UCLA CLABSI Task Force
February 25, 2014 Update

Zachary A. Rubin, MD

Objectives of Talk

- Defining CLABSI
- Cost of CLABSI
- Rationale for Task Force
- Goals of Task Force
- Structure of Task Force

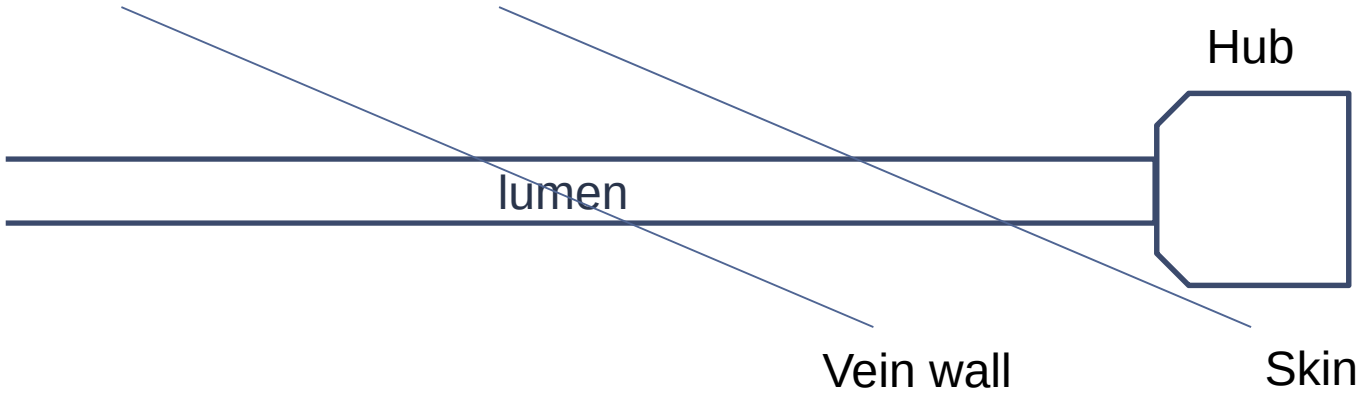
Risk factors associated with CLABSI

- Intrinsic patient risk factors (non-modifiable)
  - Prolonged hospitalization before catheterization
  - Neutropenia
  - Prematurity (ie, birth at an early gestational age)
  - Total parenteral nutrition
- Modifiable risk factors:
  - Femoral and internal jugular catheterization
  - Prolonged duration of catheterization
  - Heavy microbial colonization at the insertion site
  - Heavy microbial colonization of the catheter hub
  - Substandard care of the catheter (eg, excessive manipulation of the catheter or reduced nurse-to-patient ratio)

Marschall et al. ICHE 2008;29:S22-30.

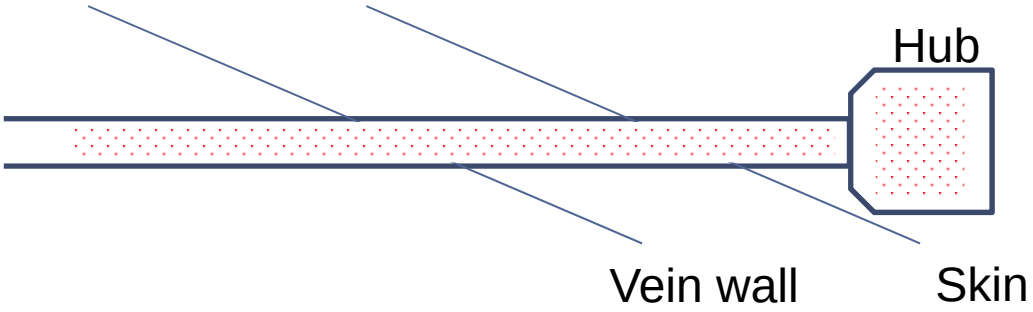
Pathogenesis of CLABSI

- Intraluminal infection
- Migration around external surface of CVC
- Hematogenous spread
- Contaminated infusate



Pathogenesis of CLABSI

- Intraluminal infection
  - Majority cause
  - Contaminated hub
  - May require removal
  - Often no visible signs
    - Fever
    - +blood cx

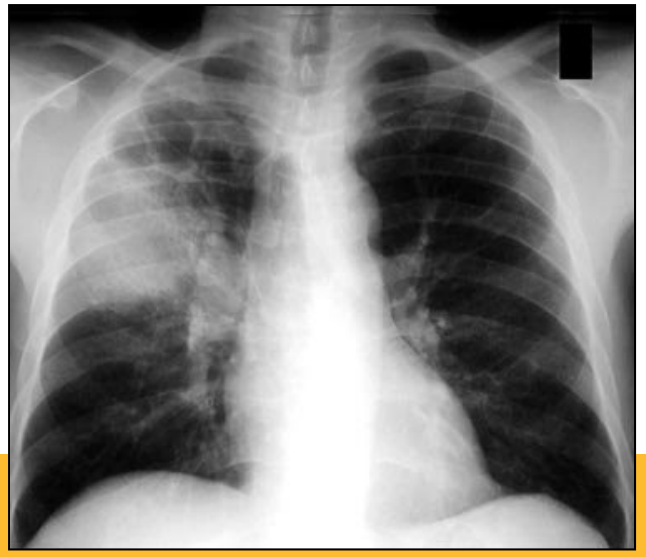


Migration around exterior "tunnel infection"

- Minority cause for CVC
- Early (within 7 days)
- Common with PVC
- Requires removal
- Symptoms
  - Fever
  - Pain
  - Redness/pus at site

Pathogenesis of CLABSI

- Hematogenous spread to catheter from primary source elsewhere (S. *aureus* & GNR due to pneumonia).
  - May still require removal of catheter
- Contaminated infusate
  - rare



CLABSI Definition

- CDC Definition
  - Primary BSI + presence of central venous catheter
  - Primary BSI
    - Blood cx + w recognized pathogen + symptoms
    - BSI not secondary to primary INFECTION (must meet CDC definition)
  - In 2013, CDC introduced a new category: Mucosal barrier injury (MBI) which recognizes BSI due to GI bacterial translocation in febrile neutropenia.
  - Unit attribution based on 48 hour transfer rule.

Human Cost of CLABSI at UCLA
Case study

- 70M Type 2 Diabetes
- Former CIA agent
- Admitted to RRUMC for dyspnea
- Found to have aortic stenosis→baloon valvuloplasty
- Post-op renal failure requiring intermittent hemodialysis
- Discharged to SNF

Human Cost of CLABSI at UCLA
Case study

- At SNF, developed severe back pain.
- Transferred to SMH.
- Blood cultures from admission 4/4 sets + Coagulase negative staph.
- MRI demonstrated osteomyelitis and discitis of spine, L2-3, L3-4.
- Biopsy of spine + coagulase neg staph.
- Deferred surgery, elected medical therapy.

Human Cost of CLABSI at UCLA
Case study

- Lumbar spinal osteomyelitis and discitis secondary to CLABSI.
- 6 weeks of IV Vancomycin→PO doxycycline x 3 months.
- Still had debilitating pain, bed bound, non-ambulatory.
- Developed another HAI due to immobility (pneumonia) and eventually died after 3+ months in ICU/hospital.

CLABSIs are very costly

- 80,000 CLABSI in US ICUs each year
- ICU study in 2006 at Wash U[1]:
  - Controlling for other cost factors & comorbidities
    - Median ICU LOS: 24 days v 5 days
    - Median hospital LOS: 45 v 11 days
    - Directly attributable cost $12,000
    - Death 28 v 51%
- Study in Canada used matched pairs to assess impact of CLABSI[2]
  - found pts w CLABSI were 3 times more likely to die in hospital.
- Study at USC in 2011[3]
  - $32,000 attributable to each CLABSI

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[1]Warren et al. Crit Care Med 2006;34:2084-9.
[2]Laupland et al. J Infect Control. 2006;63:124-32.
[3]Kim et al. A. J Infect Cont. 2011;39:640-6

CLABSI Analysis Q4, 2011

- RRUMC
  - 17 cases in ICU, 4 were neutropenic
  - 27 cases in ACU, 15 were neutropenic
- SMH
  - 5 cases in ICU
  - 3 cases in ACU (Q3 11 cases, 7 infections in 2 pts)
- Q4, 2012 financial cost 33 preventable cases

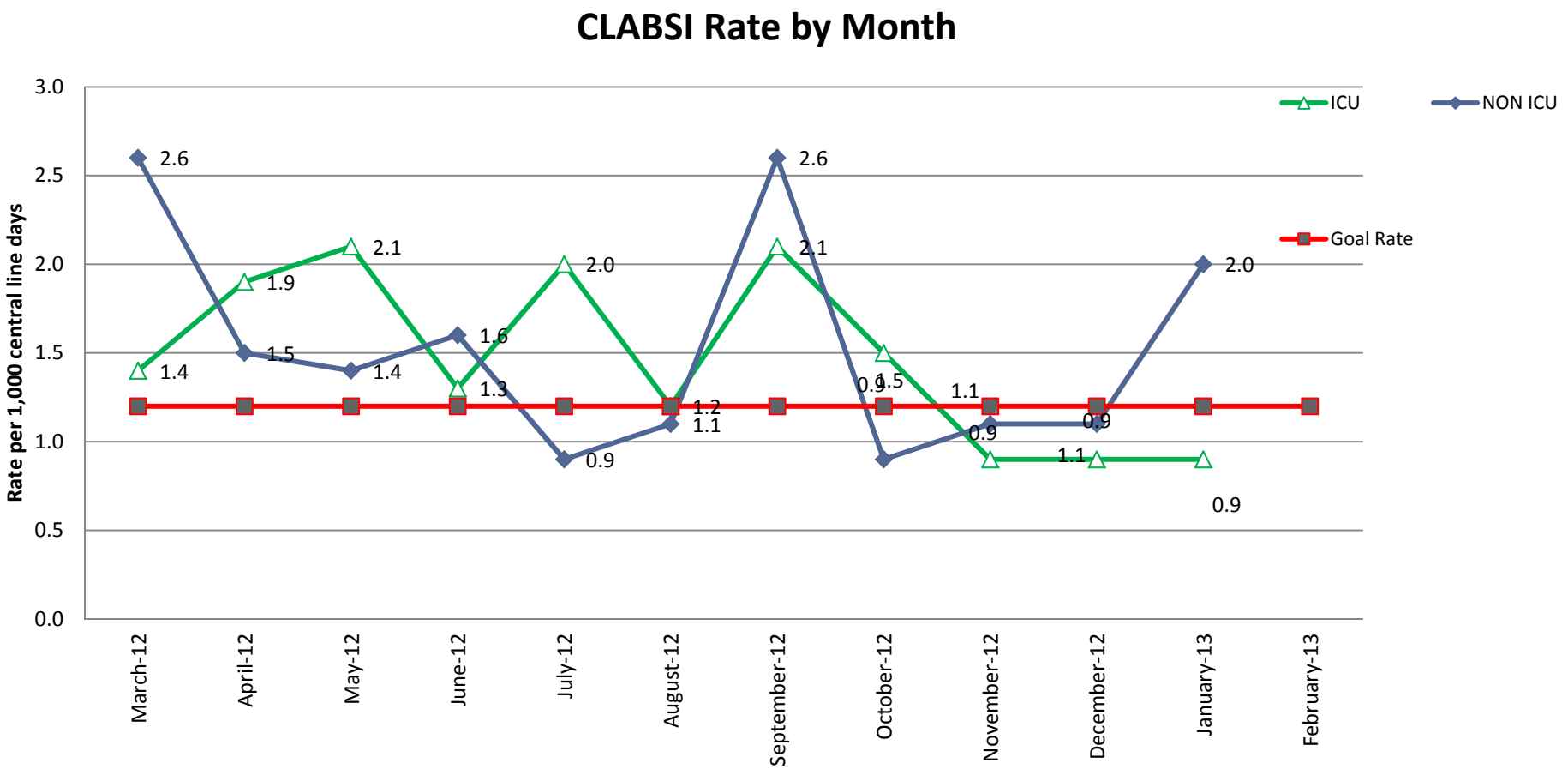
  x $12,000 = $396,000 (Wash U, 2006)

  x $32,000 = $1,056,000 (USC, 2011)
- Deaths = 5 (?attributable)

Financial cost of CLABSI

- Pay for performance/value based purchasing
  - Reimbursement based on quality/safety outcomes
  - Lack of payment for complications (CLABSI)
- Incentive payment programs
  - DSRIP (CA/CMS)
- Public Reporting
  - Decreased referrals
  - Patients may vote with their feet…

Pooled CLABSI Rates, ICUs and ACUs RRUCMC, 2013-2014



Why do we need a Task Force?

- CLABSI is a persistent problem at UCLA.
  - Even removing non-preventable infections, UCLA CLABSI rate is >50%ile nationally.
- Eliminate costs
  - Eliminate Patient suffering
  - High CLABSI rates result in tangible financial repercussions for UCLA Health System.
- Logistical challenges
  - Bundles work better than piecemeal interventions.
  - No single intervention→requires development and implementation as a package.
  - No one group at UCLA owns CLABSI—it needs to be a multidisciplinary approach to succeed.

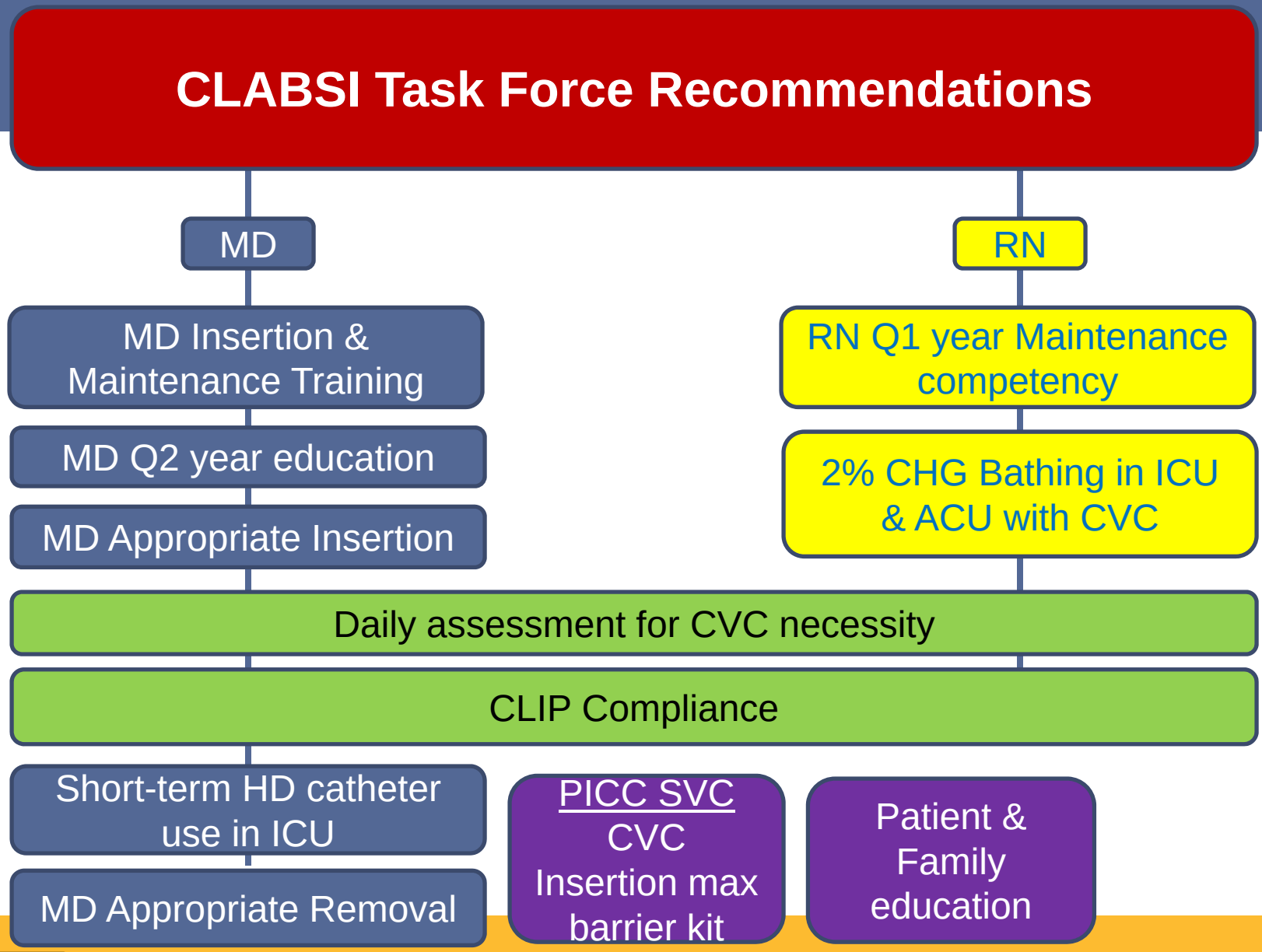
CLABSI Prevention is a TEAM effort with many stakeholders

Insertion	Maintenance	Removal
ER	RN ICU/ACU	RN ICU/ACU
OR — Anesthesia, Surgeon	OR	MD ICU/ACU
IR — MD, NP PICC SVC	Radiology	Ambulatory
Nephrology	MD ICU/ACU	Family/Patient
ICU/ACU	Dialysis RN	
	Ambulatory	
	Family/Patient	

Goals of CLABSI Task Force

- Phase 1
  - Develop UCLA Consensus Guidelines for the Prevention of CLABSI.
    - Review literature & research.
    - Apply up-to-date research to UCLA clinical setting & practice.
- Phase 2
  - Implement UCLA Consensus Guidelines in UCLA clinical areas.
- Phase 3
  - Sustaining positive change.

CLABSI Task Force Recommendations



Catheter Insertion

- Choice of site
  - Avoid femoral site (in adults)
- Appropriateness
  - Do not place CVC if peripheral IV is an option
  - Choose correct CVC
- Technique
  - Aseptic technique is critical!
  - Sterile dressing & hub caps in place.

Avoid Femoral Site
Remove “Code Lines” Promptly

- Avoid femoral insertions as much as possible.
- Removal of all non-sterile “code lines” within 24 hours.

Do not place unnecessary CVCs— HS Policy 1401

- Continued hemodynamic instability/monitoring
- Fluid resuscitation
- Long-term IV antibiotics (>14 days)
- Total parenteral nutrition (TPN)
- Chemotherapy
- Poor IV access
- long-term IV treatment or medication w no oral equivalent
- Medications which cannot be safely given through peripheral IV access.
- CNS surgery

CLABSI prevention elsewhere

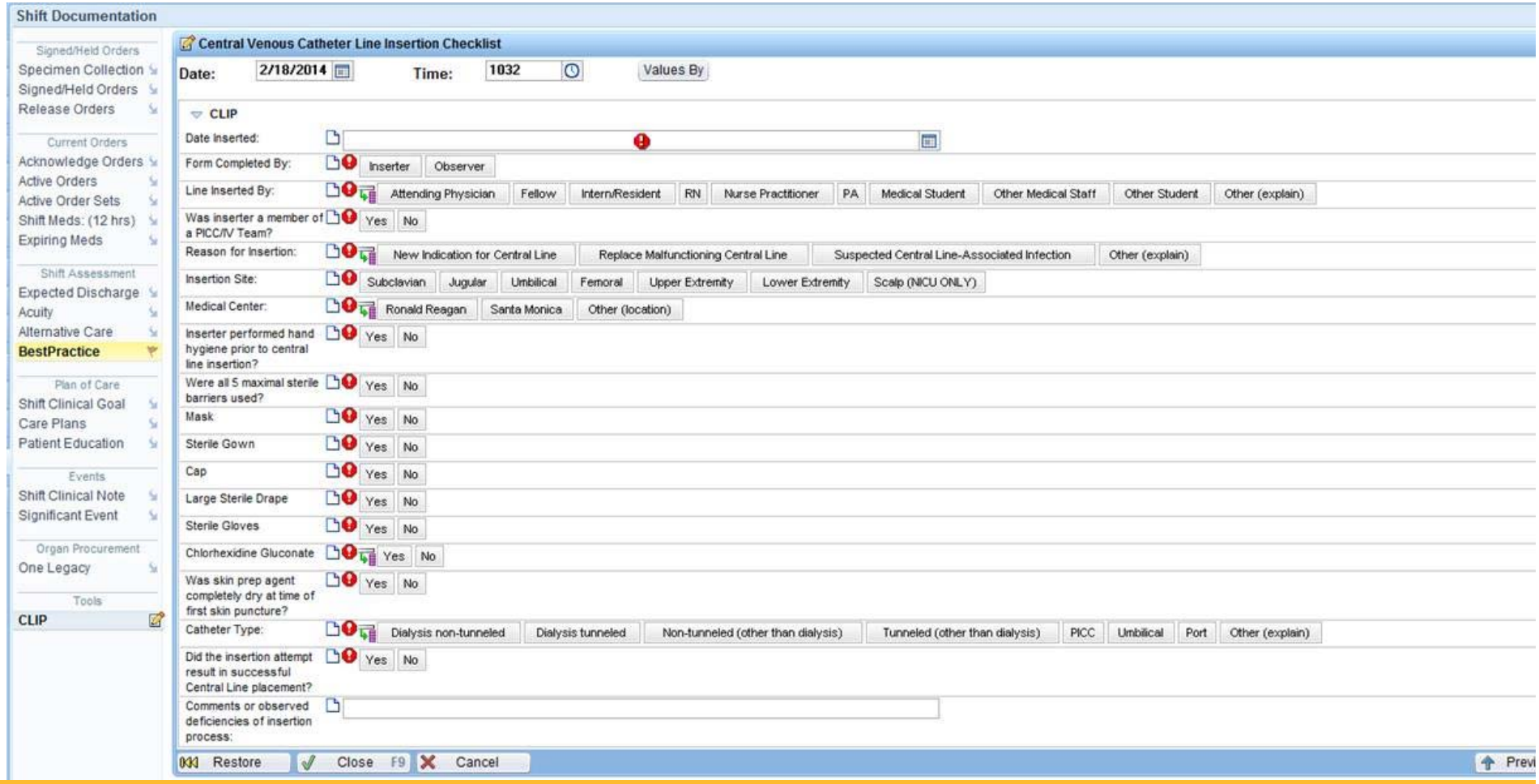
- Michigan Keystone Project
- Decrease in CLABSI in 103 ICUs in Michigan (66% reduction)
- Basic interventions:
  - Hand hygiene
  - Full barrier precautions during CL insertion
  - Skin cleansing with chlorhexidine
  - Avoiding femoral site
  - Removing unnecessary catheters
  - Use of insertion checklist
- Pittsburgh Regional Health Initiative – Decrease in CLABSIs in 66 ICUs (68% decrease)

Pronovost et al. NEJM 2006;355:2725-32.
CDC. MMWR 2005;54:1013-6.

CLIP (Central Line Insertion Practices)

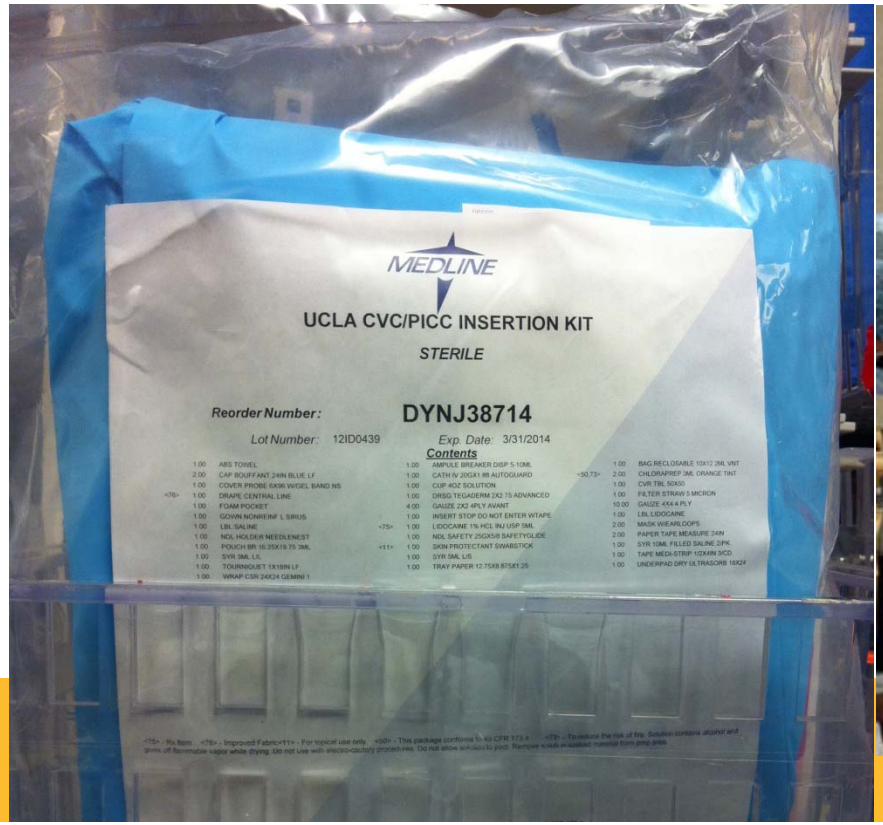
- Mandated by CA Senate to complete CLIP form on EVERY CVC insertion
  - Hand hygiene
  - 2% CHG prep >60 days old
  - CHG dry
  - Full sterile barriers used: sterile mask, gloves, cap, gown & drape
- New process:
  - In high risk areas (ICU, OR, ER, IR), RN will observe the insertion and complete the form on EVERY CVC insertion.
  - If the RN identifies a break in aseptic technique, he/she will say “The sterile field has been contaminated,”
  - New CLIP form should be completed when inserter goes to separate site.

CLIP Form in CC—March 2014



No excuses! Medline Max Barrier Kit

- Contains all the components for good aseptic technique.
- Should be stocked in all ICUs, ER and ORs.

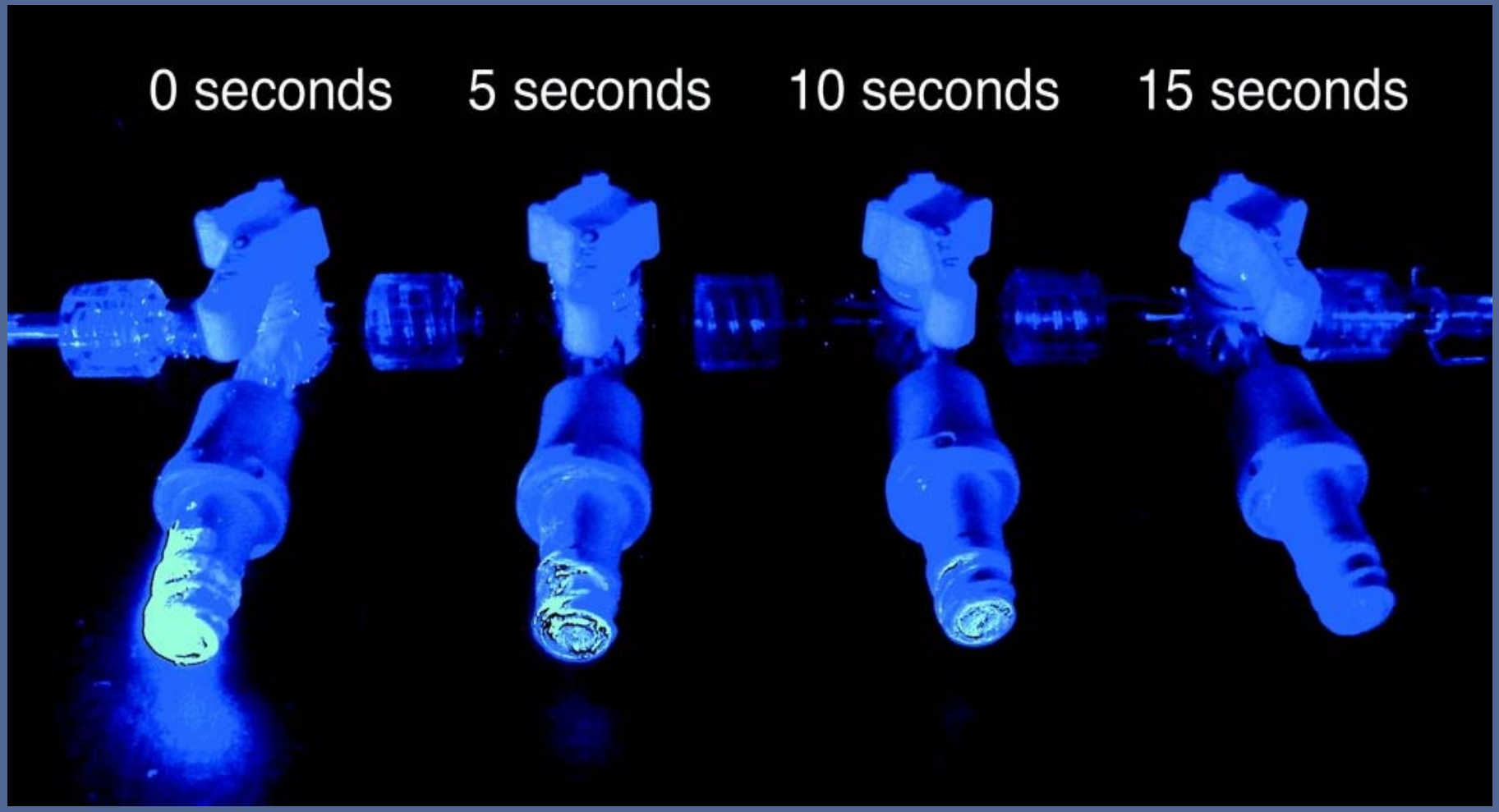


Catheter Maintenance

- Scrub the hub
- Aseptic dressing changes
- Daily assessment for removal of catheter

Scrub the Hub

- Catheter hubs are contaminated by skin bacteria. Scrubbing the hub is effective way to remove this contamination.
- EVERY CVC access
- Use alcohol prep pad to scrub the hub with friction x 15 seconds.


0 seconds
5 seconds
10 seconds
15 seconds

Dressing changes

- Dressing change kit
- Nursing competencies
- Bedside patient hand-off

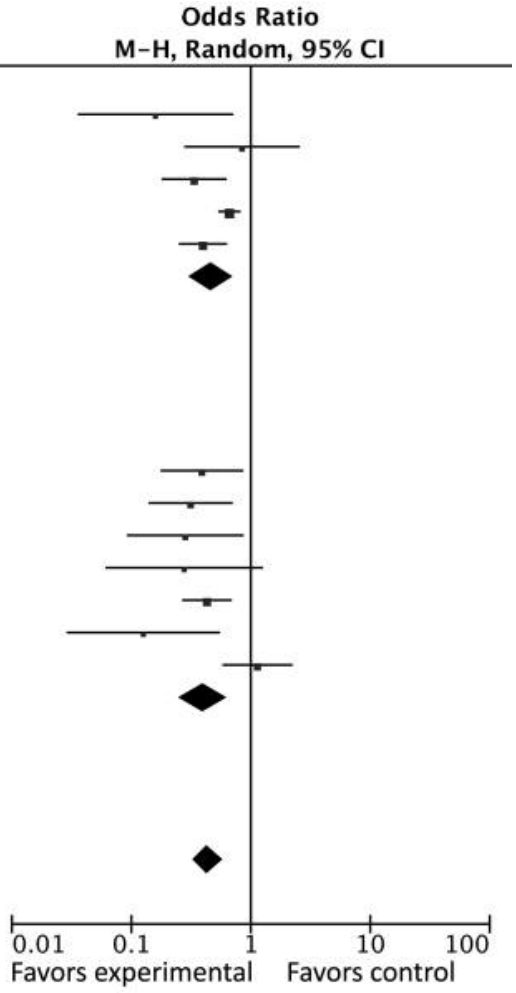
CVC Maintenance Roadshow

Daily Assessment of Line Necessity

- Every CVC should be assessed daily to determine if it is no longer necessary.
  - Continued hemodynamic instability/monitoring
  - Fluid resuscitation
  - Long-term IV antibiotics (>14 days)
  - Total parenteral nutrition (TPN)
  - Chemotherapy
  - Poor IV access
  - long-term IV treatment or medication w no oral equivalent
  - Medications which cannot be safely given through peripheral IV access.
  - CNS surgery

2% CHG bathing

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Random, 95% CI
1.2.1 CHG Bathing						
Borer et al, 2007	2	1600	15	1923	3.3%	0.16 [0.04, 0.70]
Camus et al, 2005	6	1991	7	1961	5.3%	0.84 [0.28, 2.52]
Climo et al, 2009	14	15472	41	15225	10.5%	0.34 [0.18, 0.62]
Gould et al, 2007	171	6664	264	6899	17.1%	0.66 [0.54, 0.80]
Munoz-Price et al, 2009	29	7632	59	6210	13.1%	0.40 [0.25, 0.62]
Subtotal (95% CI)		**33359**		**32218**	**49.3%**	**0.47 [0.31, 0.71]**
Total events	222		386			
Heterogeneity: $Tau^2 = 0.12$; $Chi^2 = 11.07$, df = 4 (P = 0.03); $I^2 = 64\%$						
Test for overall effect: Z = 3.53 (P = 0.0004)						
1.2.2 CHG Impregnated Cloths						
Bleasedale et al, 2007	9	2210	22	2119	8.2%	0.39 [0.18, 0.85]
Dixon and Carver, 2010	8	3148	27	3346	8.0%	0.31 [0.14, 0.69]
Evans et al, 2010	4	1785	15	1904	5.2%	0.28 [0.09, 0.85]
Holder and Zellinger, 2009	2	2000	12	3333	3.3%	0.28 [0.06, 1.24]
Montecalvo et al, 2010	27	13864	57	12603	12.8%	0.43 [0.27, 0.68]
Popovich et al, 2009	2	5610	19	6728	3.4%	0.13 [0.03, 0.54]
Popovich et al, 2010	17	5799	19	7366	9.8%	1.14 [0.59, 2.19]
Subtotal (95% CI)		**34416**		**37399**	**50.7%**	**0.41 [0.25, 0.65]**
Total events	69		171			
Heterogeneity: $Tau^2 = 0.19$; $Chi^2 = 12.80$, df = 6 (P = 0.05); $I^2 = 53\%$						
Test for overall effect: Z = 3.78 (P = 0.0002)						
Total (95% CI)		**67775**		**69617**	**100.0%**	**0.44 [0.33, 0.59]**
Total events	291		557			
Heterogeneity: $Tau^2 = 0.13$; $Chi^2 = 26.12$, df = 11 (P = 0.006); $I^2 = 58\%$						
Test for overall effect: Z = 5.39 (P < 0.00001)						
Test for subgroup differences: $Chi^2 = 0.19$, df = 1 (P = 0.66), $I^2 = 0\%$						



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O'Horo et al. ICHE. 2012;33:257-67.

2% CHG bathing

- All ICUs (RRUMC and SMH)
- All ACU patients with CVCs
- Barriers:
  - Soapy feel of CHG
  - Low compliance
- Plans:
  - Begin house-wide daily bathing for all inpatients.

Catheter Removal

- Daily assessment of line necessity
- “Talk the line” as a team—MDs and RNs
- Responding to infection
  - Mini causal analysis form with nursing
  - Infection Prevention assesses each case
  - CLABSIs are discussed w ICUs monthly

Putting it all together

- Insertion + Maintenance + Removal
- No single intervention works—ALL interventions work successfully as a “bundle”
- Simple measures make a HUGE difference
  - Get the catheter out
  - Scrub the hub
  - CHG bathing
  - CLIP process/documentation
- Other hospitals have done it!

Sustainability is the key…

- Ongoing educational efforts are crucial
- Continuous reinforcement
  - CVC Insertion technique
  - Removal of unnecessary CVC
  - CVC Maintenance
- Immediate feedback
  - Infection Prevention meetings & case reviews monthly with ICUs
  - Mini-CA process & feedback through nursing
  - Pending CareConnect reports
    - Inappropriate insertion (did not meet indications)
    - CLIP form feedback for fallouts

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