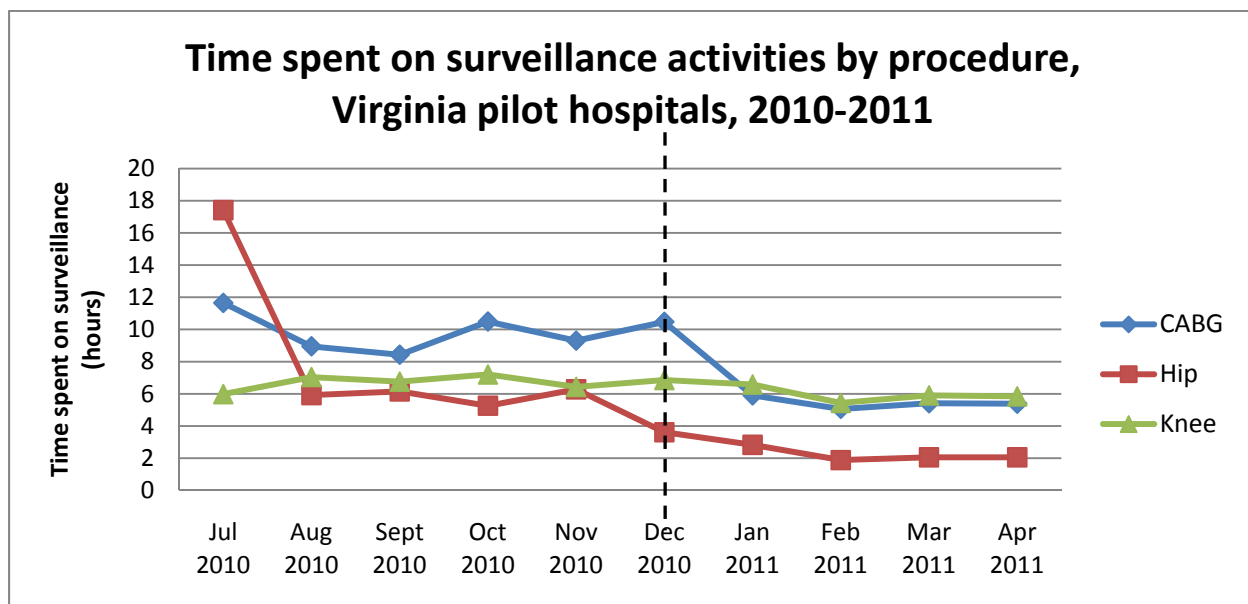


# Components to help build a business case for selecting and using a vendor to automate electronic data upload into the National Healthcare Safety Network for infection prevention purposes

## August 10, 2011

### Time and effort and cost/benefit analyses

1) Time and effort analyses from SSI surveillance pilot, Virginia, 2010-2011



Hours spent on data collection and reporting during the first 6 months of the pilot			
	CABG (n=5)	Hip (n=6)	Knee (n=6)
Average of hours spent	10	7	7
(min, max)	(3, 28)	(1, 66)	(1, 25)

- The procedures represented above are considered less burdensome to collect than the colon procedures because they include fewer ICD-9 codes, have fewer required fields, and the definitions are more straightforward
- Therefore, the time spent on the procedures above should not be used as an equivalent estimate for more complicated procedures such as colectomies, but as an indicator that denominator collection is complicated, variable, and necessitates automation to maintain other important IP activities

2) Cost analysis of SSI following colectomy at Mayo Clinic, Rochester, MN

Used National Surgical Quality Improvement Project data to compare hospital billing cost of colectomies without any post-op complications (n=1881) to colectomies with *only* a post-op SSI adverse event (n=161).

Type of SSI	Number of Procedures	Average excess cost per SSI
Any SSI	161	\$4,029
Superficial SSI	98	\$2,093
Deep SSI	13	\$10,929
Organ SSI	50	\$14,634

Data from Dr. Robert Cima, Vice-Chairman, Department of Surgery, Mayo Clinic  
 “Accelerating Healthcare-Associated Infection Elimination: Health System, Hospital, and Government Leadership Collaboration Webinar – 10/28/10” – unknown what year study was conducted. Assume excess cost estimates are for initial inpatient visit ONLY.

**Overview of NHSN and electronic import**

- Two ways to upload data electronically into the National Healthcare Safety Network (NHSN)
  - Clinical Document Architecture (CDA)
    - Health Level 7 (HL7) standards used to provide a consistent format framework for electronic documents
    - Not all vendors have the capacity to create documents in this HL7 framework
      - Participants in 2007-2008 CDC pilot activities for BSI and SSI reporting with CDA capacity:
        - MedMined™ from Cardinal Health
        - EpiQuest
        - ICPA (now BD Diagnostics) – also known as AICE
        - Premier
        - TheraDoc
        - Vecna Technologies
      - Vendor name, contact name, and e-mail for CDA-compatible vendors ([www.apic.org](http://www.apic.org) → Guidelines & Standards → Surveillance Technology Resources)
 

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○ EpiQuest	Bonnie Taggart	bonniet@epiquest.com
○ BD Diagnostics	Debra Slapak	debra_slapak@BD.com
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○ Theradoc Hospira, Inc	Susanne Miller	Susanne.miller@hospira.com
○ SafetySurveillor® by Premier	Steve Pennock	steve_pennock@premierinc.com
○ Senti7 by PharmacyOne	Andy Strunk	andy.strunk@pharmacyonesource.com
○ Atlas Development Corporation	Nancy Heritage	nheritage@atlasdev.com
○ VigiLanz Corporation	Adam Klass	aklass@vigilanzcorp.com
○ RL Solutions	Pansy Lee	plee@rlsolutions.com
      - Requires follow-up with vendor if errors occur
      - **Note: VDH does not endorse any specific vendor(s)**
    - Comma delimited ASCII file (.txt or .csv) created by the facility

- Can be generated from different external sources, such as infection prevention databases or hospital information systems
  - Requires assistance of operating room and/or IT staff
  - Specifications for values, format, and data requirements must be followed
- Specifications and instructions available on NHSN website
  - [http://www.cdc.gov/nhsn/CDA\\_eSurveillance.html](http://www.cdc.gov/nhsn/CDA_eSurveillance.html)
  - [http://www.cdc.gov/nhsn/PDFs/ImportingProcedureData\\_current.pdf](http://www.cdc.gov/nhsn/PDFs/ImportingProcedureData_current.pdf)

## Data import lessons from the VDH SSI surveillance pilot

- Onset of SSI pilot = 0 facilities electronically uploading SSI data
- End of SSI pilot = 8 facilities electronically uploading SSI data
- Received feedback from 6 of 8 hospitals who began electronic import of data during pilot project
  - 4 used Clinical Document Architecture (CDA) technology
    - 3 AICE, 1 unspecified vendor
    - Decreases in monthly surveillance effort after implementing CDA
      - 8 hours to 2 hours
      - 8 hours to 1 hour
    - Time required to set up import averaged several months
  - 2 used .csv file
    - Decreased monthly surveillance effort in one hospital from 5 hours to 1 hour
    - Took 2 months for one hospital to set up its file transmission
  - 2 hospitals used DICOM to help with their electronic import
  - 4 of these hospitals used Meditech for their patient medical records
- Lessons learned:
  - Electronic medical record system (EMR) is necessary for the electronic upload and any movement towards increased use of EMR would be of help to the facility
  - Team approach required (quality, IT, other departments)
    - Establish importance of support of the infection prevention program on a local level first
    - IT support is critical for implementation and to address data quality – manual system checks should be implemented and any changes should be discussed with and made by IT or the vendor (depending on type of electronic import)
  - Vendor representative was able to set up a virtual meeting to show several hospitals the system at once – this allowed the IP to quickly communicate information to others in her facility
  - One hospital noted that it was beneficial that the operating room system already collected the required NHSN variables
  - Helpful to talk to other facilities using the same systems and see if they have been able to set up a file transfer
    - Sometimes easier for facility IT staff to talk to each other rather than IP trying to explain to IT what is needed
- Challenges:
  - One hospital reported that the biggest challenge was writing the data dictionaries – needed to set up the various components at the same time and assure the dictionaries were written to include all those elements needed for NHSN download, which may be problematic as NHSN continues to make changes to the definitions and required fields
  - Translating OR codes to ICD-9 codes was also reported to be a challenge

## Talking points about SSI surveillance and electronic upload of data

- Infection preventionists (IPs) are spending an increasing amount of time collecting and entering surveillance data, detracting from time that can be used to analyze and disseminate data, educate staff and patients, or implement prevention measures
  - A 2009 article in the *American Journal of Infection Control* by Stone et al. on infection control program structure indicated that infection preventionists spend about **fifty percent** of their time performing infection surveillance activities.
    - Almost two-thirds (64%) of the infection preventionist (IP) respondents to the 2010 Virginia acute care infection prevention needs assessment noted that they spend >40% of their time on infection prevention activities
      - Of the time spent on surveillance, on average, IP respondents spent ~60% of their time on the following activities: analyzing data/generating reports (15%), reviewing charts (15%), reviewing laboratory reports (13%), entering data (11%), and using NHSN (4%)
  - NHSN has helped to standardize definitions by requiring a number of fields to be completed, allowing for comparability and reliability within and between healthcare facilities; however, the trade-off for increased data quality is an increase in time spent collecting and entering these data
  - Data collection and reporting divert resources away from prevention efforts that require IP skills and expertise
    - One solution to help balance priorities is to enhance IT support and use electronic data systems to meet the needs of state and federal reporting requirements by automating processes that do not require an IP's specialized skill set
      - Ties directly into national efforts to promote health information exchange and Meaningful Use
      - Creating and maintaining a flexible IT infrastructure is a valuable investment because it will allow the hospital to respond to future reporting requirements in the changing healthcare landscape
      - IT support also needed to maintain CDC digital certificates
- In 2012, electronic upload of data will be helpful for SSI reporting to receive full payment if hospital is participating in the CMS Hospital Inpatient Quality Reporting System (surgical procedure data and surgical site infections),
  - Electronic upload can also be used to report device-day denominators (central line days and catheter days), central line-associated bloodstream infections (CLABSIs), urinary tract infections, central line insertion practices, and laboratory-identified multidrug-resistant organism or *Clostridium difficile* infections
    - In 2011, CLABSI reporting in adult, pediatric, and neonatal ICUs became a requirement for facilities to receive full payment if participating in the CMS Hospital Inpatient Quality Reporting System
  - June 2010 survey by *Infection Control Today* found that 62% of IPs are not currently using automated surveillance technologies
- Surgical site infection surveillance – different than surveillance for other types of healthcare-associated infections (HAIs)
  - Multiple steps and personnel are involved in pre-operative, perioperative, and post-discharge care of surgical patients, making the identification of root causes and opportunities for improvement difficult without a sophisticated surveillance system capable of extracting and mining process-related data

- Data must be collected on each procedure completed, not just on procedures where an infection results
- Each type of procedure (ex. colon surgery, hip replacement, coronary artery bypass graft surgery, etc.) has different required data elements
- Many infections may not manifest until after the patient is discharged from the hospital, so post-discharge surveillance is required
  - Surgeries with an implant require one year of post-discharge surveillance for infections, compared to one month for all other surgeries
- Electronic system needs to be capable of interchanging with infection prevention software, surgical software, electronic health record, and other data systems – often more systems are involved pulling together required SSI data elements than with other types of infections
- Electronic systems, infection preventionists, and other departments (i.e., quality) involved with HAI surveillance and prevention must work in tandem
  - Data collection and validation against NHSN rules can be automated to help identify possible infections for investigation, electronically document the infection, and provide post-discharge follow-up capability, but there is still a need for clinical judgment to properly identify an HAI

## General structure on building a business case

1. Purpose
  - Make sure the proposal addresses the business need that the project seeks to resolve.
2. Expected benefits:
  - Business: cost savings/avoidance, reduced length of stay
    - Show the direct attributable costs of HAIs and the benefits of prevention to the bottom line
    - Calculate % of HAIs in a given year by payer category to show that the majority of HAIs occur in patients for which the hospital receives the least reimbursement
    - Calculate the annual cost of HAIs in your hospital (see: Scott RD. *The Direct Medical Costs of Healthcare Infections in US Hospitals and the Benefits of Prevention*. CDC, DHQP March 2009.)
    - Determine the average length of stay for patients and the additional # of days stayed by patients with HAI or utilize published length of stay data for patients with HAI
  - Quality: infection elimination>> improved outcomes
  - Intangible benefits
3. Options (e.g. doing nothing, implementing bundle)
4. Expected costs / include risk of doing nothing
5. Gap analysis
6. Plan to communicate impact of plan / interventions

## Other resources

- HAI Reporting Crosswalk
- Infection Prevention and Control Surveillance Technology Assessment Tool (items to consider when selecting a vendor) – APIC
- Starter Questions for Assessing Capabilities of Surveillance Technology (ST) & Their Vendors - APIC

## Tips for preparing for, selecting, implementing, and evaluating a new electronic surveillance system

Some tips taken from “Going Live with Electronic Surveillance” by Stacy Pur and “How Electronic Surveillance Systems Help with CMS-Mandated CDC NHSN Surgical Reporting ([www.infectioncontrolday.com](http://www.infectioncontrolday.com))

- Preparation
  - Partner with the project manager early on – this may be an administrator or someone from the Information Technology (IT) department
  - Generate a list of desired components and prioritize components, if possible
  - Make sure all parties (infection prevention, quality, etc.) are at the table, especially with product demonstration
- Selection
  - What does the system provide and how will the tool help to prevent infections?
  - How well does the tool integrate with existing infection prevention software or other electronic health systems?
  - What are the associated costs? Initial setup, annual fee, other costs?
  - How flexible is the tool to respond to emerging/changing needs?
  - What type of alerts or reports can be produced?
  - How easy is it to display data inside the system? (charts, graphs, etc.)
    - Able to calculate SIR, benchmark to NHSN?
  - Does the system track processes or just outcomes?
  - Which NHSN-required data elements can be transferred into coded fields for analysis?
  - Who owns the data at the end of the contract?
  - How easy will the system be to learn or to teach to others?
  - What type of education or product support is available during implementation or on an ongoing basis?
- Implementation
  - Make sure the team is aware of what components have been purchased and what have not been
  - Make sure the team is aware of the implementation plan
  - Schedule training at the same time the system is going live, not weeks before; the sooner the users practice what they learn, the more likely they are to retain it
  - Assure that all IPs are documenting infections in the same way and consistent definitions are being used
- Evaluation
  - Assign people to validation who are detail-oriented, have a strong knowledge base, are comfortable with computers, and are not shy about pointing out problems
  - Start running internal error or validation reports before the end of the month to identify problems early
  - If applicable, assure that data are being transmitted appropriately to other data systems
    - Evaluate quality of data imported to NHSN to assure data are collected and mapped correctly
  - Keep an eye out for users who may need additional one-on-one training

## Specific information required to complete CMS reporting for SSI, CAUTI, and CLABSI

(NOTE: These tables represent codes and required fields as currently defined. These are subject to change. For the most recent forms from NHSN's Patient Safety Component, go to: <http://www.cdc.gov/nhsn/psc.html>)

ICD-9 codes associated with selected procedures (as of June 2011)		
Procedure and NHSN code	Description	ICD-9 codes (updated annually in October and altered in Table 1: NHSN Operative Procedure Category Mappings to ICD-9-CM Codes)
<b>COLO</b> Colon surgery	Incision, resection, or anastomosis of the large intestine; includes large-to-small and small-to-large bowel anastomosis; does not include rectal operations	17.31-17.36, 17.39, 45.03, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 46.03, 46.04, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94
<b>HYST</b> Abdominal hysterectomy	Abdominal approach with uterine removal	68.31, 68.39, 68.41, 68.49, 68.61, 68.69

Fields required for the catheter-associated urinary tract infection (CAUTI) event form (CDC 57.108)				
Patient info	Event info	Risk factors	Other event info	If pathogen(s) identified
Patient ID	BSI event	Urinary catheter status at time of specimen collection	Specific event (symptomatic UTI, asymptomatic bacteremic UTI, or other UTI)	Pathogen(s) name
Gender	Date of event	Location of device insertion (not required)	Signs and symptoms (check all)	Antibiotic sensitivity results for each pathogen (sensitive, intermediate, resistant, etc.)
Date of birth	MDRO Infection Surveillance (Y/N) (if in-plan)	Date of device insertion (not required)	Laboratory & diagnostic testing (check all)	
Date admitted to facility	Secondary bloodstream infection (Y/N)		Pathogens identified (Y/N)	
Location				
Died (Y/N)				

*Other fields that are not required:* SSN, secondary ID, name, race, ethnicity, post-procedure UTI, date of procedure, NHSN procedure code, ICD-9-CM procedure code, location of device insertion, date of device insertion, UTI contributed to death, discharge date

Fields required for CAUTI denominators [57.118 (all other ICUs)]
Location code
Month and year
Dates
Number of patients
Number of patients with a urinary catheter

Fields required for the surgical site infection (SSI) event form (CDC 57.120)				
Patient info	Event info	Specific criteria used	Other event info	Pathogens identified (Y/N)
Patient ID	SSI specific event (superficial, deep, primary, secondary, or organ/space )	Signs and symptoms (check all)	Pathogens identified (Y/N)	Pathogen(s) name
Gender	Date of SSI event	Laboratory (check all)	Secondary bloodstream infection (Y/N)	Antibiotic sensitivity results for each pathogen (sensitive, intermediate, resistant, etc.)
Date of birth	NHSN procedure code	Clinical diagnosis (check all)	How detected (admission, post-discharge, or readmission)	
Date admitted to facility	Date of procedure	MDRO Infection Surveillance Y/N (if in-plan)		
Died (Y/N)	Outpatient procedure (Y/N)			

Fields required* for the SSI denominator for Procedure form (CDC 57.121)		
Patient info	Procedure	Procedure details
Patient ID	Date of procedure	Outpatient (Y/N)
Gender	NHSN procedure code	Wound class (category)
Date of birth	If applicable, implant (Y/N)	Duration (hrs and minutes)
Height (ft and inches or meters)	If applicable, approach/technique (anterior, posterior, both, lateral transverse, not specified)	General anaesthesia (Y/N)
Weight (lbs/kg)		Emergency (Y/N)
Diabetes mellitus (Y/N)		Trauma (Y/N)
		Endoscope (Y/N)

\*NOTE: not all of these fields may necessarily be required for COLO or HYST; height, weight, and diabetes status are projected additions

Fields required for the primary bloodstream infection (BSI) event form (CDC 57.108)				
Patient info	Event info	Risk Factors	Other event info	Pathogens identified (Y/N)
Patient ID	BSI event	If ICU, Central line (Y/N)	Signs and symptoms (check all)	Pathogen(s) name
Gender	Date of event	If NICU, non-umbilical central line (Y/N), umbilical catheter (Y/N), birth weight (g)	Laboratory (check all)	Antibiotic sensitivity results for each pathogen (sensitive, intermediate, resistant, etc.)
Date of birth	NHSN procedure code and date of procedure (not required)		Pathogens identified (Y/N)	
Date admitted to facility			MDRO Infection Surveillance Y/N (if in-plan)	
Location				
Died (Y/N)				

Fields required for CLABSI denominators [57.116 (NICU) and 57.118 (all other ICUs)]
Location code
Month and year
Dates
NICU specific: birth weight category ( $\leq 750g$ , 751-1000 g, 1001-1500 g, 1501-2500 g, $>2500g$ )
Number of patients (or infants in each birth weight category)
NICU specific: number of infants in each birth weight category with umbilical catheters
Number of patients (or infants in each birth weight category) with 1 or more central lines