



Healthcare Quality Reporting Program

HOSPITAL-ACQUIRED INFECTIONS AND PREVENTION ADVISORY SUBCOMMITTEE

8:00-9:00am, 10/10/12 at **Healthcentric Advisors**

Goals/Objectives

- To discuss HAI work to date and make policy recommendations for pending and upcoming reports

Members

- | | | |
|--|--|---|
| <input type="checkbox"/> Nicole Alexander, MD | <input type="checkbox"/> Linda McDonald, RN | <input type="checkbox"/> Georgette Uttley, MEd, BSN, RN |
| <input type="checkbox"/> Rosa Baier, MPH | <input type="checkbox"/> Leonard Mermel, DO, ScM | <input type="checkbox"/> Nancy Vallande, MSM, MT, CIC |
| <input type="checkbox"/> Utpala Bandy, MD | <input type="checkbox"/> Pat Mastors | <input type="checkbox"/> Cindy Vanner |
| <input type="checkbox"/> Marlene Fishman, MPH, CIC | <input type="checkbox"/> Robin Neale, MT (ASCP), SM, CIC | <input type="checkbox"/> Margaret Vigorito, MS, RN |
| <input type="checkbox"/> Yongwen Jiang | <input type="checkbox"/> Kathleen O’Connell, RN,BSN,CIC | <input type="checkbox"/> Samara Viner-Brown, MS |
| <input type="checkbox"/> Julie Jefferson, RN, MPH, CIC | <input type="checkbox"/> Lee Ann Quinn, RN, BS, CIC | |
| <input type="checkbox"/> Maureen Marsella, RN, BS | <input type="checkbox"/> Janet Robinson, RN, Med, CIC | |

Time

Topic/Notes

- | | |
|--------|---|
| 8:00am | <p>Welcome & Administrative Updates
 <i>Leonard Mermel, DO, ScM</i>
 <i>Samara Viner-Brown, MS</i></p> <ul style="list-style-type: none"> - Today’s objectives - Previous meeting’s action items: - Action items <ul style="list-style-type: none"> • Survey hospitals about CDI testing and processes (Maureen/Margaret) • Research the Speak Up and ICPSNE patient education materials (Ann) • Consider writing a <i>C. Difficile</i> editorial (Len) • Identify the <i>C. Difficile</i> materials available from HEALTH (Nicole) • Put <i>C. Difficile</i> information on the program’s website (Maureen) |
| 8:30am | <p>C. Difficile Reporting
 <i>Leonard Mermel, DO, ScM</i>
 <i>Rosa Baier, MPH</i>
 <i>Samara Viner-Brown, MS</i></p> <ul style="list-style-type: none"> - Discuss <i>C. Difficile</i> test and process survey results - Review 9/24 Steering Committee direction regarding <i>C. Difficile</i>: <ul style="list-style-type: none"> • Release the existing data, but in a “white paper” type report, • Recommend that the program’s methodological experts make appropriate statistical adjustments to account for the various testing methods/changes, |

- Include information in the report that provides context for the work to date to reduce CDI, including the HAI Collaborative and hospital processes, and
 - Ensure that the report clearly explains what the diamonds mean and how to interpret differences between facilities.
- Discuss next steps:
- Report content
 - *C. Difficile* materials available from HEALTH
 - Timeline

8:50am **Open Forum & Action Items**

Rosa Baier, MPH

- Discuss microbiology supervisor CRE survey results
- Healthcare worker vaccination
- Review action items
- **Next meeting:** 11/19/12 at Healthcentric Advisors

**RULES AND REGULATIONS PERTAINING TO
IMMUNIZATION, TESTING, AND HEALTH SCREENING FOR
HEALTH CARE WORKERS**

[R23-17-HCW]



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF HEALTH

JULY 2002

AS AMENDED:

January 2007 (re-filing in accordance
with the provisions of section 42-35-
4.1 of the Rhode Island General Laws,
as amended)

January 2007

January 2012 (re-filing in accordance
with the provisions of section 42-35-
4.1 of the Rhode Island General Laws,
as amended)

October 2012

INTRODUCTION

These amended *Rules and Regulations Pertaining to Immunization, Testing, and Health Screening for Health Care Workers* [R23-17-HCW] are promulgated pursuant to the authority conferred under Chapters 23-17 and 23-17.7.1 of the General Laws of Rhode Island, as amended, and are established in accordance with the most current recommendations of the Centers for Disease Control and Prevention for the purpose of adopting prevailing standards for immunization and communicable disease screening and testing for health care workers prior to employment in Rhode Island-licensed health care facilities. In addition, the provisions of §3.5 of these Regulations, as it pertains to seasonal influenza and pertussis vaccination, shall apply to all health care workers employed in health care facilities licensed under the provisions of Chapter 23-17 of the Rhode Island General Laws, as amended, on and after the effective date of these Regulations.

Pursuant to the provisions of §§42-35-3(a)(3) and (a)(4) of the General Laws of Rhode Island, as amended, consideration was given to: (1) alternative approaches to the regulations; (2) duplication or overlap with other state regulations; and (3) significant economic impact on small business. Based on the available information, no known alternative approach, overlap or duplication was identified.

Upon promulgation of these amendments, these amended regulations shall supersede all previous *Rules and Regulations Pertaining to Immunization, Testing, and Health Screening for Health Care Workers* promulgated by the Rhode island Department of Health and filed with the Secretary of State.

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Section 1.0 *Definitions*

Wherever used in these Regulations, the following terms shall be construed as follows:

- 1.1 **"Advisory Committee on Immunization Practices (ACIP) recommendations"**, as used in these Regulations, means official federal recommendations for the use of vaccines in the United States and as published by the Centers for Disease Control and Prevention. ACIP recommendations represent the standard of care for immunization practice in the United States.
- 1.2 **"Certified registered nurse practitioner (RNP)"** means a registered nurse who practices in an advanced role utilizing independent knowledge of physical assessment and management of health care and illnesses. The practice includes prescriptive privileges, and collaboration with other licensed health care professionals, including, but not limited to, physicians, pharmacists, podiatrists, dentists and nurses.
- 1.3 **"Department"** means the Rhode Island Department of Health.
- 1.4 **"Direct patient contact"**, as used in these Regulations, means any routinely anticipated face-to-face interaction with patients in a health care facility.
- 1.5 **"Director"** means the Director of the Rhode Island Department of Health.
- 1.6 **"Health care worker"** means any person who is temporarily or permanently employed by or at, or who serves as a volunteer in, or has an employment contract with, a health care facility, as defined in §2.1(a) of these Regulations, and has or may have direct contact with a patient in that health care facility. This may include, but not be limited to, a physician, physician assistant, nurse, nursing assistant, therapist, technician, clinician, behavioral analyst, social worker, occupational, physical or speech therapist, phlebotomist, emergency medical service personnel, dental personnel, pharmacist, laboratory personnel, autopsy personnel, students and trainees, contractual staff not employed by the health-care facility; other health care providers, including those have privileges at, but are not employed by, the health care facility; and persons (e.g., clerical, dietary, housekeeping, laundry, security, maintenance, administrative, billing, and volunteers) not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from a health care worker and a patient. This term shall not apply to a patient's family member or friend who visits or otherwise assists in the care of that patient in a health care facility.
- 1.9 **"Nurse"** means an individual licensed in this state to practice nursing pursuant to the provisions of RIGL Chapter 5-34.
- 1.10 **"Physician"**, as used in these Regulations, means an individual licensed under the provisions of RIGL Chapter 5-37 or an individual licensed to practice allopathic or osteopathic medicine under the laws of another state or territory of the United States, provided those laws are deemed to be substantially equivalent to RIGL Chapter 5-37.

- 1.11 **"Physician assistant"** means an individual licensed in this state to practice with physician supervision pursuant to the provisions of RIGL Chapter 5-54.
- 1.12 **"Practitioner"**, as used in these Regulations, means a physician, certified registered nurse practitioner, registered nurse, licensed practical nurse, or a physician assistant.
- 1.13 **"Pre-employment health screening"** means the review of health records, pertinent laboratory results, and other documentation of a health care worker performed by a licensed practitioner in order to determine that the health care worker is free of the communicable diseases cited in these Regulations, and is also appropriately immunized, tested, and counseled prior to employment.
- 1.14 **"RIGL"** means the General Laws of Rhode Island, as amended.
- 1.15 **"These Regulations"** mean all parts of Rhode Island *Rules and Regulations Pertaining to Immunization, Testing, and Health Screening for Health Care Workers [R23-17-HCW]*.

Section 2.0 **General Requirements**

- 2.1 Health care facilities shall adopt, at a minimum, the standards of immunization and communicable disease testing and standards for health screening contained in §3.0 of these Regulations. For the purpose of these Regulations:
- (a) "Health care facility" means any institutional health service provider, facility or institution, place, building, agency, or portion thereof, whether a partnership or corporation, whether public or private, whether organized for profit or not, used, operated, or engaged in providing health care services, including but not limited to hospitals; nursing facilities; home nursing care provider (which shall include skilled nursing services and may also include activities allowed as a home care provider, or as a nursing service agency); home care provider (which may include services such as personal care or homemaker services or as a nursing service agency); rehabilitation centers; kidney disease treatment centers; health maintenance organizations; free-standing emergency care facilities, and facilities providing surgical treatment to patients not requiring hospitalization (surgi-centers); hospice care, physician ambulatory surgical centers and podiatry ambulatory surgery centers providing surgical treatment and nursing service agencies licensed under the provisions of RIGL Chapter 23-17.7.1.
- (b) Except as provided in §2.1(c) of these Regulations, health care facility also includes organized ambulatory care facilities which are not part of a hospital but which are organized and operated to provide health care services to outpatients such as central services facilities serving more than one health care facility or health care provider, treatment centers, diagnostic centers, outpatient clinics, infirmaries and health centers, school-based health centers and neighborhood health centers.
- (c) The term "health care facility" shall not apply to organized ambulatory care facilities owned and operated by professional service corporations as defined in RIGL Chapter 7-5.1, as amended (the "Professional Service Corporation Law"), or to a private practitioner's (physician, dentist, or other health care provider) office or group of the practitioners' offices (whether owned and/or operated by an individual practitioner,

alone or as a member of a partnership, professional service corporation, organization, or association).

(d) Any provider of hospice care who provides such hospice care without charge shall be exempt from the licensing provisions of RIGL Chapter 23-17, but shall meet the "Standards of a Hospice Program of Care."

(e) Facilities licensed by the Department of Behavioral Healthcare, Developmental Disabilities and Hospitals and clinical laboratories licensed in accordance with RIGL Chapter 23-16.2, as well as Christian Science institutions (also known as Christian Science Nursing Facilities) listed and certified by the Commission for Accreditation of Christian Science Nursing Organizations/Facilities, Inc. shall not be considered health care facilities for purposes of RIGL Chapter 23-17.

2.2 It shall be the responsibility of the administrative head, or his/her designee, of any health care facility to secure compliance with these Regulations.

2.3 Each health care facility shall develop policies, procedures, and/or protocols for compliance with the requirements described in these Regulations.

2.4 **[REMOVED]**

2.5 Transient employees or outside contractors who are not involved in direct patient contact are exempt from the requirements stated in these Regulations.

2.6 **[REMOVED]**

2.7 Health care facilities and health care workers shall comply with additional immunization and screening requirements that the Director may prescribe from time to time in order to control communicable diseases.

2.8 Persons discovering communicable diseases (e.g., physicians, physician assistants, registered nurse practitioners), in the process of screening health care workers shall comply with the reporting requirements contained in the most current version of the *Rules and Regulations Pertaining to the Reporting of Communicable, Environmental and Occupational Diseases* [Reference 3].

2.9 In accordance with ACIP recommendations, for all vaccines discussed in these Regulations, vaccine doses administered less than or equal to four (4) days before the minimum interval or age shall be counted as valid. Doses administered five (5) or more days earlier than the minimum interval or age shall not be counted as valid doses and shall be repeated as age-appropriate. The repeat dose should be spaced after the invalid dose by the recommended minimum interval as provided in ACIP recommendations. [See References 1 and 2].

2.10 Health care workers who receive the first dose of a multi-dose vaccine series may begin to work after this first dose is received.

Section 3.0 ***Minimum Standards for Immunization and Communicable Disease Testing for Health Care Workers***

- 3.1 A pre-employment health screening shall be required for each health care worker involved in direct patient contact. Acceptable evidence shall be provided by the health care worker that testing and/or immunization for the communicable diseases listed in these Regulations for pre-employment health screening have been completed.
- 3.2 The health care facility shall document, in written or electronic form, that said acceptable evidence has been provided by the health care worker and validated by the practitioner as being acceptable in accordance with §4.0 of these Regulations. Copies of said acceptable evidence shall be maintained in the health care worker's file.
- 3.3 A practitioner shall have responsibility for performance of the pre-employment health screening. Such a practitioner may be an employee of the facility where employment is sought or may be an independent non-employee, contracted practitioner.
- 3.4 A health care worker who is not in compliance with these requirements shall be excluded from attending patients in a health care facility until the requirements are met.

Immunization and Testing Requirements

- 3.5 In accordance with the guidelines set forth by the [Advisory Committee on Immunization Practices \(ACIP\)](#) for immunization of health care personnel, evidence of immunity is required for all health care workers (with the exception of health care workers who receive a medical exemption) against:

3.5.1 ***Measles, Mumps and Rubella***

- (a) **Pre Employment:** Two (2) doses of MMR (measles-mumps-rubella) vaccine. Alternatively, two (2) doses of a live measles-containing vaccine, two (2) doses of a live mumps-containing vaccine and one (1) dose of a rubella vaccine. The first dose of vaccine must have been administered on or after the first birthday. The second dose of a measles or mumps containing vaccine must be administered at least four (4) weeks after the first dose. **OR**
- (b) Laboratory evidence of immunity or laboratory confirmation of disease (i.e., laboratory report of positive IgG titers for measles, and mumps and rubella). An equivocal laboratory result for measles, mumps and/or rubella are considered negative and vaccination is required.
- (c) **Current Health Care Workers.** For unvaccinated health care workers born before 1957 who lack laboratory evidence of measles immunity or laboratory confirmation of disease, two (2) doses of MMR vaccine is recommended.
- (d) **Outbreak Control.** For unvaccinated health care workers born before 1957 who lack laboratory evidence of measles immunity or laboratory confirmation of disease, health-care facilities shall require two (2) doses of MMR vaccine during an outbreak of measles.

3.5.2 *Varicella (Chickenpox)*

- (a) Two (2) doses of varicella vaccine. The second dose of varicella vaccine must be administered at least four (4) weeks after the first dose; **OR**
- (b) Laboratory evidence of immunity or laboratory confirmation of disease; **OR**
- (c) A healthcare provider diagnosis of varicella or healthcare provider verification of history of varicella disease; **OR**
- (d) History of herpes zoster based on healthcare provider diagnosis.

3.5.3 *Tetanus, Diphtheria and Pertussis (Whooping Cough):*

- (a) Pre-employment: One (1) single dose of Tdap (tetanus-diphtheria-pertussis) vaccine is required for all health care workers who have not previously received a dose of Tdap vaccine.
- (b) Effective 1 January 2014: This requirement shall apply to current employees, as well as new employees.

3.5.4 *Annual Seasonal Influenza*

- (a) Annual influenza vaccination is required for all health care workers as defined in §1.6 of these Regulations, subject to §5.8 of these Regulations when there is insufficient vaccine supply as determined by the Department.
- (b) Each health care facility shall develop a specific plan to require annual influenza vaccination of all health care workers in a timely manner in keeping with ACIP guidelines, and at no cost to the health care worker.
- (c) Each health care facility shall maintain an active surveillance program to track and record influenza vaccination levels among health care workers, including vaccinations obtained outside of the formal health care facility program.
- (d) Each health care facility shall be responsible for reporting to the Department:
 - (1) The number of health care workers who are eligible for vaccination;
 - (2) The number of health care workers who received vaccination; and
 - (3) The number of health care workers who decline annual influenza vaccination for medical or personal reasons, reported by each of the two (2) categories.
 - (4) Such reporting shall occur according to procedures and format required by the Department.

3.5.5 *Tuberculosis (TB)*

- (a) **Pre-employment.** Evidence that the health care worker is free of active tuberculosis based upon the results of a negative two-step tuberculin skin test shall be required.
 - (1) If documented evidence is provided by the health care worker that a two-step tuberculin skin test, performed within the most recent twelve (12)

months prior to hire, was negative, the requirements of this section shall be met.

- (i) For health care workers who can present documentation of serial tuberculin testing with negative results in the prior two (2) years (or more), a single baseline negative tuberculin test result is sufficient evidence of absence of TB infection.
- (2) A negative FDA-approved blood assay for Mycobacterium tuberculosis (BAMT) may be used instead of a two-step tuberculin skin test. If the baseline BAMT is positive, screening should proceed as indicated below for positive PPD.
- (3) Documentation shall include date and result of the tuberculin skin test (PPD), and reaction size in millimeters or an actual copy of the laboratory test result from a BAMT.
- (4) If the PPD test or BAMT is positive, consistent with the most current Centers for Disease Control and Prevention{CDC} guidance, or a previous one is known to have been positive, a physician's or other licensed practitioner's (acting within his/her scope of practice) certification that the health care worker is free of active disease shall be required. Such certification shall be based on documentation of adequate chemotherapy for TB disease or chemo-prophylaxis for latent TB infection in the past, and a current history of freedom from signs and symptoms of TB. In the absence of documentation of chemotherapy or chemo-prophylaxis, a negative chest X-ray shall be required for certification. The chest x-ray shall have been performed at any time after the most recent positive PPD test result.
- (5) A physician, certified registered nurse practitioner, or a physician assistant may certify that the health care worker is currently free of TB based on his/her clinical judgment for complex cases or unusual circumstances that do not fit the above criteria.

(b) Current Health Care Workers

- (1) Periodic follow up testing of all health care workers must be based on the most current [CDC Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings](#).
- (2) Effective 1 January 2013, health care workers with newly detected latent TB infection (LTBI) at initial or periodic testing are required to be referred for care with intent to obtain treatment for latent TB infection. Referral of previously (prior to 1 January 2013) known LTBI for care is recommended.
- (3) Effective 1 January 2013, LTBI cases detected in health care workers must also be reported to the [RI TB Program](#) on standard reporting forms.

3.5.6 *Hepatitis B Vaccination and Testing.*

- (a) Health care facilities shall abide by the Occupational Safety and Health Administration (OSHA) Blood Borne Pathogens Standard (29 CFR 1910-1030), including the offering of hepatitis B vaccination along with all recommendations for infection control training and provision of protective equipment to those health care workers at risk.
- (b) An exposure control plan shall be in place in all health care facilities licensed by the Department, pursuant to the provisions of RIGL Chapter 23-17.
- (c) Employees at risk of exposure to blood-borne pathogens shall be offered hepatitis B vaccine within ten (10) days of employment.
 - (1) The hepatitis B vaccination series consists of three (3) doses of vaccine given as two (2) doses four (4) weeks apart followed by a third dose five (5) months after the second dose.
 - (2) It is recommended that testing for anti-HBs be performed one (1) to two (2) months after the last dose.
 - (3) Persons failing to develop a titer shall be offered a repeat three (3) dose series with follow up titers.
 - (4) Employees have the option of signing a standard OSHA declination form if they choose not to be vaccinated and should be counseled regarding risk.
- (d) If the health care worker, upon hire, has written documentation of a full hepatitis B vaccine series administered in accordance with ACIP guidelines, testing for anti-HBs shall not be necessary. If the health care worker has a subsequent exposure to HBV, hepatitis B immunoprophylaxis should be administered following ACIP guidelines for a person who has been vaccinated, but the immune response is not known.

Section 4.0 *Documentation of Immunity and Testing (Immunization Records)*

4.1 Acceptable documentation of completion of immunizations shall include the day, month, year and type/name of each dose of vaccine administered. The record of such evidence shall be signed by a practitioner (the signature of the health care worker is not acceptable).

4.1.1 Acceptable documentation of completion of immunization consists of:

- (a) An official immunization record card, school immunization record, medical passport, World Health Organization immunization record, a copy of a medical record indicating administration of vaccine; or other official immunization records acceptable to the Director; **OR**
- (b) An electronically stored and/or transmitted documentary record (facsimile transmission, computerized record, including, but not limited to, a record on magnetic media or similar record) as may be utilized by a school; **OR**

- (c) Presentation of laboratory evidence of immunity is made in the case of measles, mumps, rubella, varicella, or hepatitis B.

Section 5.0 *Medical Exemption and Influenza Vaccination Refusa*

- 5.1 A health care worker shall be exempt from the immunization requirements described in these Regulations provided that a physician, physician assistant, or certified registered nurse practitioner signs a medical exemption stating that the health care worker is exempt from a specific vaccine because of medical reasons, in accordance with Advisory Committee on Immunization Practices (ACIP) guidelines, and determined as acceptable by the facility. [See References 1 and 2 in the endnotes to these Regulations.]
- 5.2 A "period in which flu is widespread" is defined for purposes of these Regulations as a period that commences when the Director declares that there is an outbreak of influenza that is widespread within a particular facility, or within a defined geographic area in which the facility is located, or throughout Rhode Island; and that ends when the Director declares to such a health care facility or facilities that the outbreak is no longer widespread. Whenever the Director declares a "period in which flu is widespread" in a health care facility, within a defined geographic area, or throughout Rhode Island, the requirements in §5.0 of these Regulations for wearing surgical face masks shall apply only to those nonimmunized health care workers at facilities or in geographic areas for which the period is declared.
- 5.3 Any health care worker who provides proper annual notice of a §5.1 medical exemption to annual seasonal influenza vaccination prior to December 15 of each year to each health care facility in or at which he or she is employed or volunteering, or with which he or she has an employment contract, shall be required during any declared period in which flu is widespread -- as part of his or her professional licensing obligation -- to wear a surgical face mask for the duration of each direct patient contact in the performance of his or her duties at any health care facility. "Direct patient contact" is defined in §1.4 of these Regulations.
- 5.4 Any health care worker may refuse the annual seasonal influenza vaccination requirements described in these Regulations; provided, however, that he or she provides proper annual written notice of such refusal prior to December 15 of each year to each health care facility in or at which he or she is employed or volunteering, or with which he or she has an employment contract; and provided, however, that he or she who so refuses shall be required during any declared period in which flu is widespread -- as part of his or her professional licensing obligation -- to wear a surgical face mask during each direct patient contact in the performance of his or her duties at any health care facility. "Direct patient contact" is defined in §1.4 of these Regulations
- 5.5 Each such yearly notice required by §5.4 of these Regulations shall contain the following statement: *"I refuse to obtain the annual seasonal influenza vaccination. I understand that, by refusing such vaccination, it is my professional licensing obligation to wear a surgical face mask during each direct patient contact in the performance of my professional duties at any health care facility during any declared period in which flu is*

widespread. I understand that the consequence for failing to do so shall result in a one hundred dollar (\$100) fine for each violation. Failing to do so may also result in a complaint of Unprofessional Conduct being presented to the licensing board that has authority over my professional license. I understand that such licensing complaint, if proven, may result in a sanction such as reprimand, or suspension or revocation of my professional license.” Such statement shall be signed and dated by the health care worker each year that it is submitted to each health care facility at or in which the health care worker is employed, or with which he or she has an employment contract. No health care worker shall be required to explain his or her refusal to obtain an annual seasonal influenza vaccination, nor shall any health care facility inquire into the basis of such refusal.

- 5.6 Any health care worker who holds a license issued by the Department and who shall violate §5.3, §5.4 or §5.5 of these Regulations shall be subject, pursuant to RIGL §23-1-25, to a fine of one hundred dollars (\$100) for each such act. Each such act shall be considered to meet the definition of “unprofessional conduct” as used in each chapter of the Rhode Island General Laws that governs each health care worker’s respective professional license.
- 5.7 Each act that violates §5.3, §5.4 or §5.5 of these Regulations shall form a separate basis for each complaint that may be brought for disciplinary action, based on unprofessional conduct, before the licensing board that has authority over the health care worker’s license issued by the Department. The requirements of §5.3, §5.4 and §5.5 of these Regulations apply to each health care worker regardless of any provision in any collective bargaining agreement or other contract to which the health care facility and health care workers are parties, or of any written policy of the health care facility.
- 5.8 If the Director declares that a shortage exists for annual seasonal influenza vaccine, the Director shall be permitted to modify and/or suspend any requirement for some or all health care workers to obtain an annual seasonal influenza vaccination and/or any requirement for health care workers to wear surgical face masks during any direct patient contact in the performance of his or her professional duties in any health care facility; and shall be permitted to extend the deadlines in §5.3 and §5.4 of these Regulations.
- 5.9 Any health care facility that knowingly, willingly and expressly refuses to require its health care workers who have refused an annual seasonal influenza vaccination, or who have a §5.1 medical exemption, to wear a surgical face mask during each direct patient contact in the performance of his or her professional duties in any health care facility during any declared period in which flu is widespread shall be subject, pursuant to RIGL §23-1-25, to a fine of one hundred dollars (\$100) for each such violation committed by any health care worker who is employed or volunteering in, or has an employment contract with, such facility. No health care facility shall be fined for the act of any health care worker who falsely informs such facility about his or her medical exemption and/or refusal pursuant to §5.1 or §5.4 of these Regulations.
- 5.10 Each health care facility shall provide at no financial charge an adequate supply of surgical face masks -- during any declared period in which flu is widespread at the

facility, in the geographic area in which it located, or statewide -- to any health care worker who has claimed a medical exemption to or has refused the annual seasonal influenza vaccination.

- 5.11 The purpose of these Regulations relating to annual seasonal influenza vaccination for health care workers is to protect the public as a whole, patients at health care facilities, and in particular those vulnerable to contracting annual seasonal influenza due to compromised immunity and other medical conditions. Health care workers each have a potential for spreading the disease of influenza to their patients, and it is the right of patients in health care facilities to be as safe as possible from the spread of this and other infectious diseases. The reasonable precaution of having each health care worker receive annual seasonal influenza vaccination is expected to significantly reduce the incidence of seasonal influenza in health care facilities. The purpose of allowing health care workers to wear surgical masks during direct patient contact during any declared period in which flu is widespread -- in the event they refuse, or have a medical exemption to, an annual seasonal influenza vaccination -- is to ensure patient safety and to reduce the chance of health care workers spreading the influenza virus. Scientific research has shown that the wearing of surgical face masks reduces the transmission of the influenza virus to other human beings. It is not the intent of these regulations to impose an unnecessary burden on health care workers but to effectively protect the public.

Section 6.0 **[RESERVED]**

Section 7.0 ***Severability***

- 7.1 If any provision of these Regulations or the application thereof to any person or circumstances shall be held invalid, such invalidity shall not affect the provisions or application of these Regulations which can be given effect, and to this end the provisions of these Regulations are declared to be severable.

REFERENCES

1. CDC. *Recommendations of the Advisory Committee on Immunizations on Immunization Practices (ACIP)*. MMWR, 2011; 60(No. RR-2): 1-61. Available online: <http://www.cdc.gov/vaccines/pubs/ACIP-list.htm>
2. CDC. *Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP)*. MMWR, 2011; 60(No. RR-7): 1-46. Available online: www.cdc.gov/mmwr/pdf/rr/rr6007.pdf
3. *Rules and Regulations Pertaining to the Reporting of Communicable, Environmental and Occupational Diseases [R23-5-6, 10, 11, 23-24.6-CD/ERD and R23-24.5 ASB]*, Rhode Island Department of Health, July 2008. <http://health.ri.gov/diseases/for/providers/>
4. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report, *Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection*, June 9, 2000. Available online: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4906a1.htm>
5. "Blood Borne Pathogens", Occupational Safety and Health Administration (OSHA), 29 *Code of Federal Regulations* Section 1910.1030. Available online: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051
6. Guidelines for Preventing the Transmission of *Mycobacterium tuberculosis* in Health-Care Settings, <http://www.cdc.gov/tb/publications/guidelines/infectioncontrol.htm>
7. "Licensing of Health Care Facilities", Chapter 23-17 of the Rhode Island General Laws, as amended. Available online: <http://www.rilin.state.ri.us/Statutes/TITLE23/23-17/INDEX.HTM>

The revision dates of all regulations cited above were current when these amended regulations were filed with the Secretary of State. Current copies of all regulations issued by the RI Department of Health may be downloaded at no charge from the RI Secretary of State's Final Rules and Regulations Database website: <http://www.sos.ri.gov/rules/>



Frequently Asked Questions:
Rhode Island Rules and Regulations for
Immunization and Testing For Healthcare Workers

I. GENERAL

1. *What are the major changes to the immunization and testing requirements for healthcare workers?*
Major changes are summarized in the table below in the order in which they appear in the regulations.
This table does not include all of the changes.

Section	Topic	Changes including additions, deletions and clarifications
1.6	Definition of HCW <i>Note: See question # 3 below for the exact language used to define HCW or refer to regs</i>	Added language to clarify that for the purpose of these regulations: <ul style="list-style-type: none"> ▪ Any person who is temporarily or permanently employed by or at, or who serves as a volunteer in, or has an employment contract with, a healthcare facility, as defined in §2.1(a), and has or <u>may have</u> direct contact with a patient in that healthcare facility is considered a HCW ▪ Specifies/clarifies that requirements apply to: <ul style="list-style-type: none"> ○ Healthcare providers who have privileges at, but are not employed by the healthcare facility ○ Volunteers, students and trainees ○ Persons not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from a HCW and patient (e.g. clerical, dietary, billing etc.) ▪ Specifies/clarifies that requirements do not apply to a patient's family member or friend who visits
3.5.1	MMR	Added language that: <ul style="list-style-type: none"> ▪ Recommends 2 doses of MMR vaccine for existing <u>unvaccinated</u> HCWs born before 1957 who lack laboratory evidence of measles immunity or confirmation of disease ▪ Requires 2 doses of MMR vaccine for <u>unvaccinated</u> HCWs born before 1957 in the event of an outbreak
3.5.2	Varicella	No change
3.5.3	Tdap	Added language to: <ul style="list-style-type: none"> ▪ Clarify that only a single dose of Tdap vaccine is required for HCWs who have <u>not</u> previously received a dose of Tdap regardless of age or the interval since the last Td vaccine ▪ Require proof of Tdap vaccination in all HCWs (effective 1/1/2014) Deleted language: <ul style="list-style-type: none"> ▪ Specifying vaccine was only required for HCWs under 65 years of age ▪ Specifying a 2 year interval since the last tetanus containing vaccine was needed
3.5.4	Influenza	Added language that: <ul style="list-style-type: none"> ▪ Requires flu vaccine for all HCWs as defined in §1.6 ▪ Outlines changes to reporting requirements
3.5.5(b)	TB	Added language that: <ul style="list-style-type: none"> ▪ Requires periodic follow-up testing of all HCWs based on most current CDC guidelines ▪ Requires (effective 1/1/2013) referral for care with intent to obtain

		<p>treatment with newly detected latent TB infection (LTBI) at initial or periodic testing</p> <ul style="list-style-type: none"> ▪ Recommends referral of previously known (prior to 1/1/2013) LTBI for care ▪ Requires (effective 1/1/2013) cases detected in HCWs to be reported to the RI TB Program on standard reporting forms.
3.5.6(d)	Hep B	<p>Added language to:</p> <ul style="list-style-type: none"> ▪ Clarify that if the HCW upon hire has written documentation of a full hepatitis B vaccine series, the HCW is not required to have testing for anti-HBs ▪ Antibody testing in this situation would only be needed if the HCW has a subsequent exposure to hepatitis B

2. How are changes to the immunization requirements for healthcare workers determined?

New requirements or changes to the regulations reflect the most current recommendations of CDC’s [Advisory Committee on Immunization Practices \(ACIP\): Immunization of Health-Care Personnel](#) issued on November 25, 2011.

3. What is the definition of a healthcare worker in the regulations?

Healthcare worker is defined in §1.6 as “any person who is temporarily or permanently employed by or at, or who serves as a volunteer in, or has an employment contract with, a healthcare facility, as defined in §2.1(a) of these Regulations, and has or may have direct contact with a patient in that healthcare facility. This may include, but not be limited to, a physician, physician assistant, nurse, nursing assistant, therapist, technician, clinician, behavioral analyst, social worker, occupational, physical or speech therapist, phlebotomist, emergency medical service personnel, dental personnel, pharmacist, laboratory personnel, autopsy personnel, students and trainees, contractual staff not employed by the health-care facility; other healthcare providers, including those who have privileges at, but are not employed by, the healthcare facility; and persons (e.g., clerical, dietary, housekeeping, laundry, security, maintenance, administrative, billing, and volunteers) not directly involved in patient care but potentially exposed to infectious agents that can be transmitted to and from a healthcare worker and a patient. This term shall not apply to a patient’s family member or friend who visits or otherwise assists in the care of that patient in a healthcare facility.”

4. What is the definition of “direct patient contact”?

“Direct patient contact”, as defined in the Regulations, means any routinely anticipated face-to-face interaction with patients in a healthcare facility. (§1.4)

5. In what types of healthcare facilities do the regulations apply?

The healthcare facilities in which these regulations apply include (but are not limited to):

- Hospitals
- Nursing facilities
- Nursing service agencies
- Home nursing care providers
- Home care providers
- Rehabilitation centers
- School-based health centers
- Community health centers
- Podiatry ambulatory surgery centers
- Health maintenance organizations
- Free-standing emergency care facilities
- Surgi-centers
- Physician ambulatory surgical centers
- Hospice care
- Kidney treatment centers

For the full definition of “healthcare facility,” see §2.1 of the regulations.

6. *In what types of facilities do these regulations not apply?*

The healthcare facilities in which these regulations do **not** apply include (but are not limited to):

- Assisted living facilities and adult day care centers
- Private practitioners offices (e.g. dentists' and physicians' offices)
- Providers of hospice care who provide hospice care without charge are exempt from these regs but must meet the "Standards of a Hospice Program of Care."
- Facilities licensed by the Department of Behavioral Healthcare, Developmental Disabilities and Hospitals
- Clinical laboratories licensed in accordance with RIGL Chapter 23-16.2,
- Christian Science institutions (also known as Christian Science Nursing Facilities) listed and certified by the Commission for Accreditation of Christian Science Nursing

7. *Whose responsibility is it to ensure that HCWs are in compliance with the required immunization and testing?*

It is the responsibility of the administrative head, or his/her designee, of any healthcare facility to secure compliance with the Regulations.

8. *Does my healthcare facility need policies and procedures to assure compliance with the regulations?*

Yes. Each healthcare facility is required to develop policies, procedures, and/or protocols for compliance with the requirements described in the Regulations.

9. *Why are people in certain healthcare settings (e.g. private practitioners' offices, adult day care centers) not required to comply with these regulations?*

HEALTH's regulations only apply to the facilities that HEALTH oversees. Facilities such as assisted living centers, adult day care centers, and physicians' offices are not required to comply with these regulations because these settings are not regulated by HEALTH.

II. Tdap VACCINE

10. *What is the requirement for Tdap vaccine for healthcare workers?*

- For Pre-employment: One (1) single dose of Tdap (tetanus-diphtheria-pertussis) vaccine is required for all healthcare workers who have **not** previously received a dose of Tdap vaccine.
- Effective January 1 2014: This requirement shall apply to current employees, as well as new employees

11. *I am hiring a new employee at my healthcare facility who has documentation of receiving a dose of Tdap vaccine in 2006. Does this employee need another dose?*

No. Healthcare workers who have documentation of a previous dose do not need to be revaccinated.

12. *How soon after a dose of Td can a healthcare worker receive a dose of Tdap?*

If they have not previously received Tdap, HCWs should receive a single dose of Tdap as soon as feasible and without regard to the dosing interval since the last Td. The ACIP no longer recommends a "minimum interval" one needs to wait between receiving Td and Tdap.

13. *Is there an upper age limit for Tdap administration? For example, should I vaccinate a 67-year-old HCW?*

There is no upper age limit for Tdap vaccination. A one-time dose of Tdap is recommended for all adults.

III. HEPATITIS B VACCINE

14. For a pre-employment physical, a HCW states she received all three hepatitis B vaccine doses as an adolescent. Should I do a titer to test for anti-HBs (hepatitis B antibodies)?

No. If the healthcare worker, upon hire, has written documentation of a full hepatitis B vaccine series administered in accordance with ACIP guidelines, testing for anti-HBs is **not** necessary. If the healthcare worker has a subsequent exposure to hepatitis B virus, hepatitis B immunoprophylaxis should be administered following [ACIP guidelines for post exposure prophylaxis](#) for a person who has been vaccinated, but the immune response is not known. This language has been added to the regulations in §3.5.6(d).

For more information about hepatitis B and the healthcare worker see: Hepatitis B and the Healthcare Worker--CDC answers frequently Asked Questions <http://www.immunize.org/catg.d/p2109.pdf>

IV. INFLUENZA VACCINE

15. What is the purpose of the requirements related to annual influenza vaccination for healthcare workers?

The purpose of these regulations relating to annual seasonal influenza vaccination for healthcare workers is to protect the public as a whole, patients at healthcare facilities, and in particular those vulnerable to contracting annual seasonal influenza due to compromised immunity and other medical conditions. Healthcare workers each have a potential for spreading the disease of influenza to their patients, and it is the right of patients in healthcare facilities to be as safe as possible from the spread of this and other infectious diseases. The reasonable precaution of having each healthcare worker receive annual seasonal influenza vaccination is expected to significantly reduce the incidence of seasonal influenza in healthcare facilities. The purpose of allowing healthcare workers to wear surgical masks during direct patient contact in the event they refuse, or have a medical exemption to, an annual seasonal influenza vaccination is to ensure patient safety and to reduce the chance of healthcare workers spreading the influenza virus. Scientific research has shown that the wearing of surgical face masks reduces the transmission of the influenza virus to other human beings. It is not the intent of these regulations to impose an unnecessary burden on healthcare workers but to effectively protect the public (§5.11).

16. Is there a date by which healthcare workers must be vaccinated against the flu?

Yes. Healthcare workers must be vaccinated against the flu by December 15 every year.

17. Can healthcare workers refuse influenza vaccination?

Please see Medical Exemption and Influenza Vaccination Refusal section below.

18. What do the regulations require for reporting influenza vaccination of HCWs?

Section 3.5.4(d) each healthcare facility is responsible for reporting to the Department:

- The number of healthcare workers who are eligible for influenza vaccination;
- The number of healthcare workers who received influenza vaccination; and
- The number of healthcare workers who decline annual influenza vaccination for medical or personal reasons, reported by each of the two (2) categories.

- Reporting shall occur according to procedures and format required by the Department.

V. MEDICAL EXEMPTIONS AND INFLUENZA VACCINATION REFUSAL

19. Do the regulations allow for a HCW who has a medical contraindication to one or more vaccine requirements?

Yes. Section 5.1 of the regulations state that: a healthcare worker shall be exempt from the immunization requirements described herein in these Regulations provided that a physician, physician assistant, or certified registered nurse practitioner signs a medical exemption stating that the healthcare worker is exempt from a specific vaccine because of medical reasons, in accordance with Advisory Committee on Immunization Practices (ACIP) guidelines, and determined as acceptable by the facility.

20. Do I need to send a copy of the Medical Exemption Certificate to the Department of Health?

No. Exemption certificates should not be sent to the department. The healthcare facility must keep the exemption in the HCW's file.

21. Do I need to report all medical exemptions to the Department of Health?

No. You are only required to report the total number of medical exemptions to **influenza vaccine** when you complete your annual reporting (see question # 18 above).

22. When will the HCWs who refused influenza vaccine have to wear a mask?

In accordance with §5.2 of the Regulations, A "period in which flu is widespread" is defined for purposes of the Regulations as a period that commences when the Director declares that there is an outbreak of influenza that is widespread within a particular facility, or within a defined geographic area in which the facility is located, or throughout Rhode Island; and that ends when the Director declares to such a healthcare facility or facilities that the outbreak is no longer widespread. Whenever the Director declares a "period in which flu is widespread" in a healthcare facility, within a defined geographic area, or throughout Rhode Island, the requirements in §5.0 of these Regulations for wearing surgical face masks shall apply only to those non-immunized healthcare workers at facilities or in geographic areas for which the period is declared.

23. Do HCWs have to file a notice of refusal with their employers?

Yes. By December 15 of each year, any HCW who refuses to obtain the influenza vaccine must file a form with their employer but not with the Department of Health. The form must state: "I refuse to obtain the annual seasonal influenza vaccination. I understand that, by refusing such vaccination, it is my professional licensing obligation to wear a surgical face mask during each direct patient contact in the performance of my professional duties at any healthcare facility during any declared period in which flu is widespread. I understand that the consequence for failing to do so shall result in a one hundred dollar (\$100) fine for each violation. Failing to do so may also result in a complaint of Unprofessional Conduct being presented to the licensing board that has authority over my professional license. I understand that such licensing complaint, if proven, may result in a sanction such as reprimand, or suspension or revocation of my professional license."

24. What happens if the Director declares a period in which flu is widespread for my healthcare facility and I refuse to wear a surgical face mask during routinely anticipated direct patient contact?

If you are found to be in violation of the Healthcare Worker Immunization regulations, you may be fined \$100 by the Health Department for each occurrence, as described in §5.6 of the Regulations. Also, a disciplinary complaint may be opened against you, and you would be subject to disciplinary

action against your health professional license. The regulations define refusal to wear a mask when required as unprofessional conduct, which can result in sanctions as severe as license revocation.

25. Do I have to explain to anyone why I am refusing to get a flu shot, and can my employer ask me why I am refusing?

No.

If you have a question not addressed above, contact:

Barbara McNeilly, RN

(401) 222-4640

Barbara.mcneilly@health.ri.gov

Karen Luther, RN

(401) 222-3044

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RESOURCES

Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm>

CDC Influenza Vaccination Information for Healthcare Workers

<http://www.cdc.gov/flu/healthcareworkers.htm>

Immunization Action Coalition: Mandatory influenza vaccination for all healthcare workers is imperative! Refer to the position statements of these leading medical organizations to guide you in developing and implementing a mandatory influenza vaccination policy at your healthcare institution or medical setting.

<http://www.immunize.org/honor-roll/>



Healthcare Personnel Influenza Vaccination Summary

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*required for saving

Record the number of healthcare personnel (HCP) for each category below for the influenza season being tracked.				
*Facility ID#:				
*Vaccination type: Influenza	*Influenza subtype ^a : <input type="checkbox"/> Seasonal	*Influenza Season ^b :	Date Last Modified: __/__/__	
	Employee HCP	Non-Employee HCP		
	*Employees (staff on facility payroll)	*Licensed independent practitioners: Physicians, advanced practice nurses, & physician assistants	*Adult students/trainees & volunteers	Other Contract Personnel
1. Number of HCP who worked at this healthcare facility for at least 30 days between October 1 & March 31				
2. Number of HCP who received an influenza vaccination at this healthcare facility since influenza vaccine became available this season				
3. Number of HCP who provided a written report or documentation of influenza vaccination outside this healthcare facility since influenza vaccine became available this season				
4. Number of HCP who have a medical contraindication to the influenza vaccine				
5. Number of HCP who declined to receive the influenza vaccine				
6. Number of HCP with unknown vaccination status (or criteria not met for questions 2-5 above)				
Custom Fields				
Label		Label		
_____	__/__/__	_____	__/__/__	
_____		_____		
_____		_____		
_____		_____		
_____		_____		
Comments				
^a For the purposes of NHSN, influenza subtype refers to whether seasonal or non-seasonal vaccine is used. Seasonal is the default and only current choice. ^b For the purposes of NHSN, a flu season is defined as July 1 to June 30.				
Assurance of Confidentiality: The voluntarily provided information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not otherwise be disclosed or released without the consent of the individual, or the institution in accordance with Sections 304, 306 and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d)). CDC 57.214 v7.0				

Healthcare Personnel Influenza Vaccination Summary

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Question 1 (Denominator) Notes:

- Include all HCP who have worked at the facility for at least 30 working days during the reporting period, regardless of clinical responsibility or patient contact. This includes HCP who joined after October 1 or left before March 31, or who were on extended leave during part of the reporting period. Working for any number of hours a day counts as one working day.
- Include both full-time and part-time persons. If an HCW works in two or more facilities, each facility should include the HCW in their denominator. Count HCP as individuals rather than full-time equivalents.
- Licensed practitioners who receive a direct paycheck from the reporting facility, or who are owners of the reporting facility, should be counted as employees.
- The HCP categories are mutually exclusive. Each HCP should be counted only once in the denominator (question 1).

Questions 2-6 (Numerator) Notes:

- Questions 2-6 are mutually exclusive. The sum of the HCP in questions 2-6 should equal the number of HCP in question 1 for each HCP category. Questions 2-6 are to be reported separately for each of the three HCP categories.
- Only the following HCP should be counted in question 4: HCP with (1) a severe allergic reaction to eggs or other vaccine component(s) or (2) a history of Guillain-Barré Syndrome within 6 weeks after a previous influenza vaccination.
- The following should be counted in question 5 (declined to receive influenza vaccine):
 - HCP who declined vaccination because of conditions **other than** those included in question 4.
 - HCP who declined vaccination and did not provide any other information.
 - HCP who did not receive vaccination because of religious exemptions.
 - HCP who deferred vaccination for the entire influenza season (i.e. from October 1 to March 31).

ICPs and HEs from each hospital to determine HFP. It is possible that an individual respondent may have overstated or understated how frequently HFP plans were used; however, we have no reason to believe that this would be a systematic issue. Finally, the small sample size might limit detection of other factors associated with HFP planning.

In conclusion, we provide an important first step that suggests opportunities to develop national guidelines on HFP that emphasize issues relevant to environmental decontamination, mold remediation, isolation, and surge capacity after flooding.⁸ Additional studies that rigorously evaluate such strategies would help bolster HFP efforts in developing countries and elsewhere.

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Carbapenem-Resistant *Enterobacteriaceae*: A Statewide Survey of Detection in Massachusetts Hospitals

The prevalence of antibiotic resistance is increasing worldwide. Although infection control efforts have largely been focused on gram-positive organisms, concern is growing regarding more extensive antimicrobial resistance in gram-negative organisms. Carbapenems have been used increasingly over the past decade to treat infections due to *Enterobacteriaceae*-producing extended-spectrum β -lactamases (ESBLs). The emergence of carbapenem-resistant *Enterobacteriaceae* (CRE) severely limits antibiotic options to treat such infections.¹ Moreover, it has been shown that patients infected with CRE experience a 3-fold increase in mortality compared with patients with infection due to susceptible strains.²

Because of the threat that CRE pose and the increased reliance on automated susceptibility testing, it is important to assess the prevalence of CRE and how reliably they are detected. It is particularly important to know the current variance in testing methods in light of recent changes in guidelines for antimicrobial susceptibility testing of *Enterobacteriaceae* released by the Clinical and Laboratory Standards Institute (CLSI) in June 2010 and updated in January 2011.³

Online surveys were sent to all 70 Massachusetts acute care hospital microbiology laboratories and corresponding infection prevention teams in December 2010. Standardized questions were used to estimate the proportion of hospitals that detected CRE in 2010 and to analyze current microbiological methods for CRE detection. Hospitals were asked what platforms were routinely used to work-up *Enterobacteriaceae* and confirm carbapenemase production; whether laboratories were adhering to the June 2010 CLSI guidelines; and what carbapenem minimum inhibitory concentration (MIC) cutoff values were used to prompt CRE consideration. Data were analyzed using SPSS software (SPSS) to calculate χ^2 statistics and a Spearman rank correlation coefficient.

Forty-five responses from microbiology laboratories and 49 responses from infection prevention teams were received from the 70 hospitals surveyed; 63 hospitals responded to one or both surveys, representing 90% of Massachusetts hospitals. Nonresponding hospitals were located in all regions of the state except for Boston and the metro-Boston region. Hospitals reported detection of from 0 to more than 12 unique CRE isolates in 2010. Detection of CRE was observed statewide; 49% of respondents detected CRE in 2010, 33% reported no CRE, 13% did not know whether CRE had been isolated, and 5% did not answer this question (Figure 1). Teaching hospitals were more likely to report CRE (75%) than were nonteaching hospitals (46%; $P = .036$). CRE were detected with a significantly greater frequency in larger hospitals ($P < .05$, by Fisher exact test). Seven hospitals reported more than 12 unique CRE isolates.

Of the 45 microbiology laboratories that responded, 93% reported detecting CRE by automated systems. Forty-four percent of hospitals performed additional analysis to detect drug-resistant *Enterobacteriaceae*; 2 facilities performed the

modified Hodge test, whereas others reported using single or multiple confirmatory tests (60% used disk diffusion, 20% used E-test, 40% used automated systems, and 10% used broth dilution). Fifty-one percent of hospitals reported adhering to the June 2010 CLSI guidelines; however, only 1 hospital reported correct use of the $>0.5 \mu\text{g/mL}$ ertapenem MIC currently recommended to prompt consideration of a CRE. Stratified analysis of ertapenem MIC cutoffs used for CRE detection showed that the lower the cutoff used, the more likely the institution was to recognize a CRE (Spearman rank order correlation coefficient, -0.489 ; $P = .013$; data not shown).

In 2007, the Centers for Disease Control and Prevention (CDC) reported that 8.7% of *Klebsiella pneumoniae* isolates in the United States were resistant to carbapenems compared with less than 1% reported in 2000.^{5,6} However, statewide prevalence has not been reported. We report, to our knowledge, the first statewide estimation of CRE prevalence in the United States. Our findings indicate that nearly half of all Massachusetts hospitals detected CRE in 2010. Although CRE

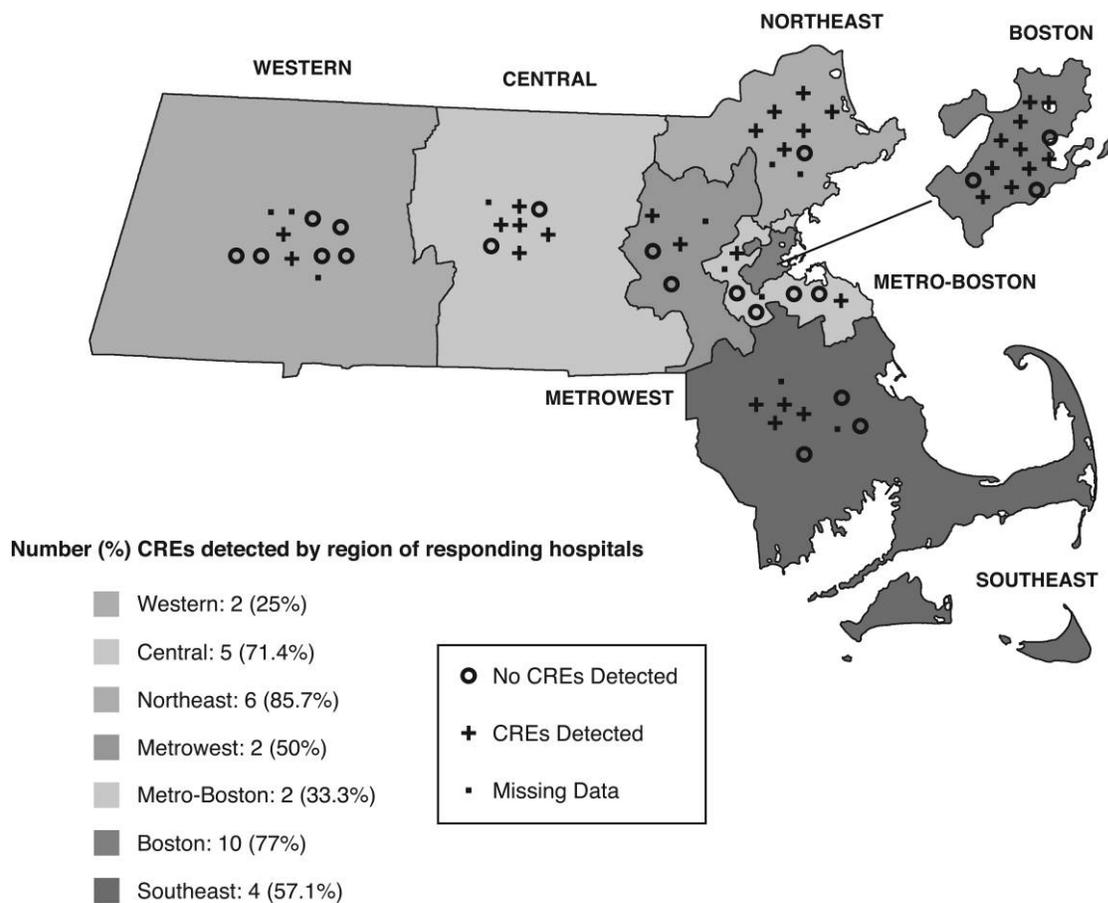


FIGURE 1. Thirty-one (49%) of 63 Massachusetts hospitals surveyed reported detection of carbapenem-resistant *Enterobacteriaceae* (CRE). CRE were detected in all 7 regions of the state, 13% of hospitals were unaware of whether CRE had been isolated, and 5% of hospitals did not answer the question.

were more often detected in teaching hospitals than in nonteaching hospitals, they were still detected across all regions of the state and in all types of hospitals, including teaching and nonteaching hospitals, small and large hospitals, and hospitals in rural and urban settings.

The limitations of this study include voluntary participation in the survey, recall bias, and selection bias. Some recall bias was improved by contacting hospitals that responded to both the microbiology laboratory survey and the infection prevention survey with discordant reports of CRE detection. Because the specific number of CRE identified in 2010 was not requested, the prevalence of CRE in Massachusetts could not be determined.

Detection of CRE bacteria through susceptibility testing is often difficult, because these organisms may appear to be carbapenem susceptible.¹ The performance of automated systems is variable; 7%–87% of *K. pneumoniae* carbapenemase-producing organisms may be falsely classified as susceptible to carbapenems.¹ Many microbiology laboratories use supplementary tests to confirm carbapenemase production because of the limitations of automated systems and the difficulty of identifying CRE.

The June 2010 CLSI guidelines replaced an earlier recommendation to use the modified Hodge test to confirm carbapenem resistance with a decreased MIC breakpoint for carbapenems for all *Enterobacteriaceae*; for ertapenem, the threshold for susceptibility was decreased from ≤ 2 $\mu\text{g}/\text{mL}$ to ≤ 0.25 $\mu\text{g}/\text{mL}$.^{1,7} Although the CLSI has revised its guidelines, US Food and Drug Administration approval and subsequent modification of automated systems are pending. Few hospitals have yet been able to implement these changes, and just one site surveyed in Massachusetts routinely used the lower MIC breakpoint for ertapenem.

We demonstrate that hospitals that used lower ertapenem MIC breakpoints detected more CRE isolates. Because of the overwhelming reliance on automated systems and inconsistency in the use of confirmatory tests, we suspect that many CRE infections have gone unrecognized. Awareness of both the widespread prevalence of CRE and the implications of new CLSI testing guidelines should help to address this problem.

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Effect of Nonpayment for Hospital-Acquired, Catheter-Associated Urinary Tract Infection

A Statewide Analysis

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Background: Most (59% to 86%) hospital-acquired urinary tract infections (UTIs) are catheter-associated urinary tract infections (CAUTIs). As of 2008, claims data are used to deny payment for certain hospital-acquired conditions, including CAUTIs, and publicly report hospital performance.

Objective: To examine rates of UTIs in adults that are coded in claims data as hospital-acquired and catheter-associated events and evaluate how often nonpayment for CAUTI lowers hospital payment.

Design: Before-and-after study of all-payer cross-sectional claims data.

Setting: 96 nonfederal acute care Michigan hospitals.

Patients: Nonobstetric adults discharged in 2007 ($n = 767\,531$) and 2009 ($n = 781\,343$).

Measurements: Hospital rates of UTIs (categorized as catheter-associated or hospital-acquired) and frequency of reduced payment for hospital-acquired CAUTIs.

Results: Hospitals frequently requested payment for non-CAUTIs as secondary diagnoses: 10.0% (95% CI, 9.5% to 10.5%) of discharges in 2007 and 10.3% (CI, 9.8% to 10.9%) in 2009.

Hospital rates of CAUTI were very low: 0.09% (CI, 0.06% to 0.12%) in 2007 and 0.14% (CI, 0.11% to 0.17%) in 2009. In 2009, 2.6% (CI, 1.6% to 3.6%) of hospital-acquired UTIs were described as CAUTIs. Nonpayment for hospital-acquired CAUTIs reduced payment for 25 of 781 343 (0.003%) hospitalizations in 2009.

Limitations: Data are from only 1 state and involved only 1 year before and after nonpayment for complications. Hospital prevention practices were not examined.

Conclusion: Catheter-associated UTI rates determined by claims data seem to be inaccurate and are much lower than expected from epidemiologic surveillance data. The financial impact of current nonpayment policy for hospital-acquired CAUTI is low. Claims data are currently not valid data sets for comparing hospital-acquired CAUTI rates for the purpose of public reporting or imposing financial incentives or penalties.

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Since October 2008, the Centers for Medicare & Medicaid Services (CMS) no longer pays hospitals to treat specific, “reasonably preventable” hospital-acquired complications as part of a value-based purchasing plan to encourage hospitals to improve patient safety and reduce Medicare spending (1–3). Administrative discharge claims data (submitted by hospitals to request payment) are now used to deny payment for these complications and publicly report and compare hospitals by complication rates.

The CMS rules are complex for identifying these complications in administrative discharge data (4, 5). For example, for the first complication chosen for nonpayment (hospital-acquired, catheter-associated urinary tract infection [CAUTI]), multiple codes must each be listed accurately to trigger nonpayment for the UTI: a diagnosis code for UTI, the code for urinary catheter-associated inflammation or infection (996.64), and both codes need to be labeled as not present on admission (indicating that the CAUTI was hospital-acquired). Even if a hospital-acquired condition is identified, hospitals can continue to receive extra payment if other patient comorbid conditions, such as heart failure, are listed as diagnoses (6). Accordingly, the financial impact of nonpayment for hospitals and payers will be influenced by how hospitals describe CAUTIs and comorbid conditions using diagnosis codes in claims data. Public reporting of hospital-acquired CAUTI rates on

Medicare Hospital Compare (www.hospitalcompare.hhs.gov) also follows similar coding conventions as the rules for payment. Case examples of how a UTI diagnosis affects hospital payment and public reporting are provided in **Appendix 1** and **Appendix Table 1** (available at www.annals.org).

Surveillance data suggest that 4.5 hospital-acquired infections occur per 100 hospitalizations and that 32% of them have a urinary tract source (7). Most hospital-acquired UTIs (59% to 86%) are catheter-associated (8–10). However, on the basis of previous work (4), we hypothesized that the catheter code in claims data was rarely applied to describe UTIs as catheter-associated. We designed a statewide study to investigate hospital rates of non-catheter-associated UTIs (non-CAUTIs) and CAUTIs before and after implementation of nonpayment for hospital-acquired CAUTIs from claims data and assessed the financial impact of nonpayment for hospital-acquired CAUTIs.

See also:

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Context

The Centers for Medicare & Medicaid Services limits payment for key “reasonably preventable” complicating conditions acquired during a hospital stay. Catheter-associated urinary tract infection (CAUTI), coded in discharge claims data as hospital-acquired, was the first condition targeted for such nonpayment.

Contribution

These data from 96 Michigan hospitals showed that hospitals frequently requested payment for non-CAUTIs. These infections were rarely coded as hospital-acquired or catheter-associated, although surveillance data sets show that such infections are common. Nonpayment for hospital-acquired CAUTIs lowered payment for very few hospitalizations (0.003%).

Implication

Discharge claims are inadequate for identifying hospital-acquired CAUTIs. Nonpayment based on such claims has little financial impact on hospital payment.

—The Editors

METHODS**Study Design**

We conducted a retrospective before-and-after study using administrative data for all adult patients discharged from acute care hospitals in Michigan in 2007 and 2009 using the Healthcare Cost and Utilization Project State Inpatient Database, sponsored by the Agency for Healthcare Research and Quality (11). This claims database contained all data from inpatient discharge abstracts generated by hospitals to request payment for each discharge in 2007 and 2009. Data were translated into a uniform format to facilitate comparisons and protect patient identity. The claims data were generated by hospital coders who reviewed medical records to guide selection of diagnosis, procedure, and demographic codes to describe each hospitalization, in accordance with federal guidelines (12). Hospitals submitted Michigan discharge data first to the Michigan Health & Hospital Association, which decided which data elements could be released publicly through the Healthcare Cost and Utilization Project Central Distributor. Few data elements were missing in the released information (Figure 1). This study received approval from the Institutional Review Board for Human Subjects at the University of Michigan.

Study Population

Figure 1 depicts application of patient and hospital inclusion and exclusion criteria that were used to construct the analytic data set. Our study population included non-obstetric adult patients (aged ≥ 18 years) who had a hospital stay of 2 days or longer. We did analyses specific to Medicare patients and analyses for an all-payer population because the policy that had been initiated only for Medi-

care has expanded to other payers, including state Medicaid programs (13) and Blue Cross Blue Shield nationwide (14).

We excluded hospitals not affected by the Hospital-Acquired Conditions Initiative, such as long-term care, rehabilitation, and psychiatric facilities and critical access, Veterans Affairs, and children’s hospitals. When comparing hospital rates of non-CAUTIs and CAUTIs, we included only hospitals with data available in both 2007 and 2009 and with 200 or more discharges of adult patients. We identified safety net hospitals as those with a Medicaid caseload 1 or more SD above the state average (15–19).

CAUTI or Hospital-Acquired UTI Identification

Non-CAUTIs were identified by having at least 1 of 10 UTI diagnosis codes (Appendix Table 2, available at www.annals.org), without an additional catheter-association code (996.64). Catheter-associated UTIs were identified by the code for urinary catheter-associated inflammation or infection (996.64), with or without an additional UTI code, in accordance with the Medicare Hospital-Acquired Conditions Initiative policy.

The variable to identify a diagnosis as present on admission versus acquired in the hospital (Appendix Table 3, available at www.annals.org) was mandated nationally for discharges after 1 October 2007. Thus, we were able to identify non-CAUTIs and CAUTIs as hospital-acquired or present on admission in the postpolicy 2009 data set. Hospital-acquired non-CAUTIs and CAUTIs were identified in the 2009 data set with the present-on-admission indicator coded as N (not present on admission) or U (could not be determined because of insufficient documentation, which also results in nonpayment). To identify hospital-acquired CAUTIs, the catheter code 996.64 also had its associated present-on-admission indicator coded as N or U.

Assessing Hospital Rates of Non-CAUTIs and CAUTIs

We assessed and compared each hospital’s rates of non-CAUTIs and CAUTIs as secondary diagnoses in both 2007 and 2009 and as hospital-acquired or present-on-admission conditions in 2009. A hospital’s rates for non-CAUTIs and CAUTIs were calculated as the percentage of each hospital’s discharged adult patients with these diagnoses. We also analyzed (Appendix 2 and Appendix Table 4, available at www.annals.org) how many hospital-acquired CAUTIs were noted in the first 8 secondary diagnoses, as is the current standard for public reporting (6).

Assessing Effect of CAUTIs on Hospital Payment

Using the postpolicy 2009 data set, we assessed how often nonpayment for hospital-acquired CAUTIs affected the payment received by the hospital. This analysis was done by using the 3M MS Grouper Software (3M Health Information Systems, Wallingford, Connecticut), which applies the diagnosis-related group (DRG) that determines hospital payment for each hospitalization record by using an algorithm that incorporates diagnosis and procedure

codes and patient characteristics. First, we obtained the DRG assigned at baseline by using all of the secondary diagnoses in the 2009 data set, with minor modifications to ensure that the same DRG version was applied to all discharges in the year. Then, we modified hospital-acquired CAUTI cases (which could not increase payment) to be coded as present-on-admission CAUTI cases (which may lead to a higher-paying DRG) and then used the software to reassign the DRG. We identified hospitalizations where nonpayment for the hospital-acquired CAUTI affected payment by a change in DRG.

Statistical Analysis

Descriptive statistics and 95% CIs are reported. A paired *t* test was used to compare prepolicy (2007) with postpolicy (2009) hospital rates of non-CAUTIs and CAUTIs. Analyses were conducted in Stata/MP, version 11.2 (Stata Corp, College Station, Texas).

Role of Funding Source

This study was funded by the Blue Cross Blue Shield of Michigan Foundation. The funding source provided some recommendations on the study design but was not involved in the conduct, interpretation, or reporting of

the results or the decision to submit the manuscript for publication.

RESULTS

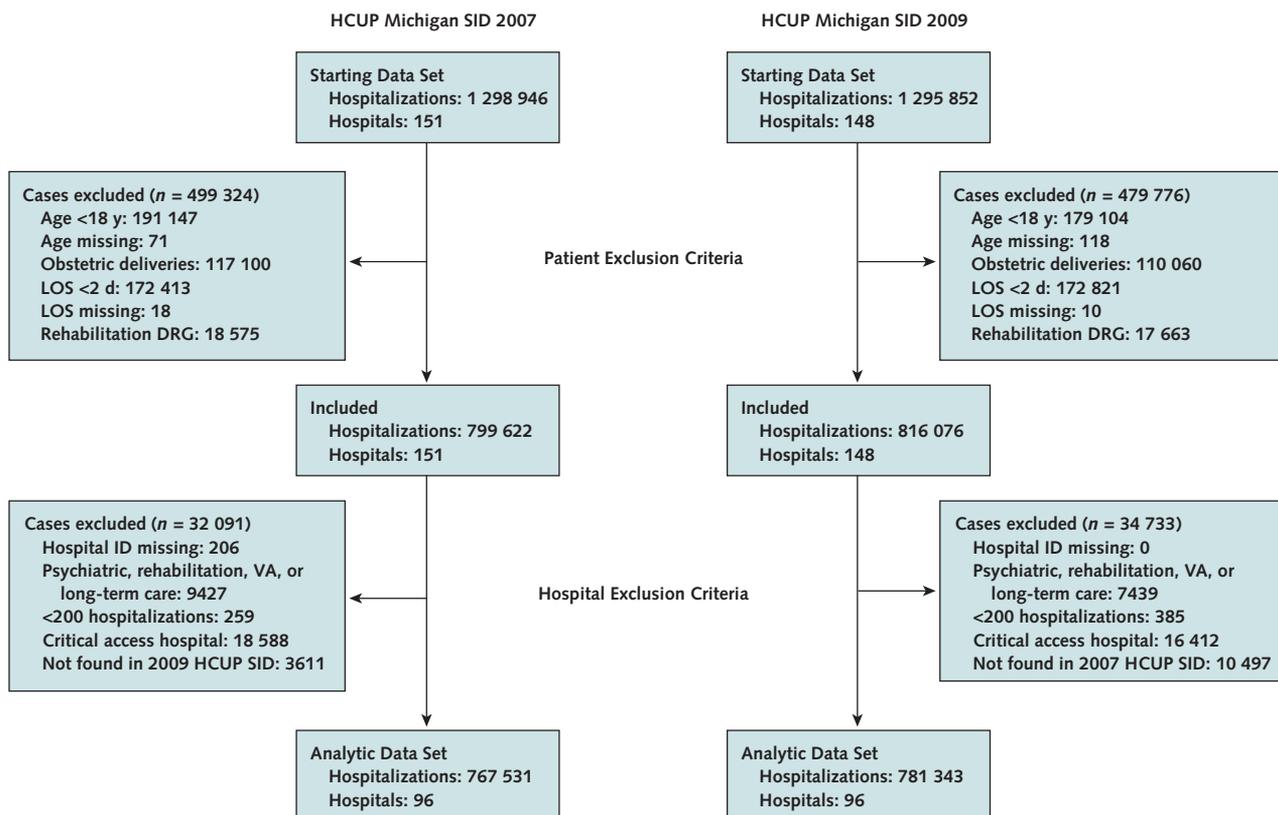
Cohort Characteristics

There were 767 531 discharges of adult patients at 96 Michigan hospitals in 2007 and 781 343 discharges in the same hospitals in 2009 (Figure 1). The Table compares hospital-level rates and characteristics for discharges with non-CAUTI and CAUTI diagnoses.

Hospital Rates of CAUTIs or Hospital-Acquired UTIs

All 96 hospitals requested payment for secondary-diagnosis non-CAUTIs. The rate for this diagnosis (that is, the proportion of the hospital's discharges of adult patients with the indicated diagnosis) ranged from 5.2% to 17.1% (mean, 10.0% [CI, 9.5% to 10.5%]) of each hospital's discharges in 2007 and 5.0% to 20.2% (mean, 10.3% [CI, 9.8% to 10.9%]) of the discharges in 2009. Hospital rates of secondary-diagnosis CAUTIs ranged from 0% to 1.10% (mean, 0.09% [CI, 0.06% to 0.12%]) of discharges in 2007 and 0% to 0.95% (mean, 0.14% [CI, 0.11% to 0.17%]) in 2009.

Figure 1. Study flow diagram.



DRG = diagnosis-related group; HCUP = Healthcare Cost and Utilization Project; LOS = length of stay; SID = State Inpatient Database; VA = Veterans Affairs.

Table. Hospital Discharge Characteristics Before and After HACI Implementation, by Diagnosis*

Characteristic	Volume, <i>n</i>	Rate of Diagnosis, %†	Length of Stay, <i>d</i>	Secondary Diagnoses per Discharge, <i>n</i>	Medicare Discharges, %
2007, before HACI implementation					
All discharges					
Mean (SD)	7995.1 (7706.1)	NA	5.3 (0.9)	8.6 (2.0)	58.8 (10.1)
Range	401.0–39 850.0	NA	3.4–7.5	3.7–16.2	11.8–74.3
Secondary diagnosis of non-CAUTI					
Mean (SD)	825.2 (836.5)	10.0 (2.6)	7.5 (2.3)	12.2 (2.9)	75.3 (11.9)
Range	25.0–4368.0	5.2–17.1	3.3–16.4	5.7–21.2	12.0–92.2
Secondary diagnosis of CAUTI					
Mean (SD)	8.4 (14.7)	0.09 (0.14)	9.9 (4.8)	15.5 (4.4)	79.6 (23.7)
Range	0–107.0	0–1.10	2.0–25.2	4.0–28.0	0–100.0
2009, after HACI implementation					
All discharges					
Mean (SD)	8139.0 (7940.7)	NA	5.1 (0.9)	9.8 (2.0)	59.5 (10.4)
Range	253.0–40385.0	NA	3.1–8.1	6.0–15.4	9.1–76.7
Secondary diagnosis of non-CAUTI					
Mean (SD)	864.5 (861.5)	10.3 (2.6)	7.0 (2.0)	13.6 (2.8)	74.5 (12.0)
Range	21.0–4375.0	5.0–20.2	3.6–12.6	8.5–20.3	0–91.5
POA non-CAUTI‡					
Mean (SD)	674.5 (666.0)	8.5 (3.1)	6.2 (1.3)	13.3 (2.7)	74.7 (12.1)
Range	0–3290.0	0–19.0	3.5–9.3	8.5–20.1	0–91.2
Hospital-acquired non-CAUTI‡					
Mean (SD)	140.8 (195.1)	1.3 (0.9)	11.7 (4.7)	15.6 (3.8)	72.5 (15.7)
Range	0–1095.0	0–4.2	3.3–26.8	8.7–24.8	0–100.0
Secondary diagnosis of CAUTI					
Mean (SD)	13.5 (21.9)	0.14 (0.15)	9.1 (4.2)	17.7 (4.6)	77.0 (23.5)
Range	0–151.0	0–0.95	2.5–21.8	8.0–27.3	0–100.0
POA CAUTI‡					
Mean (SD)	9.6 (14.7)	0.10 (0.13)	7.5 (2.9)	17.9 (4.4)	81.0 (24.2)
Range	0–82.0	0–0.88	2.0–18.0	8.0–29.0	0–100.0
Hospital-acquired CAUTI‡					
Mean (SD)	3.3 (9.8)	0.03 (0.05)	14.2 (10.4)	18.7 (6.0)	73.0 (31.9)
Range	0–92.0	0–0.34	2.0–68.5	4.0–29.0	0–100.0

CAUTI = catheter-associated urinary tract infection; HACI = Hospital-Acquired Conditions Initiative; NA = not applicable; POA = present-on-admission.

* Data are from the 2007 and 2009 Michigan Healthcare Cost and Utilization Project State Inpatient Database (11).

† Calculated as the proportion of each hospital's adult discharges with the indicated diagnosis.

‡ POA and hospital-acquired rates do not sum to total; the difference is the rate of cases coded with an invalid POA code.

Figure 2 illustrates how individual hospital rates of non-CAUTIs and CAUTIs compared for Michigan hospitals in 2009. Of note, 18 hospitals (19%) in 2007 and 8 (8%) in 2009 did not use the catheter-association code for any hospitalization record (including the principal diagnosis); these hospitals had similar proportions of discharges (8.6% in 2007 and 8.7% in 2009) with a secondary diagnosis of non-CAUTI. Fifty-seven percent of hospitals in 2007 and 48% in 2009 requested payment for 5 or fewer CAUTIs as secondary diagnoses.

Figure 2 also illustrates the changes for individual hospital rates of non-CAUTIs and CAUTIs, from 2007 (pre-policy) to 2009 (postpolicy). The average hospital difference in prepolicy and postpolicy non-CAUTI rates was 0.3% (CI, −0.01% to 0.7%). Hospital rates of CAUTI as a secondary diagnosis increased by only 0.05% on average (CI, 0.02% to 0.08%). Compared with 85 non-safety net hospitals (**Appendix Table 5**, available at www.annals.org), the 11 safety net hospitals had similar rates of non-CAUTIs and CAUTIs in 2009.

In 2009, most non-CAUTIs were described as present on admission (**Table**). The mean rate across hospitals for

present-on-admission non-CAUTI diagnosis was 8.5% (CI, 7.9% to 9.1%), whereas only 1.3% (CI, 1.1% to 1.5%) of discharges were described as hospital-acquired non-CAUTIs. Of note, hospitals did not provide a valid code to identify a UTI as present or not on admission for 0.5% of the diagnoses (CI, 0.1% to 0.9%).

Hospital-acquired CAUTIs were uncommon in claims data; the mean rate of hospital discharges with this diagnosis was 0.03% (CI, 0.02% to 0.04%). Forty-five hospitals (47%) coded 0 Medicare hospitalizations with a diagnosis of hospital-acquired CAUTI. Of all hospital-acquired UTIs, few (mean, 2.6% [CI, 1.6% to 3.6%]) were described as CAUTIs.

The **Appendix Figure** (available at www.annals.org) illustrates how the proportion of non-CAUTIs and CAUTIs identified as hospital-acquired or present on admission varied by each hospital. Focusing on hospital-acquired events only, **Figure 3** illustrates hospital rates of hospital-acquired non-CAUTIs and CAUTIs, in order of CAUTI rates. Hospital-acquired CAUTI rates in 2009 ranged from 0% of discharges in 39 (41%) hospitals to 0.34% of discharges, with 0%, 0.02%, and 0.04% of dis-

charges identifying the second, third, and fourth quartiles of hospital rates, respectively. Depending on the number of annual discharges, a single case of hospital-acquired CAUTI could move a hospital from the lowest (that is, best) quartile of infection rates to the second, third, or fourth quartile. Comparing the hospital-acquired rates for non-CAUTIs and CAUTIs of **Figure 3** illustrates that hospital rates of hospital-acquired non-CAUTIs have little correlation with rates of hospital-acquired CAUTIs.

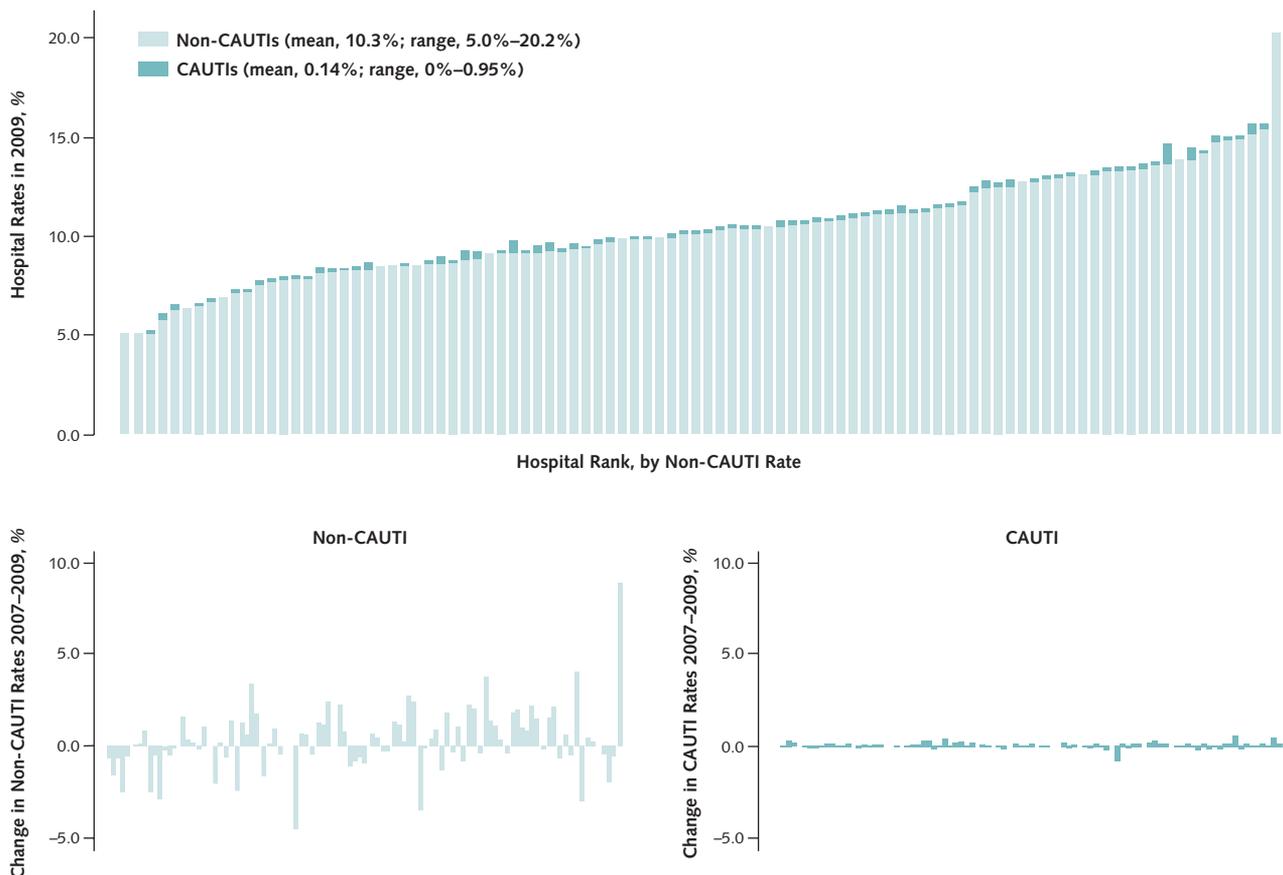
Effect of CAUTIs and UTIs on Hospital Payment

In 2009, 321 hospitalizations listed a CAUTI as hospital-acquired. Hospitals listed a mean of 18.7 secondary diagnoses for patients discharged with a hospital-acquired CAUTI (Table). Accounting for secondary diagnoses that generate higher payment, nonpayment for hospital-acquired CAUTI affected hospital payment (that is, reduced payment) for 25 of 781 343 (0.003%) hospitalizations. Twenty-two of these instances occurred in non-safety net hospitals (7.4% of 296 cases of hospital-acquired CAUTI) and 3 occurred in safety net hospitals (12.0% of 25 cases of hospital-acquired CAUTI).

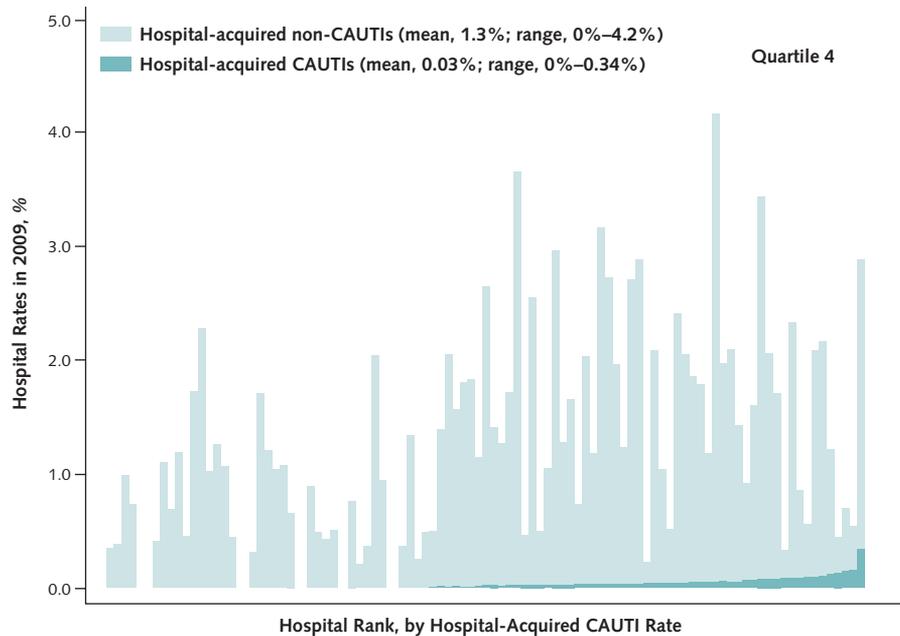
We estimated the dollar impact of nonpayment for these 25 hospitalizations with hospital-acquired CAUTI by using an average base Medicare payment of \$8700 that was in place at the University of Michigan in 2009. On the basis of these estimates, the hospital would have lost \$132 675 as a result of nonpayment of hospital-acquired CAUTI. This amount is 0.06% of annual payments (of the total \$215 000 000 paid by the Acute Inpatient Prospective Payment System). Because the base payment for the University of Michigan may be higher than most community hospitals, our estimates represent an upper limit of potential payment loss for hospital-acquired CAUTI events.

We also explored how often payment for any type of UTI as a secondary diagnosis affected hospital payment, given other patient comorbid conditions, by replacing all of the UTI diagnosis codes with a code that does not count as either a comorbid condition or a complication. In 2009, modification of the UTI secondary diagnosis codes to a nonpaying diagnosis code resulted in a lower-paying DRG for 7632 cases (9.1% of 84 290 UTIs and CAUTIs total

Figure 2. Rates of hospital-acquired non-CAUTIs and CAUTIs in 2009 and change in rates from 2007 to 2009.



A hospital's rate of diagnosis was calculated as the percentage of each hospital's discharges of adults with the indicated diagnosis. CAUTI = catheter-associated urinary tract infection.

Figure 3. Rates of hospital-acquired non-CAUTIs and CAUTIs in 2009.

A hospital's rate of diagnosis was calculated as the percentage of each hospital's discharges of adults with the indicated diagnosis. Thirty-nine hospitals reported 0 hospitalizations (all-payer) with hospital-acquired CAUTIs. CAUTI = catheter-associated urinary tract infection.

and 1% of all hospitalizations); 642 of these occurred in safety net hospitals (9.3% of 6937) and 6990 in non-safety net hospitals (9.0% of 77 353).

DISCUSSION

Hospital-acquired CAUTI was the first condition chosen for nonpayment because of its anticipated effect on large numbers of hospitalizations. Epidemiologic surveillance studies suggest that urinary tract sources are the most common of all nosocomial infections (20, 21), and medical record reviews demonstrate frequent urinary catheter use among Medicare patients (1). However, we showed that the current hospital discharge data set rarely identifies CAUTIs. The effect of a nonpayment policy based on these data is small. The accuracy of reporting from the data set is suspect. Moreover, we conclude that the current hospital discharge data set is not accurate or valid for comparing hospital-acquired CAUTI rates for the purpose of public reporting or imposing financial incentives or penalties.

Although diagnosis codes for UTIs are commonly listed as secondary diagnoses (approximately 10% of discharges), very few UTIs are identified in the claims data as CAUTIs by the addition of the 996.64 code. In contrast to epidemiologic studies reporting that most hospital-acquired UTIs are catheter-associated (22) (59% to 86% [8, 9, 23]), only 2.6% of all hospital-acquired UTIs were described in the claims data as catheter-associated. Rates of CAUTIs from claims data were also much lower than anticipated for Medicare patients who have high rates of uri-

nary catheter use during hospitalization (40%, according to the Medicare Patient Safety Monitoring System [1]). Catheter-associated UTIs are very common among catheterized patients. Studies show 3% to 10% risk for bacteriuria per day of catheterization (22, 24, 25) and that 9.9% of patients with indwelling catheters develop CAUTIs (8).

Medical record reviews and details of hospital coder instructions (12) help explain why so few UTIs are described as CAUTIs in administrative discharge claims data. Medical record reviews (4) have supported that a large proportion of UTIs (46%) are catheter-associated (including 35% of UTIs being hospital-acquired CAUTIs). Yet, urinary catheter use is often better documented in nursing notes, which, unlike physician notes, cannot be used by hospital coders to generate diagnoses for billing (12). For the hospital coder to identify the UTI as a CAUTI, it must be clearly identified as a CAUTI in the notes of a provider (for example, a physician, physician assistant, or nurse practitioner). If a hospital coder suspects that the UTI occurred after admission, the hospital coder must contact the provider for clarification of the status on admission if not clear from the provider's notes. Thus, it is not surprising that very few hospital-acquired CAUTI events are documented in the claims data used for triggering nonpayment and public reporting.

Another weakness of using claims data for public reporting is that billing coders are not trained or expected to collect and report diagnoses in the same manner as if they were generating a disease surveillance data set. They are

trained to code all diagnoses required for CMS reporting guidelines and are careful to report diagnoses that affect a patient's risk for mortality and severity of illness. Currently, there is no CMS reporting requirement for coders to list all hospital-acquired conditions in claims data. Because UTIs may not clearly affect a patient's mortality or severity of illness (particularly in comparison with other diagnoses), UTI diagnoses may not always be listed in claims data. Although several states have mandatory reporting requirements for certain hospital-acquired conditions, such as infections, this reporting is usually done in separate databases than the claims data set currently used for triggering nonpayment and public reporting.

The decrease in CAUTI events intended by the policy was not seen, comparing CAUTI events in Michigan from 2007 to 2009. In fact, a small but clinically insignificant increase in both non-CAUTIs and CAUTIs as secondary diagnoses occurred. Increases in non-CAUTI and CAUTI rates in the claims data set could be an unintended consequence of the nonpayment policy because hospitals have an incentive to document and describe all conditions that are present on admission to avoid potential nonpayment for this condition if described later in the hospitalization.

Financial impact for nonpayment of hospital-acquired CAUTI was limited. Even when we assessed a worst-case scenario of nonpayment for all UTI diagnoses, only 1% of all hospitalizations would have had reduced hospital payment. Although UTI is a common diagnosis, it is not a large target for financial savings by nonpayment because of the other comorbid conditions of patients with UTIs.

Our assessment of effect of nonpayment for hospital-acquired CAUTI is limited to analysis by claims data in Michigan in the first year after implementation of the Hospital-Acquired Conditions Initiative. We acknowledge that such policies can have important clinical effects not described in claims data, such as focusing hospitals' infection-prevention efforts on CAUTI prevention (26). Efforts to decrease inappropriate urinary catheter use can also decrease other non-infection-related risks, such as catheter-associated discomfort (27) and immobility risks (that is, thromboembolic disease and pressure ulcers [28]). It may also take more than 1 year to see an effect on CAUTI rates and coding practices about UTIs. To assess generalizability of CAUTI rates from Michigan claims data to other states (because of concerns that the Keystone CAUTI Bladder Bundle Initiative in Michigan could be responsible for low CAUTI rates in this state), we have studied the urinary catheter-association code use in claims data nationwide and found it to be similarly very low (4).

In conclusion, the financial impact of nonpayment for hospital-acquired CAUTI is low due to rare use of the catheter-association code and other comorbid conditions that generate similar payment. However, the most important finding of this study is that one of the most common nosocomial infections, hospital-acquired CAUTI, is only

rarely documented in the claims data set chosen for implementing nonpayment and public reporting of hospital-acquired conditions. In fact, using claims data for comparing hospitals has potential for unfair hospital penalty because hospitals with higher CAUTI rates in claims data may simply do a better job documenting catheter use and describing UTIs correctly as catheter-associated or hospital-acquired events in provider notes used by hospital coders to generate claims data. By 2015, rates of hospital-acquired events will be used to compare hospital performance nationwide to reduce payment for all Medicare hospitalizations for hospitals with risk-adjusted rates in the worst quartile of performance (29). Thus, the time has come to either improve the procedures for reporting hospital-acquired events in the claims data set to increase accuracy or abandon claims data for this purpose and change to data sets with more rigorous and standardized assessment about nosocomial events for comparing hospitals, such as surveillance data submitted to the National Healthcare Safety Network.

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Reproducible Research Statement: *Study protocol:* Available from Dr. Meddings (e-mail, meddings@umich.edu). *Data set:* Available by appli-

cation, purchase, and data use agreement from the Healthcare Cost and Utilization Project (www.hcup-us.ahrq.gov/databases.jsp). *Statistical code*: Not available.

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APPENDIX 1: HOW CODING HOSPITAL-ACQUIRED COMPLICATIONS AFFECTS HOSPITAL PAYMENT AND PUBLIC REPORTING

To illustrate how coding hospital-acquired complications affects hospital payment and public reporting (Hospital Compare), consider a patient hospitalized for pneumonia with comorbid heart failure who developed a hospital-acquired CAUTI during admission. In **Appendix Table 1**, we outline 5 potential ways this hospitalization could be described using diagnosis codes in the claims data used to obtain hospital payment and now also used to publicly report hospital rates of certain hospital-acquired conditions (such as hospital-acquired CAUTI) online by using Hospital Compare.

In scenario A, a diagnosis of pneumonia is listed, but no additional diagnoses are listed. The hospital receives payment for simple pneumonia and pleurisy without comorbid conditions or complications (DRG 195), and this record would not be recognized for having a case of hospital-acquired CAUTI for public reporting because neither the UTI code nor the catheter-association code was listed.

In scenarios B and C, the UTI code is listed as a secondary diagnosis without a catheter-association code. Regardless of whether the UTI is described as hospital-acquired (scenario B) or incorrectly as present on admission (scenario C), the UTI counts as a condition that leads to a higher-paying DRG (194: pneumo-

nia with comorbidity or complication), which yields more than \$2000 in additional hospital payment. There would also be no public reporting of a hospital-acquired condition from this hospitalization because the catheter-association code was not used.

In scenario D, because both the UTI and catheter-association codes are listed and described as hospital-acquired, the coding criteria have been met for describing a hospital-acquired CAUTI. Therefore, neither code counts toward a higher-paying DRG; thus, the hospital receives the same payment as though 0 secondary diagnoses were listed. Also, this record would be recognized as containing a hospital-acquired condition for public reporting.

Yet, in scenario E, in addition to listing both the hospital-acquired UTI and catheter-association codes, the hospital coder described the patient's comorbid heart failure with an additional secondary diagnosis code. Therefore, although the UTI and catheter-association codes were recognized as complications and did not count as payment-increasing comorbid conditions (and were recognized as complications for public reporting), the heart failure code counts toward the higher-paying DRG, yielding higher hospital payment.

APPENDIX 2: DO THE FIRST 8 SECONDARY DIAGNOSES CAPTURE MOST OF THE HOSPITAL-ACQUIRED CAUTI EVENTS?

Current public reporting of hospital-acquired CAUTI rates for U.S. hospitals on Hospital Compare uses data only from the first 8 secondary diagnoses that are submitted to the CMS for payment. This practice is anticipated to be expanded in 2012 (30) to include data from 25 secondary diagnoses. To assess the difference of using only the first 8 compared with all secondary diagnoses for identifying hospital-acquired CAUTI events, we compared hospital-acquired CAUTI events using the first 8 secondary diagnoses versus from all 29 secondary diagnoses for Michigan hospitalizations. Although hospital-acquired CAUTI events were rarely coded in either the first 8 or all 29 secondary diagnoses, the first 8 secondary diagnoses captured only 180 (56.1%) of all (321 total) hospital-acquired CAUTI events in Michigan in 2009 for an all-payer population and only 118 (54.9%) hospital-acquired CAUTI events for Medicare patients (**Appendix Table 4**).

30. Chan S, Halim S, Rapp M, Wrobel M. CMS's experience in publicly reporting hospital acquired conditions [Abstract]. Presented at AcademyHealth 2011 Annual Research Meeting, Seattle, 12–14 June 2011. Accessed at www.academyhealth.org/files/2011/sunday/chan.pdf on 10 July 2012.

Appendix Table 1. How Coding of Hospital-Acquired Complications Affects Hospital Payment and Public Reporting

Coding Scenario	Secondary Diagnosis ICD-9-CM Codes Listed in Discharge Claims Data*	Status of Diagnosis at Admission†	Hospital Payment‡	Would a Hospital-Acquired Complication Be Publicly Reported From This Record?
A	No secondary diagnoses listed	NA	\$6365	No
B	Urinary tract infection (599.0)	Hospital-acquired	\$8749	No
C	Urinary tract infection (599.0)	POA	\$8749	No
D	Urinary tract infection (599.0) Infection and inflammatory reaction due to indwelling urinary catheter (996.64)	Hospital-acquired Hospital-acquired	\$6365	Yes
E	Urinary tract infection (599.0) Infection and inflammatory reaction due to indwelling urinary catheter (996.64) Systolic heart failure (428.22)	Hospital-acquired Hospital-acquired POA	\$8749	Yes

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; NA = not applicable; POA = present-on-admission.

* In addition to principal diagnosis 481: pneumococcal pneumonia.

† As coded with POA indicator variable.

‡ Payments are calculated by assuming a base rate of \$8700, which is the base rate for admissions with a cost weight of 1.0 to the University of Michigan in 2009.

Appendix Table 2. ICD-9-CM Diagnosis Codes Used to Identify Urinary Tract Infections*

Code	Description
112.2	Candidiasis of other urogenital sites
590.10	Acute pyelonephritis, without lesion of renal medullary necrosis
590.11	Acute pyelonephritis, with lesion of renal medullary necrosis
590.2	Renal and perinephric abscess
590.3	Pyeloureteritis cystica
590.80	Pyelonephritis, unspecified
590.81	Pyelitis or pyelonephritis in diseases classified elsewhere
595.0	Acute cystitis
597.0	Urethral abscess
599.0	UTI, site not specified

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; UTI = urinary tract infection.

* The ICD-9-CM diagnosis codes listed are used for identification of UTIs for nonpayment in accordance with the Hospital-Acquired Conditions Initiative (1–3), when combined with the catheter-association code 996.64 and listed as not present on admission. Cases of catheter-associated UTI as the primary reason for admission were identified by having the catheter code (ICD-9-CM code 996.64) listed as the first diagnosis or having a UTI code listed as the first diagnosis and a catheter code listed among the secondary diagnoses. Cases of UTI as a secondary diagnosis (meaning that they were not the primary reason for admission) were identified with a secondary diagnosis UTI code without the catheter code. Secondary diagnosis catheter-associated UTIs were identified by the catheter code without a UTI ICD-9-CM code as principal diagnosis.

Appendix Table 3. Use of POA Indicator to Identify HACs*

POA Indicator Coding	Meaning of This Code	Payment Decision by CMS for Conditions Listed With This POA Status
Y	Diagnosis was present at time of inpatient admission.	CMS will pay the CC/MCC DRG for those selected HACs that are coded as Y for the POA indicator.
W	Clinically undetermined. Provider unable to clinically determine whether the condition was present at the time of inpatient admission.	CMS will pay the CC/MCC DRG for those selected HACs that are coded as W for the POA indicator.
N	Diagnosis was not present at time of inpatient admission.	CMS will not pay the CC/MCC DRG for those selected HACs that are coded as N for the POA indicator.
U	Documentation insufficient to determine whether the condition was present at the time of inpatient admission.	CMS will not pay the CC/MCC DRG for those selected HACs that are coded as U for the POA indicator.
1	This is listed for certain diagnoses for which hospitals are not required to list the POA status.	Exempt from POA reporting, does not alter Medicare payment.

CC = complication or comorbidity; CMS = Centers for Medicare & Medicaid Services; DRG = diagnosis-related group; HAC = hospital-acquired condition; MCC = major complication or comorbidity; POA = present-on-admission.

* Details about POA coding transitions and edits, such as how exempt coding was handled each year for Michigan, were accounted for during the analysis. Invalid coding for UTIs included missing, exempt, and any other coded value beyond the accepted valid codes of N, Y, W, or U.

Appendix Table 4. Do the First 8 Secondary Diagnoses Capture Most of the Hospital-Acquired CAUTI Events?

Michigan Hospitalizations in 2009 With a Hospital-Acquired CAUTI*	First 8 Secondary Diagnoses (Diagnoses 2–9)	All Secondary Diagnoses (Diagnoses 2–30)
All-payer hospitalizations, <i>n</i> (%)	180 (56.1)	321 (100.0)
Medicare hospitalizations, <i>n</i> (%)†	118 (54.9)	215 (100.0)

CAUTI = catheter-associated urinary tract infection.

* Data are from the 2009 Michigan Healthcare Cost and Utilization Project State Inpatient Database (11).

† Medicare is the primary or secondary payer.

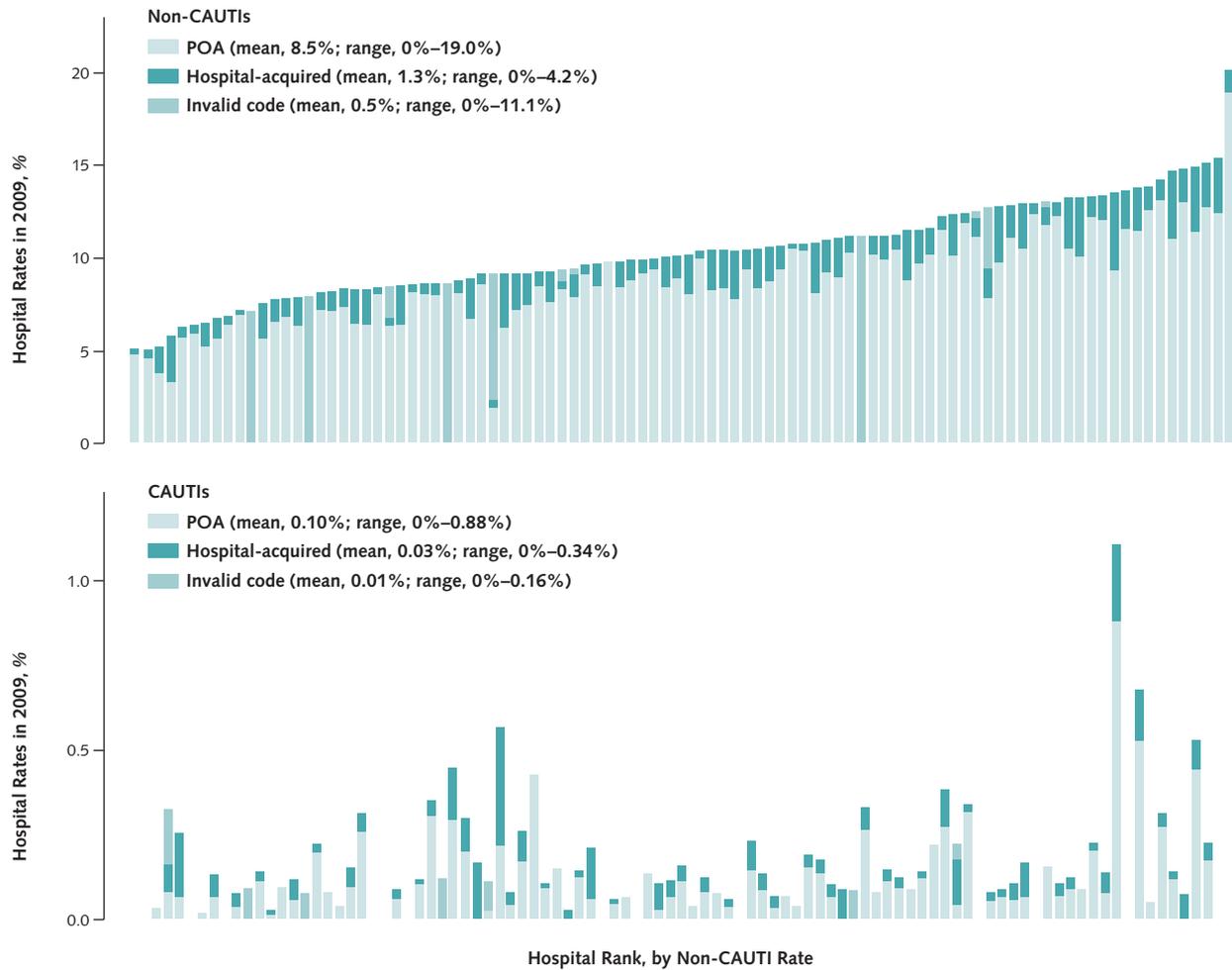
Appendix Table 5. 2009 Hospital Rates of UTI for Safety Net Hospitals Versus Non-Safety Net Hospitals, by Category*

UTI Category	Hospitals, <i>n</i> (%)	Hospitalizations, <i>n</i> (%)	UTI Cases, <i>n</i> (%)	Mean Hospitalization Rate, % (95% CI)
Safety net hospitals	11 (11.5)	68 182 (8.7)		
Non-CAUTIs			6848 (10.0)	9.4 (7.6–11.1)
CAUTIs			89 (0.10)	0.10 (0.03–0.17)
Hospital-acquired non-CAUTIs			878 (1.3)	0.9 (0.5–1.4)
Hospital-acquired CAUTIs			25 (0.04)	0.02 (0.001–0.05)
Non-safety net hospitals	85 (88.5)	713 161 (91.3)		
Non-CAUTIs			76 147 (10.7)	10.5 (9.9–11.0)
CAUTIs			1206 (0.2)	0.15 (0.11–0.18)
Hospital-acquired non-CAUTIs			12 643 (1.8)	1.4 (1.2–1.6)
Hospital-acquired CAUTIs			296 (0.04)	0.04 (0.03–0.05)

CAUTI = catheter-associated urinary tract infection; UTI = urinary tract infection.

* Data are from the 2009 Michigan Healthcare Cost and Utilization Project State Inpatient Database (11).

Appendix Figure. Rates of non-CAUTIs and CAUTIs as hospital-acquired and POA events in 2009.



A hospital's rate of diagnosis was calculated as the percentage of each hospital's discharges of adults with the indicated diagnosis. Four Michigan hospitals listed invalid POA codes for all diagnoses and all hospitalizations in the 2009 Healthcare Cost and Utilization Project State Inpatient Database. Because an invalid POA code generates an error, invalid codes would be corrected by hospitals before final submission to payers. CAUTI = catheter-associated urinary tract infection; POA = present-on-admission.

Variation in Public Reporting of Central Line–Associated Bloodstream Infections by State

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Abstract

Central line–associated bloodstream infections (CLABSIs) are common, costly, and largely preventable. Consumers who want high-quality care should have access to CLABSI rates to make health care decisions. The authors searched state health department Web sites for publicly available CLABSI data. Fourteen states, all with mandatory CLABSI monitoring laws, had publicly available data. The authors identified significant variation in the presentation of infection rates, methods of risk adjustment, locations and care settings reported, time span of data collection, and time lag to reporting. The wide variation in availability and content of information illustrates the need for standardized CLABSI monitoring and reporting mechanisms.

Keywords

central line–associated bloodstream infections, patient safety, public reporting, HAI legislation

Health care–associated infections (HAIs) impose a significant burden on the US health care system, accounting for 99 000 deaths and \$28 to \$45 billion dollars in direct costs to hospitals annually.^{1,2} Central line–associated bloodstream infections (CLABSIs) are a common, costly, and often lethal type of HAI, accounting for an estimated 31 000 HAI deaths each year.¹

Most of these deaths are preventable. In 2003, a multifaceted quality improvement program illustrated that adherence to simple and inexpensive evidence-based practices can significantly reduce the rate of CLABSIs in intensive care units (ICUs). Over an 18-month period, the mean CLABSI rate per 1000 central line days in more than 100 ICUs decreased from 7.7 to 1.4, and the median CLABSI rate per 1000 central line days decreased from 2.7 to zero.³

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topics related to quality and patient safety. She has received contractual support from England's National Patient Safety Agency and from the World Health Organization and is formally a Senior Advisor to the WHO Patient Safety Programme. She currently receives contractual funding from the US Agency for Healthcare Research and Quality to reduce infections in hospitals across the United States, to improve cardiac surgical care, and to participate in a systematic review of quality and patient safety literature. Any conflicts of interest were resolved during the peer-review process. None of the other authors disclosed any current or foreseeable financial or personal relationships that may cause a conflict relative to the content of this submission. The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Ms. Aswani is supported by a Lister Hill Health Policy Fellowship from the University of Alabama at Birmingham School of Public Health; there is no other support for this manuscript.

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Furthermore, teams sustained these reduced CLABSI rates an additional 18 months after the initial 18-month period.⁴ Others have achieved similar results in regional and pediatric settings.^{5,6}

The US House of Representatives Committee on Oversight and Government Reform, compelled by the possibility of reducing the costs of health care while improving quality, conducted a survey of state hospital associations to assess hospital activities to prevent HAIs.⁷ All 50 states reported efforts to reduce HAIs, and a large majority identified CLABSI reduction as a top priority.⁸ Yet consumers often lack information regarding CLABSI rates, and hospital-level public reporting of HAIs varies widely.⁹ CLABSIs are perhaps the best HAI candidate for public reporting because the Centers for Disease Control and Prevention (CDC) CLABSI definitions are well established, monitoring mechanisms exist through the National Healthcare Safety Network (NHSN), and inexpensive interventions can virtually eliminate these infections.¹⁰ Despite this, the quality, amount, and format of HAI and CLABSI information presented by states vary widely.

Without mechanisms to ensure that publicly reported quality measures are standardized and accurate, there is potential to misinform key stakeholders in health care.¹¹ In this article, we describe details regarding state efforts to publicly report CLABSIs and discuss the need for standardized data definitions, data collection methods, and data reporting requirements.

Methods

Data Collection

We limited the data analysis to CLABSIs because these measures are well defined and mature when compared with other HAIs.

The laws, administrative regulations, and state plans of 50 US states and 1 US territory (District of Columbia) were reviewed by one of the authors (JR) to determine if the state provides for CLABSI monitoring, whether the law is mandatory or voluntary, the data collection entity used for reporting HAI data, if public release of data is required, the public reporting mechanism, and scheduling for such public reporting.¹² JR conducted a search of relevant HAI keywords in the Lexis-Nexis legal research database to find state HAI-related statutory laws, found HAI regulations on state administrative regulation databases, and located state plans to address HAIs on the CDC Web site.¹³

We accessed Department of Health Web sites for published reports on HAIs and CLABSIs. If a report was not found by following indicators such as health care quality, data, and/or statistical reports, one of the authors (MA) conducted a page search for the following terms: *CLABSI*, *CLA-BSI*, *BSI*, *bloodstream infection*, *HAI*, *health care*

associated infection, *hospital acquired infection*, *nosocomial infection*, and *mandatory reporting*. We accessed all online data in June 2010.

Data Analysis

After locating each state's laws, HAI plans, and CLABSI or HAI report if available, we abstracted information relevant to 5 key areas: monitoring/reporting practices and public disclosure mechanisms, CLABSI rate data, risk adjustment, location/care setting, and report logistics. For each of these domains, we considered the following questions.

Monitoring and reporting practice. Do states require mandatory or voluntary CLABSI monitoring? If so, do they report to the NHSN or another data collection entity? States that do not report to NHSN may report to a state agency or state contracted entity responsible for administering the state's HAI program. What are the mandated public disclosure methods and release schedules of each state?

CLABSI rate. Did states present CLABSI infections as a rate per 1000 central line days so that inter- and intra-institution comparisons are possible? Does the state use standardized definitions developed by the CDC for NHSN?

Risk adjustment. What methods, if any, are used to risk adjust CLABSI rates? Reported CLABSI data can be risk adjusted by location. Two risk-adjustment methods are common. The first, standardized infection ratio (SIR), is the observed number of infections divided by the expected number of infections. The "expected" is based on historical NHSN CLABSI data.¹⁴ The second, device utilization ratio (DUR), is a proportion of device-days to patient-days.¹⁵ The denominator helps control for variation in the average length of stay by location.¹⁶ Studies have shown that device exposure varies by ICU type and correlates to an increased risk of HAIs.^{16,17}

Location/unit setting. In what locations or care settings are CLABSI monitored? Are CLABSI data collected throughout the entire facility or in specific areas? Do states report by unit type only, by hospital/nonunit, or by hospital-specific unit? Unit type only indicates that the state aggregated CLABSI data by similar unit types (eg, surgical ICU) across the state. Hospital/nonunit indicates that the report presents CLABSI information by hospital, but not broken down by specific unit settings within each hospital. Hospital-specific unit signifies unit types within each hospital that reported data.

At the unit level, states can summarize information by critical care, inpatient, and/or specialty care. Evidence about CLABSI rates by specialty provider type is limited, but the literature suggests that long-term acute care hospitals may harbor increased CLABSI risk.^{18,19}

Report logistics. We looked at the period of available data for each report, the time lag in reporting, and the total period of available data by state.

Table 1. CLABSI Reporting Methods

State	CLABSI Rate ^a	Standardized Infection Ratio ^b	Device Utilization Ratio ^c
Colorado	✓		
Connecticut	✓		✓
Delaware	✓		✓
Illinois		✓	
Maine	✓		
Massachusetts	✓	✓	✓
Missouri	✓		
New York	✓		
Oregon	✓		
Pennsylvania	✓	✓	✓
South Carolina		✓	
Tennessee	✓	✓	
Virginia	✓		
Washington	✓		
Summary	Yes = 86% No = 14%	Yes = 36% No = 64%	Yes = 29% No = 71%

Abbreviation: CLABSI, central line–associated bloodstream infection.

^aCLABSI rate: number of infections per 1000 central line days.

^bStandardized infection ratio: observed number of infections divided by expected number of infections.

^cDevice utilization ratio: device days to patient days.

Results

State laws mandate CLABSI monitoring in 28 (55%) of the 50 states and 1 US territory we surveyed. Three states (6%) have laws that codify a voluntary reporting process. As of June 2010, we found no laws related to CLABSI monitoring for the remaining 20 states (39%) (see Appendix).

Of the 28 states that mandate CLABSI monitoring, 24 (86%) require hospitals to submit data to NHSN by law. Three states (11%) require submission to a state agency, and 1 state, Montana (4%), requires reporting to a state entity. Per the statute, a state agency is responsible for administering the HAI program, whereas a state entity is a state-contracted system responsible for administering the HAI program. Public data reports are required in 26 (93%) of the 28 states with mandatory HAI laws, yet only 14 (50%) of the 28 states had public reports available online through their Department of Health Web sites.

Of the 3 states with voluntary legislation, 2 (67%) require hospitals to submit data to NHSN and 1 (33%) requires data submission to a state agency. Public data reports are required in 2 (67%) of the 3 states that have voluntary HAI laws.

The 15 states with publicly available CLABSI data (14 mandated states and 1 voluntary state) vary in how they report infection data. New Mexico, a state with voluntary monitoring legislation, posted a single state CLABSI

rate. We did not include it in the tables because it represents data from a small beta of their public reporting process. The following results reflect data from 14 states, all with mandatory CLABSI monitoring laws.

Twelve states (86%) publish infections as a rate per 1000 central line days. The 2 states (14%) that do not, Illinois and South Carolina, reported number of infections and central line days, but did not calculate a rate per 1000 central line days. Five states (36%) adjusted infection rates by SIRs, and 4 states (29%) risk adjusted through DURs (Table 1).

States also vary widely in how they report CLABSI data for public consumption. Seven states (50%) aggregated and reported CLABSI data by unit type only (eg, CLABSIs aggregated and reported as a single rate for all surgical ICUs across the state). Five states (36%) presented CLABSI rates by hospital without stratifying infections by unit settings within each hospital. Nine states (64%) stratified CLABSIs by hospital-specific units, delineating CLABSI rates for each ICU type within each hospital. Five states (36%), Massachusetts, Missouri, New York, Oregon, and Pennsylvania, presented data using 2 of these 3 approaches, such as unit type and hospital-specific unit type. Only 1 state (7%), Tennessee, presented data in all 3 formats (Table 2).

Reports typically organize unit-level CLABSI rates into 3 overarching categories: critical care, inpatient, and/or specialty care. The most common critical care unit types reported were medical (86%), medical/surgical (71%), and surgical (64%; Table 3). Three states (21%) reported CLABSIs by noncritical care inpatient and/or specialty care units (data not shown). Pennsylvania reported CLABSIs for 10 inpatient units and 1 specialty care unit. South Carolina pooled all inpatient units together except for inpatient rehabilitation and inpatient long-term care, and Washington reported infection data for inpatient long-term care.

Two states (14%), Colorado and South Carolina, reported CLABSI in long-term acute care hospitals. This is separate from CLABSI data reported by Pennsylvania and Washington for inpatient long-term care units.

We analyzed the total period of available data by state, using their most recent reports to gauge the length and time lag of data collection. The most common time frame represented by the reports was 1 year (10 states, 71%). The average time lag between collection and publication was 6 months, with a range of 2 to 11 months (Table 4).

Discussion

The increasing demand for value-based purchasing and pay for performance necessitate measuring and reporting data that are standardized, accurate, and accessible.^{11,20} CLABSI measures are among the most mature and, as such, could inform how health care monitors, publicly

Table 2. Summary of CLABSI Infection Data by Location

State	Unit Type Only ^a	Hospital/Nonunit ^b	Hospital-Specific Unit ^c	Long-Term Acute Care Hospital
Colorado			✓	✓
Connecticut	✓			
Delaware			✓	
Illinois			✓	
Maine		✓		
Massachusetts	✓		✓	
Missouri	✓		✓	
New York	✓		✓	
Oregon	✓	✓		
Pennsylvania	✓	✓		
South Carolina			✓	✓
Tennessee	✓	✓	✓	
Virginia		✓		
Washington			✓	
Summary	Yes = 50% No = 50%	Yes = 36% No = 64%	Yes = 64% No = 36%	Yes = 14% No = 86%

Abbreviation: CLABSI, central line-associated bloodstream infection.

^aUnit type: CLABSIs aggregated by unit type (eg, surgical intensive care unit) across state.

^bHospital/nonunit: CLABSIs tallied by hospital, but not units within each hospital.

^cHospital-specific units: CLABSIs tallied by unit types within each hospital.

Table 3. Summary of CLABSI Infection Data by Unit Setting: Critical Care Units^a

Critical Care Units	CO	CT	DE	IL	ME	MA	MO	NY	OR	PA	SC	TN	VA	WA	Total %
All adult ICUs pooled					✓								✓		14
Burn						✓				✓				✓	21
Coronary								✓				✓		✓	21
Medical cardiac	✓					✓									14
Medical major teaching															0
Medical all others	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	86
Medical/surgical major teaching						✓		✓				✓			21
Medical/surgical all others	✓	✓	✓	✓				✓	✓	✓	✓	✓		✓	71
Neurologic								✓							7
Neurosurgical						✓						✓		✓	21
Pediatric cardiothoracic						✓								✓	14
Pediatric medical		✓				✓		✓		✓	✓	✓			43
Pediatric medical/surgical			✓			✓					✓			✓	29
Surgical	✓			✓		✓	✓	✓	✓	✓	✓	✓			64
Surgical cardiothoracic	✓					✓		✓		✓		✓		✓	43
Trauma						✓				✓				✓	21

Abbreviations: CLABSI, central line-associated bloodstream infection; ICU, intensive care unit.

^aData collected during June 2010. Check signifies CLABSI data for critical care unit type were presented, by unit type only, hospital-specific unit type, or combined with other known unit types into an aggregate number (see Table 1). "All adult ICUs pooled" indicates no specific delineation of unit types in the summary rate. No check signifies CLABSI data not presented.

reports, and accounts for patient outcomes. This report characterizes the continuing efforts of states to monitor and report CLABSI data. While most states endorse reducing CLABSI as a priority,⁸ only 28 states (55%) mandate CLABSI monitoring, and only 14 (50%) of those 28 mandated states had CLABSI data publicly available on their

state health department Web sites during our June 2010 study.

The methods used to monitor and report infections varied widely among the states. We identified significant variation in the presentation of infection rates, methods of risk adjustment, locations and care settings reported, time span of data

Table 4. Length of Data Collection and Time to Publish

State	Last Report Date	Last Report Time Frame	Last Report Time Length	Time Lag to Public Report (Months)
Colorado	1/15/10	August 2008 to July 2009	Year	6.5
Connecticut	10/1/09	July 2008 to June 2009	Year	3
Delaware	6/1/10	January to March 2010	3 Months	2
Illinois	N/A	January to December 2009	Year	N/A
Maine	1/31/2010	January 2008 to June 2009	1.5 Years	7
Massachusetts	4/1/2010	July 2008 to June 2009	Year	9
Missouri	12/1/2009	April 2008 to March 2009	Year	8
New York	5/1/2009	January to December 2008	Year	4
Oregon	5/24/2010	January to December 2009	Year	4.75
Pennsylvania	12/1/2009	July to December 2008	6 Months	11
South Carolina	2/1/2010	December 2008 to November 2009	Year	2
Tennessee	12/1/2009	January to December 2008	Year	11
Virginia	12/4/2009	July to September 2009	3 Months	2.25
Washington	4/14/2010	January to December 2009	Year	4
Summary			Year and a half = 7% Year = 71% Half a year = 7% Quarter = 14%	Average = 5.73 months

collection, and time lag to reporting. As such, the available data present a confusing picture.

The lack of comparative data highlights the importance of standard approaches for the type, manner, and frequency of CLABSI measures reported. Unless all institutions provide the same quality and type of data, it is difficult for consumers, payers, or regulators to compare infections within or across states, potentially making inaccurate inferences about the quality of care.¹¹

In addition to state efforts, we recognize that there are a growing number of national efforts to publicly report CLABSIs. These are likely not first choice options for consumers who wish to compare hospital performance. Nevertheless, they complicate the picture of CLABSIs even further and intensify our concern. The Agency for Healthcare Research and Quality (AHRQ) included aggregate CLABSI data in the 2010 National Healthcare Quality Report.²¹ The AHRQ report used CLABSI rate as the metric of choice. The CDC released the first public CLABSI report in May 2010 based on NHSN data and a limited state cohort.¹⁴ The CDC report used the SIR as the metric of choice. The Commonwealth Fund posted hospital-specific CLABSI data in July 2010, as part of their Why Not the Best? Web series. The report includes data for 936 hospitals in 44 states. Each of these adds momentum to CLABSI efforts, but not necessarily clarity to our understanding of whether we actually reduce CLABSIs in US hospitals.

Our study highlights the need for the federal government to set the rules for how hospitals define, monitor, and report CLABSIs. A step toward this goal is the newly enacted CMS

rule that requires hospitals to report ICU CLABSI data, using NHSN definitions, as part of CMS Compare. By aligning payment policies to reward hospitals for reporting and reducing infections, and encouraging transparent public reporting of infections using valid data, the CMS efforts should provide valuable information to consumers and help the industry learn how to broadly improve outcomes.

Yet required use of the NHSN definitions and database and hospital payment tied to CMS Compare public reports are not sufficient to assure that hospitals prevent CLABSIs. Most important, there must be assurances that the data reported are valid. Although monitoring mechanisms through NHSN help streamline data entry and management, few mechanisms exist to ensure the accuracy of the data. Methods to mitigate bias coupled with an auditing system can help ensure that performance reports are accurate.¹¹

Limitations

This study has several limitations. First, we searched only state health department Web sites, thus data may be publicly available that we did not consider (eg, on individual hospital Web sites). We recognize that not all publicly available CLABSI data are present in this article; however, a component of consumer-friendly data is easy access. Nevertheless, 15 states have publicly available data, and by virtue of frequency and formatting, they convey cause for concern. Second, we conducted our review during a single month, and there is no way to know what Web updates might be

forthcoming. Third, we did not validate the accuracy of the Web reporting. Yet the intent of making CLABSI data publicly available is to make consumers use them when selecting a provider or assessing improvement efforts within a hospital; thus, we assumed the data are accurate. Finally, the data are time sensitive and may change by the time the results of this study are available. As the demand for quality health care increases, states are constantly implementing new legislation to meet the demands of consumers. Nevertheless, the amount of data should only increase; thus, new reports will be clearly discernable.

Conclusions

Although HAI in general and CLABSI in specific have received tremendous attention from Congress, the public, and the media, only 15 states (29%) report CLABSIs on their state health department Web sites. Among those that do report, the methods of data collection and reporting, public disclosure requirements, and schedules for reporting vary widely. This limits the value of the reports for consumers, payers, and regulators.

We applaud the new CMS rule regarding CLABSI data collection, submission, public reporting, and influence on hospital payment. The potential to eradicate a preventable harm is real through these standardized efforts. Yet these policy provisions do not go far enough. We encourage CMS to build a rigorous process to validate CLABSI data using clinical records.

There are few health care harms for which we have the knowledge and experience to accurately measure and nearly eliminate. Yet CLABSIs—although common, costly, and often lethal—are also largely preventable. Hundreds of hospitals in states across the United States and in countries around the world have nearly eliminated these infections. Consumers who want to choose high-quality care have the right to know whether their local providers have invested the time and effort to reduce these infections. Only when CLABSI data are uniformly collected, reported, clinically validated, and made transparent will such a choice be possible. CLABSI can provide a model for monitoring and reducing other types of preventable harm.

Appendix

Summary of HAI Legislation by State

States Collecting CLABSI Data Under the Authority of a State Law or Administrative Regulation	Is the State Law or Regulation Mandatory (M) or Voluntary (V)?	Data Collection Entity	Does the HAI Law Require the Public Release of Data?	What Is the Public Reporting Mechanism?	Date of First Required Public Reporting as Specified in the Law	Does the State Currently Have Publicly Released Data Available Online?
AL	M	NHSN	Yes	Annual report to be produced electronically or in hard copy	Not specified	No
AK ^a	V	State agency	No	None specified	Not specified	No
AR	V ^b	NHSN	Yes	Annual report submitted to legislature and published on state agency Web site	1/1/2010	No
CA	M	NHSN	Yes	Annual report provided to the governor, legislature, and posted on state agency Web site	1/1/2011	No
CO	M	NHSN	Yes	Annual report submitted to legislature and posted on state agency Web site. Semiannual information bulletins are also required.	1/15/2008	Yes
CT	M	NHSN	Yes	Annual report submitted to legislature, published on state agency Web site, and made available to the public	10/1/2008	Yes
DE	M	NHSN	Yes	Initial annual report to legislature and published on state agency Web site; quarterly updates thereafter	6/30/2009	Yes
IL	M	State agency	Yes	Annual report submitted to legislature and posted on state agency Web site	Not specified	Yes
ME	M	NHSN	Yes	Annual report published on state Web site and available on request	Not specified	Yes
MD	M	NHSN	Yes	Annual report with no further specification	10/1/1995 ^c	No
MA	M	NHSN	Yes	Publication on state Web site	Not specified	Yes
MN	M	State entity	Yes	Web-based system	1/1/2009 ^d	Yes

(continued)

Appendix (continued)

States Collecting CLABSI Data Under the Authority of a State Law or Administrative Regulation	Is the State Law or Regulation Mandatory (M) or Voluntary (V)?	Data Collection Entity	Does the HAI Law Require the Public Release of Data?	What Is the Public Reporting Mechanism?	Date of First Required Public Reporting as Specified in the Law	Does the State Currently Have Publicly Released Data Available Online?
MO	M	NHSN ^e	Yes	Publication of annual consumer guide made available to the public	Not specified	Yes
NV	M	NHSN	No	Not specified	Not specified ^f	No
NH	M	NHSN	Yes	State agency statewide database	Not specified	No
NJ	M	NHSN	Yes	State agency Web site publication; inclusion of data in state hospital performance report	Not specified	No
NM	V	NHSN	Yes	As determined by HAI advisory committee	07/01/2011	Yes
NY	M	NHSN	Yes	Statewide database and annual report submitted to governor, legislature, and posted on state agency Web site	May 1 of each year	Yes
OH	M	NHSN	Yes	Publication on state agency Web site	Not specified	No
OK	M	NHSN	Yes	Annual report	Not specified	No
OR	M	NHSN	Yes	Published rates biannually starting January 2010; quarterly beginning in January 2011; annual report also required	1/2010; thereafter April of each year	Yes
PA	M	NHSN	Yes	Annual report to legislature, posted on state agency Web site, and available for public inspection	5/1/2003 ^g	Yes
RI	M	State Agency ^h	Yes	Annual report to legislature and published on state agency Web site	Dec-2010	Yes
SC	M	NHSN	Yes	Annual report to legislature and published on state agency Web site	2/1/2009	Yes
TN	M	NHSN	Yes	Annual report published on state agency Web site; consumer database	6-8 months following submission of facility reports	Yes
TX	M	NHSN	Yes	Annual report published on state agency Web site and other publicly accessible formats	Not specified ⁱ	No
UT	M	State agency	No	None specified	Not specified	No
VT	M	NHSN	Yes	Publication of hospital submitted reports on state agency Web site	Not specified	Yes
VA	M	NHSN	Yes	Hospital submitted data may be released to the public on request	Not specified	Yes
WA	M	NHSN	Yes	Annual report on state agency Web site	12/1/2009	Yes
WV	M	NHSN	Yes	Annual report to legislature; other public availability as determined by HAI advisory committee	1/15/2011	No

Abbreviations: CLABSI, central line-associated bloodstream infection; HAI, health care-associated infection; NHSN, National Healthcare Safety Network.

^aCollection of data is authorized under a state reportable infectious disease administrative rule.

^bLaw requires mandatory CLABSI monitoring by facilities; however, submission of the collected data to the state agency is voluntary.

^cPublic reporting requirements made pre-HAI reporting requirements. CLABSI public reporting to begin in 2010.

^dCLABSI reporting began in November 2009.

^eFacilities also have the alternative option of reporting to the state agency.

^fData collection using NHSN is scheduled to begin June 1, 2010.

^gAlthough Pennsylvania's statute specifically states public reporting is to occur "no later than May 1, 2003," amendments to the law requiring CLABSI and other HAI reporting to NHSN were not enacted until 2007 with the passage of the Pennsylvania Healthcare-Associated Infection Act, also known as Act 52.

^hSome hospitals are reporting to NHSN; not expanded statewide because of funding issues.

ⁱCLABSI monitoring not scheduled to begin until January 1, 2011.

Declaration of Conflicting Interests

The authors declared a potential conflict of interest (eg, a financial relationship with the commercial organizations or products discussed in this article) as follows: Dr Reagan reports receiving funding as a consultant from the New Mexico Medical Review Association based on stimulus ARRA funding provided to the state of New Mexico. Dr Pronovost reports receiving grants or contract support from the Agency for Healthcare Research and Quality, the National Institutes of Health, the National Patient Safety Agency (UK), the Robert Wood Johnson Foundation, and The Commonwealth Fund for research related to measuring and improving patient safety; honoraria from various hospitals and health systems and the Leigh Speakers Bureau to speak on quality and safety; consultancy with the Association for Professionals in Infection Control and Epidemiology, Inc; and book royalties for authoring *Safe Patients, Smart Hospitals: How One Doctor's Checklist Can Help Us Change Health Care From the Inside Out*. Dr Goeschel receives honoraria from hospitals, health care affiliates, and government agencies to speak on topics related to quality and patient safety. She has received contractual support from England's National Patient Safety Agency and from the World Health Organization and is formally a Senior Advisor to the WHO Patient Safety Programme. She currently receives contractual funding from the US Agency for Healthcare Research and Quality to reduce infections in hospitals across the United States, to improve cardiac surgical care, and to participate in a systematic review of quality and patient safety literature. Any conflicts of interest were resolved during the peer-review process. None of the other authors disclosed any current or foreseeable financial or personal relationships that may cause a conflict relative to the content of this submission.

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Influenza Vaccination Coverage Among Health-Care Personnel — 2011–12 Influenza Season, United States

Influenza vaccination of health-care personnel (HCP) is recommended by the Advisory Committee on Immunization Practices (ACIP) (1). Vaccination of HCP can reduce morbidity and mortality from influenza and its potentially serious consequences among HCP, their family members, and their patients (1–3). To provide timely estimates of influenza vaccination coverage and related data among HCP for the 2011–12 influenza season, CDC conducted an Internet panel survey with 2,348 HCP during April 2–20, 2012. This report summarizes the results of that survey, which found that, overall, 66.9% of HCP reported having had an influenza vaccination for the 2011–12 season. By occupation, vaccination coverage was 85.6% among physicians, 77.9% among nurses, and 62.8% among all other HCP participating in the survey. Vaccination coverage was 76.9% among HCP working in hospitals, 67.7% among those in physician offices, and 52.4% among those in long-term care facilities (LTCFs). Among HCP working in hospitals that required influenza vaccination, coverage was 95.2%; among HCP in hospitals not requiring vaccination, coverage was 68.2%. Widespread implementation of comprehensive HCP influenza vaccination strategies is needed, particularly among those who are not physicians or nurses and who work in LTCFs, to increase HCP vaccination coverage and minimize the risk for medical-care-acquired influenza illnesses.

For the Internet panel survey, two source populations were recruited through e-mails and pop-up invitations. Clinical professionals (e.g., physicians, nurses, and other health professionals [dentists, nurse practitioners, and physician's assistants]) were recruited from the current membership roster of Medscape, a web portal managed by WebMD Professional Services. Other HCP such as assistants, aides, administrators, clerical support workers, janitors, food service workers, and housekeepers were recruited for a health survey from SurveySpot, a general population Internet panel operated by Survey Sampling International that provides its members with

online survey opportunities in exchange for nominal cash and rewards.* Among the 2,518 HCP who completed the screening questions and entered the two panel survey sites, 2,348 (93.2%) completed the survey.† Of those, 1,724 (73.4%) were clinical professionals, and 624 (26.6%) were other HCP.

Survey categories included demographics, occupation type, work setting, self-reported influenza vaccination, reasons for nonvaccination during the current influenza season, and employer vaccination policies. Based on their responses to the questionnaire, HCP from both Internet sources were divided into three groups for this analysis: physicians, nurses, and all other HCP with occupations listed on the screening questionnaire. Sampling weights were calculated based on each occupation type by age, sex, race/ethnicity, medical-care setting, and census region to be more representative of the U.S. population of HCP. Because opt-in Internet panel surveys are not random

* Additional information available at <http://www.surveysampling.com>.

† A survey response rate requires specification of the denominator at each stage of sampling. During recruitment of an online opt-in survey sample, such as the Internet panel used for this report, these numbers are not available; therefore, the response rate cannot be calculated. Instead, the survey completion rate is provided.

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samples, statistical measures such as computation of confidence intervals and tests of differences cannot be performed.[§]

By occupation, influenza vaccination was most common among physicians (85.6%), followed by nurses (77.9%), and other HCP (62.8%) (Table). Vaccination coverage was 76.9% among HCP working in hospitals, 67.7% among those in physician offices, and 52.4% among those in long-term care facilities (LTCFs). By occupation and work setting, influenza vaccination was most common among physicians who worked in hospitals (86.7%) and lowest among other HCP who worked in LTCFs (50.2%) (Table). Among HCP working in hospitals that required influenza vaccination, coverage was 95.2%; among HCP in hospitals not requiring vaccination, coverage was 68.2%.

Coverage among HCP aged ≥60 years (75.7%) was higher than coverage for other age groups. Among racial/ethnic groups, coverage did not differ more than 5 percentage points. Vaccination coverage was higher among HCP with vaccination available at no cost on multiple days at their worksite (78.4%), compared with those not offered vaccination at no cost (48.4%). Overall, 496 (21.1%) of participating HCP reported being required to be vaccinated by their employers. Influenza vaccination was more common among those who reported that their employers promoted influenza vaccination

(75.8%), compared with those whose employers did not promote influenza vaccination (55.8%) (Table).

Overall, 33.1% of HCP reported not receiving influenza vaccination. The three most common answers to a question asking for the main reason a participant did not get vaccinated for influenza were 1) a belief that they did not need it (28.1%), followed by 2) concern about vaccination effectiveness (26.4%) and 3) concern about side effects (25.1%).

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Editorial Note

The overall HCP influenza vaccination coverage estimate from this Internet panel survey for the 2011–12 season was 66.9%, compared with previous CDC Internet panel estimates, from

[§]Additional information available at http://www.aapor.org/opt_in_surveys_and_margin_of_error1.htm.

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TABLE. Percentage of health-care personnel (HCP)* who received Influenza vaccination, by selected characteristics — Internet panel surveys, United States, 2011–12 influenza season

Characteristic	Unweighted no. of participants in sample	% vaccinated [†]	Percentage point change from 2010–11 survey
Overall	2,348	66.9	3.4
Occupation by work setting			
Physician	418	85.6	1.4
Hospital	247	86.7	5.4
Physician office	311	86.2	0.0
Long-term care facility	— [§]	— [§]	— [§]
Other work setting [¶]	— [§]	— [§]	— [§]
Nurse	373	77.9	8.1
Hospital	252	78.1	2.7
Physician office	91	75.6	1.4
Long-term care facility	54	72.2	— [§]
Other work setting [¶]	— [§]	— [§]	— [§]
All other HCP**	1,557	62.8	1.8
Hospital	688	75.5	6.5
Physician office	345	62.1	7.5
Long-term care facility	375	50.2	-16.7
Other work setting [¶]	261	58.4	6.3
Work setting			
Hospital	1,187	76.9	5.8
Physician office	747	67.7	6.2
Long-term care facility	455	52.4	-12.0
Other work setting [¶]	277	61.5	9.1
Age group (yrs)			
18–29	228	63.9	7.5
30–44	690	68.8	11.0
45–59	962	63.8	-5.2
≥60	332	75.7	1.5
Race/Ethnicity			
White, non-Hispanic	1,427	66.4	-0.2
Black, non-Hispanic	344	65.5	4.4
Hispanic	334	70.3	12.7
Other or multiple race, non-Hispanic ^{††}	243	69.0	19.4
Vaccination available at no cost			
More than 1 day	1,355	78.4	3.6
1 day	297	67.7	15.6
None	682	48.4	6.7

two surveys with varying methods, of 63.5% for the 2010–11 season (4) and 63.4% for the 2009–10 season (5) (Figure 1). Earlier estimates of influenza vaccination coverage levels in HCP based on the National Health Interview Survey (NHIS) were 10% in 1989, 38% in 2002 (6), and 49% in 2008 (7). In the Internet panel surveys for the three most recent influenza seasons, vaccination coverage was highest among physicians and nurses and lowest among all other HCP. From the 2009–10 season to the 2011–12 season, coverage increased among physicians from 80.5% to 85.6%, and among nurses from 68.5% to 77.9%. Coverage among all other HCP was similar from 2009–10 through 2011–12 in the Internet panel surveys.

For certain categories, vaccination coverage among HCP differed from 2010–11 to 2011–12, according to the Internet

TABLE. (Continued) Percentage of health-care personnel (HCP)* who received Influenza vaccination, by selected characteristics — Internet panel surveys, United States, 2011–12 influenza season

Characteristic	Unweighted no. of participants in sample	% vaccinated [†]	Percentage point change from 2010–11 survey
Required by employer to be vaccinated			
Yes	496	93.7	-4.4
Hospital	362	95.2	-2.9
Non-hospital	134	91.3	-6.7
No	1,829	59.7	1.4
Hospital	818	68.2	4.7
Nonhospital	1,011	55.0	-0.4
Employer promotion ^{§§}	390	75.8	11.1
Hospital	253	75.3	13.4
Nonhospital	134	76.3	8.4
No requirement or promotion	1,450	55.8	-1.3
Hospital	561	65.9	1.7
Nonhospital	865	51.5	-1.6

Source: CDC. Influenza vaccination coverage among health-care personnel—United States, 2010–11 influenza season. *MMWR* 2011;60:1073–7.

* Persons who worked in a medical-care setting or whose work involved hands-on care of patients.

[†] Weighted estimate. Sampling weights were calculated based on each occupation type by age, sex, race/ethnicity, medical-care setting, and census region to be more representative of the U.S. population of HCP.

[§] Estimate suppressed because sample size was <30.

[¶] Included dental offices, pharmacies, nonhospital laboratories, medical-related schools, emergency medical technician sites, and home medical-care sites.

** Includes dentists, nurse practitioners or physician's assistants, allied health professionals, technicians or technologists, assistants or aides, administrative support staff members or managers, and nonclinical support staff members (e.g., food service workers, housekeeping staff members, maintenance staff members, janitors, and laundry workers).

^{††} American Indian, Alaska Native, Asian, and Native Hawaiian or other Pacific Islander.

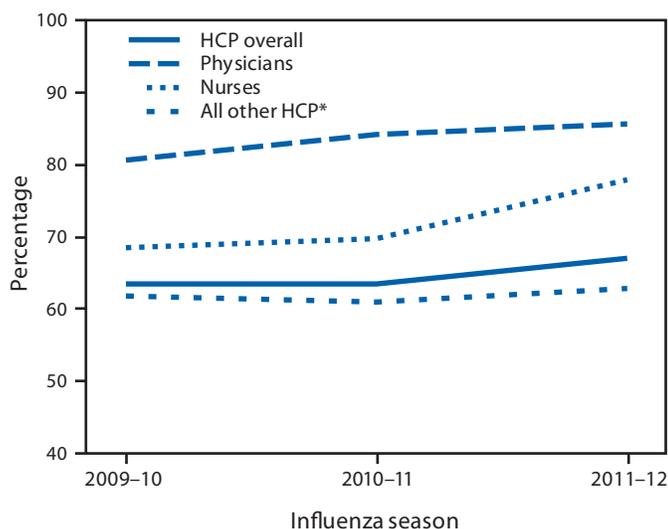
^{§§} Employer promoted influenza vaccination among employees through public recognition of vaccinated persons; financial incentives or rewards to persons; incentives or reminders/invitations, and special events.

panel surveys. Coverage in physician's office settings increased from 61.5% during the 2010–11 season to 67.7% during the 2011–12 season, and coverage in hospitals increased from 71.1% to 76.9% (4). Among LTCFs, influenza vaccination coverage was lower in 2011–12 (52.4%), compared with 2010–11 (64.4%). The 2011–12 coverage in work settings other than hospitals, physician's offices, and LTCFs was higher (61.5%) than in 2010–11 (52.4%) (4) (Figure 2).

For the 2011–12 influenza season, vaccination coverage among physicians (85.6%) neared the *Healthy People 2020* target of 90% (8). Among HCP work settings, hospitals were associated with the highest coverage, whereas coverage was lowest among HCP other than physicians and nurses working in LTCFs. Increased vaccination coverage was associated with employer vaccination requirements, employer promotion of HCP vaccination, and vaccination offered at no cost for multiple days.

These results indicate that targeted intervention and promotion programs developed for HCP groups other than physicians

FIGURE 1. Percentage of health-care personnel (HCP) who received influenza vaccination, by occupation — Internet panel surveys, United States, 2009–10, 2010–11, and 2011–12 influenza seasons

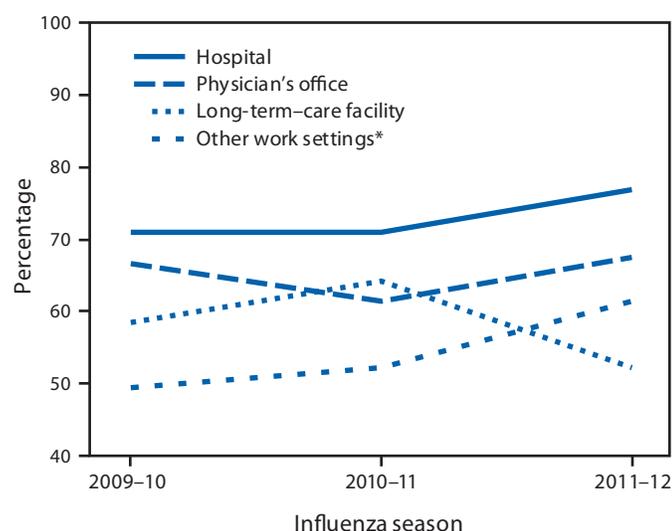


Sources: CDC. Interim results: influenza A (H1N1) 2009 monovalent and seasonal influenza vaccination coverage among health-care personnel—United States, August 2009–January 2010. *MMWR* 2010;59:357–62.

CDC. Influenza vaccination coverage among health-care personnel—United States, 2010–11 influenza season. *MMWR* 2011;60:1073–7.

* Includes dentists, nurse practitioners or physician's assistants, allied health professionals, technicians or technologists, assistants or aides, administrative support staff members or managers, and nonclinical support staff members (e.g., food service workers, housekeeping staff members, maintenance staff members, janitors, and laundry workers).

FIGURE 2. Percentage of health-care personnel (HCP) who received influenza vaccination, by work setting — Internet panel surveys, United States, 2009–10, 2010–11, and 2011–12 influenza seasons



Sources: CDC. Interim results: influenza A (H1N1) 2009 monovalent and seasonal influenza vaccination coverage among health-care personnel—United States, August 2009–January 2010. *MMWR* 2010;59:357–62.

CDC. Influenza vaccination coverage among health-care personnel—United States, 2010–11 influenza season. *MMWR* 2011;60:1073–7.

* Includes dental offices, pharmacies, nonhospital laboratories, medical-related schools, emergency medical technician sites, and home medical-care sites.

What is already known on this topic?

To help reduce influenza-related morbidity and mortality that occurs in medical-care settings, the Advisory Committee on Immunization Practices recommends annual influenza vaccination for all health-care personnel (HCP). Estimates of overall HCP vaccination coverage were 63.4% and 63.5% from Internet panel surveys, and 57.5% and 55.8% from the National Health Interview Survey for the 2009–10 and 2010–11 seasons, respectively.

What is added by this report?

For the 2011–12 season, overall influenza vaccination coverage among HCP was 66.9%. By occupation and work setting, coverage was highest among physicians (86.7%) and nurses (78.1%) who worked in hospitals and lowest (50.2%) among other HCP who worked in long-term care facilities (LTCFs).

What are the implications for public health practice?

A comprehensive intervention strategy that includes targeted education, promotion to encourage vaccination, easy access to vaccine at no cost on multiple days, and routine monitoring can increase HCP influenza vaccination coverage. Beginning in January 2013, the Centers for Medicare & Medicaid Services (CMS) will require acute care hospitals to report HCP influenza vaccination levels as part of the Hospital Inpatient Quality Reporting Program. Targeted intervention and promotion programs developed specifically for HCP who are not physicians or nurses, and particularly for those who work in LTCFs, might be important components in improving overall HCP vaccination coverage.

and nurses, and especially for those who work in LTCFs, might be important components in improving overall HCP vaccination coverage. Raising vaccination coverage of HCP working in LTCFs is especially important given that LTCF residents are at increased risk for serious influenza complications and that HCP vaccination might reduce the risk for death among LTCF residents (2,3). To increase vaccination coverage for HCP, each medical-care facility should develop a comprehensive intervention strategy that includes education and promotion to encourage vaccination and easy access to vaccine at no cost. Educational programs should include emphasis on vaccination effectiveness and its safety, knowledge of influenza transmission, and the benefits of HCP vaccination for staff, patients, and family.

The findings in this report are subject to at least five limitations. First, the sample was not selected randomly from the approximately 18 million HCP in the United States. The sample consisted of a much smaller group of several thousand volunteer HCP (a nonprobability sample) who had already enrolled in Medscape or SurveySpot. Second, all results are based on self-report and are not verified by employment or medical records. Third, the definition of HCP used in this Internet panel survey might vary from definitions used in other surveys of vaccination coverage. Fourth, occupation categories

could not always be separated because of small sample sizes and questionnaire design or other limitations. Finally, the 2011–12 estimates might not be directly comparable to those made for previous influenza seasons using Internet survey panels and NHIS, because different methods of recruitment were used each year. Compared with the population-based estimates of NHIS, influenza vaccination among HCP from the Internet panel surveys differed (63.4% versus 57.5%) for 2009–10 (5). A similar difference (63.5% versus 55.8%) was observed for 2010–11 (4) (CDC, unpublished data, 2012).

A comprehensive intervention strategy that includes targeted education, promotion to encourage vaccination, and easy access to vaccination at no cost on multiple days can increase HCP vaccination coverage (1). Targeting undervaccinated HCP groups and regularly monitoring vaccination coverage are activities needed to stimulate increases in HCP influenza vaccination. CDC's National Healthcare Safety Network (NHSN), a longitudinal surveillance system, has introduced a module for reporting HCP influenza vaccination at the hospital level, based on the HCP influenza vaccination measure endorsed by the National Quality Forum (9). Beginning in January 2013, the Centers for Medicare & Medicaid Services will require acute care hospitals that they reimburse to report HCP influenza vaccination levels as part of the Hospital Inpatient Quality Reporting Program.[‡] CDC will continue to use Internet panel surveys to monitor self-reported HCP vaccination coverage and reasons for nonvaccination across multiple occupation categories and work settings.

[‡]Additional information available at <http://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalrhqdapu.html>.

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Influenza Vaccination Coverage Among Pregnant Women — 2011–12 Influenza Season, United States

Pregnant women and their newborns are at elevated risk for influenza-associated hospitalization and death (1). The Advisory Committee on Immunization Practices (ACIP) and the American College of Obstetricians and Gynecologists (ACOG) have recommended influenza vaccination for all women who are or will be pregnant during the influenza season, regardless of trimester (1,2). To estimate influenza vaccination coverage among pregnant women for the 2011–12 influenza season, CDC analyzed data from an Internet panel survey (3) conducted April 3–17, 2012, among women pregnant at any time during the 4-month period October 2011–January 2012. Among 1,660 survey respondents, 47.0% reported they had received influenza vaccination; 9.9% were vaccinated before pregnancy, 36.5% during pregnancy, and <1.0% after pregnancy. Overall, 43.7% of women reported receipt of both a health-care provider recommendation and offer of influenza vaccination; these women had higher vaccination coverage (73.6%) than women who received only a recommendation but no offer of vaccination (47.9%) and women who received neither a recommendation nor an offer (11.1%). Continued efforts are needed to encourage providers of medical care to routinely recommend and offer influenza vaccination to women who are pregnant or who might become pregnant.

To provide timely end-of-season estimates of influenza vaccination coverage and information on knowledge, attitudes, and behaviors related to influenza vaccination among women pregnant during the 2011–12 influenza season, CDC conducted an Internet panel survey during April 3–17, 2012 that was similar to a survey conducted in April 2011 (3). Women aged 18–49 years who were pregnant at any time since August 2011 were recruited from a SurveySpot panel operated by Survey Sampling International.* Of 7,485 women who visited the Internet survey site during the study period, 2,223 were determined to be eligible for the survey based on the timing of their pregnancies; of those, 2,096 (94%) completed the online survey. Data were weighted to reflect the age group, racial/ethnic, and geographic distribution of the total U.S. population of pregnant women during 1995–2005.† The same questions used to determine pregnancy status in the April 2011 survey (3) were used in this survey. In addition,

women pregnant since August 2011 but no longer pregnant at the time of their response were asked to provide the start and end months of pregnancy. For this analysis, the study population was limited to 1,660 women reporting pregnancy any time during the usual peak influenza vaccination period of October 2011–January 2012.

Survey respondents were asked questions about their knowledge and attitudes regarding influenza and influenza vaccination; their vaccination status before, during, and after pregnancy; their physician's practices regarding influenza vaccination, place of vaccination, and reasons for not receiving influenza vaccination. Weighted analyses were conducted. Because opt-in Internet panels are not random samples, statistical measures such as compilation of confidence intervals and tests of differences cannot be performed.§

Of the 1,660 women pregnant at any time during October 2011–January 2012, 47.0% reported influenza vaccination since August 1, 2011: 9.9% were vaccinated before pregnancy; 36.5% during pregnancy; and 0.6% after pregnancy (Table 1). By trimester of pregnancy, the percentages vaccinated were similar (10.1%, 12.6%, and 11.8% during the 1st, 2nd, and 3rd trimester, respectively). Women aged 18–24 years had lower vaccination coverage (42.3%) than women aged 25–49 years (49.4%). Non-Hispanic black women had lower vaccination coverage (39.8%) than Hispanic women (48.8%), non-Hispanic white women (47.9%), and other non-Hispanic women (53.7%). Vaccination coverage estimates varied by U.S. Census regions from 43.9% in the south to 49.7% in the northeast (Table 1). Women with education beyond a college degree had higher coverage (61.3%) than those with a college degree (49.4%) or less than a college degree (42.8%). Women with private or military medical insurance had higher vaccination coverage (50.2%) than those without medical insurance (36.9%) (Table 1).

Of women in the April 2012 survey, 39.8% reported having received influenza vaccination for the 2010–11 influenza season. Among these women, vaccination coverage for the 2011–12 season was 86.5%, compared with 20.7% for those who did not receive vaccination for the 2010–11 season (Table 1).

Among women who received a health-care provider recommendation to be vaccinated, 81.6% were offered vaccination during a provider visit. Among women who received both a

*Additional information available at <http://www.surveysampling.com>.

†The sample of pregnant women was weighted to reflect the age group, racial/ethnic and geographic distribution of total pregnant women in the United States during 1995–2005. Source: CDC. Estimated pregnancy rates for the United States, 1990–2005: an update. *Nat Vital Stat Rep* 2009;58(4).

§Additional information available at http://www.aapor.org/opt_in_surveys_and_margin_of_error1.htm.

TABLE 1. Percentage vaccinated among women pregnant at any time during October 2011–January 2012, by selected characteristics — Internet panel surveys, United States, 2011–12 influenza season

Characteristic	Unweighted no. of participants	Unweighted %	Weighted %	Weighted % vaccinated	Percentage point change from 2010–11 survey*
Vaccinated	802	48.3	—	47.0	-2.0
Before pregnancy	165	9.9	—	9.9	-1.8
During pregnancy	625	37.7	—	36.5	4.3
1st trimester	172	10.4	—	10.1	—
2nd trimester	218	13.1	—	12.6	—
3rd trimester	200	12.1	—	11.8	—
After pregnancy	12	0.7	—	0.6	-4.5
Unvaccinated	858	51.7	—	53.0	
Age group (yrs)					
18–24	428	25.8	33.8	42.3	-1.3
25–49	1,232	74.2	66.2	49.4	-2.4
Race/Ethnicity					
Hispanic	234	14.1	23.5	48.8	-4.4
White, non-Hispanic	1,179	71.0	54.2	47.9	1.4
Black, non-Hispanic	132	8.0	17.2	39.8	-7.3
Other, non-Hispanic	115	6.9	5.2	53.7	-10.1
Census regions					
Region 1: Northeast	273	16.5	17.4	49.7	-4.5
Region 2: Midwest	420	25.4	21.2	48.5	-6.1
Region 3: South	591	35.7	35.2	43.9	-0.5
Region 4: West	373	22.5	26.2	48.1	0.9
Education					
Less than college degree	845	50.9	55.5	42.8	-0.6
College degree only	603	36.3	34.3	49.4	-5.5
More than college degree	186	12.8	10.2	61.3	-5.6
Married					
Yes	1,161	69.9	64.3	49.1	-4.5
No	499	30.1	35.7	43.1	0.8
Medical coverage					
Any public	555	33.4	37.4	44.0	-2.2
Private/Military only	1,000	60.2	55.9	50.2	-3.9
None reported	105	6.3	6.7	36.9	1.9
Working status†					
Working	816	49.2	47.5	47.9	-6.7
Not working	843	50.8	52.5	46.2	1.6
Income§					
<\$50,000	814	49.5	53.0	44.8	1.3
≥\$50,000	832	50.6	47.0	49.7	-4.5
High-risk condition¶					
Yes	602	36.3	37.4	52.4	-5.8
No	1,058	63.7	62.6	43.8	-1.9
Vaccinated for previous influenza season					
Yes	691	41.7	39.8	86.5	3.0
No	968	58.4	60.2	20.7	-0.2
Provider recommendation/Offer					
Recommended and offered	744	44.8	43.7	73.6	2.7
Recommended with no offer	181	10.9	9.9	47.9	15.1
No recommendation and no offer	413	24.9	26.4	11.1	2.6
Unknown status for recommendation and offer	243	14.6	15.0	30.9	1.8
Did not visit a provider since August 2011	79	4.8	5.0	50.5	5.7

* **Source:** CDC. Influenza vaccination coverage among pregnant women—United States, 2010–11 influenza season. MMWR 2011;60:1078–82.

† Those who were employed for wages and the self-employed were grouped as working. Those who were out of work, homemakers, students, retired, or unable to work were grouped as not working.

§ For those who only reported a range for income, the mid-point of the range was used for the actual household income.

¶ Conditions associated with increased risk for serious medical complications from influenza, including chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medicines taken for a chronic illness.

What is already known on this topic?

Pregnant women are at increased risk for influenza-associated complications and are recommended to receive inactivated influenza vaccination regardless of trimester. Vaccination coverage among pregnant women was estimated at 32% (National 2009 H1N1 Flu Survey) and 47% (Pregnancy Risk Assessment Monitoring System) for the 2009–10 season and 38% (Behavioral Risk Factor Surveillance System) and 49% (Internet panel survey) for the 2010–11 influenza season.

What is added by this report?

Approximately 47% of pregnant women in the Internet panel survey reported being vaccinated for influenza for the 2011–12 influenza season; 9.9% were vaccinated before pregnancy; 36.5% during pregnancy; and <1.0% after pregnancy. Women who received both health-care provider recommendations and offers to vaccinate had substantially higher vaccination coverage (73.6%) compared with other women (47.9% for those with recommendations but no offers, and 11.1% for those with neither).

What are the implications for public health practice?

Continued efforts are needed to encourage health-care providers to educate their patients about the safety and effectiveness of vaccination and continually recommend and offer influenza vaccination to their pregnant patients. To overcome their concerns and fears, messages to pregnant women should emphasize the safety and effectiveness of maternal influenza vaccination for both the mother and baby.

health-care provider recommendation and offer for influenza vaccination, 73.6% received influenza vaccination, which was substantially higher than for women whose health-care provider recommended but did not offer vaccination (47.9%) and for women who did not receive either a provider recommendation or offer (11.1%) (Table 1).

Among the 87.7% of women participants who indicated that they had visited a provider since August 2011, 62.9% received a provider recommendation for influenza vaccination (Table 2). Within each of the categories, the subgroups with lower percentages reporting receipt of a provider recommendation were non-Hispanic black (54.1%), having no medical insurance (46.4%), underweight before pregnancy (55.0%), not vaccinated for the previous season (48.6%), and visited a provider because of pregnancy five times or fewer (52.3%) (Table 2). The subgroups with a higher percentage receiving a provider recommendation were women with more than a college degree (71.9%), women who were vaccinated for the previous season (83.7%), and those with more than 10 pregnancy-related provider visits (76.0%) (Table 2).

Most women who received influenza vaccination received it at their obstetrician's or midwife's office (41.4%), at a non-obstetrician health-care provider's office (20.7%), or a hospital, clinic or health center (17.5%). Other locations for vaccination

included pharmacy/drug or grocery store (8.0%); health department (4.1%); and workplace, school, or others (8.3%).

Among unvaccinated women who received a health-care provider recommendation and offer of vaccination, when the main reason for nonvaccination was asked, the top three most common answers were 1) concern that the vaccination would cause influenza (25.6%); 2) concern about the safety risk to the baby (13.1%); and 3) not believing the vaccination was effective (12.5%) (Table 3). Among women reporting no provider offer for influenza vaccination, the same three answers for not being vaccinated were most frequently cited (Table 3).

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Editorial Note

In previous years, estimates of annual influenza vaccination levels among pregnant women were consistently lower than 30% through the 2007–08 season, according to data from the National Health Interview Survey (4) and Behavioral Risk Factor Surveillance System (BRFSS) (5). During the 2009–10 influenza A (H1N1) pdm09 season, estimates increased to 32% (National 2009 H1N1 Flu Survey) (6) and 47% (Pregnancy Risk Assessment Monitoring System) (5). During the 2010–11 influenza season, estimates were 38%, according to BRFSS data (5) and 49%, based on the previous Internet panel survey (3). The findings in this report indicate that the level of influenza vaccination among pregnant women achieved during the two preceding seasons (3) was sustained during the 2011–12 season.

Women who received a health-care provider recommendation for influenza vaccination continued to be more likely to be vaccinated (5,6); in addition, women who received both a provider recommendation and an offer for influenza vaccination were more likely to be vaccinated than women who only received a provider recommendation. In this study, 81.6% of women with a recommendation to be vaccinated were offered vaccination during a visit with their provider. Among women

TABLE 2. Percentage vaccinated among women pregnant at any time during October 2011–January 2012 who reported at least one visit to a health-care provider since August 2011, by health-care provider recommendation and offer status* and selected characteristics — Internet panel survey, United States, 2011–12 influenza season

Characteristic	Received health-care provider recommendation		% vaccinated					
	No.	%†	Recommended and offered		Recommended with no offer		No recommendation	
			No.	%†	No.	%†	No.	%†
Total	1,356	62.9	693	73.8	167	48.5	380	11.0
Age group (yrs)								
18–24	329	56.6	162	70.5	—§	—	107	6.1
25–49	1,027	65.9	531	75.2	138	52.1	273	14.0
Race/Ethnicity								
Hispanic	186	61.8	96	76.8	—	—	57	11.8
White, non-Hispanic	986	65.1	505	74.1	128	48.2	265	12.0
Black, non-Hispanic	94	54.1	44	66.3	—	—	36	8.1
Other, non-Hispanic	90	69.4	48	77.0	—	—	—	—
Education								
Less than college degree	654	61.0	329	71.7	74	40.1	197	7.8
College degree only	510	62.4	267	74.4	60	50.1	137	14.5
More than college degree	172	71.9	87	79.5	31	68.1	43	16.3
Married								
Yes	982	64.3	509	75.1	124	51.1	262	11.7
No	374	60.0	184	71.1	43	42.5	118	9.7
Medical coverage								
Any public	428	63.2	227	72.9	52	38.1	122	9.9
Private/Military only	858	64.2	440	75.1	108	56.2	230	12.1
None reported	70	46.4	—	—	—	—	—	—
Working status¶								
Working	735	63.0	335	75.8	93	52.6	191	12.4
Not working	721	62.7	358	72.0	74	43.2	189	9.7
Poverty status**								
Below poverty	264	59.9	130	74.2	32	22.5	74	7.3
At or above poverty	1,064	63.5	547	74.0	131	57.5	299	12.4
Pre-pregnancy weight††								
Underweight	76	55.0	36	66.6	—	—	—	—
Normal weight	734	61.5	365	73.4	98	41.7	198	9.8
Overweight	242	67.8	128	70.0	32	63.3	65	5.6
Obese	267	64.0	144	78.1	—	N/A	80	15.5
High-risk conditions§§								
Yes	492	67.6	273	76.8	55	52.9	125	11.6
No	864	60.0	420	71.6	112	46.1	255	10.7
Vaccinated for previous season								
Yes	581	83.7	410	94.7	70	89.5	71	51.2
No	774	48.6	283	45.7	97	20.8	309	2.4
No. of provider visits related to pregnancy								
≤5 visits	487	52.3	205	70.7	52	43.7	180	7.8
6–10 visits	530	64.4	272	72.9	74	48.8	137	13.4
>10 visits	288	76.0	182	79.0	35	49.5	53	18.5

* The women were asked two questions: “Since August 2011, during your visits to the doctor/medical professional, did your doctor or other health professional personally recommend that you get a flu vaccination?” and “Since August 2011, during your visits to the doctor/medical professional, did your doctor or other health professional offer the flu vaccination to you?” A total of 243 women with unknown response regarding provider recommendation and offer were excluded.

† Weighted percentage.

§ Sample size <30.

¶ Those who were employed for wages and the self-employed were grouped as working. Those who were out of work, homemakers, students, retired, or unable to work were grouped as not working.

** Below poverty was defined as a total family income of <\$22,811 for a family of four with two minors as of 2011, as categorized by the U.S. Census Bureau (<http://www.census.gov/hhes/www/poverty/data/threshld/index.html>). For those who only reported a range for income, the mid-point of the range was used for the actual household income.

†† Based on body mass index (weight [kg] / height [m]²). Underweight = <8.5; normal weight = 18.5–24.9; overweight = 25–29.9; obese = ≥30.0.

§§ Conditions associated with increased risk for serious medical complications from influenza, including chronic asthma, a lung condition other than asthma, a heart condition, diabetes, a kidney condition, a liver condition, obesity, or a weakened immune system caused by a chronic illness or by medicines taken for a chronic illness.

TABLE 3. Main reasons offered for not receiving influenza vaccination among nonvaccinated women pregnant at any time during October 2011–January 2012*, by health-care provider recommendation and offer status — Internet panel survey, United States, 2011–12 influenza season

Reason	Total		Recommendation and offer†		No offer†	
	No.	% [§]	No.	%	No.	%
Total	815	100	179	28	434	72
Concerned vaccination would give me the flu	145	20.0	43	25.6	70	18.3
Concerned about the safety risk to my baby	131	15.8	26	13.1	72	17.1
Don't think the vaccination is effective in preventing flu	93	10.7	21	12.5	53	11.2
Do not need the vaccination	66	8.4	12	7.8	36	8.8
The flu will not make me very sick/can get medication to treat	61	7.6	5	3.0	41	9.0
Concerned about the safety risks to myself	52	5.5	16	6.4	21	4.3
Afraid of needle/shots	38	5.4	13	10.6	14	3.3
Concerned about side effects	39	5.2	2	1.7	22	4.9
Don't trust it	43	4.6	11	5.6	25	4.9
Not covered by medical insurance/costs too much	35	4.3	7	2.5	19	5.4
Don't have time/don't know where to go/who to call	31	3.7	5	3.2	20	4.5
Allergic/contraindication	22	2.4	6	2.5	6	1.6
Other reason	59	6.4	12	5.5	35	6.7

* Main reason data were missing for 43 women.

† The women were asked two questions: "Since August 2011, during your visits to the doctor/medical professional, did your doctor or other health professional personally recommend that you get a flu vaccination?" and "Since August 2011, during your visits to the doctor/medical professional, did your doctor or other health professional offer the flu vaccination to you?" Data regarding provider recommendation and offer were missing for 202 women.

§ Weighted percentage.

in this group, vaccination coverage was 73.6%, nearly reaching the *Healthy People 2020* target of 80% for pregnant women, regardless of provider recommendations or offers.[¶]

Studies of health-care providers have suggested that they are more likely to discuss influenza vaccination with their patients when they understand the vaccination guidelines for pregnant women, are vaccinated themselves, or provide vaccination at their practice (7–8). However, providers also might be more likely to recommend influenza vaccination to women who appear to be in favor of influenza vaccination. A previous study found that providers' who did not recommend vaccination were more likely influenced by patient preference than the providers' continuing education (9).

Even among the 288 women in the sample with more than 10 pregnancy-related provider visits, about one fourth reported they did not receive a provider recommendation for influenza vaccination. Providers might have administrative and financial barriers to routine offering of influenza vaccination, such as working in a solo practice, concern about the up-front cost of ordering vaccines, high costs of storing and maintaining vaccine inventory, and other logistical challenges of vaccine administration (10). In this study, women without medical insurance of any type or with less frequent provider visits related to pregnancy were less likely to receive a provider recommendation. Health-care providers should use every opportunity to recommend and offer vaccination if appropriate, and women

[¶] Additional information available at <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=23>.

who are pregnant or who might become pregnant should ask about influenza vaccination at their provider visits, and if necessary, make a visit just for influenza vaccination.

Among unvaccinated women, 25.6% who received a provider offer and recommendation indicated that the main reason they chose not to receive an influenza vaccination was concern that the vaccination would give them influenza; another 13.1% said they were concerned about the safety risk to their baby. Tailored education messages on vaccination safety delivered through multiple means including social media and text messaging might help change negative attitudes and false beliefs about vaccination.

The findings in this report are subject to at least four limitations. First, the survey was self-administered and not validated by medical record review. Second, the results were weighted to the distribution of pregnant women in the U.S. population, but the study sample did not include women without Internet access. Therefore, it might not be a representative sample of pregnant women and findings might not be generalizable to all pregnant women in the United States. Third, estimates might be biased if the selection processes for entry into the Internet panel and a woman's decision to participate in this particular survey were related to receipt of vaccination. Comparing estimates, the Internet panel survey estimates for women pregnant at any time during October–January was 9 percentage points higher than the BRFSS estimate for women who were pregnant at interview during December–February for the 2010–11 influenza season (5) and 4 percentage points higher for the

2011–12 season (CDC, unpublished data, 2012). Additional comparisons with BRFSS and other available data sources over multiple seasons are needed to determine whether the more timely Internet panel survey estimates, despite sampling differences, provide valid assessments of trends. Finally, the results from these surveys might be subject to multiple sources of error, including but not limited to sampling error, coverage error, and measurement error.

Health-care provider recommendation and offer of influenza vaccination were associated with higher vaccination levels among pregnant women. Efforts to enhance provider practices are needed. Messages to pregnant women from providers should more strongly emphasize the safety and effectiveness of maternal influenza vaccination and the risk from influenza to mother and infants without maternal vaccination. Increasing knowledge among pregnant women regarding influenza risks and influenza vaccination safety might also increase opportunities for provider recommendations and offers to vaccinate.

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Influenza A (H3N2) Variant Virus-Related Hospitalizations — Ohio, 2012

Since July 2012, 305 cases of infection with influenza A (H3N2) variant (H3N2v) virus containing the influenza A (H1N1)pdm09 M gene have occurred in multiple U.S. states, primarily associated with swine exposure at agricultural fairs (1). In Ohio, from July 28 to September 25, 2012, a total of 106 confirmed H3N2v cases were identified through enhanced surveillance. Whereas most H3N2v patients experienced mild, self-limited influenza-like illness (ILI), 11 of the Ohio patients were hospitalized, representing 69% of all H3N2v hospitalizations in the United States. Of these hospitalized H3N2v patients, six were at increased risk for influenza complications because of age or underlying medical conditions, including the only H3N2v-associated fatality reported in the United States to date. This report summarizes the epidemiology and clinical features of the 11 hospitalized H3N2v patients in Ohio. These findings reinforce the recommendation for persons at high risk for influenza complications to avoid swine exposure at agricultural fairs this fall (2). In addition, persons not at high risk for influenza complications who wish to reduce their risk for infection with influenza viruses circulating among pigs also should avoid swine and swine barns at agricultural fairs this fall.

Case Finding

In Ohio, testing of upper respiratory specimens was encouraged for patients with ILI (fever $\geq 100^{\circ}\text{F}$ [$\geq 37.8^{\circ}\text{C}$] with cough or sore throat), and epidemiologic linkages to a confirmed H3N2v case or attendance at an event where confirmed cases were identified (Ohio Department of Health, Health Alert Network: H3N2v information and recommendations, August 2, 2012) (3). As part of the epidemiologic investigation, direct swine contact was defined as touching pigs; indirect swine contact was defined as visiting a swine barn at a fair without touching pigs. Respiratory specimens were confirmed as positive for H3N2v virus by testing at the Ohio Department of Health (ODH) laboratory using the CDC FLU real-time reverse transcription polymerase chain reaction (rRT-PCR) Dx Panel for influenza A (H3N2)v and at CDC by rRT-PCR and genetic sequencing (1). Information about hospitalized patients was collected using a standard CDC human infection with novel influenza A virus case report form, supplemented by review of medical records.

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Patient A. A woman aged 61 years with type 2 diabetes, congestive cardiomyopathy, hypertension, and a past history of B-cell lymphoma, experienced cough and sneezing on

August 10 (Table, patient 11). Beginning 6 days earlier, she spent 4 days at a county fair where she visited a swine barn and had direct swine contact. Over the next 2 weeks, she experienced cough and fever and was treated with antibiotics for a sinus infection. On August 25, she sought care at an emergency department with worsening symptoms. The patient was transferred to a tertiary care center with hemodynamic instability and respiratory distress, and required mechanical ventilation. Her condition deteriorated, and she died on August 26. Blood cultures obtained on August 25 yielded *Pseudomonas aeruginosa*, and a nasopharyngeal swab was positive for H3N2v virus by rRT-PCR at ODH. Genetic sequencing of H3N2v virus from a clinical specimen from this patient at CDC was nearly identical to sequencing from several nonfatal H3N2v cases in Ohio, and from H3N2pM* viruses identified among pigs at fairs in Ohio.

Patient B. On August 2, a girl aged 4 years with cough-variant asthma requiring daily inhaled corticosteroids developed fever, 6 days after attending a county fair where she had direct swine contact (Table, patient 6). No close contacts of the patient were ill. The fever resolved after a few days, but diarrhea and cough developed, and the doses of her asthma control medications were increased. On August 11, the diarrhea continued, fever of 101°F (38.3°C) developed, and she was evaluated at an emergency department. Examination revealed dehydration, bilateral otitis media, and normal respiratory function. Chest radiography displayed hyperinflation of the lungs. The girl was treated with intravenous fluids for dehydration and ceftriaxone for otitis media, admitted overnight for hydration, and discharged the following day on amoxicillin. Before discharge, a nasopharyngeal specimen was tested using a commercial respiratory virus PCR panel; results were positive for influenza A (H3) and parainfluenza type 3 viruses. Further testing of a nasopharyngeal specimen was positive for H3N2v virus at ODH and CDC.

Of the 11 hospitalized H3N2v patients, case report forms for seven and hospital records for nine were available. The median age of the patients was 6 years (range: <1 year–61 years), and eight were female (Table). Patients lived in eight counties and attended six fairs. Direct contact with swine prior to illness onset was reported by six patients (five children and one adult), and of these, one patient might have had direct contact with an ill pig. Indirect contact with swine during fair attendance was reported by four patients, including two children aged ≤ 2

* Infection of swine with H3N2 virus containing the influenza A(H1N1)pdm09 virus M gene is referred to as H3N2pM virus. Infection of humans with this virus is referred to as H3N2v virus.

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TABLE. Characteristics of hospitalized patients with confirmed H3N2v virus infection — Ohio, 2012

Patient no.	Age (yrs)	Date(s) of exposure	Date of onset	Type and description of swine exposure	Underlying medical problem	Admission dates and reason	Complications	Imaging or abnormal laboratory findings	Treatment	Day of illness antiviral treatment was started
1* [†]	<1	July 30–Aug 5	Aug 5	Indirect contact. Attended a county fair for 6 days while sibling showed pigs, but spent much of time in a stroller in the swine barn. Sibling's pigs normally boarded at family member's house.	None	Aug 7–8; dehydration, influenza A	Dehydration	None	Oseltamivir; IV fluids	2
2*	7	Unknown	Aug 4	Indirect contact. Visited a county fair sometime during the week preceding illness.	Acute lymphocytic leukemia	Aug 6–7; fever, observation	Dehydration	Chest radiograph: normal	Oseltamivir; ceftriaxone	2
3*	12	July 30–Aug 4	Aug 2	Direct contact. Attended county fair for 3 days, involved in transport of swine.	None	Aug 3–4; dehydration, influenza A, bronchitis	Dehydration	Chest radiograph: no infiltrates; serum bicarbonate: 18 mmol/L	Oseltamivir; IV fluids	2
4* [†]	1	July 28–Aug 4	Aug 5	Indirect contact. Attended state fair and county fair. Was in stroller in swine barn at state fair. Did not enter swine barn at county fair, but was in stroller and walked in sheep barn which housed several pigs. Was in barn with an ill pig that later died, but without direct swine contact.	None	Aug 7–8; croup	Croup	None	Oseltamivir; croup tent; methylprednisolone; IV fluids	3
5* [†]	6	Aug 5–11	Aug 12	Direct contact. Attended county fair for 6 days, stayed in camper on fairgrounds; reported petting pigs on Aug 6 and 7.	History of asthma	Aug 13–14; influenza-like illness	Nonpurulent bilateral conjunctivitis	Chest radiograph: no acute process Throat culture: group A beta <i>Streptococcus</i>	IV fluids	Not given
6* [†]	4	July 26	Aug 2	Direct contact. Attended a county fair for 1 day.	Asthma	Aug 12–13; dehydration	Asthma exacerbation; otitis media	Chest radiograph: hyperinflation, no consolidation or effusion PCR [§] : parainfluenza virus type 3	IV fluids; inhaled corticosteroids; albuterol; amoxicillin	Not given
7* [†]	5	Aug 3–11	Aug 10	Direct contact. Attended a county fair for 7 days. Siblings were showing swine, which normally stay with another family member. Also had contact with an ill pig, unclear whether this contact was direct or indirect.	None	Aug 11–13; fever with petechiae	Thrombocytopenia	No imaging Platelets: 113,000/mm ³	Ceftriaxone; oseltamivir [¶]	2
8*	5	Aug 4–5	Aug 9	Indirect contact. Visited county fair for 2 days, mother reported child was "playing near pigs."	Genetic syndrome; developmental delay; asthma	Aug 10–12; severe constipation; pneumonia	Pneumonia	Chest radiograph: bronchial airway disease CT pelvis: stool filling colon, large fecal mass in rectal vault	Ceftriaxone; IV fluids; oxygen by nasal cannula; polyethylene glycol electrolyte solution by nasogastric tube	Not given
9 [†]	6	Aug 10–12	Aug 14	Direct contact. Attended county fair for 2 days.	None	Aug 15–16; dehydration	Dehydration	None	Oseltamivir [¶]	3
10 [†]	6	Unknown	Aug 25	No contact. No attendance at fairs. Saw grandmother on Aug 23, who works with horses on a farm where pigs are also kept. Grandmother had no recent illness. No known illness in pigs.	None	Aug 25–28; urinary tract infection; failed outpatient therapy (Aug 25–28)	None	Unavailable	IV antibiotics**	Not given
11* [†]	61	Aug 4–9	Aug 10	Direct contact. Attended county fair for 4 days, spent time in swine barn, at arena, and stayed on fairgrounds in camper. Reported direct pig contact during fair.	Diabetes; cardiomyopathy; hypertension; history of lymphoma	Aug 25–26; atrial fibrillation; respiratory distress; hypoxia	Pneumonia; sepsis; death	Chest CT: bilateral infiltrates; blood culture: <i>Pseudomonas aeruginosa</i>	Supportive care in intensive care unit; IV antibiotics**	Not given

Abbreviations: IV = intravenous; PCR = polymerase chain reaction; CT = computed tomography.

* Data gathered from medical chart review.

[†] Data gathered using novel influenza A case report form.

[§] Commercial respiratory virus PCR panel.

[¶] Oseltamivir therapy discontinued after 1 day because of vomiting.

** Antibiotic unknown.

years who were in strollers in swine areas, and two children with serious underlying medical conditions. Of the four children who reported indirect exposure to swine, exposure was reported to be ≥ 2 days for three. One child did not attend a fair, but had contact with a person who was exposed to pigs.

Among the 11 hospitalized H3N2v patients, six were considered at high risk for complications from influenza, because of age < 5 years (three) or underlying medical conditions (two children, one adult). All 11 experienced fever, nine had cough, and seven had vomiting or diarrhea. One patient was admitted for an unrelated medical problem and tested for respiratory viruses because of prolonged fever and a new cough. Dehydration was the most common reason for admission. Two children were admitted for observation because of fever: one with acute lymphocytic leukemia and one with a petechial rash. Only one patient had received antiviral treatment before admission, four patients received oseltamivir treatment within 48 hours of illness onset, and six were treated with oseltamivir during hospitalization, but two were treated only for 1 day. Only one child required supplemental oxygen, and another was treated with humidified air. Patient A, who subsequently died, was the only patient requiring mechanical ventilation. Median length of hospital stay was 1 day (range: 1–3 days).

Reported by

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Editorial Note

Of the hospitalized H3N2v patients described in this report, 10 of 11 were children, and six of 11 were considered at high risk for influenza complications because they were aged < 5 years or had underlying medical conditions. All hospitalizations were brief and severe illness was observed only in the patient who died. Six patients reported direct contact with pigs at agricultural fairs. Among four patients with indirect swine exposure at fairs, three reported ≥ 2 days of fair attendance. One patient had no reported swine exposure. These findings support current recommendations that persons at high risk for influenza complications, including children aged < 5 years and persons with chronic underlying medical conditions that confer high

What is already known on this topic?

Beginning in the summer of 2012, CDC reported increases in numbers of cases of human infections with influenza A (H3N2) variant (H3N2v) viruses associated with swine exposure at agricultural fairs. Nationwide, 305 cases, 16 hospitalizations, and one death across 10 states have been reported since July 2012.

What is added by this report?

Of 16 patients hospitalized with confirmed H3N2v virus infection, 11 were Ohio residents, including the only H3N2v-associated fatality to date. All but one of the Ohio patients were children, and six were considered high-risk for complications of influenza because they were aged < 5 years or had underlying medical conditions; four high-risk persons became ill after indirect contact with pigs. These findings support current CDC recommendations that persons at high risk for complications of influenza should avoid exposure to swine at agricultural fairs this fall.

What are the implications for public health practice?

County and state fairs in the United States continue to occur through the month of October, highlighting the potential for continued cases of H3N2v virus infection. Persons at high risk for complications of influenza should avoid exposure to swine at agricultural fairs. Patients with suspected influenza, including H3N2v, who are hospitalized or at increased risk for influenza complications, should receive antiviral treatment with oral oseltamivir or inhaled zanamivir as soon as possible. Antiviral treatment also is encouraged for outpatients with suspected H3N2v who are not at increased risk for influenza complications.

risk for severe complications from influenza, should avoid the swine barn and pens when attending agricultural fairs. (2).

Clinicians should be aware that rapid influenza diagnostic tests might not detect H3N2v virus (4). Specific H3N2v virus testing is available only at state public health laboratories and CDC. In two instances, rRT-PCR testing for H3N2v was positive after ≥ 10 days of illness in patients who were not immunosuppressed and did not receive antiviral treatment. Both patients had documented infection with other pathogens (*P. aeruginosa* in patient A and parainfluenza virus type 3 in patient B). Although *P. aeruginosa* bacteremia undoubtedly contributed to patient A's death, the role of parainfluenza virus infection in patient B's illness is unknown.

Of the six patients at high risk for influenza complications, two received antiviral treatment within 2 days after illness onset, while five of 11 patients were not treated at any time during their hospitalization. Clinicians should be aware that starting empiric antiviral treatment for 5 days with oral oseltamivir or inhaled zanamivir as soon as possible after onset of symptoms is recommended for any hospitalized patient with suspected influenza, including H3N2v, without waiting for

testing results (2,5). Beginning antiviral treatment as soon as possible also is recommended for outpatients with suspected influenza who are at high risk for influenza complications (2,5). Five H3N2v patients reported here were not in a high risk group, highlighting the fact that H3N2v virus infection can cause illness resulting in hospitalization, even in otherwise healthy persons. The current interim recommendations from CDC also encourage early antiviral treatment of non-high-risk outpatients with suspected H3N2v virus infection (2).

Public health professionals should be aware of the possibility of continued outbreaks of H3N2v virus related to agricultural fairs where swine are present. Pigs with influenza virus infection might be present at agricultural fairs, and swine might be asymptotically infected with H3N2 or other influenza A viruses (6,7). Limited serologic studies indicate that children aged <10 years lack cross-protective antibodies to H3N2v virus (8). Persons, especially young children, might be infected with influenza viruses through direct or indirect swine exposure (9). Recommendations for preventing swine-to-human transmission of influenza viruses among the general population include staying away from pigs that appear ill (e.g., are coughing or sneezing, off feed, or lethargic) and washing hands with soap and water after contact with swine. Persons at high risk for influenza complications because of age (<5 years or ≥65 years) or underlying medical conditions should avoid swine and swine barns at agricultural fairs this fall. Persons not at high risk for influenza complications who wish to reduce their risk for infection with influenza viruses circulating among pigs also should avoid swine and swine barns at fairs this fall. Continued close communication and collaboration between human and animal health agencies for ongoing surveillance and investigation of influenza viruses among pigs and humans is needed to help guide and potentially expand measures to reduce the public health risk of H3N2v and related viruses.

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Postvaccination Serologic Testing Results for Infants Aged ≤24 Months Exposed to Hepatitis B Virus at Birth — United States, 2008–2011

An estimated 25,000 infants are born to hepatitis B surface antigen (HBsAg)-positive women annually in the United States (1). With no intervention, 40%–90% of these infants will acquire hepatitis B virus (HBV) infection (2,3). Approximately 90% of infected infants develop chronic HBV infection, with a 15%–25% risk for premature death from cirrhosis or cancer of the liver (4). To prevent perinatal HBV transmission, the Advisory Committee on Immunization Practices (ACIP) recommends that infants born to HBsAg-positive women receive postexposure prophylaxis with hepatitis B vaccine (HepB) and hepatitis B immune globulin (HBIG) within 12 hours of birth, and complete the 3-dose HepB series. To determine infant outcomes after postexposure prophylaxis, ACIP recommends postvaccination serologic testing (PVST) at age 9–18 months (4). To evaluate the implementation of these recommendations, CDC assessed outcomes at age 24 months (through 2011) among infants born to HBsAg-positive women enrolled during 2008–2009 in Enhanced Perinatal Hepatitis B Case Management Projects (EPHBP). Of 4,214 EPHBP-managed infants who completed ≥3 HepB doses, 63.7% had reported PVST results, 13.3% had reported PVST results but infant age was unknown, and 23.0% had no reported PVST results. Of 2,683 infants with PVST results by age 24 months, 93.3% were protected, 1.2% were infected, 3.2% remained susceptible, and 2.3% had indeterminate results. ACIP-recommended post-exposure prophylaxis was highly effective among infants who completed vaccination and received PVST. PVST is critical for guiding medical management of infants born to HBsAg-positive women, identifying infants with HBV infection and in need of further care, and monitoring progress toward the elimination of perinatal HBV transmission.

In 2007, CDC funded EPHBP to characterize HBsAg-positive pregnant women and assess outcomes among their infants. Five project sites, in Florida, Michigan, Minnesota, New York City, and Texas (excluding cities of Houston and San Antonio), collected and reported data to CDC. Data of women enrolled in EPHBP during 2008–2009 were reviewed; maternal characteristics from the first pregnancy on record were used. Records of all infants born to these women were reviewed to age 24 months; PVST records were examined for infants who completed ≥3 HepB doses (with and without HBIG). Of infants with reported PVST results and date, HBV serology status was categorized as “protected” (anti-HBs-positive, HBsAg-negative), “HBV-infected” (anti-HBs-negative, HBsAg-positive; anti-HBs-positive, HBsAg-positive;

or anti-HBs unreported, HBsAg-positive), “susceptible” (anti-HBs-negative, HBsAg-negative), or “indeterminate” (all other result combinations). A protective anti-HBs result was defined as ≥10 mIU/mL. Records of susceptible infants were reviewed for revaccination and repeat PVST. Bivariate analysis of mother/infant pairs was used to examine associations between maternal characteristics (age, race/ethnicity, place of birth, primary language) and infant outcomes (≥3 HepB doses, PVST receipt); significant variables were evaluated further in a multivariable logistic regression model.

EPHBP managed 5,075 infants born to 4,938 HBsAg-positive women in 2008–2009. Most of the women were aged 20–39 years, self-identified as Asian/Pacific Islander (API) or non-Hispanic black, were foreign-born, and almost half indicated a primary language other than English (Table 1). Maternal characteristics were not significantly associated with infant receipt of ≥3 HepB doses. Infants born to women who were Hispanic (odds ratio [OR] = 0.43; 95% confidence interval [CI] = 0.31–0.61), U.S.-born (OR = 0.60; CI = 0.47–0.75), or whose primary language was English (OR = 0.66; CI = 0.56–0.78) were significantly less likely to receive PVST compared to infants born to women who were non-Hispanic, foreign-born, and whose primary language was non-English, respectively. Infants born to API women (OR = 1.50; CI = 1.29–1.74) were significantly more likely to receive PVST compared to infants born to non-API women. After controlling for maternal place of birth (U.S.-born versus foreign-born) and primary language (English versus non-English), infants born to API women were slightly more likely to receive PVST than infants of non-API women (OR = 1.09, $p < 0.001$).

By age 24 months, 4,214 EPHBP-managed infants received ≥3 HepB doses (Table 2). Although 3,244 (77.0%) of these infants received PVST, 412 (9.8%) received incomplete PVST, either anti-HBs only (41) or HBsAg only (371). Among the 4,214 EPHBP-managed infants, 2,073 (49.1%) were tested at age 9–18 months; 259 (6.2%) were tested before age 9 months and 351 (8.4%) were tested after age 18 months. Age at testing was unknown (not reported) for 561 (13.3%) infants. Most (355) incomplete results were from one site where infants were tested only for HBsAg and test dates were not reported (Table 3).

Of the 2,683 infants with reported PVST dates and results, 114 remained susceptible after initial vaccination and PVST. Of these infants, 29 received three additional HepB doses and

TABLE 1. Characteristics of hepatitis B surface antigen-positive pregnant women (N = 4,938) — Enhanced Perinatal Case Management Project, Florida, Michigan, Minnesota, New York City, and Texas, 2008–2011

Characteristic	No.	(%)
Age		
≤19 yrs	146	(3.0)
20–29 yrs	2,464	(49.9)
30–39 yrs	2,153	(43.6)
≥40 yrs	175	(3.5)
Race/Ethnicity		
Asian/Pacific Islander	2,961	(60.0)
Black, non-Hispanic	1,195	(24.2)
White, non-Hispanic	367	(7.4)
Hispanic	168	(3.4)
Other*	53	(1.1)
Not reported	194	(3.9)
Place of birth		
U.S.-born	453	(9.2)
Foreign-born	3,855	(78.1)
Not reported	630	(12.7)
Primary language		
English	1,539	(31.2)
Non-English	2,280	(46.2)
Not reported	1,119	(22.6)

* Defined as Alaska Native/Native American or multiracial.

TABLE 2. Vaccination status of infants born to HBsAg-positive pregnant women, at age 24 months (N = 5,075) — Enhanced Perinatal Case Management Project, Florida, Michigan, Minnesota, New York City, and Texas, 2008–2011

Vaccination status	No.	(%)
Completed ≥3 HepB doses	4,214	(83.0)
HBIG, ≥3 HepB doses	4,173	(82.2)
No HBIG, ≥3 HepB doses	41	(0.8)
Incomplete vaccination (lost to follow-up)	861	(17.0)
HBIG, 2 HepB doses	728	(14.3)
No HBIG, 2 HepB doses	5	(0.1)
HBIG, 1 HepB dose	111	(2.2)
No HBIG, 1 HepB dose	15	(0.3)
HBIG, no HepB doses	2	(<0.1)

Abbreviations: HBsAg = hepatitis B surface antigen; HBIG = hepatitis B immune globulin; HepB = hepatitis B vaccine.

repeat PVST, as recommended by ACIP; 27 were protected and two remained susceptible. Overall, 93.3% of tested infants were protected, 1.2% were infected, 3.2% remained susceptible, and 2.3% had indeterminate results (Table 4).

Reported by

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TABLE 3. Postvaccination serologic testing (PVST) among infants who received ≥3 doses of HepB by age 24 months (N = 4,214) — Enhanced Perinatal Case Management Project, Florida, Michigan, Minnesota, New York City, and Texas, 2008–2011

PVST status	No.	(%)
Reported serologic markers tested	3,244	(77.0)
Anti-HBs and HBsAg*	2,832	(67.2)
Anti-HBs only	41	(1.0)
HBsAg only	371	(8.8)
Reported serologic testing (by age)	2,683	(63.7)
<9 mos	259	(6.2)
9–12 mos	1,204	(28.5)
13–18 mos	869	(20.6)
≥19 mos	351	(8.4)
Unknown†	561	(13.3)
No reported PVST	970	(23.0)

Abbreviations: HepB = hepatitis B vaccine; anti-HBs = hepatitis B surface antigen antibody; HBsAg = hepatitis B surface antigen.

* If infant received testing for HBsAg and anti-HBs on different dates, the later test date was used.

† Age at testing could not be calculated because test dates were not reported.

TABLE 4. Serologic outcomes of infants with reported PVST results, by age 24 months (N = 2,683)* — Enhanced Perinatal Case Management Project, Florida, Michigan, Minnesota, New York City, and Texas, 2008–2011

Serologic outcome	No.	(%)
Protected	2,504	(93.3)
Anti-HBs-positive,† HBsAg-negative	2,504	(93.3)
HBV-infected	32	(1.2)
Anti-HBs-negative, HBsAg-positive	28	(1.0)
Anti-HBs-positive, HBsAg-positive	2	(<0.1)
Anti-HBs,‡ HBsAg-positive	2	(<0.1)
Susceptible	87	(3.2)
Anti-HBs-negative, HBsAg-negative	87	(3.2)
Indeterminate	60	(2.3)
Anti-HBs-positive, HBsAg§	36	(1.3)
Anti-HBs-negative, HBsAg§	1	(<0.1)
Anti-HBs,‡ HBsAg-negative	18	(0.7)
Anti-HBs,‡ HBsAg§	5	(0.2)

Abbreviations: PVST = postvaccination serologic testing; anti-HBs = hepatitis B surface antigen antibody; HBsAg = hepatitis B surface antigen.

* Infant PVST outcome was excluded if test date was not reported (n = 561).

† Defined as titer result ≥10 mIU/mL.

‡ Serologic test result not reported.

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Editorial Note

ACIP-recommended postexposure prophylaxis for infants born to HBsAg-positive mothers protects 85%–95% of infants from perinatally acquired HBV infection (4). Since 1990, CDC has funded perinatal hepatitis B prevention programs to identify HBsAg-positive pregnant women and ensure that their infants receive postexposure prophylaxis, including PVST. PVST identifies infants who are protected, remain susceptible

after a primary HepB series, or develop HBV infection and should be referred for continuing medical care (4–6).

Among infants born to HBsAg-positive mothers and managed by perinatal hepatitis B prevention programs in the United States, and who received ≥ 3 HepB doses, PVST rates by age 15–27 months increased from 25% in 1994 to 56% in 2008 (1). In another study, 57% of infants born to HBsAg-positive mothers during 2003–2005 received HBsAg testing (7). In comparison, 77.0% of EPHBP-managed infants received PVST, and 63.7% had known serologic outcomes (Table 3). Although rates of PVST have increased, this analysis highlights areas in need of improvement. Strategies are needed to increase the rates for overall testing and testing for both anti-HBs and HBsAg, which are required to confirm outcomes. Of infants in EPHBP, 9.8% received only one of the two recommended serologic tests. An anti-HBs result < 10 mIU/mL is insufficient to determine whether the infant is susceptible or is HBV-infected. Alone, an anti-HBs result ≥ 10 mIU/mL does not confirm that the infant is protected; the HBsAg result also must be negative. A negative HBsAg test result by itself does not indicate whether the infant is protected by vaccination or remains susceptible.

ACIP recommends PVST at age 9–18 months (4). Infants should be tested starting at age 9 months, if at least 1 month has passed since the last HepB dose, to ensure that all HBV-infected infants are identified* (4,8). Of EPHBP-managed infants, 14.6% received PVST outside of the recommended time frame, and 13.3% had an unknown age at testing. Infants who remain susceptible after an initial HepB series without timely PVST to prompt revaccination have continuing risk for transmission from household contacts with chronic HBV infection. Intervals ≥ 4 months between the final HepB dose and PVST have been associated with waning of anti-HBs titers, which might fail to confirm protection and result in unnecessary revaccination (6,9).

In this analysis, infants born to API women were significantly more likely to receive PVST. Previous studies have yielded mixed results (5,6,10). A study examining data from 1992–2000 found that infants whose mothers were non-Hispanic white, were aged < 20 years, were U.S.-born, or had a household income $< \$15,000$ were less likely to receive PVST (6,10). In another study, however, PVST did not differ significantly by maternal age or race among infants managed by the Louisiana Office of Public Health (5).

The results of this study are subject to at least two limitations. First, results from the EPHBP sites might not be representative of all births to HBsAg-positive women in the United

What is already known on this topic?

Infants born to hepatitis B surface antigen-positive women have a 40%–90% chance of acquiring hepatitis B virus (HBV) infection. Infected infants have a 90% risk of chronic HBV infection, which can result in premature death from liver failure or cancer. Postexposure immunoprophylaxis in infancy prevents 85% to 95% of perinatal infections. To determine infant outcomes, including whether infants require additional vaccination for protection, postvaccination serologic testing is recommended 1 month after completing the hepatitis B vaccine series (age 9–18 months).

What is added by this report?

Among infants with reported outcomes, postvaccination serologic testing data from Enhanced Perinatal Hepatitis B Case Management Projects indicated that timely postexposure prophylaxis might be 93% effective in protecting infants from perinatal hepatitis B infection. However, 23.0% of infants had no reported postvaccination serologic testing.

What are the implications for public health practice?

Postvaccination serologic testing (hepatitis B surface antigen [HBsAg] and hepatitis B surface antigen antibody) for infants born to HBsAg-positive women is important to determine appropriate infant medical follow-up. Test results should be reported to perinatal hepatitis B program coordinators who can assist families in assuring infant protection and who monitor progress toward elimination of perinatal hepatitis B virus transmission.

States; EPHBP-managed women and infants comprise about 25% of CDC's estimated births to HBsAg-positive women. Second, the completeness of reporting PVST results to CDC was not examined. However, overall PVST rates of EPHBP-managed infants were high compared with rates reported in other studies (1,7).

To achieve optimal prevention of perinatal HBV infection, HBsAg-positive pregnant women must be identified before delivery, and their infants must complete appropriate and timely postexposure prophylaxis. PVST (anti-HBs and HBsAg) as soon as age 9 months and at least 1 month after the last HepB dose has been given determines if infants are susceptible and should be revaccinated and retested, or are infected and require additional medical care. Although universal recommendations for HepB vaccination have been published (4), no universal recommendations for HBV screening of infants or children have been issued. HBV infection usually is asymptomatic, and therefore is unlikely to be detected without testing, until complications arise. Conducting timely PVST and reporting results to public health officials ensures that infants born to HBsAg-positive women receive appropriate follow-up, and is a key element of surveillance to monitor progress toward the elimination of perinatal HBV transmission.

* Infants who complete the HepB series with the *Haemophilus influenzae* type b combination product (COMVAX, Merck & Co.) at age 12–15 months are eligible for PVST 1 month after the last dose (2).

Acknowledgments

Immunization Svcs Div, National Center for Immunization and Respiratory Diseases, CDC.

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Announcements

Final State-Level 2011–12 Influenza Vaccination Coverage Estimates Available Online

Final state-specific influenza vaccination coverage estimates for the 2011–12 influenza season are now available online at FluVaxView (<http://www.cdc.gov/flu/fluview>). Included are estimates of the cumulative percentage of persons vaccinated by the end of each month, during August 2011–May 2012, for each state and U.S. Department of Health and Human Services region, and the United States overall.

Analyses were conducted using National Immunization Survey data for children aged 6 months–17 years and Behavioral Risk Factor Surveillance System data for adults aged ≥ 18 years. Estimates are provided by age group and race/ethnicity. These estimates are presented using an interactive feature at <http://www.cdc.gov/flu/professionals/vaccination/report1112/report1/index.htm> and complemented by an online summary report at http://www.cdc.gov/flu/professionals/vaccination/coverage_1112estimates.htm.

The data update the national preliminary estimates from the March 2012 National Immunization Survey and National Flu Survey at <http://www.cdc.gov/flu/professionals/vaccination/nfs-survey-march2012.htm>.

Environmental Microbiology: Control of Foodborne and Waterborne Diseases Course — January 7–12, 2013

CDC and Emory University's Rollins School of Public Health will cosponsor, Environmental Microbiology: Control of Foodborne and Waterborne Diseases, on January 7–12, 2013, at Emory University, Rollins School of Public Health. This 6-day course on the surveillance of foodborne and waterborne diseases is designed for public health practitioners and other students interested in the safety of food and water.

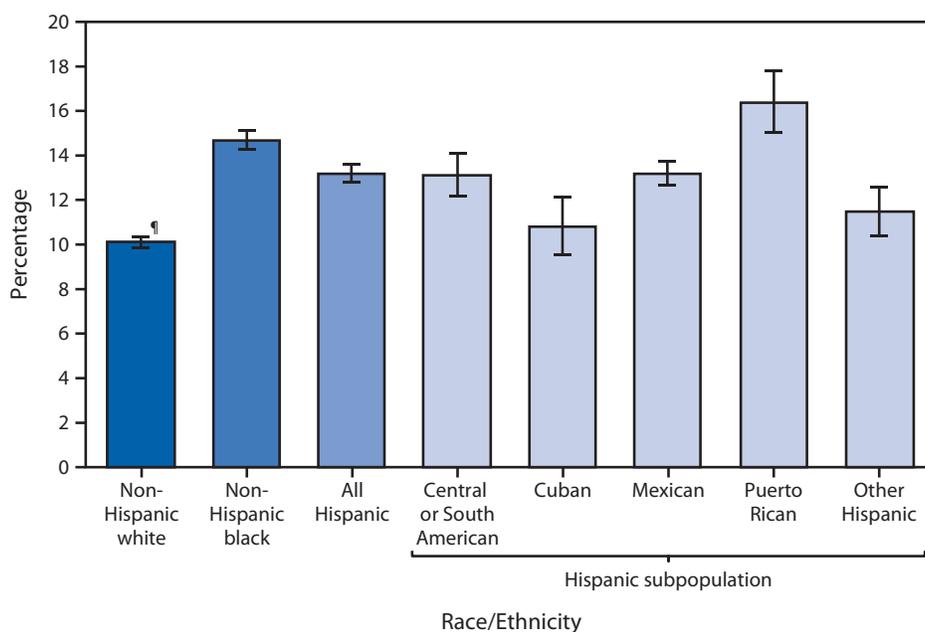
This course will provide a broad overview of the major foodborne and waterborne diseases. The course describes how information from surveillance is used to improve public health policy and practice in ways that contribute to the safety of food and water supplies. Participants will learn about microorganisms and chemical agents responsible for food and water-transmitted diseases, the diseases they cause, the pathogenesis, clinical manifestations, reservoirs, modes of transmission, and surveillance systems. The course also will cover the transport, survival, and fate of pathogens in the environment, the concept of indicator organisms as surrogates for pathogens, and the removal and inactivation of pathogens and indicators by water and wastewater treatment processes. Examples of the public health impact of quality assurance programs, such as Hazard Analysis and Critical Control Points, to control foodborne and waterborne diseases in both industrialized and developing countries will be discussed.

This course is offered to public health professionals and Emory University students. Continuing Education credit is available. Tuition will be charged. The application deadline is December 15, 2012, or until all slots have been filled. Additional information and applications are available from by mail (Emory University, Hubert Department of Global Health [Attn: Pia Valeriano], 1518 Clifton Rd. NE, CNR Bldg., Room 7038, Atlanta, GA 30322); telephone (404-727-3485); fax (404-727-4590); online (<http://www.sph.emory.edu/epi-courses>), or e-mail (pvaleri@emory.edu).

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Percentage of Adults Aged 18–64 years Who Needed Prescription Medicine But Did Not Get it Because of Cost During the Preceding 12 months,* by Black or White Race and Hispanic Subpopulation[†] — National Health Interview Survey, United States, 2009–2011[§]



* Based on a survey question that asked respondents, "During the past 12 months, was there any time when you needed (prescription medicine) but didn't get it because you couldn't afford it?" Unknowns were not included in the denominators when calculating percentages.

[†] Persons of Hispanic ethnicity might be of any race or combination of races. Non-Hispanic persons are those who are not of Hispanic ethnicity, regardless of race.

[§] Estimates were based on household interviews of a sample of the U.S. civilian, noninstitutionalized population.

[¶] 95% confidence interval.

During 2009–2011, Hispanic adults aged 18–64 years were less likely (13.2%) than non-Hispanic blacks (14.7%) but more likely than non-Hispanic whites (10.1%) to have needed prescription medicine but not gotten it because of cost during the preceding 12 months. Among Hispanic subpopulations, the percentage of Puerto Rican adults needing prescription medicine but not getting it because of cost was higher (16.4%) than for Mexican adults (13.2%), other Hispanic adults (11.5%), and Cuban adults (10.8%), but not significantly different from Central or South American adults (13.1%).

Source: National Health Interview Survey, 2009–2011 Sample Adult Core component. Available at <http://www.cdc.gov/nchs/nhis.htm>.

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Joint Commission R3 Report Explains New Flu Vaccine Requirements

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By:

Posted on: 07/18/2012

 PRINT

The Joint Commission has released an R3 Report, a complimentary publication that provides detailed information, about a July 1, 2012, requirement that all Joint Commission accredited health care organizations establish an annual influenza vaccination program for licensed independent practitioners and staff. Although vaccination is the single most effective method for preventing influenza deaths and illnesses, the U.S. Department of Health and Human Resources reports that vaccination rates for healthcare professionals remains below 60 percent.

The R3 Report is designed to give accredited organizations a deeper understanding of the accreditation requirements that strengthen existing requirements for hospitals, critical access hospitals and long-term care organizations and expands the vaccination standard to include the ambulatory care, behavioral healthcare, home care, laboratory, and office-based surgery accreditation programs.

The R3 Report provides information on the elements of performance for the vaccination standard that goes into effect July 1, 2012, as well as specifics about three of the elements of performance that will be phased in by July 1, 2013 for certain types of organizations. In addition, the R3 Report provides the rationale for the standard, reference information, results of feedback from the field, and outstanding issues related to performance measures for vaccination rates.

In addition to establishing a vaccination program, the standard will require accredited healthcare organizations to set incremental goals for meeting a 90 percent coverage rate by 2020. Organizations also will be required to measure and improve vaccination rates for staff. The Joint Commission standard will not mandate influenza vaccination for staff as a condition of accreditation.

"Increasing flu vaccination rates for healthcare workers is important not only to help protect themselves, but also to reduce the risk of flu infection for patients or individuals served," says Kelly L. Podgorny, DNP, MS, CPHQ, RN, project director in the Standards and Survey Methods Department, Division of Healthcare Quality Evaluation, at the Joint Commission.

To view the R3 Report on the new infection control standard related to influenza vaccination programs, visit http://www.jointcommission.org/r3_issue3/

Morbidity and Mortality Weekly Report

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format. To receive an electronic copy each week, visit *MMWR*'s free subscription page at <http://www.cdc.gov/mmwr/mmwrsubscribe.html>. Paper copy subscriptions are available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone 202-512-1800.

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