SVHCD QUALITY COMMITTEE
AGENDA
WEDNESDAY, February 27, 2019
5:00 p.m. Regular Session
(Closed Session will be held upon adjournment of the Regular Session)

Location: Schantz Conference Room
Sonoma Valley Hospital – 347 Andrieux Street, Sonoma CA 95476

AGENDA ITEM	RECOMMENDATION	
In compliance with the Americans with Disabilities Act, if you require special accommodations to attend a Quality Committee meeting, please contact the District Clerk, Stacey Finn, at sfinn@svh.com or 707.935.5004 at least 48 hours prior to the meeting.		
MISSION STATEMENT The mission of the SVHCD is to maintain, improve, and restore the health of everyone in our community.		
1. CALL TO ORDER/ANNOUNCEMENTS	*Hirsch*	
2. PUBLIC COMMENT SECTION *At this time, members of the public may comment on any item not appearing on the agenda. It is recommended that you keep your comments to three minutes or less, Under State Law, matters presented under this item cannot be discussed or acted upon by the Committee at this time For items appearing on the agenda, the public will be invited to make comments at the time the item comes up for Committee consideration.*	*Hirsch*	
3. CONSENT CALENDAR • Minutes 01.30.2019	*Hirsch*	Action
4. ANNUAL INFECTION CONTROL REPORT	*Matthews*	Inform
5. PERFORMANCE IMPROVEMENT PROJECTS/FAIR	*Jones*	Inform
6. QUALITY AND RESOURCE MANAGEMENT REPORT	*Jones*	Inform
7. 2018 MEDICATION ERROR REPORT	*Jones*	Inform
8. POLICIES AND PROCEDURES	*Jones*	Inform/Action
9. CLOSED SESSION: a. Calif. Health & Safety Code § 32155 Medical Staff Credentialing & Peer Review Report	*Hirsch*	Inform
10. REPORT OF CLOSED SESSION	*Hirsch*	Inform/Action
11. ADJOURN	*Hirsch*	

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SONOMA VALLEY HEALTH CARE DISTRICT
QUALITY COMMITTEE
January 30, 2019 5:00 PM
MINUTES
Schantz Conference Room

Members Present	Members Present cont.	Excused	Public/Staff
Jane Hirsch Cathy Webber Carol Snyder Michael Mainardi, MD Howard Eisenstark, MD		Ingrid Sheets Susan Idell Michael Brown, MD	Danielle Jones, RN Mark Kobe, RN

AGENDA ITEM	DISCUSSION	ACTION
1. CALL TO ORDER/ANNOUNCEMENTS		
	Called to order at 5:00 pm	
2. PUBLIC COMMENT		
3. CONSENT CALENDAR		Action
• QC Minutes, 12.19.18		**MOTION:** by Webber to approve, 2nd by Snyder. All in favor.
4. 2019 WORK PLAN APPROVAL	*Jones*	Inform/Action
	Ms. Jones presented the revised work plan for 2019.	**MOTION:** by Eisenstark to approve, 2nd by Webber. All in favor.
5. CNO QUARTERLY PATIENT CARE DASHBOARD	*Kobe*	
	Mr. Kobe reviewed the 4th quarter patient care dashboard. There conintues to be opportunities for improvement with medication scanning. Mr. Kobe reported that he has started a 100 day work out to research and improve the medication scanning process.	Add medication errors and the break down of depts to the dashboard.

AGENDA ITEM	DISCUSSION	ACTION
6. GOOD CATCHES	*Jones*	
	Ms. Jones reviewed the good catches via the newly created Quality Newsletter.	Recommendation to revise the "no blame: sentence.
7. **HQI QUALITY DASHBOARD**	*Jones*	
	Ms. Jones reviewed the HQI dashboard. The dashboard showed SVH's performance in comparison with national and state benchmarks.	
8. QUALITY AND RESOURCE MANAGEMENT REPORT	*Jones*	
	Ms. Jones reviewd the Quality and Resource management report. This included the plan to bring SVH to a 5 star rating.	
9. POLICIES AND PROCEDURES	*Jones*	
	New a. Contract Administration – Patient Care CL8610-139 (have this reviewed by legal and Kelly and Ken. To come back next month) b. Leaves – Military Related HR8610-172L c. Tracking of On-duty Staff During a Disaster EP8610-104 d. Homeless Discharge Planning DC8610-108 (minor revisions) e. Paging Codes Overhead EP8610-105 (revision of wording in purpose) Revisions f. Contract Administration – Non-Patient Care GL8610-138 g. Formulary Management MM8610-122 h. Leave of Absence Policies HR8610-173 i. Leaves- Emergency Responder HR8610-172I j. Leaves –Jury and Witness Duty HR8610-172D k. Leaves – Organ and Bone Marrow Donor HR8610-172K	**MOTION:** by Eisenstark to approve b. through q with stated revisions. 2nd by Mainardi. All in favor

AGENDA ITEM	DISCUSSION	ACTION
	l. Leaves – Personal & Non-FMLACFRA Medical HR8610-172E m. Leaves – Victim of Crime Related to Domestic Violence, Sexual Assault or Stalking HR8610-172G n. Leaves – Voting Time Off HR8610-172J o. Required Certifications HR8610-365 p. Workplace Violence Prevention Program HR8610-371 Retire q. Leaves – Occupational Injury and Illness Disability Leave HR8610-172C	
10. CLOSED SESSION	*Hirsch*	
	Called to order at 6:04pm	
11. REPORT OF CLOSED SESSION	*Hirsch*	
	Medical Staff Credentialing reviewed.	**MOTION:** by Mainardi to approve credentialing, 2nd by Eisenstark. All in favor.
12. ADJOURN	*Hirsch*	
	6:07pm	

THE INFECTION PREVENTION PROGRAM

SONOMA VALLEY HOSPITAL

BOARD QUALITY COMMITTEE

FEBRUARY 28, 2019

KATHY MATHEWS

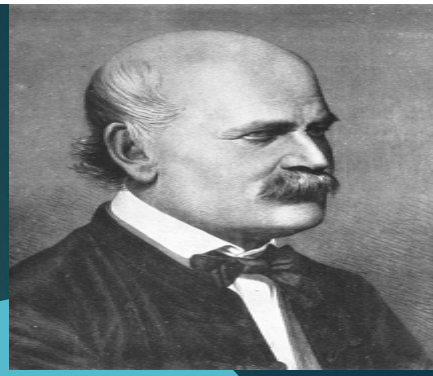
The Infection Prevention Program

- Infection Prevention (IP) is an organization-wide program that complies with standards established by CMS, CDPH, CDC, CIHQ, APIC, AORN, and other regulatory bodies e.g., OSHA
- IP standards apply to all services e.g., Pharmacy, Lab, PT, Medical Imaging
- All settings including Emergency, Acute and Critical Care, Surgical, Outpatient, and SNF
- All healthcare providers, including physicians, licensed independent practitioners, staff, students, trainees, volunteers, and as appropriate, visitors, and patients
- New 2018-Manager, Patient Experience and Infection Prevention (.5)

WHAT WERE THE GOALS IN 2018?

- Sustain observed hand hygiene compliance >90%
- Reduce HA-C. difficile infections, not to exceed 3.5 / year/ acute (CDPH)
- Achieve <1.6 surgical site infections (SSI) in colon and hysterectomy pts (CDPH)
- Maintain low overall SSI rate (0.4%)
- Continue surgeon reported post discharge SSI >90%
- Maintain zero ventilator associated pneumonias
- Implement a hospital-associated pneumonia prevention program
- Maintain zero CLABSI, HA MRSA or HA VRE
- Develop a CMS, CIHQ approved water management program
- Quantify environmental cleanliness
- Achieve 90% compliance for influenza immunization of healthcare workers

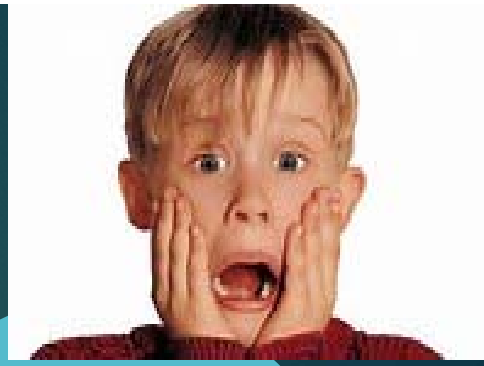
Hand Hygiene

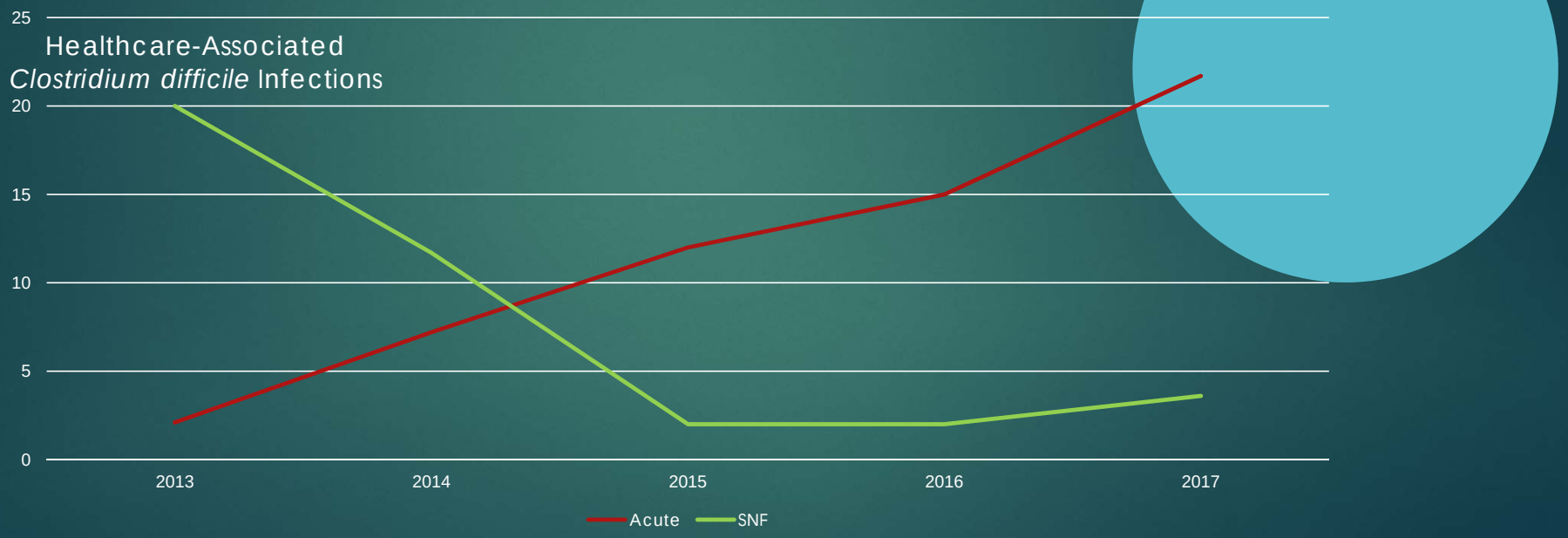


Hand hygiene is the single most important measure to reduce the risk of hospital acquired infections (CDC)

- 2015 audit revealed compliance <40%
- 2016 hand hygiene campaign, High Five for Hand Hygiene (95% post intervention)
- 2017 observations revealed 98.7%
- 2018 observations revealed 95%

HA-Clostridium difficile Infections 2013-2017

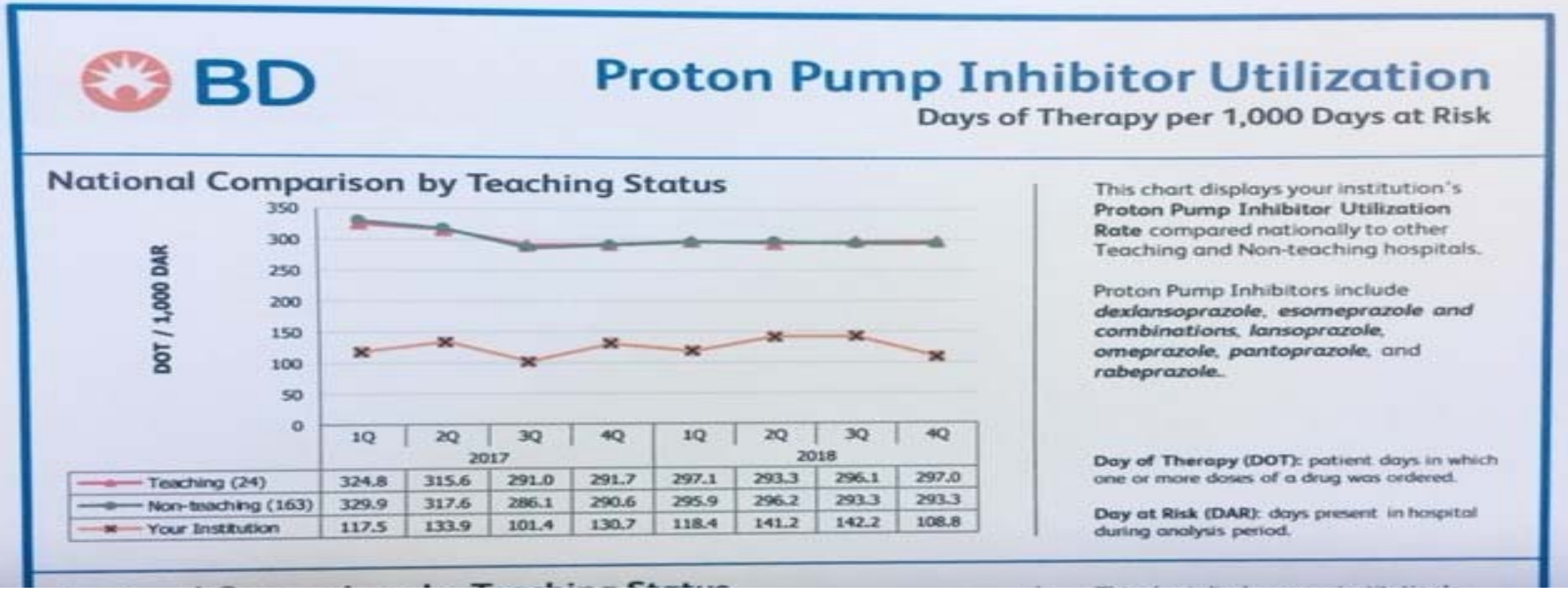




C. DIFFICILE PREVENTION INTERVENTIONS

- 2018 approved nurse-driven testing/isolation protocol (took > year to get approval)
- MDs de-escalate PPIs. SVH use of PPI lower than national average
- Live culture yogurt/probiotics while on antibiotics hardwired
- Bleach and UV disinfection with robot hardwired
- New environmental disinfection detection/teaching tool
- >90% test sites CLEAN

Proton Pump Inhibitors Linked to CDI



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Proton Pump Inhibitor Utilization

Days of Therapy per 1,000 Days at Risk

National Comparison by Teaching Status

	1Q 2017	2Q 2017	3Q 2017	4Q 2017	1Q 2018	2Q 2018	3Q 2018	4Q 2018
Teaching (24)	324.8	315.6	291.0	291.7	297.1	293.3	296.1	297.0
Non-teaching (163)	329.9	317.6	286.1	290.6	295.9	296.2	293.3	293.3
Your Institution	117.5	133.9	101.4	130.7	118.4	141.2	142.2	108.8

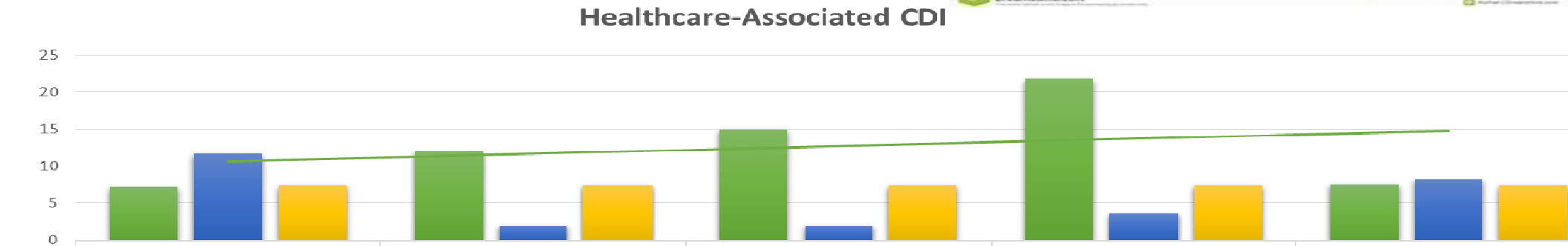
This chart displays your institution's **Proton Pump Inhibitor Utilization Rate** compared nationally to other Teaching and Non-teaching hospitals.

Proton Pump Inhibitors include ***dexlansoprazole, esomeprazole and combinations, lansoprazole, omeprazole, pantoprazole,*** and ***rabeprazole.***

Day of Therapy (DOT): patient days in which one or more doses of a drug was ordered.

Day at Risk (DAR): days present in hospital during analysis period.

HA-CDI 2013-2018



	2014 (Interventions)	2015	2016	2017	2018
cule	7.2	12	15	21.7	7.5
NF	11.7	2	2	3.6	8.3
enchmark	7.4	7.4	7.4	7.4	7.4

2018 The HAPPI Project COMPLETED

- Pneumonia is the second most common nosocomial infection in the United States
- US: 19% mortality, 4-9 extra days, >50% develop sepsis, 34% to SNF
- $40,000 per occurrence
- **ORAL CARE focus… Procedure revised, education, EMR prompts for nursing to use the Beck Scale for all patients to determine type of oral care needed**
- Decrease aspiration risks e.g., thick liquid diet education during annual review and swallow evaluations
- prevent cross-contamination or colonization via hands of personnel. Hand hygiene compliance is >90%.
- In 2017 1.6 per 1000 pt days. **2018 acute 0.7, SNF 0.5 per 1000 pt days**

Catheter-Associated Urinary Tract Infections

- Acute Units: NHSN predicts 1 CAUTI/yr. Acute had 1 CAUTI in 4th quarter
- = 0.85 CAUTI / 1000 catheter days. Lowest rate since 2015.
- SNF: NHSN benchmark 1.5 per 1000 catheter days. SNF had 4 CAUTIs = 7.3 per 1000 catheter days.
- High risk, hemiplegic long term patient has recurrent UTIs

Surgical Site Infections

- Overall SSI rate 0.4% (8SSIs) No change from 2017
- Zero colon or hysterectomy SSIs (met CDPH goal)
- Total Knee Replacement: 2 SSIs in 3rd quarter. Thorough investigation of potential risk factors conducted. Pre op prep with CHG wipes and Aquamantys identified as areas for improvement. No knee SSIs in 4th quarter. Annual SSI rate 3.5% (2/57). Benchmark 0.6%-1.6%
- Post discharge surveillance by surgeons is excellent >95%

Influenza

SVH Influenza Stats

- Laboratory confirmed cases: 50 (9/1/18-2/20-19) compared to 133 same period last season
- Cough etiquette stations and signage posted
- 1 influenza exposure in ED and ICU due to delayed testing and isolation. Educational information to MDs and Nursing. No further exposures.
- Consistent droplet isolation of inpatients with influenza.
- 0 patients developed healthcare-associated influenza
- Patients given influenza immunization (EMR prompt):
- HCW Influenza immunization compliance:
  - Physicians: 65% (Medical Staff Office still following up with MDs)
  - Staff: 87% (359/415) improvement
  - Students: 100%

Pertussis

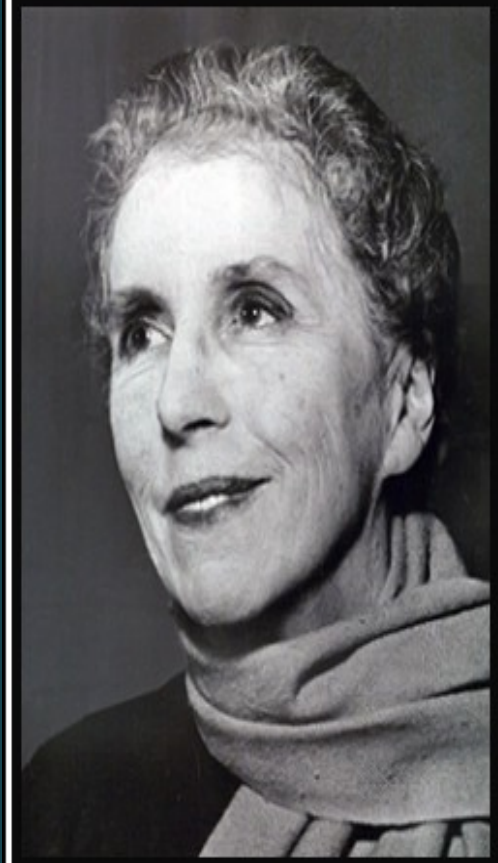
- 2 Pertussis exposures in November/December (over holidays)
- Delay in lab notification system to IP
- Lack of proper isolation in ED for suspected pertussis
- 1 case was in an employee with exposures to co-workers
- Multiple departments affected (23 staff)
- Full investigation conducted with referrals to Occupational Health for follow up
- No patient exposures
- No laboratory confirmed secondary cases
- Lab notification issue corrected
- Need improvement in coordination between ED and Occ Health

2018 Water Management Program

- US 2000-2014: 19% Legionellosis cases associated with LTC, 15% with hospitals
- 9% mortality
- 5000 US cases reported in 2014 (286% increase 2000-2014)
- CMS mandated a WMP June 2, 2017, CIHQ approved SVH 2018
- 2002-2019: No lab confirmed, healthcare associated legionellosis
- 2018 Identified legionella (not pneumophila) in water source. Flushed, No reoccurrence upon retesting.
- 2018 WMP transferred to Grigory Gatenian and Forensic Analytical Consulting is assisting with implementation. Action Plan timeline pending.

WHAT'S THE PLAN FOR 2019?

- As part of our commitment to quality care and service, Sonoma Valley Hospital IP, conducts a risk assessment for transmission and acquisition of infectious agents.
- Analysis of surveillance data are central to the annual risk assessment e.g., monitor ortho SSI and CDI closely, and sustain low infection rates with high compliance in hand hygiene. Continue to work on SNF CAUTI/CDI reduction strategies. Improve collaboration with ED/Occ Health following exposures and work restrictions
- Greater focus on Patient Experience and 5 Star Hospital status
- Both Infection Prevention and Patient Experience are central to achieving 5 Star status.



When you have a great and difficult task, something perhaps almost impossible, if you only work a little at a time, every day a little, suddenly the work will finish itself.

(Karen Blixen)

izquotes.com

THANK YOU

QUESTIONS?

Infection Prevention Report: 4th Quarter 2018

Indicator	Comparison Rates: 2013-2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Benchmarks/Actions/Comments
Quarterly reporting of National Healthcare Safety Network (NHSN) indicator data is required by CDPH. NHSN provides the predicated number of HAIs based on standardized infection rations (SIRS). ** Indicates public reporting on CDPH website. Green indicates no action indicated, yellow indicates above the predicted number of infections, red indicates action is recommended to reduce infections.						
****CLABSI (NHSN) (CMS Never Event)** *# Central Line Associated Bloodstream Infections (CLABSI)/1000 central line days*	**0 since 2011**	**0** 0/106	**0** 0/131	**0** 0/109	**0** 0/138	**NHSN predicts 0.51 CLABSIs per year.**
****CDI (NHSN)** *#Inpatient Hospital Acquired infections due to C. difficile per 10,000 patient days*	**2.1 /7.2 /12 15/21.7**	**10** 1/978	**9.9** 1/1006	0 **0/906**	**9.2** 1/1079	**NHSN predicts 3.51 cases per year. 2018 total 3 cases is better than NHSN prediction. Improvement over last three years. Benchmark (MMWR) is 7.4/10,000 patient days. 2018 7.5 per 10,000 pt. days.**
****MRSA Bloodstream Infections (NHSN)** *#bloodstream infections due to MRSA per 1000 pt. days*	**1.3 /0 /0 0/ 0**	**0** 0/1018	**0** 0/1069	**0** 0/989	**0** 0/1079	**NHSN predicts 0.13 infections per year.**
****VRE Bloodstream Infections (NHSN)** *#Hospital Acquired bloodstream infections due to VRE per 1000 pt. days*	**0 x 5 yrs**	**0** 0/1018	**0** 0/1069	**0** 0/989	**0** 0/1079	**SVH Benchmark: 1 per 1,000 patient days.**
****Hip: Deep or Organ Space Surgical Site Infections (NHSN)** *# infections/ # Total Hip Cases x 100*	**0 / 1.8% / 0** **1.6% / 0**	**0** 0/12	**0** **0/7**	**0** 0/8	**0** 0/17	**NHSN predicts 0.26 SSIs per year.**
****Knee: Deep or Organ/Space Surgical Site Infections (NHSN)** *# infections/ # Total Knee Cases x 100*	**0 / 1.7% / 2** **1.4% / 1.3%**	**0** 0/20	**0** **0/13**	**12.5%** 2/16	**0** 0/8	**NHSN predicts 0.28 SSIs per year. 2 SSIs /57 procedures. Annual rate 3.5%**
****Overall Surgical Site Infections (SSI)** *Total # SSI/Total # surgeries x 100*	**0.2%/0.7% (12)/** **0.4% (6)/ 0.5% (8)/ 0.4% (8)**	0 0/431	**0.6%** **3/470**	**0.8%** 4/501	**0.2%** 1/485	**NHSN predicts 1.6 SSIs per year for colon and hysterectomy surgery only, deep or organ space infections, within 30 days. 2018 rate 0.4% (8SSIs). 1 hysterectomy complication (compartment syndrome) 4th qtr, but does not appear to meet NHSN criteria for SSI. Discuss in Surgery Committee. Also, 1 superficial SSI s/p ORIF rt. hip**
Class I SSI rate	**<1% x 5 yrs**	0 0/341	**0.3%** **1/338**	0.5% 2/382	0.2% 1/376	**No NHSN Class I (Clean Wound) rate benchmark. Superficial SSI s/p ORIF rt. Hip. Pt. was also s/p rt. Total hip replacement in the same month.**
Class II SSI rate	**< 1.3% x 5 yrs**	0 0/69	**0.8%** **1/120**	1.9% 2/104	0 0/84	**No NHSN Class II (Clean Contaminated) rate benchmark**
Total Joint SSI rate	**0 / 0.8%/1.9%/1.4%/1.4%**	**0 0/32**	**0 0/28**	10% 2/20	0 0/29	**No NHSN All Total Joint SSI rate Benchmark. 0.68%-1.6% expected SSI rate for total knee (CDC 2009)**
Post discharge surveillance surgeon compliance	**57% 2014/ 64% 2015/ 84% 2016/ 96.5% 2017**	99% Jan &Feb	**99%**	84.5%	99%	**2014 Surgery Committee approved SSI reporting by surgeons monthly, to promote accurate SSI rates. Missing 2 surgeon's reports.**

Infection Prevention Report: 4th Quarter 2018

Indicator	Comparison Rates: 2013-2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Benchmarks/Actions/Comments
Quarterly reporting of National Healthcare Safety Network (NHSN) indicator data is required by CDPH. NHSN provides the predicated number of HAIs based on standardized infection rations (SIRS). ** Indicates public reporting on CDPH website. Green indicates no action indicated, yellow indicates above the predicted number of infections, red indicates action is recommended to reduce infections.						
Hand Hygiene Compliance *Stealth hand hygiene observations: # opportunities/# observed*	**2017 98.7%**	**100%** 6/6	**71%** **5/7**	**100%** 21/21	**100%** 10/10	**>90%**
****Ventilator Associated Event (VAE): Pneumonia** *# Ventilator Associated Pneumonias or events/ # vent days x 1000*	**0 x 4 yrs.**	**0** 0/20	**0** 0/41	**0** 0/25	**0** 0/7	**NHSN Benchmark: 1.1 per 1,000 ventilator days.**
****Hospital Acquired Pneumonia (HAP)** *# hospital acquired pneumonia/# pt days x 1000 pt days*	**0.2/0.5/0.9/1.6**	acute 1/1018 .9 SNF 1.2 2/1706	acute 0.9 1/1069 SNF 0 0/1493	0/906 0/1749	0.9 acute 1/1079 SNF 1/1022	**Benchmark 1.2 cases per 1,000 pt days. HAPPI project implemented with prevention triggers in EMR and staff education. Annual rate acute 0.7, SNF 0.5 per 1000 pt. days. Improvement noted from 2017.**
****Inpatient Hospital Acquired Catheter Associated Urinary Tract Infections (CA-UTI) (CMS Never Event)** *# inpatient CAUTI/# catheter days x 1000*	**0.7 /0 / 1.7 1.4/1.6**	**0** 0/283	**0** 0/280	**0** **0/307**	**3.3** **1/298**	**NHSN predicts 1.04 CAUTIs per year. 1 CAUTI in 2018 (0.85 per 1000 catheter days)**
SNF Hospital Acquired Catheter Associated Urinary Tract Infections (CA-UTI) *# SNF CAUTI/# catheter days x 1000*	**2.6 / 3.3/ 5.7/ 7.6/2.6**	**9.5** 1/105	**0** 0/133	11.2 **2/177**	**7.3** 1/127	**No NHSN SIR for SNF. Previous NHSN benchmark was 1.5 per 1000 catheter days. SNF 7.3 per 1000 catheter days. There is one hemiplegic patient that has recurrent CAUTIs.**
SNF Hospital Acquired *C. Difficile* Infections (CDI) *# SNF CDI/# patient days x 10,000*	**20 /11.7 /2/2/ 3.6**	**11.7** 2/1706	**6.7** 1/1493	2/1749	**0** 0/1022	**Benchmark: 7.4 per 10,000 patient days. Annual rate 8.3 per 10,000 pt days in 2018.**
SNF Central line associated bloodstream infections (CLABSI) *# Central Line Associated Bloodstream Infections (CLABSI)/central line days x 1000*	**1 / 0/ 0 /0 /2.7**	0 0/93	0 0/101	o 0/142	0 0/87	**Previous NHSN benchmark: 0.8 per 1,000 central line days.**
Communicable Disease Exposures *Pertussis*					2	**2 Pertussis exposures (Nov/Dec). 1 in ED and 1 in Medical Imaging (employee). ED did not isolate the patient and had 3 exposures. Medical Imaging resulted in 21 exposures. No pt. exposures. Both exposures had delayed reporting by lab to IP. The reporting issue has been addressed and resolved. Occ Health/ED followed up with symptomatic employees during incubation period. No secondary cases.**
MRSA Active Surveillance Cultures (nares cultures only) *# positives/total screened x 100*	**14%** **20%/26%/9.2%**	**10%**	3.4%	**7.9%**	**1.9%** 2/108	**Nares surveillance perofrmed in accordance with California law.**
% ESBL(E. coli;K. pneumoniae, K. oxytoca, P. mirabilis)	**2% /3%/4.2%/4.1%**	4%	2.9%	3.9%	9.3%	**ASP monitors antibiogram and updates annually. 31 ESBL /333 cultures 4th qtr.**
# CRE cases	**0/0/0/1**	0	0	0	0	**Track and trend**
Legionella Monitoring: water samples and patients with HA pneumonia		0 pts./ 3 cfu/ml water	0 pts/ water cx neg.	NA	0 pts.	**Water management company now in contract with SVH to assist with the water management program. Initial assessment performed.**
Environmental Cleanliness Monitoring		95%	91%	81%	97%	
Total Influenza Vaccination All HCP	80%			no report	pending	CDPH benchmark 90%
Physicians, LIP, Pas	88%				65%	
Employees	78%				87%	
Volunteers				pending		
Students	100%			100%		

Sonoma Valley Hospital 100 Day Workout 2019

	Date	Project Name	Department	Target Completion Status	Project Description	Outcome
1	Q1 2019	Medication Administration Scanning	Emergency Department	In Process	By April 1, 2019 we will increase compliance to medication administration scanning per RN in the ED to 90%.	
2	Q1 2019	Marketing & Community Outreach	Marketing	In Process	Ensure that forms and instruction procedures (and other documents) provided to patients and community members that are not reviewed by the SVH Forms Committee are understandable and conform with SVH Identity Guidelines and SVH Form Committee's	Greater clarity in all patient-directed documents, improved consistency with SVH identity standards, and a more professional-looking presentation of materials to patients.
3	Q1 2019	Emergency Department Point of Sales Collection Improvement	Patient Financial Services	In Process	To collect all emergency department copays at time of service or obtain a Health Presumptive Eligibility (HPE) application an all patients. We will target an increase in POS collection for ED services to reduce all overall bad debt by 50% by May 1, 2019	
4	Q1 2019	Medical Imaging Pricing	Patient Financial Services	In Process	To accomplish a pricing structure that is in line with other facilities, and not reduce our net revenue. We need to include PARA (for comp data), CFO, Dir of PFS. and revenue integrity specialist. We want to do this by April 15, 2019.	This goal is aligned with our objective to be competitive within the community and the market. We need to ensure that our reducing prices will not impact our overall medical imaging net revenue for SVH, while encouraging patients to use our facility for services.

5	Q1 2019	Employee Engagement Survey	Human Resources	In Process	Human Resources will develop an internal employee engagement survey to be distributed to all employees in April of 2019, asking for feedback about their work environment.	Honest and meaningful information that can be utilized to help guide actions and behaviors of this organization and our leaders in the continuous effort of creating and maintaining a healthy and balanced placed of work. Additionally, by producing this survey
6	Q1 2019	Respiratory Therapy Supply Chain	Patient Care Services	In Process	To evaluate the current respiratory therapy supply chain process related to number and type of supplies, location of supplies, staff dedicated to supply management, and cost of supplies. To recommend an internal best practice solution that delivers the right supplies at the right time.	No expirations, implementation of effective respiratory therapy material restocking process, ability to use the current supply space available, increase financial stewardship through an accurate supply ordering system, decrease clinician resource management costs.
7	Q1 2019	Renovo Contract	Engineering	In Process	Three years ago SVH contracted with RENOVO to provide Bio Medical services and a Maintenance Scheduling system. It has ended up much more expensive that what was estimated at the contract signing. Goal is to determine if SVH is getting value for the expenditure and is there an alternative to this service. Original estimated cost was around $180k. Actual costs around $200k plus. Goal to save $20k	We are spending too much money. However, we at first put this on hold due to time requirements for Finance. Now we are going to put this into our next round as the contract expires in March. Renovo is proposing an almost $100k increase in cost.

8	Q1 2019	Ancillary Utilization & Reimbursement focus on ED and day of discharge	Emergency Department	In Process	Evaluate the ED and Discharge physicians utilization of ancillary tests and cost compared to allowed billable labs for level of ED visit and Day of Discharge costs/margin. Look at as a department as a whole as well as per physician. Identify areas for improvement and give feedback regarding ancillary & staffing resource utilization, documentation and cost effective ordering to department and individual physicians.	Constructive feedback to doctors regarding cost effective testing and follow up per level of ED visit and thus increase the margin for the ED lab testing. Ex. Reduction of ordering unnecessary ancillary testing but continuing to capture level charge per pt with high quality outcomes and increase patient satisfaction
9	Q1 2019	Readmission and Mortality	Medical Staff	In Process	Identify patients who are at high risk of being readmitted be so that further readmissions can be avoided. Identification of Palliative Care opportunities	By collectively pursuing improvement strategies in a visible and measurable way, this measured approach includes focusing on reduction of preventable deaths and readmissions in acute care setting. Aligned with strategic goal related to CMS 5 Star rating
10	Q1 2019	Access to Medical Imaging	Medical Imaging	In Process	By April 1, 2019, we will see a decrease in patient complaints regarding "ability to schedule an appointment" by < 3 per month, 90% of the time. In addition, we will schedule Medicare patients with an accurate physician order within 24-48 hours 90% of the time	Greater clarity by Medical Imaging and Admitting personnel regarding the scheduling and authorization process resulting in faster scheduling times for specific types of insurance, and increased physician and patient loyalty as evidenced by decrease in complaints.

To: Sonoma Valley Healthcare District Board Quality Committee
From: Danielle Jones
Date: 2/27/19
Subject: Quality and Resource Management Report

February Priorities: CMS 5 Star Hospital Update

5 Star Hospital

Mortality 22% of CMS 5 Star Rating

- Goal: Reduction of preventable deaths in acute care setting and identification of Palliative Care opportunities
    - Identification and placement of patients at the accurate initial level of care
    - Recognition of the deterioration of patient's condition and reacting appropriately
    - End of Life Care
        - Partnering with Sound Physician Group to implement End Of Life question if answer is yes, then the End Of Life trigger is initiated on physician rounding list
    - Document an accurate reflection of severity of illness, risk of mortality and co-morbidities

Readmission 22% of CMS 5 Star Rating

- Goal: Identify patients who are at high risk of being readmitted be so that further readmissions can be avoided
    - Partnering with Medical Records and Coding to ensure that patients who are readmitted based on a transfer back agreement are coded with as code 82-discharge treatment transfer to short term general hospital with planned readmission, then these encounters will not count against us as readmissions in our 30 Day All Cause Readmission Rate.
    - Reviewed Sound Physician Initial Two Week Home Health Protocol which begins with pre-discharge visit by home health liaison, continues with home visits and phone calls and ends with education, medication compliance, and vital signs.

Patient Experience 22% of CMS 5 Star Rating

- Goal: Continue to focus on Patient Experience to increase satisfaction for inpatients and outpatient surgery through CAHPS measurements
    - Key Driver Report from Press Ganey review shows that 91% of patients who give top box scores for top two drivers (Doctors listen carefully to you and Nurses listen carefully to you) are likely to give SVH a 9/10 for Overall Rating.
    - Shared *Understanding Relational Patient Experience: Provider Communication in the Exam Room, an Observational Study,* with the Hospitalist group, an updated study

that John Hopkins did several years back on key behaviors physician needed to completed to improve patient experience.

- "The doctors were very helpful, they visited me regularly, they gave me good advice, they helped identified what was wrong with me, they gave me good advice of taking care of myself. The nurses were very, very, very helpful. They came whenever I needed them. They even came when I didn't call them, checking on me seeing if I needed anything. So, overall, I've been in the hospital before for different things. This was the best hospital visit I've had in my 80 years in my lifetime." **Nurse & Doctors Listen Carefully, Call button**
- "They absolutely treated me with the greatest respect and care. It was absolutely super. I've had hospital stays other places that were absolutely horrible. This is by far and above anything. It's just because people listen and care and they're there. They're doing an excellent job. From the doctors, to the nurses, to the people that draw blood who are just as polite and good as you can get." **Nurse & Doctors Listen Carefully**

Effectiveness of Care-Core measures related to sepsis, stroke and colonoscopy surveillance 4% of CMS 5 Star Rating

- Goal: To enhance best practice care for sepsis, stroke and colonoscopy surveillance
  - Continue to prepare to for anticipate on site CIHQ Stroke Ready Survey in late March 2019

Safety of Care -Hospital Acquired Infections of 4% CMS 5 Star Rating

- Kathy Mathews to present Annual Infection Prevention Report

2018 Medication Error Reports

- 158 total
- 37 administration related
- 16 potentially preventable
- Actions taken:
  - Met with RT department to identify barriers to use of scanning since 5 of 12 in ED were RT
  - Increasing use of auto-processing to help minimize need to Pyxis override in ED
  - FYI, SNF no longer barcode scans all meds due to change in staffing ratio causing unrealistic turn around for med pass; not a standard for other SNFs or nursing homes.

Administration Errors by Unit

Unit	Administration Errors	Preventable with Scanning
Emergency Department	26	12
Medical/Surgical	8	2
Skilled Nursing	3	2

Bar Code Medication Administration Technology: A Systematic Review of Impact on Patient Safety When Used with Computerized Prescriber Order Entry and Automated Dispensing Devices

Kieran Shah, Clifford Lo, Michele Babich, Nicole W Tsao, and Nick J Bansback

INTRODUCTION

Medication errors (any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer) that lead to adverse drug events (any undesirable experience associated with a patient's use of a drug) are known to represent a major threat to patient safety, despite widespread preventive programs and extensive education of hospital personnel.[1-4] It has been estimated that when adverse drug events occur in the hospital setting, they increase the patient's length of stay by an average of 4.6 days, and the cost to the Canadian health care system is $4685 per event[4] ($6655 in 2016 Canadian dollars, adjusted for inflation). Fortunately, many medication errors are preventable, and the implementation of health information technologies, such as bar code medication administration (BCMA) systems, is increasingly being considered as one solution.[4-6] In fact, the American Society of Health-System Pharmacists and the Healthcare Information and Management Systems Society both recommend the use of BCMA.[7,8]

BCMA systems reduce medication errors by electronically verifying the "5 rights" of medication administration—right patient, right dose, right drug, right time, right route—at the patient's bedside.[7] For example, when a nurse scans a bar code on his or her identification badge, on the patient's wristband, and on the medication to be administered, the data are delivered to a computer software system where algorithms check various databases and generate real-time warnings or approvals.[7] Most systems then automatically document, in real time, the administration of the medication in an electronic medication administration record (eMAR).

Other than cost, one of the barriers to widespread adoption of BCMA technology is the lack of definitive evidence that BCMA actually reduces preventable medication errors, especially in hospitals that are already using other safety systems, such as computerized prescriber order entry (CPOE) and automated dispensing devices (ADDs).[7,9] The objective of this systematic review was to determine the impact of BCMA on medication errors when used as part of a closed-loop medication administration system (i.e., BCMA with CPOE and ADD).

METHODS

A comprehensive search, covering the years 1992 to 2015, was conducted within the MEDLINE, PubMed, and Embase databases, for English-language articles reporting on medication errors with the use of BCMA systems combined with CPOE and ADDs in hospital wards. The keywords "bar code", "bar codes", "bar coding", and "barcoding" generated the Medical Subject Heading (MeSH) terms "automatic data processing", "medication errors", and "medication systems, hospital". The MeSH terms "systems analysis" and "medication systems," adapted from Young and others,[9] were used to broaden the search. Related articles identified by using the function "similar articles" or "related articles" in each database, pertaining to systematic reviews or other studies found to be relevant to this literature review, were also reviewed. This additional step helped to incorporate any other studies not found using the specific

search terms. Finally, the reference lists of any relevant summaries, systematic reviews, and articles were reviewed to ensure that relevant articles not identified by the above search strategy were included.

Inclusion Criteria

All articles reporting on the use of BCMA at the point of care (i.e., the patient's bedside) in a hospital setting, including randomized controlled trials, observational studies (cohort and case–control), and before-and-after studies, were considered for inclusion.

Exclusion Criteria

Studies were excluded if they examined the use of any bar code–based technologies used in other areas of the hospital, such as the pharmacy department, or in non–medication-related applications. Studies that did not report the impact of BCMA technology on medication error rates were also excluded. Studies that did not include the BCMA technology as a closed-loop medication process (i.e., in addition to CPOE and ADD systems) were excluded.

Analysis

All relevant abstracts and titles were screened to assess the eligibility of studies for inclusion. Two reviewers (K.S. and C.L.), working independently, used a standardized data extraction form to extract information from the articles, such as study design, sample size, inclusion and exclusion criteria for the individual study, interventions, outcomes, and results. These data were used in a critical appraisal of the studies, whereby the strengths and weaknesses of the studies, their sources of bias, and their overall quality and reliability were determined, by overall consensus, using the Newcastle–Ottawa Scale.

RESULTS

A total of 430 citations were found, of which 393 were excluded at the abstract review level (Figure 1). These articles were excluded because they did not include the specified complementary technologies (CPOE and ADD), did not involve use of BCMA at the patient's bedside, did not report the impact of BCMA on medication error rates, or reported only preliminary results on medication error rates. Of the 37 articles selected for full-text review, 5 met the inclusion criteria for evidence synthesis. Three of these studies used direct observation to determine medication errors,[10-12] whereas the other 2 studies relied on self-reporting.[13,14] Direct-observation studies are considered more reliable than those based on self-reporting[15]; however, both types of data collection are commonly used in studies examining medication errors. Three of the studies investigated the outcomes when BCMA technology was added to existing ADD and CPOE systems,[10,11,13] one study examined a setting where all 3 technologies were implemented at once,[12] and the final study investigated a setting where BCMA was added to existing ADDs, followed by implementation of CPOE.[14] Given variations among the studies in terms of their methods, periods between data collection, populations, and care settings, we were unable to perform a

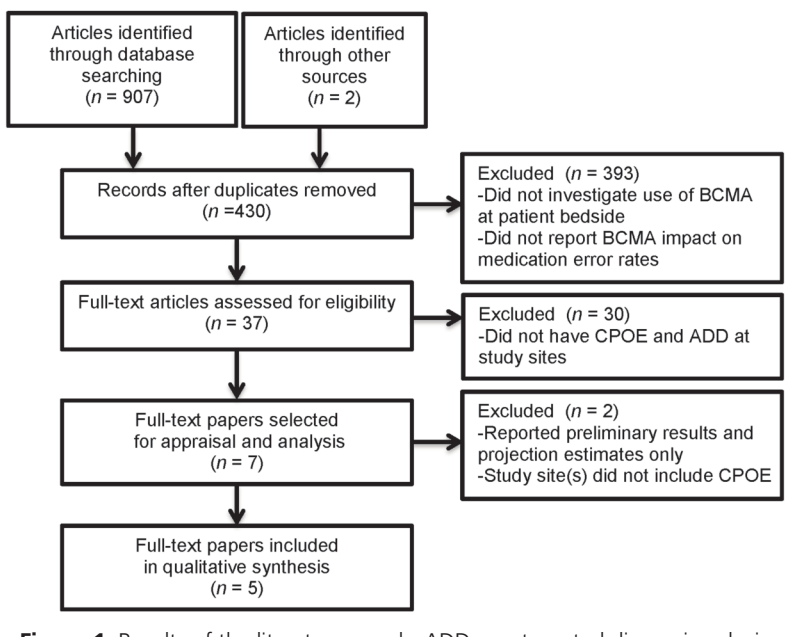


Figure 1. Results of the literature search. ADD = automated dispensing devices, BCMA = bar code medication administration, CPOE = computerized prescriber order entry.

pooled quantitative analysis incorporating all of the results. In general, the studies focused on 3 categories of errors: administration errors (timing or nontiming), transcription errors, and total medication errors. The study characteristics are summarized in Table 1, and overall results are summarized in Table 2.

Administration Errors (Timing and Nontiming)

The 3 studies that used direct-observation methods and a prospective before-and-after design examined differences in medication administration error rates.[10-12] Two of these studies concluded that BCMA reduced the absolute rate of nontiming errors by 4.6%[11] or 4.7%,[10] but their findings on timing-related medication administration errors were conflicting.

Poon and others[10] studied the impact of BCMA technology on patient safety in medical and surgical wards and intensive care units (ICUs) where a CPOE and ADD system was already established. They found that after implementation of BCMA, nontiming errors were reduced from 11.5% to 6.8%, a 41.4% relative risk reduction (RRR) (95% confidence interval [CI] –34.2% to –47.1%; $p < 0.001$). The nontiming errors were also analyzed by subtype. Wrong medication errors were reduced from 1.0% to 0.4% (RRR 57.4%, 95% CI –39.2% to –79.3%; $p < 0.001$), wrong dose errors from 2.0% to 1.1% (RRR 41.9%, 95% CI –27.9% to –58.7%; $p < 0.001$), wrong route of administration errors from 0.3% to 0.1% (RRR 68%, 95% CI –37.4% to –97.7%; $p < 0.001$), and administration documentation errors from 2.9% to 0.6% (RRR 80.3%,

Table 1 (part 1 of 3). Characteristics of Included Studies

Study and Method of Error Detection	Study Type and Duration	Population and Inclusion Criteria	Exclusion Criteria	Intervention	Quality Assessment: Newcastle–Ottawa Scale[16]
Poon et al. (2010)[10] Direct observation by nurses	Prospective, quasi-experimental, controlled before-and-after study Data collected 2–4 weeks before BCMA versus 4–8 weeks after BCMA Staggered nature of roll-out: 2–4 units began using BCMA every 2 weeks Duration of observation period for each unit implementing BCMA unknown	Inpatients from 35 adult medical, surgical, and intensive care units in a 735-bed tertiary academic medical centre (United States)	Oncology units (because of complex protocols, dosing regimens, and specialized workflow for administering medications)	Implementation of BCMA with eMARs *versus* Traditional, paper-based process of administering drugs (whereby medication orders were manually transcribed to paper MAR by physician, with nurse manually verifying dose and patient identity before giving the dose) CPOE and ADD systems were in place before and after the intervention	Selection: 4/4 Comparability: 0/2 Outcome assessment: 2/3
Franklin et al. (2007)[12] Direct observation by pharmacists	Before-and-after study Data collected 3–6 months before BCMA versus 6–12 months after BCMA Duration of observation period 2 weeks	Patients and staff of a 28-bed surgical ward of a London teaching hospital (United Kingdom)	IV doses for MAE rate calculation, as implementation of eMAR changed workflow (one nurse could now prepare IV medications while another prepared oral medications); this situation introduced potential for bias in results IV infusions and oral anticoagulation remained in paper charts	CPOE, ADD, BCMA, and eMAR system *versus* No implementation of previously described technology; units used paper charts, and medications were stored in carts and cupboards	Selection: 3/4 Comparability: 0/2 Outcome assessment: 3/3

continued on page 397

Table 1 (part 2 of 3). Characteristics of Included Studies

Study and Method of Error Detection	Study Type and Duration	Population and Inclusion Criteria	Exclusion Criteria	Intervention	Quality Assessment: Newcastle–Ottawa Scale[16]
Helmons et al. (2009)[11] Direct observation by pharmacists and pharmacy students	Prospective, before-and-after observational study Data collected 1 month before BCMA versus 3 months after BCMA Staggered roll-out over 1 year Duration of observation period for each unit implementing BCMA unknown	Patients in 2 medical-surgical units and 2 ICUs of a 386-bed academic teaching hospital (United States)	Medication administration during emergencies	BCMA technology (medication administration checked with software system) interfaced with CPOE and pharmacy information system *versus* MAR printed once daily serving as a paper reference for medications to be delivered to patients and completed that day; hospital CPOE system that was already implemented had to be regularly checked for new or modified medication orders, and any changes had to be transcribed onto the MAR	Selection: 4/4 Comparability: 0/2 Outcome assessment: 2/3
Richardson et al. (2012)[14] Self-reporting	Medication error rates recorded on the basis of a before-and-after approach Study focused on key steps guiding clinical nurse specialists to improve safety of medication administration by implementing BCMA, with phased-in approach over 3 years; scanning rates were recorded in 3 phases (months 6–13, months 14–24, and months 25–36)	Not stated (United States)	Not stated	Implementation of eMAR and BCMA, followed by implementation of CPOE *versus* Traditional paper system with ADDs already in place	Selection: 4/4 Comparability: 0/2 Outcome assessment: 2/3

continued on page 398

95% CI –73.7% to –87.0%; $p < 0.001$). Potential adverse drug events due to nontiming administration errors decreased from 3.1% to 1.6% (RRR 50.8%, 95% CI –39.1% to –61.7%; $p < 0.001$). Specifically, there were RRRs of 48.5% (95% CI –33.9% to –64%; $p < 0.001$) and 54.1% (95% CI –36.8% to –70.4%; $p < 0.001$) for "significant" and "serious" potential adverse drug events, respectively, as adjudicated by a multidisciplinary panel of physicians, nurses, and pharmacists. However, there was no significant reduction in potential adverse drug events categorized as life-threatening.

Helmons and others[11] examined medication administration error rates, as well as the accuracy of medication administration, in 2 medical–surgical units and 2 ICUs in a 386-bed teaching hospital in the United States. The incorporation of BCMA technology into an established CPOE and ADD system decreased medication administration errors in the medical–

Table 1 (part 3 of 3). Characteristics of Included Studies

Study and Method of Error Detection	Study Type and Duration	Population and Inclusion Criteria	Exclusion Criteria	Intervention	Quality Assessment: Newcastle–Ottawa Scale[16]
Higgins et al. (2010)[13] Self-reporting	Before-and-after study in a large teaching hospital with retrospective analysis; pre-implementation data collected from 2007 to April 2008; post-implementation data collected from April 2008 to 2009	Administration of medication to patients from the Baystate Medical Center, a 655-bed general acute tertiary care teaching hospital (United States)	Medication administration errors in the emergency department (which did not have BCMA)	Implementation of bar code scanning for positive identification of patient *versus* No bar code administration system CPOE and ADD already in place	Selection: 4/4 Comparability: 0/2 Outcome assessment: 2/3

ADD = automated dispensing device, BCMA = bar code medication administration, CPOE = computerized prescriber order entry, eMAR = electronic medication administration record, ICU = intensive care unit, MAE = medication administration error, MAR = medication administration record.

surgical units from 8% to 3.4%, representing a 56.9% RRR ($p < 0.0001$); however, no change in error rates was observed in the ICUs. This difference in findings for different settings within the hospital was largely attributed to a decrease in omission errors in the medical–surgical units, a type of error that did not occur frequently in the ICUs. The accuracy of medication administration was measured with the 9-point accuracy indicator system of the California Nursing Outcomes Coalition.[17] One of the indicators, "two forms of identity not checked (orally confirming patient identity and scanning the bar code on the patient's wristband)", decreased from 13.4% to 6.9% ($p < 0.0001$) in the medical–surgical units.[11] However, the use of BCMA led to increases in distractions or interruptions (from 15.5% to 25.2%; $p < 0.0001$) and in medications given without explanation to the patient (from 10.9% to 14.9%; $p = 0.045$).[11] In the ICUs, none of the accuracy indicators improved after implementation of BCMA, except noncompliance with medication charting, which declined from 24.4% to 6.7% ($p < 0.0001$).[11]

Poon and others[10] were the only authors to conclude that BCMA reduces wrong time errors. This type of error, defined as medication administration that was early or late by more than 1 h, decreased from 16.7% to 12.2% (RRR 27.3%, 95% CI –21.0% to –33.8%; $p = 0.001$). However, there was no significant reduction in potential adverse drug events as a result of wrong time errors. In contrast, Helmons and others[11] found that wrong time errors increased after BCMA implementation in both the medical–surgical units (from 2.7% to 4.5%; $p < 0.05$) and the ICUs (no statistically significant difference).

Table 2. Effect of BCMA on Medication Errors

Medication Error Type and Study	Error Rate: Before Implementation	Error Rate: After Implementation	RRR (%)	*p* Value
Administration errors: timing				
Poon et al.[10]	16.7% (1126/6723)	12.2% (891/7318)	–27.3	0.001
Administration errors: nontiming				
Poon et al.[10]	11.5% (776/6723)	6.8% (495/7318)	–41.4	< 0.001
Franklin et al.[12]*	7.0% (103/1473)	4.3% (49/1149)	–39.0	0.005
Helmons et al.[11] (medical and surgical units)	8.0% (71/888)	3.4% (24/697)	–56.9	< 0.0001
Helmons et al.[11] (ICU)	11.0% (41/374)	9.9% (39/394)	–10.0	NSS
Transcription errors				
Poon et al.[10]	6.1% (110/1799)	0 (completely eliminated)	–100	Not calculated†
All types of medication errors				
Richardson et al.[14]	2.89 errors per 10 000 doses (% not reported)	1.48 errors per 10 000 doses (% not reported)	–48.8	Not calculated

BCMA = bar code medication administration, ICU = intensive care unit, NSS = not statistically significant, RRR = relative risk reduction.
*IV doses were excluded.
†Because there were no errors in the postimplementation phase, the authors were unable to build multivariable models to compute adjusted *p* values.

Franklin and others[12] conducted their before-and-after direct-observation study in a 28-bed surgical ward of a teaching hospital in London, UK. These authors investigated the impact of a closed-loop medication administration (CPOE, ADDs, and BCMA) on medication administration errors and prescribing errors; however, they did not report their findings on timing and nontiming medication administration errors separately. There was a statistically significant reduction in non-IV medication administration errors, from 7.0% to 4.3% (absolute difference 3.7%, 95% CI –0.9% to –4.5%; $p = 0.005$), after implementation of a closed-loop medication administration system. However, the reduction in mean clinical severity score (assessed by judges on a scale of 0 [no harm] to 10 [death], according to a validated method) was nonsignificant. The predominant types of errors that were reduced were wrong dose errors (1.8% before versus 0.4% after implementation; no *p* value reported) and omission errors not due to nonavailability of the drug (2.6% before versus 0.9% after implementation; no *p* value reported). Furthermore, the authors found a statistically significant reduction in prescribing errors, from 3.8% to 2.0% (absolute difference 1.8%, 95% CI –0.9% to –2.7%; $p < 0.001$), with no differences in mean clinical severity score; this reduction was likely the result of concurrent implementation of CPOE, rather than a direct consequence of BCMA. There was a nonsignificant trend for more prescribing errors to be resolved before reaching the patient (48% before versus 67% after implementation).

Finally, Franklin and others[12] found that not checking patient identity before medication administration was significantly reduced, from 82.6% to 18.9% (absolute difference 63.7%, 95% CI 60.8% to 66.6%; $p < 0.001$), after implementation of the closed-loop medication administration system. The authors noted that full compliance in checking patient identity before each medication administration was not achieved because of informal practices, such as affixing bar codes to patients' furniture, with the furniture, rather than the patient's wristband, being scanned.

Transcription Errors

Although eMARs were implemented along with BCMA in 3 of the studies,[10,12,14] Poon and others[10] were the only authors to report the impact of these technologies on transcription errors. Transcription errors, defined as errors in the transcription of physicians' orders onto the MAR for medications administered during the observation period, occurred at a baseline rate of 6.1%. Of these, 48% were classified as potential adverse drug events, with 25% being classified as "significant" and 22% classified as "serious" in severity.[10] The types of transcription errors included directions stated in the physician's order incompletely or incorrectly transcribed onto the MAR, physician's order not transcribed onto the MAR at all, and incorrect formulations transcribed onto the MAR. Once BCMA with eMAR was deployed, such transcription errors were completely eliminated.

Total Medication Errors

Two of the studies, based on self-reporting methods, reported RRRs for total medication errors of 49%[13] and 75%.[14] Higgins and other[13] studied the incidence of total medication errors (specifically medication dispensing and administration errors) before and after addition of BCMA to an established CPOE and ADD system in the emergency department of a 655-bed teaching hospital in the United States, using data from an existing anonymous safety reporting system. They categorized the errors as "near-miss" events (a situation with potential to cause harm or unsafe conditions that was noted by a provider, but corrected before reaching the patient) and "errors that reached the patient".[13] Interestingly, they found a 90% increase in near-miss events after implementation of BCMA (20 administration errors per million doses dispensed versus 38 administration errors per million doses dispensed; $p < 0.05$). When they separated the low-severity errors (identified before medication administration) from those that reached a patient, possibly necessitating monitoring or treatment for harm, they found a statistically significant relative reduction of 75% in errors reaching the patient (3.26 per million doses dispensed to 0.8 per million doses dispensed; $p < 0.05$). This error reduction was sustained for 15 months after BCMA implementation.

Richardson and others[14] described the experience of a small New England hospital that added BCMA technology, followed by CPOE, to an established ADD system over a 3-year period. Self-reported data supplied by nurses showed a trend toward a reduction in total medication errors (types not defined), from 2.89 errors per 10 000 doses to 1.48 errors per 10 000 doses. Furthermore, the rate of bar code scanning by nurses increased from 94% at the end of the first year to 98% at the end of the study. Unfortunately, no analysis was performed to determine statistical significance.

DISCUSSION

To the authors' knowledge, this is the first systematic review to investigate the effects of BCMA on patient safety and medication administration errors when used in conjunction with CPOE and ADDs. In a previous systematic review, Young and others[9] included studies that used BCMA alongside CPOE and ADDs, BCMA with one other technology, or BCMA on its own. Their broad inclusion criteria made it difficult to isolate the magnitude of benefit provided by BCMA within a closed-loop medication administration system.[9] In addition, their search covered a narrower period (1999–2009), whereas the current systematic review captured articles published

between 1992 and 2015. This longer search period resulted in the inclusion of 3 new articles, all published after 2009, which allowed for an updated analysis using more homogeneous data. Two of these new studies used direct-observation methodology, which addressed one of the limitations identified by Young and others.[9] Although no studies published between 1992 and 1999 met our inclusion criteria, we included those years in the literature search because BCMA technology was developed during this period.

The ability of BCMA to reduce nontiming-related administration errors was evident and generally accepted in the 3 studies that investigated this type of error.[10-12] Poon and others[10] found that dosing, incorrect medication, and wrong route errors were all reduced. Similarly, Franklin and others[12] reported that dosing errors were one of the predominant types of error reduced by BCMA, and Helmons and others[11] and Franklin and others[12] found reductions in omitted doses. Because of the direct-observation design of these 3 studies, it is unclear whether reported omission errors were in fact wrong time errors, with the medications being given at another time but not observed. All 3 studies showed that, in addition to ensuring that patients received their medications, BCMA technology reduced errors resulting in administration of a wrong dose or wrong medication, as well as errors involving medication being given by the wrong route.[10-12] These results are logical, given that the BCMA technology checks the "5 rights" of medication administration at the patient's bedside.

Wrong time errors are generally considered less severe than other types of errors. That is why some studies have reported wrong time errors separately from medication administration errors[11] or have excluded them entirely.[18] Two of the studies included in the current review[10,11] reported conflicting data on wrong time errors associated with BCMA. The increase in wrong time errors in the study by Helmons and others[11] was not explained by the new technology causing nurses to spend more time on medication administration, because the median duration of medication administration did not change after BCMA implementation. However, unless there were efficiency gains, the reduction in wrong time errors in the study by Poon and others[10] could have been explained by the accompanying eMAR technology, since some eMARs display a visual status board of actions required for each patient. Therefore, the net effect of BCMA on wrong time errors, whether a decrease or an increase, is inconclusive but likely depends on the implementation and design of the particular closed-loop system. Further research is needed to determine the specific implications of BCMA for this type of error.

Two of the studies[10,12] reported conflicting results in terms of the severity of potential medication administration errors prevented by BCMA, albeit using different methods and vague definitions to judge clinical severity. Poon and others[10] found that the potential errors reduced by BCMA were "significant" or "serious" but not "life-threatening". Conversely, Franklin and others[12] found that BCMA did not significantly reduce the mean severity score of medication administration errors prevented; however, their small study in a single unit was likely insufficiently powered to evaluate serious medication errors. Further research (involving larger studies over longer study periods) is needed to determine the impact on life-threatening medication errors of BCMA within a closed-loop medication administration system. In particular, institutions that were early adopters of this technology are encouraged to publish their safety data.

Two of the studies found an increase in the percentage of doses for which a patient's identity was checked before medi - cation administration following implementation of BCMA in medical–surgical[11] or surgical[12] wards. However, this benefit may be offset by nurses being less likely to explain the side effects of a medication to the patient, possibly because there may be more distractions and interruptions after BCMA implementation.[11] In addition, one of these studies found no significant improvement in the rate of checking 2 forms of identity in the ICU.[11] The authors postulated that baseline compliance with the requirement to check 2 forms of identity is low in the ICU because most patients are unconscious, meaning that oral verification of a patient's identity is impossible.[11] Furthermore, visually checking the patient's name and medical record number on the wristband and then scanning the wristband as a dual method of checking the patient's identity was likely not performed in the ICU, because each nurse was assigned to the same patient for the entire shift.[11] Therefore, checking 2 forms of identity may not be the best indicator of medication accuracy in all settings.

Poon and others[10] were the only authors to conclude that BCMA completely eliminates transcription errors. Each of the transcription errors that they identified could have led to potential adverse events, but elimination of these errors was likely a result of the accompanying eMAR technology and a reduction in the need for clerical MAR entries, rather than being directly attributable to BCMA. Similarly, Helmons and others[11] found that compliance with charting of medication administration on the MAR increased significantly in the ICU after implementation of BCMA, but this outcome may have been related in part to the relatively low baseline compliance. Taken together, these studies indicate that not only does the use of BCMA technology have the potential to improve the accuracy of the MAR, it facilitates nurses' compliance with MAR charting.[10,11] However, the impact on both of these error types will depend on each institution's current practices and how it implements and configures BCMA.

Higgins and others[13] and Richardson and others[14] reported a reduction in total medication errors using self-reporting

methods. Direct observation is considered more reliable than self-reporting,[15] but the latter is a pragmatic method of determining error rates in hospitals. Its major weaknesses are the potential for under-reporting and the inability to distinguish between an increase in error rates and an increase in reporting rates. These reasons may explain why Higgins and others[13] found a significant reduction in total medication errors reaching the patient but also reported an increase in near-miss errors after implementation of BCMA: an increase in self-reported near-miss medication errors should be expected when BCMA technology is first deployed.

Reported Limitations of BCMA

Human factors and technical issues are important considerations for BCMA technology. Every study included in this systematic review reported an inability to completely eliminate medication administration errors and an inability to achieve 100% scanning rates,[10-14] although Richardson and others[14] came close to the latter goal, with a 97% scanning rate after 36 months of rapid quality improvement cycles. Workarounds by nurses and technical issues contributed to the incomplete scanning rates.[10,12-14] Technical issues included smudged bar code labels, lack of updating of bar codes with a new pharmacy inventory, and activation of alerts despite correctly delivered care, all of which can result in increased scanning failures and, consequently, near-miss events.[12,13]

Despite these limitations, there are no data in this review citing BCMA as a direct cause of medication administration errors. In fact, all of the benefits reported—reductions in administration errors, transcription errors, and total medication errors, as well as reductions in severity of errors—were observed despite nursing workarounds and technical issues. Poon and others[10] concluded that implementation of BCMA should not be regarded as a single event, but rather an ongoing process that requires training and education, along with improvements and modifications. Therefore, we encourage institutions that have adopted this technology to share their experiences. We also encourage the authors of studies using direct-observation methodology to perform follow-up analyses to determine whether the benefits of BCMA are sustained over time.

Quality Assessment of Studies

The Newcastle–Ottawa Scale[16] was used to assess the quality of the nonrandomized trials included in this study; this validated tool is recommended for this purpose by the *Cochrane Handbook for Systematic Reviews of Interventions*.[19] The maximum score for any individual study is 9, and the results of this analysis are presented in Table 1.

In terms of the selection criteria, the studies included in the current systematic review had representative populations, as they were conducted in tertiary care hospitals and included multiple sites, such as medical–surgical units, general medicine wards, and ICUs.[10,11,13,14] Only one study focused on a single (surgical) ward,[12] which was less desirable.

Given the observational design of these studies, the largest and most consistent limitation is the theoretical risk of confounding. None of the studies performed statistical modelling to control for potential confounding variables; therefore, no points were awarded in the comparability category for design and analysis.

In terms of outcome measures, major factors that reduced study quality included the use of self-reporting methodology, rather than direct observation of administration errors. Although studies that used self-reporting[13,14] were rated less favourably, the self-reporting methodology did allow for a longer duration of follow-up (8 months to 1 year before implementation; 2 to 4 years after implementation) relative to direct observation, which typically occurred over only a few days. Two of the studies that used direct observation did not specify the duration of follow-up before and after the intervention, which led to less favourable ratings.[10,11] For the single direct-observation study that did specify the follow-up period, this duration was only 2 weeks.[12]

Finally, the outcomes of interest in all studies (administration errors) were readily available from direct observation and self-reports, which made loss of data or attrition bias unlikely. Overall, the quality of studies included in this review (total score 6 for every study) was typical of observational studies conducted with medication management technology and automation. In a utopian world, we would call for randomized controlled data, but from a pragmatic perspective, the return on investment with this type of evaluation is low, and such studies will likely never be done. Instead, we encourage those who have implemented BCMA technology to share their experiences.

Limitations

With regard to the search methods, included studies were restricted to those published in English, as we did not have the resources to translate articles published in other languages. Unfortunately, we were unable to assess publication bias because of the paucity of published studies with unfavourable results. We did not include any unpublished studies, since such studies have not undergone peer review and their reliability is uncertain. Nevertheless, our literature search was thorough and robust, and detailed data were extracted from each study and then synthesized to arrive at the most conclusive outcomes.

CONCLUSION

Comparative evidence providing clinical justification of BCMA with its complementary technologies is limited. Results

from the 5 studies included in this review suggest that BCMA has the potential to reduce nontiming administration errors, transcription errors, and total medication errors. Its impact on wrong time errors, an error type that is less clinically significant, is unclear. Additionally, BCMA has the potential to improve compliance with the requirements to check patient identity before administering medications and to chart the administration of medications on the MAR. Although BCMA has been shown to reduce serious and significant nontiming medication administration errors, more longitudinal studies are required to capture data on life-threatening errors. Institutions that were early adopters of this technology are encouraged to publish their long-term data and to share their experience in managing human factors and technical issues that are barriers to completely eliminating medication administration errors and achieving 100% bar-code scanning rates. Finally, future research should focus on the economic impact of using BCMA (for example, through a full cost–benefit analysis incorporating all direct, indirect, and intangible costs and benefits) to further facilitate the assessment of its use in Canadian hospitals.

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Funding: None received.

Policy and Procedures – Summary of Changes
Board Quality Committee, February 27th, 2019

Review and Approval Requirements

The SVH departmental/organizational policies and/or procedures on the attached list have been reviewed and approved by the following organizational leaders for meeting all of the following criteria. All of these policies and procedures are:

- Consistent with the Mission, Vision and Values of the Sonoma Valley Health Care District
- Consistent with all Board Policy, Hospital Policy and Hospital Procedures
- Meet all applicable law, regulation, and related accreditation standards
- Consistent with prevailing standards of care
- Consistent with evidence-based practice

We recommend their acceptance by the Quality Committee and that the Quality Committee forward them to the Sonoma Valley Health Care District Board with a recommendation to approve.

ORGANIZATIONAL

NEW:

Contract Administration - Patient Care GL8610-139
A new policy is required to cover administrative practices unique to contracted patient care services. Policy has been updated based on Board Quality feedback received 1/30/19. Draft appendices have been removed for clarity and simplification.

Stroke Admission Transfer Guidelines PC8610-184
This policy was created to fulfill the CIHQ requirement that the hospital have a policy covering how we handle stroke patients.

REVISIONS:

Abbreviations and Symbols Used MR8610-102
Update to use of approved abbreviation list to use of online abbreviation resource "Medical Abbreviations" by Neil M. Davis.

Administration of Medications MM8610-106
Extended the time frame in which SNF doses may be given and considered on time from 1 hour before or after scheduled administration time to 90 minutes before or after scheduled administration time. The 2 hour window previously listed is not consistently achievable in SNF with the new nursing ratio of 1:15. The time frame is determined by the facility and must be defined in policy.

Formulary Management MM8610-122
Added verbiage defining how generics and biosimilar agents are managed in terms of use on the formulary. Now that there are more biosimilars on the market, they need to be addressed formally in our policy to more rapidly incorporate their use without necessarily going through the process that a new drug would need to go through in order to be added to formulary. Adding section on generics to be complete.

Malignant Hyperthermia Management of Patient with MM8610-105
Updated policy to reflect current MHAUS guidelines and incorporate the use of Ryanodex as the dantrolene product used rather than Dantrium. To include a 'to do' checklist for actions to be taken in the event of MH. Update to location of MH supplies. Ryanodex is a new product that allows for only 3 vials to be stored instead of 32 vials. Ryanodex is also easier and faster to prepare.

Central Venous Catheter and Port Access and Management PC8610-120
Combined the central venous catheter and port access policies and Appendix A per the recommendation of the P&P Committee 11/20/18. “Appendix A – Venous Access Device Adult Quick Reference Guidelines” was revised to address intermittent infusion and other tubing changes.

Surgical Invasive Procedure and Site Confirmation Verification OI8610-104
Further detailing procedure for briefing/timeout according to current practice and Universal Protocol; adding verbiage for correctly filling out surgical consent and verification of it. Standardize timeout procedure for all cases for increased accuracy and preparedness for all cases prior to incision; additional safeguards to assure accuracy of consent.

Annual Medical Surveillance HR8610-164.7
Revised to clarify that Human Resources is responsible for Employee Health Services, in coordination with Occupational Health and Infection Prevention (removed references to an employee health department/nurse). Removed requirements for home care personnel. Added references to corresponding Employee Health and Infection Prevention policies.

Dress Code HR8610-230
No significant/substantive changes; revised the language and organization of the policy in an effort to improve clarity. Added the uniform “color by discipline” chart for reference.

Employee Assistance HR8610-355
Reorganized and revised language to provide clarity – no substantive changes.

Employee Health Services HR8610-164
Revised to clarify that Human Resources is responsible for Employee Health Services, in coordination with Occupational Health and Infection Prevention (removed references to an employee health department/nurse). Eliminated redundancy of details/procedures addressed in other policies (provided reference to such policies instead). Removed language referring leave of absences (HR process and not associated with Employee Health Services).

Grievance Policy (Employee) HR8610-186
Simplified the language overall; added the first step of an informal discussion; eliminated the fourth step by establishing final decision by senior management in step 3.

Harassment HR8610-188
Significant changes in regards to adding much more content and clear definitions of the various types of harassment, providing examples, and outlining the appropriate reporting requirements. Ensured all content was aligned with current federal and state laws, where appropriate.

Infectious Disease Work Restrictions Exposures HR8610-164.9
Updated all references to “employee health” to Human Resources, Infection Prevention, or Occupational Health, as appropriate. Updated Appendix A (Table of Infectious Diseases) and Appendix B (Notification of Potential Infectious Disease Exposure form).

Overtime HR8610-132
Combined Holiday Pay policy with this Overtime policy. Minor language changes and re-organization of the information to provide improved clarity.

Pay Periods and Pay Checks HR8610-124
Minor language edits – no substantive changes
Post Offer Pre-Employment Screening HR8610-164.1
Updated language and organization of policy to provide enhanced clarity. Updated procedures to reflect current process and outlined in a more summary format with reference to other Employee Health policies that contain more specific details (thereby also reducing redundancy and risk of inconsistency). Changes were implemented in our pre-screening process, removing the full physical and limiting the assessment to a physical capacity test only. This change improves the time commitment for onboarding activities by eliminating unnecessary evaluations.

Respiratory Protection Program HR8610-164.14
A number of revisions to reflect that Human Resources provides employee health services and oversight of this program, coordinated with Infection Prevention. Reorganized policy language and procedure language to provide improved clarity; organized procedures by new hire and annual requirements; added language about consequences of non-compliance. Added appendix identifying employees by occupation that require compliance under this program. Policy needed improved organization for enhanced understanding of the requirements, needed updates to reflect current processes, and needed embedded accountability.

Time and Attendance Records HR8610-122
Revised language to reference electronic time entry methods; added requirement of time entry exceptions be recorded in the department's Exception Log and no timecard edits/changes are allowed without corresponding Exception Log entry; added requirement to record sick calls, or other unscheduled absences as such (i.e., Unscheduled PTO); expanded on the definition of the 7-minute rounding rule.

RETIRE:

Holiday Premium Pay HR8610-154
combined with Overtime & Holiday Pay HR8610-132

DEPARTMENTAL

Nutrition

Dry Storage 8340-173
Current Food Storage Procedures Policy does not adequately address cold and dry storage. Information has been separated into two expanded policies. This policy more fully addresses dry storage. Added "Policy" and "Purpose". They were missing. Changed policy number from 8340-112 to 8310-173.

Refrigerator Freezer Storage 8340-174
Current Food Storage Procedures Policy does not adequately address cold and dry storage. Information has been separated into two expanded policies. This policy more fully addresses Refrigerator Freezer storage. Added "Policy" and "Purpose". They were missing. Changed policy number from 8340-112 to 8310-174.

Occupational Health Departmental Manual

Table of Contents includes description of changes

SUBJECT: Contract Administration, Patient Care Services	POLICY: GL8610-139
	PAGE 1 OF 3
DEPARTMENT: Organizational	EFFECTIVE:
REVISED:	

PURPOSE:

To ensure contracted patient care providers administer the same level of high-quality care, treatment, and service as directly administered by the organization and that such care, treatment, and service is administered in a safe and effective manner.

POLICY:

- Patient care services provided under contract are subject to the same hospital-wide quality assessment and performance improvement (QAPI) evaluation as other services provided directly by the hospital
- The hospital maintains a list of all contracted services that directly impact the patient. The list includes the scope and nature of the services provided.
- Written communication to the provider establishes the expectations of the contracted service with regard to quality
- The metrics that will be used to measure quality are established and collected data is incorporated into the QAPI program
- The evaluation of a contract service is performed on a quarterly basis, just as it would if the service was provided by the organization

PROCEDURE:

Approval Process
The Executive Level Leader identifies the need for a new patient care contracted service. In cases where a hospital template exists for the type of agreement required, it will be utilized. If no such template exists, the Executive Level Leader requests a draft from the other party. If neither SVH nor the other party can easily draft an agreement, the CEO can provide approval for a draft to be prepared by a SVH retained attorney.

The Executive Level Leader shall:

- review the draft for service level accuracy and ensure the contract includes all relevant terms

- work with the Quality Coordinator to identify performance measures and ensure they are communicated to the other party
- handles all communication with the other party related to draft revisions
- identifies and obtains approvals from additional internal stake holders. Prior to execution, ALL patient care service agreements must be approved by the Chief Financial Officer. Contracted services that will have an Information Systems component must be reviewed by the Chief Information Officer. Approvals will be obtained and documented via email. Approval Records will be electronically saved in the shared contract drafting file
- submits the final draft to the President & CEO for signature
- coordinates counter-signature with the other party
- alerts the Quality Coordinator that the agreement is fully executed

Tracking Process
The Quality Coordinator ensures that all Patient Care Contract Services are accurately represented on the Patient Care Contract Tracking log and submits the log to the Chief Medical Officer and Chief Executive Officer on a monthly basis.

The Quality Coordinator alerts the Executive Level Leader responsible for a contract three months in advance of an upcoming contract expiration. Until the time that a new agreement is in place or the decision is made to discontinue service, the Quality Coordinator will follow up with the responsible Executive Level Leader on a weekly basis.

Monitoring Process
The Director of Quality and Risk Management ensures that all contracted patient care services are appropriately incorporated into the hospital-wide QAPI program and ensures that quarterly reviews are conducted. The Quality Coordinator maintains a list of all contracted services that directly impact the patient.

Quality expectations will be established for every new patient care contracted service and communicated to the provider. The communication of expectations can occur within the contract, as an addendum, or in a letter.

SUBJECT: Contract Administration, Patient Care Services	POLICY: GL8610-139
	PAGE 3 OF 3
DEPARTMENT: Organizational	EFFECTIVE:
REVISED:	

With the assistance of the Director of Quality and Risk Management, the contract manager is responsible for establishing the performance metrics to measure quality based on services and volumes provided. The contract manager is also responsible to report quarterly on data. Data can be collected by either the contract manager or by the service organization.

An annual patient care services report will be completed and shared with the Board Quality Committee and the Medical Staff.

Close-out Process
When either a contract is early terminated or the term concludes without decision for renewal, the contract will undergo a close-out process.

When appropriate or required, the contract manager will send a termination letter and provide a copy to the Quality Coordinator for the Close-out file.

The Quality Coordinator will archive the contract and termination letter. These files will be kept by SVH for a minimum of six years.

REFERENCES:
CIHQ 2018 Summit Presentation – Contract Services

OWNER:
Director Quality & Risk Management

AUTHORS/REVIEWERS:
Danielle Jones, Director Quality & Risk Management
Laura Gallmeyer, Quality Coordinator

DATES OF APPROVAL:
Policy & Procedure Team: 12/18/18
Board Quality Committee:
The Board of Directors:

SUBJECT: Stroke Admission/Transfer Guidelines	POLICY #PC8610-184
	PAGE 1 OF 1
DEPARTMENT: ORGANIZATIONAL	EFFECTIVE:
REVISED:	

PURPOSE:

As a stroke ready facility, Sonoma Valley Hospital (SVH) can receive patients actively having a stroke or exhibiting signs and symptoms of having a stroke. SVH is not equipped to treat hemorrhagic stroke and therefore has transfer agreements with primary stroke centers.

POLICY:

Patients presenting to SVH with signs and symptoms of acute stroke AND meet inclusion guidelines for Tissue Plasminogen Activator (tPA) may be treated according to American Heart Association guidelines.

Post treatment of tPA may be accepted for further inpatient treatment by Hospitalists or transferred to higher level of care, if indicated. Tele-Neurology is available at SVH for ED MD or Hospitalist consultation.

Patients presenting to SVH with a surgically treatable hemorrhagic stroke on Computerized Tomography (CT) scan will be transferred to one of the following Primary Stroke Centers for further treatment:

1. California Pacific Medical Center (CPMC)
2. University of California San Francisco (UCSF)

REFERENCES:
CIHQ SRH-6 Stroke Ready Receiving Centers Guidelines

OWNER:
Chief Nursing Officer

AUTHORS/REVIEWERS:
Mark Kobe, Chief Nursing Officer

APPROVALS:
Policy & Procedure Team: 12/18/18
Surgery Committee: 2/14/19
Medicine Committee: 2/14/19
Medical Executive Committee: 2/21/19
Board Quality Committee:
The Board of Directors:

APPROVALS:
Policy & Procedure Team: 12/18/18
Medical Executive Committee: 02/14/19
Medical Executive Committee: 02/21/19
Board Quality Committee:
The Board of Directors:

OCCUPATIONAL HEALTH
POLICIES/PROCEDURES MANUAL
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