



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

Healthcare Infection Control Practices Advisory Committee
(HICPAC)

Meeting Summary Report
March 14- 15, 2013
The Centers for Disease Control and Prevention
Atlanta, Georgia

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Healthcare Infection Control Practices Advisory Committee

March 14-15, 2013

Centers for Disease Control and Prevention

Tom Harkin Global Communications Center (Building 19)

Thursday March 14, 2013

Time	Topic	Presider/Presenter
9:00	Welcome and Introductions Administrative issues: Meeting logistics Introductions: New Members and Liaisons Conflicts of interest declarations	Neil Fishman (HICPAC Chair) Jeff Hageman (CDC)
9:30	DHQP HAI Communications Update	Abbigail Tumpey (CDC)
10:00	Draft Guideline for the Prevention of Surgical Site Infections	Sandra Berrios-Torres (CDC)
11:00 11:15	Break Draft Guideline for the Prevention of Surgical Site Infections (Cont'd)	
12:15 1:30	Lunch Update on State and Local Health Department Engagement	Joni Young (CDC)
1:45	Overview of Reliability Adjusted Standardized Infection Ratio	Jonathan Edwards (CDC)
2:15	Draft Guideline for Prevention of Infections Among Patients in NICUs	Alexis Elward (HICPAC) Alex Kallen (CDC)
3:30 3:45	Break Draft Guideline for Prevention of Infections Among Patients in NICUs (Cont'd)	
4:15 4:30	Public Comment Liaison/ Ex-officio Reports	

Friday March 15, 2013

Time	Topic	Presider/Presenter
9:00	Update on Multistate Outbreak of Fungal Meningitis and Other Infections	J. Todd Weber (CDC)
9:15	Draft Guideline for Infection Prevention in Healthcare Personnel	David Kuhar (CDC)
9:45	HICPAC Surveillance Workgroup - SSI Definitions Update on NHSN Ventilator Associated Event Surveillance Update on NHSN Antimicrobial Use and Resistance Surveillance HICPAC Workgroup Formation	Ryan Fagan (CDC) Shelley Magill (CDC) Scott Fridkin (CDC)
11:00		Neil Fishman (HICPAC)
11:40	Public Comment	
11:45	Summary and Wrap Up	
12:00	Adjourn	

ATTACHMENT 2
List of Participants

(Note: the Designated Federal Official opened the floor for introductions on March 14 and 15, 2013, and confirmed the presence of a quorum.)

DAY 1: MARCH 14, 2013

HICPAC MEMBERS PRESENT:

Dr. Neil Fishman, Chair
Dr. Dale Bratzler
Dr. Ruth Carrico
Dr. Daniel Diekema
Dr. Alexis Elward
Dr. Mary Hayden
Dr. Susan Huang
Dr. Stephen Ostroff
Ms. Gina Pugliese
Dr. Selwyn Rogers
Dr. Tom Talbot
Dr. Deborah Yokoe

DESIGNATED FEDERAL OFFICIAL:

Mr. Jeffrey Hageman, Deputy Chief, Prevention and Response Branch, DHQP

EX OFFICIO MEMBERS PRESENT:

Dr. David Henderson, National Institutes of Health
Dr. Stephen Kralovic, Veterans Administration
Dr. Sheila Murphey, Food and Drug Administration
Dr. Daniel Schwartz, Centers for Medicare and Medicaid Services
Dr. Kim Willard-Jelks, Health Resources and Services Administration

LIAISON MEMBERS PRESENT:

Ms. Kathy Aureden, Association of Professionals of Infection Control and Epidemiology, Inc.
Dr. Sheri Chernetsky Tejedor, Society of Hospital Medicine
Ms. Kathleen Dunn, Public Health Agency of Canada
Dr. Diana Gaviria, National Association of County and City Health Officials
Mr. Patrick Horine, DNV Healthcare, Inc.

Dr. Michael Howell, Society of Critical Care Medicine
Dr. Marion Kainer, Council of State and Territorial Epidemiologists
Ms. Lisa McGiffert, Consumers Union
Dr. Silvia Munoz-Price, National Association of Public Hospitals and Health Systems
Dr. Mark Russi, American College of Occupational and Environmental Medicine
Dr. Robert Sawyer, Surgical Infection Society
Ms. Donna Tiberi, Healthcare Facilities Accreditation Program
Ms. Margaret VanAmringe, The Joint Commission
Ms. Amber Wood, Association of periOperative Registered Nurses

CDC REPRESENTATIVES PRESENT:

Dr. Katie Arnold, Epidemiologist, DHQP
Dr. Michael Bell, DHQP Acting Director
Dr. Ramona Bennett, Public Health Advisor, DHQP
Dr. Sandra Berrios-Torres, DHQP
Dr. Denise Cardo, DHQP Director
Ms. Swapna Deshpande, Web Developer, DHQP
Ms. Angela Dunbar, Health Communicator, DHQP
Mr. Jonathan Edwards, Statistician, DHQP
Dr. Ryan Fagan, Medical Epidemiologist, DHQP
Dr. Scott Fridkin, Medical Officer and Deputy Chief, Surveillance Branch, DHQP
Dr. Carolyn Gould, Medical Epidemiologist, DHQP
Dr. Rita Helfand, DHQP
Dr. John Jernigan, Director, OPRD, DHQP
Dr. Alex Kallen, DHQP
Dr. David Kuhar, Medical Epidemiologist, Prevention and Response Branch, DHQP
Dr. Melanie Lawson, Public Health Analyst, DHQP
Dr. Shelley Magill, DHQP
Dr. Paul Malpiedi, Epidemiologist, DHQP
Dr. Elizabeth Mothershed, Deputy ADP, CDC
Dr. John O'Connor, ADCS, NCEZID/OD
Dr. Amanda Overholt, Public Health Advisor, DHQP
Ms. Rose Pecoraro, Web Team Lead, DHQP
Dr. Dan Pollack, Chief, Surveillance Branch, DHQP
Dr. Loria Pollack, Medical Officer, DHQP
Dr. Catherine Rebmann, Health Scientist, DHQP
Ms. Maggie Silver, Health Communicator, DHQP
Dr. Elizabeth Skillen, ADP/DHQP
Dr. Jason Snow, Health Scientist, DHQP

Ms. Erin Stone, Committee Management Specialist
Dr. Nimalie Stone, Medical Epidemiologist, DHQP
Ms. Abbigail Tumpey, Associate Director for Communications Science, DHQP
Dr. J. Todd Weber, Chief, Prevention and Response Branch, DHQP
Dr. Matthew West, Public Health Advisor, DHQP
Ms. Joni Young, Senior Advisor, DHQP

MEMBERS OF THE PUBLIC PRESENT:

Mr. David Brett, Science & Technology Manager, Smith & Nephew
Ms. Danielle Hunt, Senior Associate, ABT Associates
Ms. Nancy Klinger, 3M
Ms. Judy Reed, Senior Market Manager, Smith & Nephew

DAY 2: MARCH 15, 2013

HICPAC MEMBERS PRESENT:

Dr. Neil Fishman, Chair
Dr. Ruth Carrico
Dr. Daniel Diekema
Dr. Alexis Elward
Dr. Mary Hayden
Dr. Susan Huang
Dr. Stephen Ostroff
Ms. Gina Pugliese
Dr. Selwyn Rogers
Dr. Tom Talbot
Dr. Deborah Yokoe

DESIGNATED FEDERAL OFFICIAL:

Mr. Jeffrey Hageman, Deputy Chief, Prevention and Response Branch, DHQP

EX OFFICIO MEMBERS PRESENT:

Dr. David Henderson, National Institutes of Health
Dr. Stephen Kralovic, Veterans Administration
Dr. Sheila Murphey, Food and Drug Administration
Dr. Daniel Schwartz, Centers for Medicare and Medicaid Services
Dr. Kim Willard-Jelks, Health Resources and Services Administration

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Dr. Scott Fridkin, Medical Officer and Deputy Chief, Surveillance Branch, DHQP
Dr. Carolyn Gould, Medical Epidemiologist, DHQP
Dr. Rita Helfand, DHQP
Dr. Alex Kallen, DHQP
Dr. David Kuhar, Medical Epidemiologist, Prevention and Response Branch, DHQP
Dr. Lisa LaPlace, Public Health Analyst, DHQP
Dr. Melanie Lawson, Public Health Analyst, DHQP
Dr. Shelley Magill, DHQP
Dr. Amanda Overholt, Public Health Advisor, DHQP
Dr. Dan Pollack, Chief, Surveillance Branch, DHQP
Dr. Catherine Rebmann, Health Scientist, DHQP
Dr. Philip Ricks, Epidemiologist, DHQP
Dr. Elizabeth Skillen, ADP/DHQP
Ms. Erin Stone, Committee Management Specialist
Dr. Nimalie Stone, Medical Epidemiologist, DHQP

Ms. Abbigail Tumpey, Associate Director for Communications Science, DHQP
Dr. J. Todd Weber, Chief, Prevention and Response Branch, DHQP

MEMBERS OF THE PUBLIC PRESENT:

Mr. David Brett, Science & Technology Manager, Smith & Nephew

Ms. Danielle Hunt, Senior Associate, ABT Associates

Ms. Nancy Klinger, 3M

EXECUTIVE SUMMARY

The Division of Healthcare Quality Promotion (DHQP), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Centers for Disease Control and Prevention, Department of Health and Human Services (HHS) convened a meeting of the Healthcare Infection Control Practices Advisory Committee (HICPAC) on March 14-15, 2013, in Atlanta, Georgia.

The Designated Federal Official and Chair confirmed the presence of a quorum with voting members and ex-officio members for HICPAC to conduct its business on both days of the meeting. The HICPAC voting members disclosed their conflicts of interest for the public record.

CDC's communication office staff presented an outline of their work on communicating actionable information on HAIs to healthcare providers and to the public.

HICPAC heard a detailed presentation on updates to CDC's draft guideline for prevention of surgical site infections. Based on HICPAC feedback, several recommendations have been revised. New draft recommendations on the core section were presented; narrative summaries for the arthroplasty section were presented, but recommendations are still pending. HICPAC provided input and suggestions for the writing group to consider. CDC will consider and incorporate HICPAC's suggestions and present updated recommendations at the June 2013 meeting. Following that meeting, the draft recommendations will be published in the Federal Register for public comments. Following public comment CDC will compile all comments, and review them at an upcoming HICPAC meeting before finalizing the draft and submitting it to final CDC clearance.

CDC presented an overview of its engagement with state and local health departments on HAI related issues. A presentation on the new reliability-adjusted standardized infection ratio was next. This measure, calculated using Bayesian methods, adjusts raw infection rates based on the reliability of the data. The reliability adjusted SIR is not meant to replace the unadjusted SIRs.

The writing group for the draft NICU guideline presented updates to its draft guideline for infection prevention in NICUs. Based on HICPAC feedback, the respiratory pathogen and MRSA sections have been revised. New draft recommendations on CLABSI prevention were presented to HICPAC. HICPAC members made a number of comments, in particular questioning whether core practices such as hand hygiene or staff education need to be examined anew in every topic.

HICPAC's liaison and ex officio members provided updates at the meeting on recently completed, ongoing and upcoming activities of their organizations and agencies.

An overview of CDC's response to the recent outbreak of fungal meningitis or other infections associated with contaminated steroid injections was presented.

CDC presented an outline of the proposed update to the 1998 Infection Prevention and Control for Healthcare Personnel Guideline. Work on this guideline is still in the early stages, but progress updates and draft recommendations will be shared with HICPAC when they are available.

NHSN's new ventilator-associated event definition will replace the older ventilator-associated pneumonia definition. HICPAC heard a presentation on the new definition and CDC's support for its implementation.

A final report from CDC on the input provided by HICPAC that was developed based on HICPAC's surveillance working group was given, describing changes made to NHSN SSI surveillance definitions in 2013 and proposed changes for 2014 and 2015. CDC still has a few outstanding issues to address including how and whether to do post-discharge SSI surveillance.

HICPAC heard a presentation on CDC's surveillance of antimicrobial use and resistance, an area in which several new initiatives are taking shape.

Discussion during the NICU guideline led to an action item for HICPAC related to "accepted practices" that are currently placed in Cat IB recommendation regardless of the level of evidence:

- HICPAC will outline the infection control standard core practices (e.g., hand hygiene, educate HCP, etc) that should be followed regardless of the setting or situation. The list of practices will be referred to in future guidelines instead of repeated these in all of the subsequent guidelines.

The Chair called for public comments at all times noted on the published agenda.

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Division of Healthcare Quality Promotion

**Healthcare Infection Control Practices Advisory Committee
(HICPAC)**

March 14 and 15, 2013
Atlanta, Georgia

Minutes of the Meeting

The Division of Healthcare Quality Promotion (DHQP), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), the Centers for Disease Control and Prevention (CDC), Department of Health and Human Services (HHS) convened a meeting of the Healthcare Infection Control Practices Advisory Committee (HICPAC). The proceedings were held on March 14-15, 2013, at the Tom Harkin Global Communication Center (Building 19), Centers for Disease Control and Prevention, 1600 Clifton Road NE, Atlanta, Georgia.

Opening Session: March 14, 2013

Jeffrey Hageman, MHS
Deputy Chief, Prevention and Response, DHQP
HICPAC Designated Federal Official

The Designated Federal Official, Mr. Hageman, opened the floor for introductions of HICPAC voting members, ex officio members, and liaison representatives who were in attendance. Several new members have been added to the HICPAC:

- Diana Gaviria, Liaison from NACCHO
- Patrick Horine, Liaison from DNV Healthcare, Inc.
- Silvia Munoz-Price, Liaison from NAPH
- Gina Pugliese
- Selwyn Rogers
- Robert Sawyer, Liaison from the Surgical Infection Society
- Donna Tiberi, Liaison from HFAP
- Amber Wood, Liaison from AORN

Michael Anne Preas, the new liaison from APIC, was unable to attend and was represented by Kathy Aureden. The liaison member from ASTHO has not yet been selected, but most likely will attend the next meeting.

Voting members were asked to publicly disclose any new conflicts of interest:

- Alexis Elward received research support from Sage Products, Inc. to study the efficacy of daily bathing with chlorhexidine to prevent bloodstream infections in pediatric ICU patients.

- Sage Products provided Mary Hayden chlorhexidine cloths free of charge for a project; Dr. Hayden is also performing an unpaid evaluation of a Cepheid product.
- Dale Bratzler recently finished a contract to do grant reviews for Medline Industries.

Opening Remarks

Michael Bell, MD
DHQP Acting Director

Dr. Bell gave an overview of the evolution of HICPAC's mission over the years. HAIs have recently been getting more attention from both the healthcare community and the public. Complete elimination of HAIs is now a goal widely embraced in the public health field. There is now more emphasis on implementation; recommendations which sit on shelves don't do much good. Moreover, CDC's recommendations now often affect purchases of proprietary products and can have a substantive impact on the economics of the healthcare industry. This increased public attention to HAI prevention efforts has led CDC to continue to look for ways to improve the guideline development process, including ensuring that it is sustainable. CDC also continues to work to ensure that HICPAC provides input according to its charter and that its work is consistent and sustainable, even as individual members come and go.

DHQP HAI Communications Update

Abigail Tumpey, MPH, CHES, Associate Director for Communications Science, DHQP

Ms. Tumpey discussed the special challenges of the HAI "communication landscape." HAI outbreaks often gather a lot of press attention and trigger strong feelings, while it may be difficult to explain the issues involved to consumers. Moreover, prevention recommendations are varied since no one behavior can prevent all HAI threats.

DHQP's objectives for HAI communications are to increase patients' and caregivers' awareness, educate healthcare providers on the best prevention practices, and improve transparency and accountability around reporting medical errors.

HICPAC Discussion:

How does CDC balance communicating the good news as well as the bad? Ms. Tumpey replied that, in the past, CDC has been focusing on bad news, so this year, the attempt is to rebalance in the other direction. However, the communications staff is always looking for success stories. The goal is to get people's attention in plain language, even if that means more colorful and less nuanced messages than would be typical for a government agency.

Once a particular issue such as CRE has been highlighted, what is the long-term plan? Each year, Vital Signs will focus on a different concern, but the plan is to provide periodic updates showing the progress on each issue.

Draft Guideline for Prevention of Surgical Site Infection

Sandra Berrios-Torres, MD,
DHQP

At the October 2012 HICPAC meeting, some of the surgical site infection (SSI) draft recommendations were first presented to the HICPAC. The recommendations were revised based on HICPAC feedback and presented again. New recommendations from the core and arthroplasty topics will also be presented.

Dr. Berrios-Torres began by outlining the key topics the guideline will cover. The topics in bold are the ones which will be discussed at the current meeting.

Core section:

- **Antimicrobial prophylaxis**
- **Glycemic control** (updated since October)
- **Normothermia** (updated since October)
- **Oxygenation** (updated since October)
- Skin prep

Arthroplasty section:

- **Transfusion**
- Anticoagulation
- Immunosuppressive therapy
- **Exhaust suit** (updated since October)
- Antimicrobial prophylaxis duration with drain use
- Biofilm

GRADE tables, evidence reviews, and recommendations are now completed for the core section, while GRADE tables and evidence reviews are done for the arthroplasty section, but recommendations are still pending.

Evidence grading: Evidence is given an initial grade based on what type of evidence it is: that is, a randomized controlled trial (RCT) gets an initial high grade, an observational study gets an initial low grade, and any other evidence gets an initial very low grade. Other criteria are then used to adjust the grade including study quality limitations, inconsistency, indirectness, imprecision, or risk of publication bias decrease the grade, while strength of association, evidence of a dose-response gradient, or inclusion of unmeasured confounders increasing the magnitude of effect increase the grade.

An overall quality grade of high, moderate, low or very low is then arrived at.

A **high** grade indicates that further research is *very unlikely to change* confidence in the

estimate of effect.

A **moderate** grade indicates that further research is *likely* to impact confidence in the estimate of effect and *may change* the estimate.

A **low** grade indicates that further research is *very likely* to impact confidence in the estimate of effect and is *likely to change* the estimate.

A **very low** grade indicates *any* estimate of effect.

Three key inputs are used when CDC formulates recommendations. First, its values and preferences are used to determine the critical outcomes; second, the overall GRADE of evidence concerning critical outcomes; and third, the net benefits, net harms or tradeoffs which result from weighing the critical outcomes.

The resulting recommendations vary in direction (for or against) and strength (strong or weak). Recommendations fall into one of the following categories:

Category IA: A strong recommendation supported by high to moderate quality evidence suggesting net clinical benefits or harms.

Category IB: A strong recommendation supported by low quality evidence suggesting net clinical benefits or harms, or an accepted practice supported by low to very low quality evidence (e.g., aseptic technique).

Category IC: A strong recommendation required by state or federal regulation.

Category II: A weak recommendation supported by any quality evidence suggesting a tradeoff between clinical benefits and harms.

Recommendation for further research: Indicates an unresolved issue for which there is low to very low quality evidence with uncertain tradeoffs between benefits and harms.

DRAFT SSI PREVENTION GUIDELINES: CORE SECTION

KQ1: Antimicrobial prophylaxis (AMP) – parenteral

What are the most effective strategies for administering parenteral AMP to reduce the risk of SSI?

Antimicrobial prophylaxis (AMP) is defined as a very brief course of an antimicrobial agent initiated just before an operation. It is intended to reduce the microbial burden of intraoperative contamination, not to prevent postoperative contamination. Intravenous infusion is the most common mode of delivery, and AMP is indicated for elective operations in which skin incisions are closed in the operating room, not for operations classified as contaminated.

KQ1A.1: How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?

No RCTs on the timing of preoperative parenteral AMP were found. Current clinical practice is a single IV dose of AMP within 60 minutes before incision.

Draft recommendation: KQ1A.1 Administer by the intravenous route a single dose of the prophylactic antimicrobial agent within 60 minutes prior to surgical incision. Administer vancomycin and fluoroquinolones within 60-120 minutes prior to surgical incision. **(Category IB).**

KQ1A.2: In cesarean section, how does the timing of AMP impact the risk of SSI and what is the optimal timing?

A systematic review and meta-analysis of three RCTs with a total of 749 patients (Constantine 2007) showed a benefit of administering parenteral AMP before the skin incision as compared to after core clamping. This was found to be high-level evidence. Rates of post-cesarean endometritis were reduced by 53%; there was a trend toward reduction in rates of abdominal incisional SSI but this was not significant; and there was no change in rates of neonatal sepsis, neonatal sepsis workup, or NICU admission.

Draft recommendation: KQ1A.2 Administer the appropriate single dose parenteral prophylactic antimicrobial agent within 60 minutes prior to skin incision in all cesarean sections. **(Category IA).**

This is a change to the 1999 guideline, which called for AMP after core clamping.

KQ1B: How safe and effective is intraoperative redosing and when is it indicated?

One poor quality RCT found no benefit of intraoperative redosing compared to one preoperative dose in elective colorectal surgery patients. No difference was found for abdominal incisional SSI, intra-abdominal abscess, or perineal wound infections, although this was low quality evidence. There was a significantly higher probability of

infection for procedures lasting more than three hours.

Clinical guidelines indicate intraoperative redosing should be done for prolonged procedures or those involving major blood loss.

Draft recommendation: KQ1B Maintain therapeutic levels of the prophylactic antimicrobial agent in serum and tissues throughout the operation based on individual agent pharmacokinetics; redose when the procedure duration exceeds the half-life of the antimicrobial agent, or when there is excessive blood loss. (**Category IB**).

HICPAC Discussion:

The previous recommendations should be tailored to the pharmacokinetics of the drug being used, as this one is.

Is there any guidance on what constitutes “excessive” blood loss? This would depend on the circumstances of the case, such as the nature of the procedure and the patient’s circulating blood volume. In essence, intraoperative redosing is being recommended when blood loss is expected to cause dilutional effects that will reduce the circulating concentration of the antimicrobial agent.

Will there be guidance on the pharmacokinetics of antimicrobial agents to help with implementation? The 2013 ASHP guidelines have summary tables, or a clinical pharmacist could be consulted.

The new guidelines should be linked back to old ones which might provide more detailed logistical data.

KQ1C: How safe and effective is postoperative AMP, when is it indicated, and what is the optimal duration?

38 RCTs addressed this question, so the analysis focused on studies using the same agents at the same doses via IV administration. 71% of the studies were done before the last guideline was published. Not all studies reported on whether intraoperative redosing was done. For this analysis, “duration” was defined as the number of hours or days AMP was continued after the skin incision was closed in the operating room, excluding pre- and intraoperative AMP doses.

19 RCTs with high-quality evidence studying multiple surgical fields compared no

postoperative AMP to postoperative AMP within 24 hours. The critical outcome was SSI, and no benefit of postoperative AMP was found.

Existing ASHP guidance calls for less than 24 hour AMP duration for all patients. The 1999 CDC guideline called for AMP until, at most, a few hours after the incision is closed.

Draft recommendation: KQ1C In clean and clean-contaminated procedures, do not administer additional prophylactic antimicrobial agent doses after the surgical incision is closed in the operating room. (**Category IA**).

HICPAC Discussion:

There is incredible variation in practice because of the scarcity of RCT evidence, although observational study data is available. In the past, four or five days of AMP were given; now recommendations are coming down. Just one solid RCT showing no benefit might convince surgeons to change their practice.

Does the recommendation address neurosurgical procedures and are there studies with that patient population? No RCTs on neurosurgical procedures were found. Will there be a different recommendation when drains are in place? No studies showed up on drains in the orthopaedic surgery section.

Often, the reason given for prolonged courses of antibiotics is that a drain is in place; it's unfortunate that the data to support a statement on drains is not there.

Have the groups which recommend postoperative AMP, such as the Society for Thoracic Surgeons and the ASHP, given any feedback? At the moment, there are no plans to change the Society for Thoracic Surgeons' guidelines, which are based on observational data. One member noted that the largest cardiac study does show a benefit to postoperative AMP, while this recommendation rolls up cardiac procedures with all others.

KQ1D: How safe and effective is weight-adjusted dosing and redosing of AMP in non-obese, obese, and morbidly obese patients?

No studies that evaluated weight-based dosing and redosing of AMP and its impact on SSI risk were found.

Current guidelines advise weight-based dosing.

Draft recommendation: KQ1D Adjust the prophylactic antimicrobial agent dose, based on the patient's weight, in obese and morbidly obese patients. (**Category IB**).

HICPAC Discussion:

There is data on weight-based dosing for the cephalosporins and aminoglycosides, but not for almost any other class of antimicrobial, so it's hard to know how much to give.

In pediatrics, weight-based dosing is routine. Maybe the recommendation could point to the opportunities in the pediatric field.

KQ2: Antimicrobial prophylaxis (AMP) – topical

What are the most effective strategies for administering local, non-parenteral AMP to reduce the risk of SSI?

KQ2A: *How safe and effective is antimicrobial or antiseptic irrigation?*

KQ2A.1: *How safe and effective is antimicrobial irrigation?*

No studies were identified which evaluated the safety and effectiveness of antimicrobial irrigation in combination with parenteral AMP and its impact on SSI risk.

No studies were identified which evaluated the safety and effectiveness of soaking surgical implants (e.g., meshes or neurosurgical ventricular shunts) in antimicrobial or antiseptic solutions prior to insertion in combination with AMP and their impact on SSI risk.

Studies looking at antimicrobial irrigation *without* AMP were not deemed appropriate for this analysis.

Draft recommendation: KQ2A.1 Further research is needed to evaluate the safety and effectiveness of antimicrobial irrigation and of soaking prosthetic devices in antimicrobial or antiseptic solutions prior to surgical implantation. (**Unresolved issue.**)

KQ2A.1: *How safe and effective is antiseptic irrigation?*

Three RCTs were found which evaluated antiseptic irrigation in combination with parenteral AMP using either electrochemically activated solutions (ECAS) or povidone iodine (PI).

One study compared ECAS versus normal saline and found a reduction in superficial SSI for elective open appendectomy, but no difference in superficial SSI for elective colorectal patients, and no difference in deep or organ/space SSI for either group. A study comparing ECAS and PI found no difference for CABG patients. Studies comparing PI with normal saline showed no difference in superficial SSI, but did show a benefit in deep SSI.

High-quality evidence showed that ECAS reduced superficial SSI compared to normal saline. This dealt with a patient population that is not commonly seen. PI data only showed a benefit in dirty procedures, which is not relevant here.

Product-related adverse outcomes: One RCT found ECAS was a significant independent risk factor associated with wound healing disturbances. One incident of povidone-iodine-related wound dehiscence was reported.

Dr. Berrios-Torres asked the HICPAC for suggestions on potential recommendations.

HICPAC Discussion:

There is in vitro and in vivo data on the effect of povidone iodine on wound healing, fibroblast function, and leukocyte function.

Is ECAS FDA-approved? Yes, it is approved for wound debridement, but it is not clear whether the approval extends to intraoperative wound irrigation or to chronic wound irrigation. This could be mentioned in the narrative evidence summary.

It does not seem that there is enough evidence to warrant a recommendation.

KQ2B: How safe and effective are antimicrobial-coated sutures; when and how should they be used?

A meta-analysis of 4 RCTs in a variety of surgical fields found no benefit of triclosan-coated absorbable sutures as compared to non-antimicrobial-coated sutures (both absorbable and non-absorbable). There were 424 patients in total. This was high-quality evidence. The RCTs did not suggest a risk of product-related adverse events.

Draft recommendation: KQ2B Do not use antimicrobial-coated sutures for the prevention of surgical site infection. (**Category IA**).

HICPAC Discussion:

Given the low risk for SSIs and the size of the trials, would the trials have the power to detect a reduction in SSIs due to the triclosan-coated sutures? The GRADE formulas don't give enough guidance about whether trials are the right size or whether high-quality results are generalizable.

SSI rates are on the order of 1 to 5%, so trials of the order of tens of thousands might be necessary to detect a difference. A Category IA recommendation is inappropriate when the evidence is grossly insufficiently powered.

Some studies are done for reasons which don't directly address the needs of the current analysis. They may never have been intended to be powered to answer questions such as: can this product prevent SSI? If a manufacturer wants to claim on the label that a product prevents SSI, it must prove it to FDA with a sufficiently powered study; but if it does not make that claim, the manufacturer need not do such a study in order to market the product. This is one reason why the literature is full of insufficiently powered studies. How should such studies be dealt with? This raises broader issues of antimicrobial stewardship.

One of the problems with the pharmaceutical device market is that products are cleared for marketing because they are pharmacologically similar to a prior product, without having to prove safety or efficacy.

The confidence interval for this meta-analysis is extraordinarily wide, and the odds ratio is 0.58, showing that the study is not sufficiently powered. This recommendation should be less than a Category IA, perhaps II.

KQ2C: How safe and effective are topical antimicrobial or antiseptic agents?

KQ2C.1: How safe and effective are topical antimicrobial agents?

With regard to antimicrobial agents, the data compares ampicillin, chloramphenicol, or rifampin versus no topical agent, in combination with parenteral AMP. No benefit of topical antimicrobial agents was found.

Draft recommendation: KQ2C.1 Do not use topical antimicrobial agents (i.e., ointments, solutions) prior to or following wound closure for the prevention of surgical site infection. **(Category IA).**

HICPAC Discussion:

Are there studies addressing the use of antimicrobial powder, which is an emerging practice in some orthopaedic surgical procedures? None of the studies addressed powder.

A Category IA “do not use” recommendation suggests there is very high-quality evidence for the recommendation, and suggests it will never change. However, the most we can say at this point is that, at this time, there is insufficient data to recommend this practice as the standard of care, and more research is needed. Caution should be taken before many RCTs with small sample sizes can lead to a Category IA recommendation. Some RCTs in the literature were not done in the era of high compliance to surgical best practice guidelines.

Whatever category the recommendation is given should make it clear that there are RCTs on this topic, but they are insufficient to drive a strong Category IA recommendation, and the recommendation may change.

Perhaps a Category II with a brief asterisk, saying something like “RCTs were performed in this area, but they do not have sufficient weight to change the evidence.” Or the phrase “There is no evidence to support the use of X” instead of “Do not use X” might be used, when the possibility of benefit has not been conclusively excluded. The narrative summary can also be used to explain the nature of the data.

The issue of how to categorize evidence from small or less generalizable RCTs is a broad one, and the evidence review process and phrasing of recommendations could change based on this consideration. How widespread the use of antimicrobial-coated sutures is should affect the phrasing of the recommendation.

KQ2C.2: How safe and effective are topical antiseptic agents?

One small RCT compared povidone iodine applied to skin prior to wound closure versus no topical agent. No benefit was found.

Draft recommendation: KQ2C.2 Use of a topical skin antiseptic agent after performing skin preparation prior to wound closure is not recommended for the prevention of surgical site infection. (**Category II**).

KQ2C.3 How safe and effective is topical autologous platelet rich plasma?

A meta-analysis of three small RCTs (one for cardiac patients and one in total knee arthroplasty) showed no benefit of topical autologous platelet rich plasma (spray or gel) compared to no topical treatment. One study showed an association between use of a spray and decreased likelihood of total wound closure.

Draft recommendation: KQ2C.3 Do not use autologous platelet rich plasma for the prevention of surgical site infection. (**Category IA**).

KQ2D: How safe and effective are topical antimicrobial sealants?

A meta-analysis of 3 RCTs looked at cyanoacrylate-based skin sealant versus no sealant, with 3 RCTs in cardiac surgery and one in hernia repair. The evidence was judged high-quality, and no benefit of skin sealant was found. Two of the largest studies were funded by the sealant manufacturer.

Adverse events: There were four episodes of difficulty incising through the film and, in one patient, visible flaking of the product.

Draft recommendation: KQ2D Do not use antimicrobial skin sealant following skin preparation and prior to skin incision for the prevention of surgical site infection. (**Category IA**).

KQ2E: *How safe and effective are antimicrobial dressings?*

The search did not identify any studies that evaluated the safety and effectiveness of antimicrobial dressings and their impact on the risk of SSI.

Draft recommendation: KQ2E Further research is needed to evaluate the safety and effectiveness of antimicrobial dressings. (**Unresolved issue.**)

KQ8: *What are the most effective strategies for preparing the patient's skin prior to surgery?*

KQ8A: *How safe and effective are topical antiseptic products individually and in combination?*

2 RCTs found no benefit of two-step aqueous iodophor compared to one-step aqueous iodophor. 5 RCTs found no benefit of iodophor in alcohol (one or two-step) compared to aqueous iodophor (one or two-step). These studies were not designed to evaluate SSI risk. This evidence was judged moderate quality.

7 RCTs compared chlorhexidine gluconate in alcohol to aqueous iodophor, and found a benefit. However, no benefit was shown for chlorhexidine gluconate in alcohol compared to aqueous iodophor in alcohol (all either one or two-step). This was high-quality evidence.

Draft recommendation: KQ8A Perform intraoperative skin preparation with an appropriate antiseptic agent. (**Category IA**).

KQ8.1.a Use an antiseptic agent with alcohol, unless contraindicated. (**Category IA**).

HICPAC Discussion:

There is some inconsistency in whether a specific product is mentioned in CDC recommendations. Why not mention that chlorhexidine gluconate in alcohol was the product here? The evidence is not sufficient to decide whether chlorhexidine gluconate in alcohol is superior to iodophor in alcohol.

The best way to support the recommendation to use an antiseptic agent *with alcohol* would be a comparison of the same agent with or without alcohol. Experts might believe that an agent with alcohol is superior, but the data here only show that chlorhexidine in alcohol is superior to iodophor alone.

The current recommendation is consistent with the previous guideline on CLABSI, which noted that there was no evidence that chlorhexidine in alcohol is superior to iodophor in

alcohol.

The phrase “intraoperative skin preparation” is used to indicate that the recommendation does not apply to patients cleansing their skin before arriving at the operating room.

KQ8A.1: How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in obstetric and gynecological procedures?

Cesarean section: One systematic review of four RCTs showed there was a benefit of aqueous iodophor vaginal preparation as compared to no vaginal preparation in cesarean section. The evidence was moderate quality.

Vaginal preparation was associated with a reduced risk of post-cesarean endometritis, especially in women with ruptured membranes, but no difference in rates of abdominal incisional SSI, which would not be expected.

Draft recommendation: KQ8A.2.a In cesarean sections, perform vaginal preparation with aqueous iodophor in addition to standard abdominal skin preparation. (**Category IA**).

Total abdominal hysterectomy: One large RCT showed a benefit of iodophor gel at the vaginal apex plus aqueous iodophor vaginal prep versus aqueous iodophor vaginal prep alone. The evidence was moderate quality, and showed a decreased rate of pelvic abscess; however, antimicrobial prophylaxis was not consistently done across the two experimental groups.

Dr. Berrios-Torres asked the HICPAC for its suggestions on what the recommendation should be. Looking at ACOG guidelines is a possibility.

HICPAC Discussion:

Is there an alternative topical antiseptic vaginal preparation for patients who are allergic to iodine? The alternative would be a saline prep. A recommendation for saline prep could not be justified based on the evidence, and this fact should be in the discussion part of the guidelines. Was there data on use of chlorhexidine? There were no RCTs on this topic using chlorhexidine.

KQ8B: How safe and effective are plastic adhesive drapes?

One large systematic review of 4 RCTs looked at non-antimicrobial plastic adhesive drapes compared to no drape. No benefit was found, and the evidence was of high quality. Some of the RCTs dated from the 1970s, which means the skin prep may have differed, which could have impacted drape adhesion.

One systematic review of 2 RCTs looked at iodophor-impregnated plastic adhesive drapes compared to no drape. This also showed no benefit, and the evidence was of high quality.

Draft recommendation: KQ8B Do not use plastic adhesive drapes (with or without antimicrobial properties) for the sole purpose of preventing surgical site infection. **(Category IA).**

HICPAC Discussion:

The adhesive drapes may be used during surgery, particularly by cardiac surgeons, to keep the drapes in place, not for prevention of SSI.

The meta-analysis concluded that there was an increased risk of SSI with use of plastic adhesive drapes. However, this finding comes from one study with a large number of infections, but the study did not report how the infections were divided between the experimental and control groups. Therefore, that study was excluded from the current analysis.

UPDATES TO RECOMMENDATIONS PRESENTED IN OCTOBER 2012

KQ3: Glycemic control

The October 2012 recommendation on glycemic control was:

KQ3A.1 For diabetic cardiac surgery patients with short surgical intensive care unit stays, standard practice of blood glucose targets less than 200 mg/dL is recommended. (Category IB).

This was revised based on HICPAC suggestions and now reads:

New draft recommendation: KQ3A.1 Implement perioperative glycemic control and use blood glucose target levels less than 180 mg/dL in diabetic and non-diabetic surgical patients. **(Category IB).**

Further research to define optimal blood glucose target levels in diabetic, non-diabetic, and critically ill surgical patients should evaluate the benefits and harms associated with glycemic control in different surgical populations, and postoperative settings which may impact choice of optimal target levels, delivery methods, timing of instituting, and duration of the protocol. **(Unresolved issue.)**

The recommendation is now in accord with other groups' standard practice guidelines.

October recommendation: KQ3A.2 Perioperative glycemic control using strict blood glucose target levels, solely for the prevention of surgical site infections in predominantly non-diabetic cardiac surgery patients with expected short surgical intensive care unit stays is not recommended. (Category IA).

This recommendation has now been removed based on the input that an analysis focused on SSI risk would miss most of the body of literature on tight glycemic control in this setting.

There was no change to the October recommendation KQ3B: Further research is needed to

understand the association between hemoglobin A1C and the risk of surgical site infection in diabetic and non-diabetic patients. (**Unresolved issue.**)

KQ4-5: Normothermia

October recommendation: KQ4 Maintenance of perioperative normothermia is recommended. (Category IA).

New draft recommendation: KQ4 Maintain perioperative normothermia. (**Category IA**). This change was intended to strengthen the language.

There was no change to the October recommendation KQ5: Further research is needed on the most effective strategies for achieving and maintaining normothermia, particularly with respect to determining the lower limit, optimal timing, and duration. These studies should all include SSI as an outcome. (**Unresolved issue**).

Dr. Berrios-Torres added that the recommendation does not give a numerical definition of hypothermia; the 1999 guideline specified a temperature of less than 36 degrees Celsius, but the American Society of Anesthesiologists may soon change that number to 35.5 degrees C.

HICPAC Discussion:

The statement that more research is needed shows up often. However, not all areas need more research. Should we have a strategy for identifying the kind of research necessary to establish solid guidelines? "Further research is needed" appears in the guidelines as a way to document that CDC tried to make a recommendation and was unable to do so because of lack of data.

KQ6-7: Oxygenation

October recommendation: KQ6 Increased perioperative oxygenation alone, in the absence of strategies to optimize oxygen tissue delivery, including maintenance of perioperative normothermia and liberal fluid/volume replacement, is not recommended for the prevention of surgical site infection. (Category IA).

New draft recommendation: KQ6A.1 In patients undergoing surgery with general anesthesia using mechanical ventilation, administer increased fraction of inspired oxygen (FiO₂) intraoperatively and post-extubation in the immediate postoperative period, in combination with strategies to optimize tissue oxygen delivery through maintenance of perioperative normothermia and adequate volume replacement. (**Category IA**).

This update was made after looking carefully at the patient populations in which the relevant studies had been done.

HICPAC Discussion:

Does this recommendation refer only to mechanical ventilation during surgery, or also post-operative mechanical ventilation? Post-operative mechanical ventilation is not considered here; that is part of critical care. The concern here is that administering FiO₂ in

the immediate post-operative period will cause discomfort for the patient. The recommendation does not specify what fraction of FiO₂ should be used, since that has not been adequately studied. Most studies use 80% FiO₂, but that seems to be an arbitrary fraction. Research has shown that adequate volume replacement and patient warming is essential to optimize tissue oxygen delivery, with whatever fraction of FiO₂.

KQ6A.2 Further research is needed to understand the association between perioperative increased fraction of inspired oxygen (FiO₂) delivery and the risk of surgical site infection in patients undergoing surgery with general anesthesia without mechanical ventilation or neuraxial anesthesia (e.g., spinal, epidural or local nerve blocks.) (**Unresolved issue**).

There was no change to the October recommendation KQ7: Further research addressing the optimal fraction of inspired oxygen (FiO₂) timing, duration, and delivery method in surgical site infection prevention should also evaluate potential benefits and harms. (**Unresolved issue**).

DRAFT SSI PREVENTION GUIDELINES: ARTHROPLASTY SECTION

Dr. Berrios-Torres presented narrative evidence summaries for the arthroplasty section of the SSI prevention guidelines, but recommendations have not yet been drafted. Only studies which specifically looked at arthroplasty procedures were considered. For all of the topics in this section, the evidence is primarily from observational studies, since few RCTs were found.

KQ26: Orthopaedic exhaust suit

KQ26: How safe and effective is an orthopaedic exhaust suit for reducing the risk of SSI in arthroplasty patients? KQ26A: Who should wear them?

October recommendation: KQ26 Further research addressing the use of orthopaedic exhaust suits and SSIs following arthroplasty procedures should evaluate potential benefits and harms, including their impact on personnel safety. (Unresolved issue).

The new recommendation makes it clear that further research on exhaust suits' impact on SSIs is needed; their role in preventing transmission of blood-borne pathogens is already recognized.

New draft recommendation: KQ26: Further research addressing the use of orthopaedic exhaust suits in arthroplasty procedures should evaluate their impact on surgical site infections, potential benefits and harms, which surgical personnel should wear them, and the impact on their safety. (**Unresolved issue**.)

KQ17: Transfusion

KQ17: How is the risk of SSI impacted by perioperative transfusion in arthroplasty patients? KQ17A: Are specific blood products associated with increased or decreased risk?

A meta-analysis of 2 RCTs and 4 observational studies showed an increased risk of SSI with transfusion as opposed to no transfusion. This was high-quality evidence.

However, when studies were separated out by type of transfusion, a more complex picture emerges:

- Allogeneic vs. no transfusion showed increased SSI risk with the allogeneic transfusion
- Allogeneic transfusion vs. autologous showed increased SSI risk with the allogeneic transfusion
- Autologous vs. no transfusion showed no increased risk
- Autologous plus additional allogeneic transfusion vs. no transfusion showed no increased risk

KQ17B: If the risk is increased, can this effect be isolated from the risk associated with operative severity?

The search did not identify studies that directly evaluated the association between increasing transfusion requirements, operative severity, and SSI risk.

However, data from 3 observational studies stratified transfusion requirement by procedure type, and 1 observational study reported blood loss by procedure type. Revision hip and knee surgeries were found to have a higher transfusion risk than primary hip and knee surgeries. Revision hip surgeries were more likely to get allogeneic transfusions or allogeneic plus autologous, while primary hip surgeries were more likely to get autologous transfusions.

Optimal hemoglobin threshold for blood transfusion

The search did not identify studies on the optimal hemoglobin threshold for blood transfusion in arthroplasty patients.

The American Association of Blood Banks in 2012 recommended more restrictive transfusion strategies:

- In hemodynamically stable postoperative surgical patients, transfusion is recommended for hemoglobin levels of 8 g/dL or less for symptoms
- In adult and pediatric intensive care patients, the recommended hemoglobin level for transfusion is 7 g/dL or less.

KQ17C: How does volume of transfused blood product impact this risk of SSI?

The search did not identify studies that evaluated differences in volume of transfused blood product and their impact on SSI risk.

KQ17D: How safe and effective is withholding transfusion in decreasing the risk of SSI?

The search did not identify studies that evaluated the safety and effectiveness of withholding transfusions and included SSI as an outcome. However, the 1999 guideline stated that necessary blood products should not be withheld to prevent SSI (Category IB).

Dr. Berrios-Torres introduced several questions for discussion:

- Could the increased risk of infection seen with allogeneic transfusion be a surrogate for a wound that was at risk before the transfusion, because of an unexpected high blood loss with associated decreased volume, decreased oxygen tension, and vasoconstriction?
- Could autologous transfusion be associated with no increased risk because of a lower threshold for transfusing patients with their own blood?
- Should we be taking more of a multidisciplinary approach to blood management? What could be the role of preoperative optimization, better planning for anticipated blood loss, standards for who gets autologous transfusion, or intraoperative cell saver/postoperative techniques?

HICPAC Discussion:

What is the impact of allogeneic blood transfusion on the immune system? Most of these studies looked at levels of white blood cell reduction and found no difference between allogeneic and autologous transfusion. In the past, patients were sometimes intentionally transfused before a kidney transplant so that they would accept the new organ more readily.

KQ18-22: Immunosuppressive therapy - systemic and intra-articular

Immunosuppressive therapy is a particular issue for rheumatoid arthritis patients, since they are at an increased risk of post-arthroplasty infection compared to osteoarthritis patients.

KQ18: How is the risk of SSI impacted by the use of systemic corticosteroids, or other immunosuppressive agents in arthroplasty patients?

A number of observational studies addressed this issue, but no RCTs. The drugs being considered here are disease-modifying anti-rheumatic drugs (DMARDs, e.g., methotrexate), biologic agents such as anti-tumor necrosis factors (anti-TNFs, e.g., infliximab), and corticosteroids such as prednisone. All studies were of patients with established rheumatoid arthritis. In rheumatoid arthritis treatment, progression from DMARD monotherapy to DMARD double or triple therapy to use of biologic agents is indicative of progression from low to high disease activity. This means that patients on biologic agents may have more advanced arthritis than those on DMARDs.

1) A meta-analysis of 4 observational studies with more than 16,000 patients in total showed biologic agents were associated with a higher risk of SSI compared to DMARDs. This was moderate-quality evidence.

2) One observational study from 1991 compared doses of DMARDs to no therapy and found no difference in rates of prosthetic joint infection, deep wound abscess or infected hematoma. This was very low quality evidence, and the methotrexate dose was so low as to

perhaps be subtherapeutic by current standards.

KQ18A: Does the length of time used preoperatively affect the risk?

2 observational studies comparing patients on anti-TNFs to those of DMARDs found that years of disease duration was a risk factor for SSI.

KQ18B: Does dose affect the risk?

The search did not identify studies that evaluated differences in biologic agent or DMARD doses and their impact on SSI risk in arthroplasty patients. There is conflicting data on whether prednisone dose is a risk for SSI.

KQ19: What are the most effective strategies for managing their use?

KQ19A: Should dosing be adjusted, and if so, for how long?

The search did not identify studies evaluating perioperative systemic corticosteroid and other immunosuppressive therapy dose adjustment and its impact on SSI risk in arthroplasty patients.

KQ19B: How safe and effective is discontinuation of these agents preoperatively, and when should they be resumed?

- Low quality evidence from 3 observational studies showed no difference between methotrexate stopped vs. continued perioperatively. These studies date from the 1990s and used possibly subtherapeutic methotrexate doses. No increased risk of prosthetic joint infection was found.
- One observational study showed no difference between anti-TNFs stopped vs. continued perioperatively. An increased risk of prosthetic joint infection with continued anti-TNF therapy was found, but the finding was not significant. This was a small study with a small number of events, and the evidence was judged very low quality.

Clinical guidelines on perioperative continuation of DMARDs and biologic agents are inconsistent.

KQ20: What is the optimal duration of AMP for reducing the risk of SSI in patients using systemic corticosteroids and other immunosuppressive agents?

The search did not identify studies that evaluated differences in AMP duration in patients using immunosuppressive agents and their impact on SSI risk.

KQ21: How is the risk of SSI impacted by the use of preoperative intra-articular corticosteroids in arthroplasty patients?

- In total knee arthroplasty, one observational study showed greater deep SSI risk with steroid injection. In this study, injections were given in orthopaedic, rheumatology, and GP clinics. Another observational study showed no increase in deep SSI; patients were injected in the operating room using aseptic techniques in this study. Both studies showed no difference in superficial SSI.
- In total hip arthroplasty, all injections must be given in a radiology suite using aseptic technique. 3 observational studies showed no difference in deep or superficial SSI.

KQ21A: Does the length of time used preoperatively affect the risk?

One observational study found that neither total number of preoperative injections nor the time between injection and operation affected SSI risk. However, the study was underpowered.

Another observational study found no association between the average time between injection and total hip arthroplasty and development of SSI.

KQ21B: Does the dosage affect the risk?

The search did not identify arthroplasty studies that evaluated the impact of different doses of corticosteroid injections on SSI risk. Agents and doses varied between studies.

KQ22: What are the most effective strategies for managing the use of intra-articular corticosteroids?

No arthroplasty studies that evaluated strategies for managing the use of intra-articular corticosteroids and their impact on SSI risk were identified.

2012 American College of Rheumatology guidelines recommend intra-articular corticosteroid injections for initial management of knee and hip osteoarthritis, but do not provide management strategies.

Perhaps the guidelines should note the importance of aseptic technique in infection prevention with knee arthroplasty.

KQ23: Anticoagulation

KQ23: How is the risk of SSI impacted by perioperative anticoagulation for venous thromboembolism prophylaxis in arthroplasty patients who are or are not on anticoagulation therapy before surgery?

KQ23A: Does SSI risk differ by agent?

The search did not identify studies evaluating arthroplasty patients and the impact of

preoperative anticoagulation therapy on SSI. The studies included a mixture of patients, most not on anticoagulation therapy, and SSI results were not stratified by history of anticoagulation therapy.

A number of observational studies were found comparing either low molecular weight heparin vs. another agent or warfarin vs. aspirin. The outcome of interest of these studies was VTE prophylaxis, not SSI risk. Agent dose, timing of administration, and other factors varied between the studies. No studies were found comparing clopidogrel, unfractionated heparin, or low molecular weight heparin vs. warfarin.

This literature search focused on SSI, not on deep venous thrombosis, bleeding, or hematoma risk. No RCTs or controlled observational studies have established a link between bleeding and infection in this area.

- With low molecular weight heparin, comparisons of enoxaparin and other agents found no difference in SSI risk
- Comparisons of warfarin vs. no prophylaxis or vs. aspirin with or without mechanical prophylaxis found no difference in SSI risk
- A comparison of higher vs. lower mean INR warfarin found an increased SSI risk for those with the higher mean INR.

KQ23B: What is the optimal timing and duration of perioperative anticoagulation prophylaxis to reduce the risk of deep venous thrombosis, bleeding, hematoma formation, and SSI?

One observational study found no association between close perioperative timing of the first anticoagulant dose and risk of prosthetic joint infection. The results were not stratified by anticoagulation agent.

2012 clinical guidelines from the American Academy of Orthopaedic Surgeons and the American College of Chest Physicians focus on VTE prevention and provide recommendations on agent choice, timing, and duration.

KQ23C: How safe and effective is altering anticoagulation therapy perioperatively?

The search did not identify studies evaluating safety and effectiveness of altering anticoagulation therapy perioperatively which included SSI.

KQ27K: How does the duration of AMP in the presence of a drain affect the risk of SSI?

The search did not identify arthroplasty studies that evaluated the impact of AMP duration in the presence of a drain on SSI risk.

HICPAC Discussion:

Was there any discussion on adding antibiotic beads or preoperative chlorhexidine baths to the list of topics? Topics were chosen by the writing group, HICPAC input and external

experts including orthopaedic surgeons and infectious disease specialists. Beads are considered part of infection treatment, not infection prevention. Chlorhexidine baths are intended to be addressed in the *S. aureas* section.

Is there data of timing of prophylactic antibiotics in arthroplasty procedures with regard to tourniquet application? There were no RCTs on that topic, and the evidence does not seem to point in a specific direction.

It is unclear why certain topics are grouped the way they are. For instance, AMP and drain use is a wider issue which does not just apply to arthroplasty. If there is good data on a practice in one specialty, it can be generalizable. We should think about how the grouping of topics will affect the end user's reading of the guidelines.

Dr. Fishman reminded HICPAC that these are draft recommendations. After HICPAC's suggestions are incorporated, the drafts will be published in the Federal Register for public comments, and the comments will be reviewed by the HICPAC before the recommendations are finalized.

Update on State and Local Health Department Engagement

Joni C. Young, MS, Senior Advisor, DHQP

Ms. Young stated that state and local health departments play an essential role in implementing HAI prevention strategies, tracking infections, outbreak response, and sharing their experiences. CDC supports these departments through standardized guidance, technical assistance, and funding provided through cooperative agreements.

CDC investments are focused on:

- Building program infrastructure
- Supporting state HAI coordinators
- Increasing state programs' HAI prevention capacity
- Building on HAI prevention efforts and expanding them across all healthcare settings

In addition to funding, CDC has various programs, often in collaboration with other organizations, to ensure that state and local health departments have access to the expertise they need. CDC funding streams are intended to trickle down to smaller, rural, healthcare institutions, which are easier to reach on the state level. The goal is to enable these departments to sustain their own efforts.

Each state has an HAI coordinator, who is responsible for tracking the progress of state HAI plans and running a multidisciplinary advisory group. In the past, state engagement with the issue of HAI prevention was uneven, but now a point of contact is available in every state. These coordinators also use NHSN data to monitor and inform their efforts. The response to the recent fungal meningitis outbreak highlighted the benefits of skilled and informed state health department staff.

An online guide to state-based HAI prevention efforts is available at: www.cdc.gov/hai.

HICPAC Discussion:

The past few years have seen HAI prevention get a lot more attention. How will federal budget cuts affect these efforts? CDC is working to sustain and maintain what it has accomplished, even though budget cuts would have an undeniable impact.

Overview of Reliability-Adjusted Standardized Infection Ratio

Jonathan R. Edwards, MStat, DHQP

Mr. Edwards explained the new reliability-adjusted standardized infection ratio (SIR), which was developed in order to summarize experience with infections and provide more meaningful ranking among hospitals. The first reliability-adjusted SIRs deal with CLABSI incidence data, which, as of 2012, is publicly reported on CMS's Hospital Compare site. This raises the question of what kind of quality metrics are suitable for public reporting. Such metrics should:

- Account for variability in patient case-mix
- Adjust for both measured and unmeasured risk factors
- Account for differences due to exposure volume

Quality measures should be as reliable and valid as possible. Reliability is a measure of precision, or the amount of spread between values, while validity refers to how centered results are over the target.

Both hospital exposure volume (i.e., sample size which determines noise variation) and the amount of true variation across hospitals (sigma) determine data reliability. For example, hospitals with low exposure volume will have lower reliability and need to be weighted towards the mean, while hospitals with high exposure volume are more reliable and require less weighting towards the mean. Exposure volume here is defined as number of relevant events, such as number of procedures or number of central line days.

Using NHSN data, Mr. Edwards calculated both crude and reliability-adjusted standardized infection ratios (SIRs) for CLABSIs and compared the variation across the distributions of both. The plurality of hospitals had crude SIRs of zero. An adjusted SIR allows us to discriminate between all those zero-SIR hospitals.

As an example, Hospital 1 has 107 central line days in a year and zero CLABSIs. Hospital 2 has 1503 central line days (about 15 times the number for Hospital 1) and also saw zero CLABSIs. A raw SIR of zero for both would obscure the meaningful difference in the size of the hospitals and thus in the reliability of their data.

The reliability-adjusted SIR is therefore calculated as the ratio of adjusted number of CLABSIs to predicted number of CLABSIs. The adjusted number of CLABSIs is the result of an equation which factors in the raw SIR or observed number of infections, the number of exposures to infection risk, and the mean number of infections. The predicted number of CLABSIs comes from a Bayesian random effects model.

Using the reliability-adjusted SIR effectively shifts the distribution of infection ratios away from zero and towards the mean, especially for smaller hospitals.

The CLABSI measure will be joined by measures for other HAI events, and CDC plans to implement these in future performance measurement that will be conducted by CMS.

HICPAC Discussion:

Would the model be able to accommodate patients with multiple devices, such as a central line and a hemodialysis catheter? The model could, but that information would have to be collected on all patients.

If the aim is to allow meaningful hospital ranking with a single figure, the reliability-adjusted SIR achieves that. However, is this really the optimal way to inspire institutions to improve? How does this figure get explained to hospital leadership and to consumers?

Mr. Edwards replied that CDC recognizes there may be multiple measures needed. The unadjusted SIR will not disappear; it is useful for measuring a particular hospital's progress over time. The adjusted SIR will also allow CDC to focus resources on where the greatest risk to consumers exists—a very small hospital with a high infection rate might be less of a priority than a large hospital with a moderate rate.

Using the adjusted SIR, a hospital with a raw SIR of zero will see that zero disappear. This seems contrary to the overall goal of HAI elimination.

For smaller hospitals, it might be worthwhile to look at data across several years. Five years of data could show a trend not apparent from one year's data. The adjusted SIR, by drawing small hospitals closer to the mean, tends to hide the fact that some small hospitals do unusually well or unusually poorly, and we may miss the opportunity to discriminate between them. Mr. Edwards stated he is working on a method to distinguish better between small hospitals.

CMS and state-level data might be used to pinpoint some unmeasured risk factors for CLABSI, such as severity of patient illness, without adding too many variables to NHSN reports. Mr. Edwards replied that that goes to the need for validity; in the future, tapping into electronic health records may help.

Are there plans to stratify by patient days for patients with specific diagnoses which put them at higher risk of CLABSI, such as burn patients? Mr. Edwards replied that that would be desirable, but, again, depends on access to patient data.

Draft Guideline for Prevention of Infections Among Patients in NICUs

Alexis Elward, MD

Alex Kallen, MD, DHQP

Dr. Elward described the writing group's accomplishments since the last HICPAC meeting:

- Evidence and GRADE tables have been finalized
- Evidence reviews on MRSA and respiratory pathogen sections were revised to incorporate HICPAC feedback
- The evidence review for CLABSI section is under review

- Discussions with SHEA on the implementation guidance document have been held.

In response to HICPAC feedback, there have been several revisions to respiratory pathogen recommendations:

- Categories of isolation used rather than categories of personal protective equipment
- Discussion of aerosol-generating procedures and N95s removed, because it is discussed in other guidance and is an ongoing topic of scientific investigation
- Staff cohorting changed to Category II to reflect the potential harm of limiting the staff available to care for patients
- References to “rapid” and “early” detection were changed to antigen and PCR testing

Revisions to MRSA recommendations are as follows:

- Categories of isolation used rather than categories of personal protective equipment
- Tier I and II language used to differentiate between outbreak and nonoutbreak settings
- Education is recommended for patients’ families and other visitors in addition to healthcare personnel
- Language on patients’ risk factors in draft recommendation III.A was changed in response to suggestions

HICPAC Discussion:

Consider mentioning cultures for respiratory pathogens in the guidelines.

Consider clarifying that standard precautions against infection will always apply before a test result comes back, even when rapid testing is used,

Many implementation questions need to be answered, such as how often testing should be done, who will be considered exposed, and how long isolation should last.

CLABSI SECTION

Dr. Kallen presented this section.

Q2A: What are the most effective strategies to prevent central line-associated bloodstream infection (CLABSI) in the neonatal intensive care unit?

Bundled interventions: Ten studies evaluated use of bundled interventions to prevent CLABSIs among neonates. Low-quality evidence from these studies suggested benefit. This was based on a reduction in bloodstream-infection-related outcomes such as rate of CLABSI, catheter-related bloodstream infection, or late-onset nosocomial infection.

Draft recommendation: Q2A: Use “bundled” interventions for central line insertion and

maintenance as part of a single or multiple facility quality improvement effort to reduce rates of CLABSIs. Bundled interventions should include staff education and efforts to promote adherence to recommended practices (e.g., a checklist.) (**Category IB**).

HICPAC Discussion:

How many of the ten studies looked exclusively at insertion versus maintenance? Eight of ten included both.

Hand hygiene: Two studies evaluated the effect of hand hygiene promotion on CLABSI incidence in NICUs. Low-quality evidence suggested this had a benefit in increasing hand hygiene adherence and decreasing HAIs. Both studies showed a reduction in HAIs and increase in hand hygiene adherence, although determining effect on CLABSIs alone was not part of either evaluation.

Draft recommendation: Promote adherence to hand hygiene to prevent healthcare-associated infections. Hand hygiene adherence programs should include education of healthcare personnel about the importance of hand hygiene for infection prevention, reminders, and adherence surveillance with feedback of results to frontline providers. (**Category IB**).

Category IB was chosen because hand hygiene is an accepted practice, but the studies do not focus on the effect of hand hygiene promotion on CLABSIs specifically.

HICPAC Discussion:

Hand hygiene seems like a broader topic, for which there is Category IA-level evidence. We should be reluctant to set a precedent that something for which very good evidence exists needs to be siloed, revisited and regraded in every specific topic. One option is to define core strategies in a separate part of the document and refer to them in the NICU guidelines.

It may be confusing to make the distinction between hand hygiene and hand hygiene promotion. However, providers need evidence on which promotion strategies work, and whether specific interventions are needed in the NICU. References to studies on hand hygiene in the NICU should be accessible.

Number of umbilical venous catheter lumens: One randomized trial evaluated difference in sepsis risk for short-term catheter-related sepsis between single- and double-lumen umbilical venous catheters. Low quality evidence suggested that there was no difference between the two groups. It is of note that in this study, neonates had catheters for only about 3 days.

Draft recommendation: When using umbilical venous catheters, consider using single- or double-lumen catheters as needed. (**Category II**).

Central line site 1: Two studies compared the risk for catheter-associated bloodstream

infections (BSIs) between percutaneous central catheters placed in the femoral vein versus peripheral veins. Low quality evidence suggested an increase in BSIs in neonates with a percutaneous central catheter placed directly into the femoral vein compared to those placed peripherally. Both studies may have been biased by the fact that peripheral sites were chosen first and femoral sites used only if attempts to place the catheter in a peripheral site were unsuccessful.

Draft recommendation: When inserting a percutaneous central catheter, consider placement in a peripheral vein instead of placement directly into the femoral vein. **(Category II)**.

HICPAC Discussion:

Why the word “consider”? This is the language generally used with a Category II recommendation.

Central line site 2: One small observational study evaluated BSI risk for percutaneous central catheters placed in lower extremity sites versus upper extremity peripheral sites. Very low quality evidence suggested incidence of BSI did not differ. Cholestasis was higher and time to first complication was shorter for those placed into the upper extremity.

Draft recommendation: No recommendation can be made about whether or not percutaneous central catheter placement in upper extremity peripheral veins or lower extremity peripheral veins is preferred. **(Unresolved issue)**.

Central line site 3: Two studies evaluated BSI risk for surgically implanted central lines in neonates placed in either the femoral, subclavian, or jugular site. Very low quality evidence suggested BSI risk was highest for the internal jugular site. One study compared neonates with tunneled central lines in femoral sites with those placed in other sites (67% jugular, 33% subclavian) and suggested a benefit to central lines placed in a femoral site. The second study compared central lines placed in the internal jugular vein with those placed in the subclavian vein, and suggested a benefit associated with subclavian vein placement.

Draft recommendation: For long-term surgically implanted central lines, consider using the subclavian or femoral sites rather than the internal jugular due to an increase in the risk for CLABSIs. **(Category II)**.

HICPAC Discussion:

What was the magnitude of the difference in BSI risk? The answer was not available.

What does “surgically implanted” mean? All the lines had operating room-type placements.

Most recommendations in the NICU section are not based on strong evidence because of the difficulty of conducting RCTs in this population. The fact that there were two studies in

this section with consistent results led to the Category II recommendation, while the central line site 2 section had only one small study.

Closed medication systems: Two studies evaluated the effect of closed medication systems on catheter-associated BSIs in neonates. Very low quality evidence failed to suggest a benefit; this was possibly related to differing definitions of a closed medication system. The two studies had conflicting results.

Draft recommendation: More research using standardized definitions is needed to define the role of closed medication systems for preventing CLABSIs. (**Unresolved issue**).

HICPAC Discussion:

What is a closed medication system? Some interpret the term as meaning not using stopcocks with caps, but the more common interpretation is setting up the medication system under a hood with only one access port.

Central line types: Four studies evaluated differential risk of BSI among neonates with different central line types. Very low quality evidence did not allow for a clear determination of BSI risk, because of inconsistent results and methodological flaws among the studies.

Draft recommendation: More research is needed to determine if specific central line types are associated with different rates of CLABSI among comparable patient types. (**Unresolved issue**).

Peripherally inserted central catheter replaced at same site vs. new site: One study evaluated BSI risk for peripherally inserted central catheters replaced at a new site compared to those replaced over the previous catheter at the same site. Very low quality evidence suggested that BSI rates were higher for peripherally inserted central catheters placed using an introducer over the catheter being replaced.

Draft recommendation: Consider placing peripherally inserted central catheters at a new site rather than through an introducer placed over the peripherally inserted central catheter that is being replaced. (**Category II**).

In-line filters: Two studies evaluated the use of in-line filters to decrease incidence of sepsis. Moderate quality evidence suggested no benefit.

Draft recommendation: Do not use in-line filters solely for the prevention of CLABSIs. (**Category IA**).

Catheter care education: One study evaluated the effect of an educational program on catheter sepsis rates. Very low quality evidence suggested ongoing staff educational programs have a benefit in preventing catheter sepsis.

Draft recommendation: Conduct regular ongoing education for staff that care for central lines to highlight proper catheter care to prevent CLABSIs. (**Category IB, accepted practice**).

Dedicated percutaneous central line care team: Three studies evaluated the effect of dedicated percutaneous central catheter care teams on BSI risk. Low quality evidence suggested the use of teams has a benefit in reducing BSIs. However, in one study, significant benefit was only found in the group which had a catheter for 30 or more days.

Draft recommendation: Allow only trained personnel to insert and care for central lines. **(Category IA)**.

Use specialized central line care teams that are responsible for dressing changes and exit site care for patients with percutaneously inserted central catheters. **(Category IB)**.

HICPAC Discussion:

What is meant by trained personnel? The trained personnel in the studies were a special group responsible for all catheter care. The precise nature of training was not given.

How does this recommendation apply to smaller hospitals with a small volume of NICU patients, who might not have a truly dedicated central line care team? The dedicated team doesn't have to be newly hired staff; it could mean dedicating a certain portion of a nurse's time to central line care.

This could be a big resource commitment for any hospital, and we may not have the evidence to support a strong recommendation.

Dr. Kallen noted that in this case, there were three consistent studies, although they were small and observational. The Category IB designation depends on the definition of standard practice. A dedicated central line care team is standard practice, but it may be difficult to substantiate that with data. We could note that in professional society guidelines, this practice is highly recommended.

The first recommendation really does not follow from the studies found, but is a recommendation found in adult guidelines, so it might be more of a Category IB. The implementation guide could address what kind of training is needed.

Silver alginate dressing: Two very small studies evaluated the effect of silver alginate dressings on BSIs, although BSI was not the primary outcome of interest in either study. Moderate quality evidence did not suggest a benefit. No adverse skin reactions were identified in either study; one study found a statistically significant increase in serum silver levels, but below levels expected to cause toxicity.

Draft recommendation: No recommendation can be made about the use of silver alginate dressings for the purpose of reducing CLABSIs. **(Unresolved issue)**.

Chlorhexidine-impregnated dressing: Two studies evaluated the effect of chlorhexidine-impregnated dressings on BSI rates and catheter colonization. Moderate quality evidence did not suggest a significant benefit to use of a chlorhexidine-impregnated

disc compared to standard care, and also suggested possible use-limiting toxicity in a subgroup of neonates.

Both studies found no difference in rates of catheter-related BSIs, but did find lower rates of catheter colonization in the group given chlorhexidine-impregnated discs. With regard to toxicity, one study found local redness and the second study found contact dermatitis in the intervention group. Contact dermatitis was significantly more prevalent with neonates weighing less than 1,000 grams.

Draft recommendation: Consider using chlorhexidine-impregnated dressings with caution in neonates less than or equal to 1,000 grams due to high rates of cutaneous reactions (about 15% required discontinuation), especially within the first two weeks of life. (**Category II**).

No recommendation can be made about the use of chlorhexidine-impregnated dressings in neonates greater than 1,000 grams. (**Unresolved issue**).

HICPAC Discussion:

The wording of the first recommendation is hard to interpret; the phrase “with caution” is buried behind “consider using,” and if read quickly, the recommendation sounds like it is advocating use. “Consider avoiding the use of” could replace “consider using” for clarity.

Why not categorize both statements as unresolved? Dr. Kallen said that evidence of adverse reactions in neonates less than 1,000 grams warrants the Category II.

Catheter manipulations/blood draws: One study evaluated the effect of catheter hub manipulations and blood draws through the catheter on catheter-associated BSIs. Very low quality evidence suggested that more frequent central line hub manipulations requiring disinfection or drawing blood through the central line increases the risk of catheter-associated BSIs.

Draft recommendation: Minimize the number of times central line hubs are accessed and minimize blood sampling through central lines to decrease the risk for CLABSI. (**Category IB**).

Dr. Bell noted that the committee is struggling with the context of its work. When questions are being generated for the guidelines, there should be a focus on *what* needs to be done, while questions of *how* it should be done ought to be reserved for the professional society implementation guides. There seems to be a need for a white paper which would reiterate core elements of HAI prevention, not in a systematic evidence review format, but embracing expert opinion.

Chlorhexidine with alcohol for hub antisepsis: One study evaluated the effect of 2% chlorhexidine with 70% alcohol compared to 70% alcohol for antisepsis of the catheter hub. Very low quality evidence showed chlorhexidine with alcohol led to a reduction in the incidence rate ratio for positive blood cultures and clinically suspected sepsis. The incidence

of clinically suspected sepsis and of positive blood cultures was very high in this study. No data on adverse events were included.

Draft recommendation: Consider the use of chlorhexidine with alcohol (2% with 70% alcohol) over 70% alcohol alone for central line hub antisepsis when rates of CLABSIs are high and not responding to initial prevention measures. (**Category II**).

HICPAC Discussion:

Why does the recommendation apply only “when rates of CLABSIs are high”? This was a response to the high rates of CLABSIs in the study, which may not be representative of every NICU. The idea was that prevention measures with lots of evidence to justify them should be used first, and if that doesn’t work, then a practice with weaker evidence such as this one could be used.

The phrase “when rates are high” is problematic for implementation because of the need to judge how high rates need to be to justify the practice. Perhaps the phrase should be removed to give institutions the flexibility to consider this practice when they judge it appropriate.

The neonates in the study were receiving TPN, which means their CLABSI rates can be expected to be higher than with other uses of central lines. However, most NICU patients are receiving TPN, so the result is generalizable.

In one hospital’s experience, using chlorhexidine with alcohol forces staff to actually scrub the central line hub. The scrubbing may be what causes the difference rather than the chlorhexidine itself. Outcomes improved with engaged NICU leadership, but not with less engaged leadership.

Is there truly evidence, even for a Category II recommendation, that scrubbing with alcohol alone is not sufficient? A broader recommendation to disinfect catheter hubs, without specifying the product used, might be appropriate.

This again raises the question of whether evidence from a broader population can be used to justify the recommendation. However, Dr. Kallen stated that evidence from adult populations would not strengthen this recommendation.

Public Comment Period 1

Nancy Klinger from 3M commented on draft recommendation KQ8B, which states: “Do not use plastic adhesive drapes (with or without antimicrobial properties) for the sole purpose of preventing surgical site infection.”

3M recognizes the lack of evidence demonstrating the impact of drapes on SSI prevention. However, demonstrating a reduction in this already small risk could require a clinical study with tens of thousands of participants. The studies supporting this recommendation were

underpowered. 3M is concerned that this recommendation could lead to disregarding the benefits of drapes as one of many practices used to decrease the likelihood of SSI. 3M suggests the recommendation should be changed to acknowledge the benefit of drapes to reduction of wound contamination and preservation of the sterile field, where there is data available.

Draft Guideline for Prevention of Infections Among Patients in NICUs (continued)

Alex Kallen, MD, DHQP

Prophylactic antimicrobials: Four studies evaluated the effect of prophylactic antibiotics on BSIs among patients with central lines. Moderate quality evidence did not suggest a clear net benefit to prophylactic antibiotics for preventing total BSIs, although prophylactic vancomycin did appear to result in a decrease of BSIs due to coagulase-negative Staphylococci. The development of antimicrobial resistance was not adequately evaluated in any of these studies.

Draft recommendation: Do not use prophylactic antimicrobial infusions routinely to decrease the rate of bacterial CLABSIs. **(Category IB)**.

HICPAC Discussion:

Why was the word “infusions” used? All the studies used intravenous infusions.

The recommendation specifies bacterial CLABSIs because there is separate data on ways to prevent fungal CLABSIs in NICUs. The reference to antimicrobial infusions should then be changed to “antibiotic infusions.”

Heparin to prevent CLABSIs: Four RCTs evaluated the effect of heparin infusions on BSI-related outcomes. Moderate quality evidence suggested that continuous infusion of heparin did not result in significant reductions in catheter-related sepsis. This was based on heterogeneous results from three RCTs, two of which showed no significant decrease in sepsis or septicemia, and one which showed significant risk reduction in a combined outcome of definite, probable, or possible catheter-related sepsis.

Draft recommendation: Do not use heparin infusions solely for the purpose of preventing CLABSIs. **(Category IA)**.

Central line antimicrobial locks: Three studies evaluated the effect of central line antimicrobial locks on catheter-related BSIs in neonates. High quality evidence suggested their use prevented catheter-related BSIs. The development of antimicrobial resistance over the short term was evaluated in two studies and not found to be higher in the antimicrobial lock group. Rates of catheter-related BSIs were very high in the non-intervention groups.

Draft recommendation: Consider central line antimicrobial locks as a strategy to decrease high rates of CLABSI when other recommended strategies have failed. The long-term effects

of locks that use antibiotics on antimicrobial resistance is not known.

(Category II).

HICPAC Discussion:

The recommendation could mention that no products have been approved by FDA for this purpose.

Dr. Kallen replied that the potential downsides of a practice and the writing group's clinical judgment also factor into the category. In this case, the failure to look at potential antimicrobial resistance and the high BSI rates in the studies were concerning.

In the heparin section, there is a risk of intracranial hemorrhage with heparin in neonates. This potential harm supports the Category IA strong recommendation against heparin infusions.

Catheter dwell times (percutaneous central catheters): Four studies evaluated BSI risk over time for percutaneous central catheters. Low quality evidence suggested that the odds or risk for CLABSI, catheter-related BSI, or catheter-related sepsis was higher the longer a percutaneous central catheter was in place.

Draft recommendation: Discontinue percutaneous central catheters as soon as they are no longer needed. **(Category IB).**

HICPAC Discussion:

Catheter dwell times (umbilical catheters): Four studies evaluated BSI risk for patients with umbilical catheters. Very low quality evidence suggested that longer dwell times were associated with higher odds or risk of a BSI-related outcome; however, time periods varied between studies.

Draft recommendation: Discontinue functioning umbilical catheters as soon as they are no longer needed. **(Category IB).**

No recommendation can be made about the duration a functioning umbilical catheter can remain in place. (**Unresolved issue**).

HICPAC Discussion:

Taking out catheters may mean inserting other devices with their own risks. Maybe those potential consequences should be mentioned in the recommendation.

In the studies, the catheters were taken out and then replaced with another. The data do not show a clear answer as to whether leaving a catheter in after 7 to 10 days is more risky than putting in a new one.

Central line tip placement for lower extremity peripherally inserted central catheter: One study evaluated the effect of different catheter tip locations in catheters inserted in the lower extremities. Very low quality evidence suggested there was no difference in catheter complications between catheters terminating in the upper vena cava versus the lower vena cava.

Draft recommendation: Consider allowing peripherally inserted central catheters inserted into the lower extremity veins to terminate in either the upper or lower vena cava. (**Category II**).

Skin antiseptics: Four studies addressed the effect of or toxicities associated with skin antiseptic use for catheter insertion and/or maintenance. Moderate quality evidence suggested that there was no difference between 2% chlorhexidine and 10% povidone iodine used at catheter insertion and during dressing changes to prevent BSIs or catheter tip colonization, but that both chlorhexidine and povidone iodine might be associated with toxicity. The efficacy evaluation was based on one small, underpowered RCT.

Three studies evaluated thyroid toxicities, and two found elevated thyroid stimulating hormone levels among neonates exposed to povidone iodine. One study evaluated cutaneous toxicities and found no difference in severe contact dermatitis between neonates treated with either povidone iodine or chlorhexidine gluconate. Low quality evidence suggested that there were rarely adverse events associated with one-time chlorhexidine bathing of newborns, although several studies found measurable levels of chlorhexidine in blood or feces.

Draft recommendation: No recommendation can be made about the preferred antiseptic for catheter insertion and exit site care. (**Unresolved issue**).

Next steps: After HICPAC feedback is incorporated into the draft recommendations, they will be cleared by CDC and submitted to the Federal Register for public comment. At a subsequent HICPAC meeting will review the public comment, after which the guidelines will be finalized and submitted to final CDC clearance.

Public Comment Period 2

Judye Reed and David Brett from Smith & Nephew commented that Smith & Nephew believes that, based on illustrative evidence and expert opinion, antimicrobial dressings can play a significant role in the prevention of surgical site infections as part of a comprehensive infection control program.

Smith & Nephew asked the committee to reconsider the evidence and add language to the guidelines recommending the use of antimicrobial barrier dressings because they:

- provide antimicrobial barrier protection
- are widely available in many formats and cost-effective
- provide sustained antimicrobial activity for up to 7 days to protect patients when moving between healthcare settings or when discharged
- reduce need for dressing changes due to longer wear times
- allow options for risk stratification

In the 1999 guideline for SSI prevention, there was a statement about postoperative incision care to protect the sterile dressing, which was given a Category IB grade. Will this be part of the future guidelines? The HICPAC should be aware that the majority of SSIs occur post-discharge, and most are not reported.

Steve Brash, RN, ICP, who works in infection control leadership at Sacred Heart Hospital in Wisconsin, thanked the CDC and HICPAC for keeping its meetings open to the public.

Liaison and Ex Officio Reports

AHRQ: Dr. Baine's report was submitted in writing.

NIH: Dr. Henderson's report was submitted in writing.

CMS: Dr. Schwartz commented that collaboration between CDC and CMS is getting better and better. An infection control worksheet for ambulatory surgical centers has revealed a number of infection control deficiencies, which have improved over time but are still concerning. CMS's Patient Safety Initiative will survey hospitals on their quality assessment, performance improvement, discharge planning, and infection control procedures, and help them identify areas for improvement.

FDA: Dr. Murphey provided a written report with a few more recent updates. New strains of the influenza vaccine for 2013/14 have been identified. The H1N1 strain will be the same, with minor changes to H3N2 and influenza B strains. They will be posted on the FDA website soon. Two new food recalls of canned tuna fish and salmonella-contaminated dog food are also on the website. FDA is also recommending that products not made with natural rubber latex stop using an inaccurate label which says "latex-free." FDA has also found that Striker high-suction devices can use too much suction and have resulted in deaths. Dr. Murphey urged members to see whether these devices are in use in their institutions.

APIC: Ms. Aureden stated that this year is APIC's 40th anniversary. APIC recently completed a two-day educational conference in Baltimore on the topic of *C. difficile* infections. A new open-access guide on *C. diff* infection prevention is on the APIC website. Michael Anne Preas will be the APIC representative at the next HICPAC meeting.

DNV Healthcare: Mr. Horine explained that DNV Healthcare is an approved accreditation organization recognized by CMS. DNV has developed a Managing Infection Risk (MIR) standard, which allows organizations to audit themselves and demonstrate compliance with third-party standards for infection control.

Public Health Agency of Canada: Ms. Dunn pointed members to three new infection prevention guidelines posted by the Public Health Agency of Canada recently. A hand hygiene document has also been approved for release. A guideline on infected healthcare workers with bloodborne pathogens and one on personal service establishments (such as tattooing and piercing establishments and spas) is being started. Implementation efforts will target smaller organizations with fewer resources.

NACCHO: Dr. Gaviria presented a few highlights from NACCHO's written report. NACCHO has drafted summaries on local health department involvement in the fungal meningitis outbreak. NACCHO is also collaborating with CDC on the HAI prevention demonstration program.

The Joint Commission: Ms. VanAmringe described The Joint Commission's hand hygiene module, which allows healthcare organizations to identify the causes of their problems with hand hygiene compliance and choose tested solutions. The module has produced hand hygiene compliance improvements of 40% on average. A project on preventing sepsis mortality is now in the analysis phase, and it has identified some causes of failure to identify patients with sepsis and intervene quickly.

AORN: Ms. Wood stated that AORN's 60th National Congress was held last week. The 2013 Perioperative Standards and Recommended Practices has been published.

SHEA: Dr. Rupp stated that SHEA is about to publish a white paper on core infrastructure needs in infection control and a guideline on infection control practices in Ronald McDonald Houses. Work on the compendium of implementation practices is well under way. Several expert guides on healthcare worker attire and on pet therapy will come out this year; they focus on expert opinion, not on evidence review

Consumers Union: Ms. McGiffert stated that Consumers Union is working to preserve current reporting requirements in Washington State for surgical infections related to cardiac surgery and hip and knee replacements. The campaign to discourage Trader Joe's from selling meat with antibiotics is in progress. Consumers Union is also involved in the Choosing Wisely campaign, intended to help patients avoid unnecessary medical procedures; in particular, questioning unnecessary use of antibiotics.

CSTE: Dr. Kainer noted that CSTE's annual meeting in June will include lots of work on HAIs and antimicrobial resistance.

Society for Hospital Medicine: Dr. Chernetsky Tejedor noted that hospitalists are on the front lines of the implementation efforts that were discussed today. SHM is collaborating with CDC and other organizations on better use of information technology to improve care, and is also working on the Choosing Wisely campaign.

NAPH: Dr. Munoz-Price stated that NAPH ranks its hospitals monthly based on the information hospitals provide to NHSN. NAPH will be working with The Joint Commission to improve hand hygiene compliance among its members.

Society of Critical Care Medicine: Dr. Howell noted that the Society supported new sepsis care measures which were endorsed by the National Quality Forum this month. The Society is involved with the production of the implementation guide and represented on the ventilator-associated events working group. Guidelines on care of patients with severe sepsis and septic shock, on patients with pain, agitation, and delirium, and on using insulin in the ICU population have been adopted.

Surgical Infection Society: Dr. Sawyer stated that the Surgical Infection Society is a smaller group of surgeons concerned with infection. The Society publishes guidelines and has a journal, Surgical Infections.

ACIP: Dr. Elward stated that three ACIP recommendations have been published since the last HICPAC meeting, on Tdap in pregnant women, infant meningococcal vaccination, and on pneumococcal vaccination for adults with immunocompromising conditions. Quadrivalent tissue-based influenza vaccine will be available for the next flu season.

HICPAC Discussion:

Some have suggested that doing RCTs which evaluate products intended for surgical site infection prevention is impractical because of low event rates. However, several recently published RCTs, particularly for colorectal surgery, show high infection rates, and reviews of institutions with high infection rates often show that the true infection rate is four times what is reported in routine surveillance. This means that studies with tens of thousands of participants are not necessary, because smaller studies are sufficiently powered to detect a decrease in SSI rates, especially with very commonly used products such as drapes, dressings, or sutures.

Recess

With no further discussion or business brought before HICPAC, Dr. Fishman recessed the meeting at 5:31 p.m.

Opening Session: March 15, 2013

Jeffrey Hageman, MHS
CDC/NCEZID/DHQP
Deputy Chief, Prevention and Response
HICPAC Designated Federal Official

The Designated Federal Official, Mr. Jeff Hageman, opened the floor for introductions of HICPAC voting members, ex officio members, and liaison representatives who were in attendance.

Mr. Hageman confirmed that the voting members and ex officio members in attendance constituted a quorum sufficient for HICPAC to conduct its business. He called the meeting to order at 9:05 a.m.

Update on Multistate Outbreak of Fungal Meningitis and Other Infections Associated with Contaminated Steroid Injections

J. Todd Weber, MD
Chief, Prevention and Response Branch, DHQP, and Incident Manager, CDC Response to Multistate Outbreak of Fungal Meningitis and Other Infections

Dr. Weber described the response to the recent outbreak, which is the largest HAI outbreak ever reported in the United States. The CDC response was conducted jointly by DHQP and the Mycotic Diseases Branch. CDC also collaborated with state and local health departments nationwide, and with FDA, CMS, and individual clinicians.

After patients were informed that they had been exposed and needed to seek care, the next step was to develop clinical guidance on patient care. CDC engaged six expert mycologists with experience in fungal infections. Their work resulted in real-time development and dissemination of recommendations for patient care, which were able to evolve as the situation changed. CMS used CDC guidance as the basis for modifying indications for diagnostic testing, treatment, and eligibility for reimbursement.

Laboratory support was essential to the CDC response. At the beginning of the outbreak, fungal diagnostics for cerebrospinal fluid did not exist, but in two days, a novel PCR test was developed.

Current status of the outbreak: As March 11, 722 cases have been reported to CDC, with 50 deaths, although it cannot be determined whether all the deaths were due to the reputed infection. At the beginning of the outbreak, meningitis was the predominant

syndrome, but later, paraspinal and spinal infections became more prevalent. Joint infections and stroke without lumbar puncture were also observed. Michigan and Tennessee had the greatest number of cases, but 18 other states were affected.

About five cases a week continue to be reported. A long-term follow-up study is planned to track the clinical course of these patients. There is the possibility of a case control study to address some unanswered questions, such as risk factors for infection among the exposed and why some states and clinics had high attack rates.

HICPAC Discussion:

Was it surprising that such a large population got the injections? Actually, Dr. Weber said, this is a popular procedure among patients with pain, and pain clinics are common. The fact that the manufacturer sent shipments of drugs this size to so many different clinics accounts for the size of the outbreak.

It might be interesting to see how many injections were given in high-volume pain clinics, as opposed to primary care clinics. Some patients got steroid injections the first time they complained of pain. Dr. Weber replied that virtually all the injections were given in specialty clinics.

Dr. Bell stated that the steroid injections were not being badly administered, so far as we know. The bad conditions at one compounding pharmacy, which was operating without FDA oversight because the drugs were being given off-label, are to blame.

We should look at this in the context of the overtreatment and reckless off-label use of drugs which many consumer advocates are concerned with.

The repeated diagnostic tests done on exposed individuals and therapy given to patients present the risk of iatrogenic harm. Is CDC following up on this issue? Dr. Weber said that the long-term follow-up is intended to capture that issue. The states are doing early tracking of patients, and there have indeed been complaints of post-lumbar-puncture headaches and of adverse effects associated with use of voriconazole.

Draft Guideline for Infection Prevention in Healthcare Personnel

David T. Kuhar, MD

Medical Epidemiologist, Prevention and Response Branch

Dr. Kuhar stated that the U.S. Public Health Service's updated recommendations for post-exposure prophylaxis after occupational exposure to HIV will be coming out soon. The new recommendations will:

- Recommend three or more drugs for all exposures, rather than using risk stratification to recommend either two or three
- Update the list of medications to include newly developed drugs
- Present options for completing post-exposure testing sooner with new testing platforms

The draft guideline for infection prevention in healthcare personnel will be reminiscent of the previous 1998 document, Dr. Kuhar said. It will include systematic literature reviews and expert opinion, with GRADE methodology applied to key questions.

The guideline will cover only infection prevention topics. The intent is to avoid duplication of recommendations and to reference other guidelines when appropriate.

Dr. Kuhar presented an outline:

Section I: Baseline infrastructure and routine practices

- Introduction
- Methods
- Infection prevention objectives for an occupational health service
- Elements of an occupational health service for infection prevention
- Coordinated planning and administration
- Healthcare provider medical evaluations
- Pre-placement evaluations
- Periodic and episodic exams
- Healthcare provider health and safety education
- Immunization programs
- Management of job-related illnesses and exposures
- Health counseling and wellness
- Maintenance of records, data management, and confidentiality

Section II: Specific infectious diseases: epidemiology, prevention, and control of selected infections transmitted among healthcare providers and patients

- Isolation precautions
- [Sections for specific infectious diseases]
- Potential agents of bioterrorism

Section III: Special healthcare provider populations

- Introduction and privacy-related issues
- Pregnancy
- Immunocompromised healthcare providers
- Laboratory personnel
- Emergency response employees
- Healthcare providers with disabilities
- Americans with Disabilities Act
- Personnel linked to infectious diseases outbreaks
- Healthcare providers traveling in nontraditional healthcare settings

Currently, CDC is drafting Section I, and a systematic literature search strategy has been developed. When a draft is finished, it will be shared with the HICPAC for input.

HICPAC Discussion:

Dr. Kuhar asked for HICPAC's input on the Section I outline.

There should be a specific person assigned to coordinate infection prevention efforts. Dr. Kuhar agreed, and added that outsourcing of occupational health services also requires emphasis upon integrated planning and administration of infection prevention.

Does the guideline address how to manage ill personnel or those implicated in outbreaks? Yes, that will be addressed primarily in Section II.

Respiratory protection programs and sharps injury prevention programs should be included in the outline. Dr. Kuhar said these will be covered under the tuberculosis and bloodborne pathogen parts of Section II.

Will informatics efforts, such as tracking vaccination, be included in the infrastructure section? Dr. Kuhar replied that the guideline will say that data should be tracked and uploaded to NHSN, without specifying how that should be done.

Some hospitals are not aware of these techniques. Perhaps the guideline should say that consideration should be given to interoperability, particularly with immunization registries. Because of the lack of information-sharing, many immunization programs inefficiently re-immunize their employees.

Proper vaccine handling and management should be mentioned, since very little is currently known about that in the occupational health field.

Should we specify who should be covered by an occupational health program, so that such a program is not too exclusive? However, it should be clear that the hospital does not have responsibility for every person who walks through the doors. Dr. Kuhar said that the guideline will define "healthcare personnel."

Will the guideline apply just to acute care settings, or to long-term care as well? The guideline is intended to be broadly applicable, but is being drafted with acute care in mind.

Will the guideline specify parameters for medical exemption programs for vaccines? No, although it will cite ACIP guidance on that topic.

Draft Guideline for Prevention of Infections Among Patients in NICUs (continued)

Alexis Elward, MD, HICPAC

Dr. Elward finished her presentation from the previous day by discussing the implementation document, which will pair with the CDC guidelines. SHEA will lead the writing of this document.

There is not enough evidence to make a formal recommendation on several implementation-related topics, but they are of concern for stakeholders and will be included in the implementation documents. These topics include:

A) Respiratory pathogens

- Isolette distance for patients on contact isolation if no private room available
- Cohorting of undifferentiated suspected viral illness
- Specific agents for post-exposure prophylaxis
- Pertussis serology

B) MRSA

- Active surveillance testing (patient population, interval, and anatomic sites)
- Discordant multiples

C) Topics suggested by HICPAC

- Hand hygiene promotion
- Who and how to educate on central venous catheter care
- Definition of “trained” personnel
- Definition of dedicated percutaneous central line care team

Dr. Yokoe asked members from other liaison organizations to contact her if they are interested in participating in drafting the implementation document.

Update on NHSN Ventilator-Associated Event (VAE) Surveillance

Shelley Magill, MD, PhD, DHQP

Background: The new VAE surveillance definitions were developed by the VAE working group and implemented in NHSN in January 2013. The new approach includes more general measures of ventilator-associated conditions and complications, and replaces the older ventilator-associated pneumonia (VAP) measure.

As of March 1st, 558 healthcare facilities have included VAE in their reporting plans for at least one month. CDC has provided a VAE calculator and worksheets to help with implementation.

The VAE definition algorithm works as follows:

First, if a patient is on mechanical ventilation for more than two days, and has a baseline period of stability or improvement followed by a sustained period of worsening

oxygenation, that person is determined to have a ventilator-associated condition (VAC). If the person also shows evidence of infection or inflammation, his condition will be deemed an infection-related ventilator-associated complication (IVAC). If there are positive results from microbiological testing, then the condition will be deemed a possible or probable ventilator-associated pneumonia (VAP).

Challenges:

- Mechanical ventilator terminology is complex and has raised many questions
- Changes to the algorithm may be necessary to deal with VACs that are detected as a result of usual processes of care or differences in ventilator management preferences among providers
- The IVAC list of eligible antimicrobial agents is broad, including drugs not used to treat respiratory problems, and has caused confusion
- Narrowing the spectrum of therapy can occasionally result in an IVAC determination
- Variability in reporting of respiratory specimen Gram stain results may render some hospitals unable to use or rarely able to use the probable VAP definition. Modifications to the algorithm might be necessary.

In the future, CDC will:

- Continue IT work to make VAE surveillance easier and more accurate
- Consider possible future modifications to the algorithm, in collaboration with the VAE working group
- Continue collaborations with partners to fill VAE knowledge gaps

HICPAC Discussion:

What is the status of the pediatric VAE definition? There is a working group on the issue, and discussions continue, although it has been challenging.

One member said that the amount of time spent doing VAE surveillance in her hospital has significantly decreased. However, not all hospitals are able to put FiO₂ or PEEP values in an electronic system, so not everyone who is ventilated can be surveyed. Dr. Magill stated that the intent is for all VAE surveillance ultimately to be automated; it is possible to do it manually, but that will involve more work. CDC is working with software vendors to work out implementation challenges.

The National Database of Nursing Quality Indicators is still measuring VAPs, not VAEs. Some facilities therefore have to do both VAP and VAE surveillance. CDC should discuss the need for harmonization with NDNQI.

Which categories of data will be reported out? CDC is working on ways to analyze data at the facility level in order to help individual institutions improve. It will take some time before national aggregated data is available for reporting. Either the overall VAE rate or the IVAC plus VAP rate will probably be appropriate for the purposes of comparing different

facilities.

It is laudable that the definitions use objective, discrete data elements, that will ultimately be pulled from electronic records.

NHSN Surveillance Update: SSI Definitions

Ryan Fagan, MD, MPH

Medical Epidemiologist, DHQP

At past HICPAC meetings, CDC received input on several NHSN surveillance definition changes and had organized a working group to outline the issues for HICPAC to consider. The following are the changes that CDC is making based on HICPAC's input.

Dr. Fagan reviewed the changes made to NHSN SSI surveillance definitions in 2013.

- Definition of primary incisional closure was changed to include all incisions with some closure to the level of the skin
- Implant variable is no longer used to determine length of follow-up and was removed from data collection requirements.
- Follow-up period was changed to reflect procedure categories.
- Changed label "endoscope" to "scope"
- The phrase "appears to be related to the operative procedure" was removed from deep and organ space SSI criteria as too subjective
- NHSN principal operative procedure category selection lists were updated

The changes planned for 2014/2015 are:

- A new definition of operative procedure will remove the requirement that incisions be primarily closed. NHSN will also collect information about type of closure.
- New fields will be added: all procedures will have fields for type of closure, height, weight and diabetes status. "Transoral" will be added as a type of approach for spinal fusion or refusion procedures.
- NHSN will transition to CPT code-based procedure categories, and will not support ICD-10 categories
- The Musculoskeletal Infection Society definition of periprosthetic joint infection will be adopted. This includes new fields for "sinus tract" and "positive culture from greater than 2 separate tissue or fluid samples from the affected joint."
- The phrase "diagnosis of SSI by the surgeon or attending physician" will be dropped from deep and organ space SSI criteria.
- A new variable "prior infection at the index joint" may be added for hip and knee arthroplasty SSIs
- A new ICD-9 code-based admit and readmit surveillance tool for colon and hysterectomy SSIs will be required

- A new PATOS (“present at the time of surgery”) variable will be added to SSI event forms.
- For superficial and deep SSI, the criteria will be changed to “deliberately opened or otherwise drained by a physician or his/her designee.”
- If the SSI involves both an incision and an organ space, the SSI will be classified as organ space.

- A spinal abscess with meningitis will be classified as SSI-SA (spinal abscess).
- The Association of Anesthesia Clinical Directors' definition of operative duration will be adopted, due to the removal of the incisional closure requirement.

The best method for post-discharge surveillance remains an open issue. The input received was evenly split on whether to eliminate the post-discharge surveillance requirement or to replace it with one of a number of proposed approaches.

HICPAC Discussion:

Post-discharge surveillance is essential to determine what infection rates truly are, since a great proportion of SSIs occur post-discharge, and there is huge variability across hospitals.

Neglecting post-discharge surveillance risks the unintended consequence of dismissing valid study results which could lead to better practice because they show an SSI rate higher than what is commonly reported.

For instance, only one trial showed a significant benefit for preoperative bathing in reducing SSI, and that trial has been criticized for having a high SSI rate out of proportion with what is usually reported. However, further research suggests that the trial's high SSI rate was likely accurate, since SSIs are commonly underreported, because of inconsistent post-discharge follow-up, among other considerations. The heavy surveillance characteristic of trials is likely more accurate.

Why was the choice made to use CPT code-based categories? CPT codes are more specific to the procedure done than ICD codes, and the surgical professional societies that were consulted believed they were better for quality measurement.

Length of hospital stays is expected to decrease, so, if post-discharge surveillance is omitted, what NHSN measures will change over time as time that previously would have been spent in the hospital becomes post-discharge time.

Post-discharge surveillance is currently required, but most public reporting excludes cases identified post-discharge. Truly effective post-discharge surveillance would require policy changes, technology, labor force investment, and ultimately, a less fragmented healthcare system.

How will historical trends in SSI rates be monitored, given these definitional changes and the new reliability-adjusted SIRs? Dr. Fagan acknowledged that the changes will limit CDC's ability to make historical comparisons; new baselines might have to be established using the new definitions.

Update on NHSN Antimicrobial Use and Resistance Surveillance

Scott Fridkin, MD

Medical Officer and Deputy Chief, Surveillance Branch, DHQP

The Surveillance Branch monitors antibiotic use and resistance in three ways:

- 1) Enhancing use of existing NHSN-reported data on antimicrobial resistance
- 2) Implementation of the antimicrobial use and resistance module in NHSN
- 3) Assessments of antimicrobial use through the 2011 EIP Antimicrobial Use and HAI Point Prevalence Survey

The Alert Initiative uses existing data on antimicrobial resistance to give an automated response to unusual phenotypes. A pop-up window will appear when an unusual phenotype is entered. Users will be prompted to check the accuracy of the data entry, verify it with the lab, save the isolate, and report to public health authorities if applicable, and will be given brief transmission prevention information.

A monthly alert message will report on data quality and list events with unusual phenotypes. The monthly alert requires that users verify the data entered again. A response is required for only the first three events per year, for some phenotypes. A third tier of alert generation will generate a report of unusual phenotypes observed in a facility or group.

The Summary Resistance Measures initiative will enhance the analytic capacity of NHSN software to provide group users with line lists of patients with key antimicrobial-resistant phenotypes; this list will supplement the Alert Initiative to include more traditional resistance concerns. This initiative is intended to enhance use of existing HAI data for group and facility users, and has the potential for regional reporting.

Ways to summarize percent resistance are also being explored. HAI-type-specific summary resistance measures are being pursued, as well as a second infection-based measure. Exploratory work on an adjusted summary percent resistance measure, which would work similarly to the reliability-adjusted SIR, has also been done. Age was found to be the most significant predictor of percent resistance. However, the benefit of such an adjusted measure is still being determined. Publishing either adjusted or crude percent resistance numbers by states is a possibility.

The antimicrobial use and resistance module in NHSN is intended to provide a mechanism for facilities to report and analyze antimicrobial resistance data from clinical specimens, in order to aid in clinical decisions, identify emerging resistance early, and prevent transmission. Standardized antibiograms could aid in clinical decision making. Implementation guidance is now being drafted; the module will rely solely on electronically captured data.

NHSN surveillance of antimicrobial use in healthcare settings: Optional NHSN surveillance of antimicrobial use is intended to support hospitals in their antimicrobial stewardship

efforts and assist them in collecting data. The system is ultimately meant to risk-adjust usage patterns based on location types and inform hospitals how their usage of antimicrobials compares to their risk-adjusted peers. Sixteen hospitals are currently reporting data into the system, and the goal is to recruit 70 facilities by the end of the calendar year and to make the initiative scalable. The largest obstacle observed so far is availability of facility IT staff.

HICPAC Discussion:

This is an important effort to provide context around outbreaks of multiple-drug resistant infections. The use of an approach which uses high reliability concepts to improve data quality is praiseworthy.

In the future, will it be possible to use some of this data to judge appropriateness of antimicrobial use? That is one of the goals of the project, but it will take time.

If age is a risk factor for antimicrobial resistance, why would we want to adjust for it? Dr. Fridkin said that, for example, if a relatively small state has a large pediatric population, it may have a very low crude percent MRSA, but adjusting for the youth of the patient population could reveal a problem with MRSA.

These initiatives could help coming to a definition of what a “highly drug-resistant organism” is. Caution is called for in pre-defining categories of organisms that will be reported; we should include some flexibility to allow response to emerging pathogens.

NHSN should consider collecting data on antimicrobial use in modules directed to other parts of the healthcare system, such as long-term care facilities. Dr. Fridkin said that electronic reporting systems are less prevalent in long-term care, but the possibility is being discussed.

Phenotypic signals from laboratories are low in specificity for epidemiologically important genotypes; the opportunity for labs to submit isolates for confirmatory testing and genotypic evaluation is promising. There may be a need for a feedback loop from CDC to labs for quality control of reported data.

More advocacy for the use of healthcare IT resources would help this sort of reporting be done. Excessive investment in syndromic surveillance capability may take resources away from antimicrobial resistance surveillance.

Closing Remarks

Dr. Fishman noted that HICPAC provided considerable input into two draft guidelines and looks forward to seeing additional drafts.

Certain core practices, such as hand hygiene and skin antisepsis, should always be done, and it is not necessary to conduct a separate evidence review on the value of these core

practices in every practice area for subsequent guidelines. Having HICPAC outlining these core practices would be useful as a preface to the guidelines. Dr. Carrico, Dr. Yokoe, and Ms. Pugliese volunteered to work on this effort.

Public Comment Period 3

David Brett of Smith & Nephew suggested that the SSI writing group should look at RCTs published after 2001 looking at SSI reduction using topical antimicrobial agents. Also, there is new in vitro data on topical antimicrobial agents showing bactericidal activity against certain CRE strains. Mr. Brett also stated that surveillance of post-discharge SSIs is important.

Closing Session

With no further discussion or business brought before HICPAC, Dr. Fishman adjourned the meeting at 11:43 a.m. on March 15, 2013.

I hereby certify that, to the best of my knowledge, the foregoing minutes of the proceedings are accurate and complete.

Date

Neil O. Fishman, MD,
Chair, Healthcare Infection Control
Practices Advisory Committee