vaccinate their adolescents under each vaccine scenario was assessed on a scale that ranged from 0 to 100. Conjoint analysis was used to determine the relative contribution of each dimension to the ratings. **RESULTS:** The mean vaccine scenario rating was 81.3. Sexually transmitted infection vaccines (mean, 81.3) were not rated differently than non-STI vaccines (mean, 80.0). Conjoint analysis indicated that severity of infection and vaccine efficacy had the strongest influence on ratings, followed by availability of behavioral prevention. Mode of transmission had negligible effect on ratings. Child age ($P=.08$) and sex ($P=.77$), parent age ($P=.32$) and education ($P=.34$), insurance status ($P=.08$), and data collection site ($P=.48$) were not significantly associated with STI vaccine acceptability.

CONCLUSIONS: Parents were accepting of the idea of vaccinating their adolescent children against STIs. The most salient issues were severity of infection and vaccine efficacy, not sexual transmissibility. Parents also favored vaccines for infections that had no method of behavioral prevention available.

Zuckerman J, Langer B. Hepatitis B vaccination in a school age population: A feasibility study. *J-Med-Virol.* 2005; 76: 47-54

There remains no consensus on whether to adopt a universal hepatitis B vaccination strategy in the United Kingdom, where the endemicity of hepatitis B virus (HBV) is considered to be very low in the general population. To assess the feasibility and acceptance of a school-based adolescent vaccination approach, 11-13 years old pupils in local secondary schools in the London Borough of Camden and Islington were contacted and offered a three-dose hepatitis B vaccination course using a 0, 1, and 12 months schedule. The adult dose of hepatitis B vaccine (Engerix B (TM) GlaxoSmithKline) containing 20 μ g recombinant hepatitis B surface antigen (HBsAg) in 1 ml suspension was administered. This dosage is normally intended for adults and children older than 15 years of age, but can be administered in 10-15 years old children when compliance may be low, since a higher proportion of those vaccinated develop protective antibody levels following administration of only two doses of vaccine. Overall, a total of 528 pupils were contacted, with 122 (23%) consenting to be vaccinated. Of these, 117 (96%) received the complete three-dose regimen according to the schedule (four did not receive vaccine: three were non-attendees and one

was previously vaccinated; one withdrew following a flu-like adverse event). The results of this study show that it is feasible and practical to administer hepatitis B vaccination to adolescents in a school setting, and that it is possible to achieve high rates of uptake for the complete three-dose course among adolescents. However, in order to attain and sustain high coverage rates among pupils, this would require additional general health promotion, including health education and provision of information, targeting of teachers, pupils, and parents in order to increase participation in a school-based hepatitis B vaccination programme. A further requirement includes the availability of good local health support within schools so as to allow for an efficient vaccine delivery system to maximize vaccination in this setting. (c) 2005 Wiley-Liss, Inc.