Hospital-Acquired Infection Drill Down Collaborative: Sharing Our Journey and Lessons Learned

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Overview

- Our Journey
 - Background
 - How did we start?
 - Where are we now?
 - Examples of Data Outputs
 - Where are we going?
 - What have we learned?



- Translating the Process into Community Hospital Setting
- **Q&A**



Background

- Our infection prevention and hospital epidemiology (IPHE) team historically drove initiatives to decrease hospital-acquired infections (HAI)
 - Interventions not always sustainable without local champion(s)
- Example: In 2017, hospital-onset C. difficile infection (HO-CDI) above target
- IPHE rolled out a HO-CDI case review tool (among many other interventions) to begin systematically tracking 5 key process metrics/contributing factors
- Performance on the 5 metrics informed the development and helped prioritize targeted countermeasures



Process Measurement & Data Feedback

- Five Metrics
 - Hand hygiene
 - Personal protective equipment
 - Environmental cleaning
 - Antimicrobial stewardship
 - Diagnostic stewardship
- Goal: to develop dashboard with process and outcome measure data





Early Stages of Culture Change

- 2018 Leapfrog Results
- Helped create a sense of urgency
- Organizational focus
- Increased resource allocation
- Still largely driven by IPHE, but better positioned to build a coalition
- Vision = shift focus to process (proactive) vs. outcome (reactive)





Leveraging Organizational Safety Culture Change

- In 2019, Duke University Hospital embarked on a transformational journey, implementing a new quality management system (QMS)
 - Team member engagement Everyone. Everyday.
 - Solving problems to root A3, PDCA, humble inquiry
 - Delineation of a clear help chain to remove barriers
 - Tiered huddles unit, service line, hospital, health system, university + health system
 - Improved communication closing the loop, sharing lessons more broadly





Increased Visibility, Engagement, and Accountability

- Case review findings reported out at the hospital level huddle by IPHE
- Report out transitioned to unit leadership, though case reviews still performed by IPHE
- With the help of QMS and quality coaches, transitioned some of the case review elements to the local team to foster understanding of process defects
- Birth of the "SWARM"



Overarching Goals of a SWARM

- To advance safety culture by enhancing engagement and accountability for infection prevention processes, promote interdisciplinary teamwork, and improve patient safety through hospital-acquired infection (HAI) reduction
- Leverage existing methodologies
- Align efforts with the Duke Quality Team



What is a SWARM?

- The term "SWARM" is based on the concept of 'swarm intelligence' in social insects such as bees, where the collective intelligence is greater than that of individuals.
- SWARMS have been used for problem-solving in the aerospace industry and more recently in US hospitals to improve RCA after patient safety incidents.
- Multidisciplinary team nurses, physicians, ancillary staff, administrative leaders, quality coaches, subject matter experts
- The primary goals of a SWARM are to find out: what happened and why it happened, and how to prevent it from happening again.





Motuel L et al. *Nursing Times* [online] 2017; 113: 9, 36-38. Li et al. Jt Comm J Qual Patient Saf. 2015 Nov;41(11):494-501.

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Overview of the SWARM Process



Li et al. Jt Comm J Qual Patient Saf. 2015 Nov;41(11):494-501.



SWARM steps

- 1. Introductory explanation of goal for the SWARM and statement of commitment to psychological safety
- 2. Introductions from *multidisciplinary team* to help "attack problems, not people"
- 3. Review of the facts prompting SWARM
- 4. Discussion of what happened, investigation of underlying system factors, theorizing what contributory factors led to the event
- 5. Conclusion with proposed focus areas for action and assignment of task leaders with specific deliverables and completion dates



Li et al. Jt Comm J Qual Patient Saf. 2015 Nov;41(11):494-501.

SWARM Pilot

- Unit with uptick in HO-CDI was chosen as pilot unit
- Initially, the multidisciplinary team would meet on the unit within the week following an HAI to evaluate opportunities in the location where the harm occurred (Gemba walk)
- Unit, service line, and hospital leaders present to help identify and close gaps in process by removing barriers and providing needed support
- Paused and then pivoted to a virtual meeting because of the COVID-19 Pandemic



Current State



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HAI Included

- HO-CDI
- CLABSI
- CAUTI
- Select SSI



Hospital-Acquired Infection Case Review/SWARM Process for HO-CDI



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Hospital-Acquired Infection Case Review Process for CLABSI/CAUTI

Infection Prevention Specialist performs secondary review of case for validation

CLABSI/CAUTI Identified via Centralized Surveillance Hospital Epidemiologist reviews case to evaluate for opportunities/root causes, where applicable Multidisciplinary Swarm scheduled to review case, opportunities, and develop countermeasures to prevent future cases Learning opportunities shared during tier 3 (hospital-level) huddle

*RedCap used to store case review findings



SSI Case Review Workflow



Example SWARM Forms - CLABSI

CLABSI Review and Swarm Form

As you perform your preliminary investigation into the CLABSI, please look for any non-unit services that may have performed either line placement or care on this patient.

If you discover that care was provided by non-unit staff/providers, please include a representative from those areas in the swarm. These individuals will be able to provide additional information and are our direct connection into their services should additional follow-up be needed. Current swarm invitees include:

Service(s)	Invite to Swarm:
Vascular Access Team (line placement and/or care)	
Hemodialysis (pts receiving hemodialysis on unit or transported to hemodialysis)	
Phlebotomy (drawing for blood tests or blood cultures)	
Interventional Radiology (for IR placement of lines within 7 days prior to infection)	
Previous unit (if line placed and/or cared for within 7 days prior to current unit)	
Cath lab (for placement of lines within 7 days prior to infection)	

Filled out by: INFECTION PREV	ENTION
Patient Information	- da um
Unit of Attribution	
Patient Name	
MRN	
DOB/Age	
Date of Admission	
Date of Event	
Days from Insertion to Infection	
Culture Information	
Culture Indication	
Culture Source	
Organism	
Device Information	
Device Type/anatomic location (e.g., right JJ temporary triple lumen CVL, tunneled subclavian dialysis line)	1

Filled out by: CARE TEAM	
Care and Maintenance Information	and the second sec
For the 7 days leading to the infection,	were there missed opportunities? Provide details:
Cap changes	
Dressing Changes	
Tubing Changes	
CHG Bathing Treatments	
Documentation of daily line necessity	
Other	
Other Line Information	
Was tPA used to de-clot the line?	Yes, dates:
Was the patient on dialysis?	
Current FY HH/PPE Unit Compliance	
HH Compliance: xx%; PPE Compliance	: xx%
Current FY Central Line Champion Dat	a
Narrative Information	
Nursing Comments (Please provide any float staff assignment) or patient-speci circumstances, multiple stools, etc.) - ↓	y relevant information regarding staffing issues (e.g., traveler or fic concerns; e.g., refusals of care and escalation, extenuating
Provider Comments (Please provide an circumstances, multiple stools, etc.)	ny relevant information regarding the patient; e.g., extenuating



Filled out by: IN	FECTION PREVENTION LEADERSHIP	
CLABSI Adjudica	ntio/n	
	Was this a true primary CLABSI?	
	Was it preventable?	
Potential Oppor	tunities	
Insertion	Insertion checklist used/ documented	
	Daily review of indication	
	Daily CHG bathing treatments	
Care &	Daily review of dressing integrity	
Maintenance	Dressing changed per policy	
	Tubing changed per policy	
	Needleless caps changed per policy	
Removal	Removal opportunity	
Disconstin	Blood cultures drawn from catheter	
Diagnostic	Blood cultures not clinically indicated	1
Additional Com	ments:	
a construction of the state		

Given	the environment	in which the	organism is	found what an	e the team's	findings on	the following
	the chief white h	mi winch chie	or Barmonn 13	round winde ut	e une seann a	minum Bo on	the ronowing

GI	Skin	Respiratory	Water	Other
 Urine or stools maintenance CHG treatment Patient/ Staff hand hygiene Mucosal barrier injuries 	 CHG treatment (regularity, audit results) Wounds, lesions, sores Dressing changes Line changes Cap changes Patient/ Staff hand hygiene 	 Staff/ patient masking during maintenance/ manipulation events Patient/ Staff hand hygiene 	 Priming of lines near sink CHG treatment Storage of unit supplies or personal patient/ visitor items on sink Patient/ Staff hand hygiene 	

To be filled out during the SWARM:	
Other concerns the team may have regarding:	
 Procedures the patient had in or off the unit Disease processes present in the patient Length of time line in use Line not being used at all 	 Line location Line securement Lumens not being used Patient self-manipulating lines
Specific items to discuss during swarm:	
Presumed root cause(s) for this infection	
Learnings Summary:	
Follow-up action items post swarm:	Responsible Person(s): Task: Deadline: Responsible Person(s): Task: Deadline:
REPORT OUT TO Tiers 1, 2, 3 the following informa	ation:
Brief background of the patient and harm	
Swarm learnings	
Help needed from your help chain	
Key takeaways for Tier 3 attendees to take back	



CLABSI Case Definitions Used by Hospital Epidemiology

- True CLABSI/primary blood stream infection
 - Infections where clinically the patient has a CLABSI based on the case review, discussion with primary team during swarm, and lack of alternate source for infection
- Probable secondary blood stream infection
 - Infections where clinically the patient has an identifiable primary source of infection (GI, GU, pneumonia, etc), but does not meet NHSN definition requirements to call it a secondary BSI
- Possible contaminant
 - Not clear if patient clinically had BSI
- Unclear
 - Sometimes it is not clear if it is truly CLABSI vs. secondary



Translating Findings into CLABSI Prevention Activities

Case Definition	Focus area for developing countermeasure
True CLABSI/primary BSI	 Insertion bundle process measures Care and maintenance bundle process measures Line removal opportunity
Probable secondary BSI	 Gaps in documentation Gaps in diagnostic work up Opportunities to prevent the primary infection
Possible contaminant	Diagnostic stewardship opportunitiesBlood culture collection techniques
Unclear	n/a

Example SWARM Form - CAUTI

Filled out by: CARE TEAM	
Care and Maintenance Information	and the second state of th
For the 7 days leading to the infection, were	e there missed opportunities? Provide details:
Peri/Foley-Care Oshift	
Reason for continuing urinary catheter documented <u>Oshift</u>	
Daily Bathing	
Other	
Was the patient having diarrhea?	
If the patient still has a catheter in place, c	heck the following:
Collection bag < ¾ full	
Collection bag not touching floor	
Drainage system closed (red seal)	
Unobstructed flow (no kinks, dependent loops)	
Collection bag below level of bladder	La
Securement device in place	
Can the catheter be removed	
Current FY HH/PPE Unit Compliance	
Current FY Urinary Catheter Champion Dat	a
Narrative Information	
Nursing Comments (Please provide any rele staff assignment) or patient-specific concern multiple stools, etc.) 	vant information regarding staffing issues (e.g., traveler or float ns; e.g., refusals of care and escalation, extenuating circumstances,

circumstances, multiple stools, etc.)

Filled out by: IN	FECTION PREVENTION LEADERSHIP	
CAUTI Adjudicat	ion	
	Was this a true primary CAUTI?	
	Was it preventable?	
Potential Oppor	tunities	
Insertion	Insertion bundle used	
	Daily review of indication	
5-12-B	Peri-Care Q shift	
Care &	Foley Care Q shift	
Maintenance	Daily bathing	
	Other	
Removal	Removal opportunity	
Diagnostic	Cultures not clinically indicated	

CAUTI Case Definitions Used by Hospital Epidemiology

- True CAUTI
 - Infections where clinically the patient has a CAUTI based on case review, discussion with primary team during swarm, and lack of alternate source for fever or other symptoms
- Colonization/Contaminant
 - Positive urine cultures not thought to represent infection with alternate cause of fever or other symptoms identified
- Unclear

Translating Findings into CAUTI Prevention Activities

Case Definition	Focus area for developing countermeasure
True CAUTI	 Insertion bundle process measures Care and maintenance bundle process measures Catheter removal opportunity
Colonization/contaminant	Diagnostic stewardship opportunitiesUrine culture collection techniques
Unclear	n/a

Example SWARM Form: HO-CDI

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Patient Information		
Unit of Attribution		
Patient Name		
MRN		
DOB/Age		
Date of Admission		
Date of Event		
Days from Admission to Infection		
Patient background		
Antimicrobial & Testing Stewardship	-	
Amount of stool do	ocumented:	
Did the test follow the	algorithm?	
Did the pt have a penicillin or cephalospo	orin allergy?	
Did the pt have an	ID consult?	
Has pt previously been tested	for C. diff?	
Comments from ASET team: (verbal duri	ng Swarm, ASET team documents	s findings in RedCap)
	Given Duration	High risk?
the second s	and an and the second second second second	

Filled out by: CARE TEAM	
Patient Care Information	
Were there indications the pt had C. diff on arrival?	
Pt's location prior to admission:	
Has pt traveled to other areas inside the hospital?	
Does the pt wash their hands prior to eating?	
Opportunity to ingest C. diff spores (eating, oral care)?	
In 7 days before the + C. diff, did the pt receive daily baths?	
Anything unique about this pt?	
Isolation Practices – PPE and Hand Hygiene	
Issues with PPE (deficiencies, stocking)?	
Proper signage outside room (large, small signs)?	
Issues with hand hygiene (compliance, products)?	
Last 30 days HH/PPE Compliance Data from PS. Web?	
Environmental Factors	
Are there other C. diff + patients near this pt?	
Has the pt's room regularly been cleaned prior to C. diff?	
Issues/challenges with EVS cleaning the room or unit?	
Issues/challenges with cleaning shared equipment?	THE CONCERNMENT OF A CONCERNMENT OF
Anything unique about the pt's room?	Previous patient was cdiff positive
Narrative Information	
Nursing Comments (Please provide any relevant information staff assignment) or patient-specific concerns; e.g., refusals o multiple stools, etc.)	regarding staffing issues (e.g., traveler or float f care and escalation, extenuating circumstances,
Provider Comments (Please provide any relevant information circumstances, etc.)	regarding the patient; e.g., extenuating

otential Opportu	inities (Identified from previous s	ections)	
Dationt Cara	Daily bathing	No. and the Con-	
Patient care	Other		
Diamostic	Test not clinically indicated		
Diagnostic	Antimicrobial opportunities		
Englanmant	Issues with PPE, hand hygiene		
Environment	EVS/cleaning issues		

SSI Process

- Survey 1:
 - Filled out by infection prevention
 - Adjudicates data elements from the chart regarding index surgery and subsequent infection
 - Pushes survey 2 and 3 to perioperative leadership and surgeon from index surgery
- Survey 2:
 - Perioperative leadership reviews elements regarding perioperative care from index surgery
- Survey 3:
 - Surgeon reviews risk factors pre-operatively, intraoperatively, and postoperatively to adjudicate if in fact the SSI was preventable.

Revides additional details that may not be easily identified via discrete data he ments in the EMR

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Examples of Data Output

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Opportunities ≠ Root Cause

- Root Cause: Clear cause of HAI
- Opportunity: Deviation from recommended practice, but not the clear cause of the HAI

CLABSI Prevention Opportunities Identified During Swarms/Case Review

CAUTI Prevention Opportunities Identified During Swarms/Case Review

HO-CDI Prevention Opportunities Identified During Swarms/Case Review

SSI Dashboard

SSI Dashboard: Categorical Risk Factors

Categorical V	/ariab	e 1009	% Stacke	d Bar	Surg	eries \	vith an	d with	nout SS	SIS (Excl	udes SSI	s PATOS)	By N	HSN Ca	ategor	v Code						
No CMS SSI	7	145 91%									(1,687 92.09%										
SSI Detected	1 3.70%										26 96.3	; 0%										
	0%	5%	10%	15%	20%	25%	30%	35%	40%	45% % (50% of Total S	55% urgery Co	60% unt	65%	70%	75%	80%	85%	90%	95%	100% 10	5%

SSI Dashboard: Continuous Risk Factors

SSI Dashboard: Pathogens

SSI Dashboard: Other Tabs

- SSIs by Surgeon
- Perioperative Antibiotic(s)
- Antibiotic Allergies
- Preoperative Measures
 - CHG bathing
 - Day before surgery
 - Day of surgery
 - Povidone iodine administration
 - Hair clipping

Where Are We Going?

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Goal: move from reactive to proactive work

Reactive (case review) harm already occurred

Proactive (process review) correct issue upstream of harm

Sustaining Standard Work: Process Observation

Standard Work Process Observations

- Goal: Identify barriers and opportunities before harms occur
- Observe standard work prevention processes using Kamishibai cards (K cards)
- Incorporate learnings into tiered huddles

Objective: Assess whether or not a	each point has been di	iscussed or observe	ed AND if proper P
and h	and hygiene has been	practiced.	
Bloo	d Culture Co	llection	
	Observe:		
) raw 3ml of waste before filling sy	ringes		
ottles tops have been scrubbed w	ith alcohol for 15 seco	nds	
te has been scrubbed with back a	nd forth motion with	CHG-IPA swab for 3	30 seconds
	Discuss:		
what scenario/s would you draw	a blood culture from	a central line?	
as collection been completed by t	wo different sticks?		
Have all preventative	measures been asses	sed?	
If yes, place side of card	with GREEN top, in sl	ot for shift and red	ord kudos

Why are Process Observations Key?

- Correct process upstream of outcome
- Leading indicator before harm
- Intervene ahead of harm occurrence

Next Steps

- Continue to use standardized case review tools to gather data from the multidisciplinary team and identify opportunities and record in RedCap database
- Arrive at the swarm with an understanding of contributing factors and opportunities identified by the case review – this will provide focus for the observations performed on the unit
- Pilot a new version of a SWARM in one service line
 - Return to the original intent of the SWARM process
 - Observe standard work in the place where the harm took place
 - Evaluating process performance for at-risk patients in real time and close identified gaps to prevent future harm, as able

Next Steps - Continued

- Continue to share learnings from the case review and swarm broadly
- Use findings from the case review and swarm to inform targeted improvement efforts/interventions in that area
- Engage providers
- Continue to PDCA this process

What Have We Learned?

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Key Lessons

- Continuous improvement is just that! It never ends!
- Multidisciplinary engagement is critical
- Hospital leadership engagement is critical
- Pay attention to process we can control processes/adherence, we cannot control host factors
- Go and see

Q&A

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