Tier 1: Implement Global Strategies to Improve PICC Safety

Convene a Vascular Access Committee to review PICC use and outcomes	Use MAGIC or a related decision-tool (e.g., INS Standards) to determine PICC appropriatenes	Reduce short term PICC use (PICC ≤ 5 days)	Increase use of single lumen PICCs; decrease use of multi-lumen PICCs	Avoid PICC Placement in patients with eGFR < 45ml/min (CKD Stage IIIb)

Tier 2: Implement Focused Practices to Targeted Problems

(Pick One [or More] of these Three Conditions)

Catheter Occlusion	**PICC-Related Deep Vein Thrombosis or Thromboembolism**	**PICC-Related Bloodstream Infection (e.g, CLABSI)**

TIER 1: GLOBAL STRATEGIES TO IMPROVE PICC SAFETY		
Recommendation	***Background, Rationale and Suggested Implementation Strategies***	***Resources, References & Tools***
1. Convene a Vascular Access Committee to review PICC use and outcomes on a monthly to quarterly basis	• Numerous studies suggest audit and feedback of data related to utilization and outcomes of central lines (including PICCs) to frontline clinicians improves outcomes • A multi-disciplinary team consisting of key stakeholders that includes (but is not limited to), organizational leadership (e.g., CMO, CQO), vascular access team members, interventional radiology, critical care physicians, hematology/oncology physicians, emergency room physicians and hospitalists is suggested for maximal impact • The multidisciplinary team should meet quarterly, identify opportunities for improvement (e.g., PICC use <5 days) by reviewing HMS data and outline strategies for implementing change. • Designate an internal facilitator for all PICC-related QI efforts. The internal facilitator may be a member of the Vascular Access Committee but focuses their work on implementing changes recommended from the committee. The internal facilitator will work with the coordinating center to identify barriers and facilitators in implementing PICC QI efforts	• HMS site data reports and audits • Pronovost, PJ, et al. An Intervention to Reduce CLABSI in the ICU • *Bosk, C et al.* Reality check for checklists. • Infusion Therapy Standards of Practice 2016 – Overview Presentation • Infusion Therapy Standards of Practice – Purchase Site • Studies describing the "Partnered Implementation Strategy" *(A) Kirchner JE, et al.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4239280/ *(B) Ritchie E, et al.* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.792.3771&rep=rep1&type=pdf
2. Use a decision tool to guide the appropriateness of PICC use prior to insertion	• Identify, adapt and deploy a decision-tool to guide clinicians in determining the appropriateness of CVC or PICC placement prior to insertion • Ensure that the decision to use a PICC is made in consultation with operators familiar with recommendations from the decision tool; • Designate a physician champion for resolving disagreements between inserter and ordering physician or managing uncertainty regarding best practice • Share the proposed decision tool with front-line clinicians and members of the vascular access committee to ensure buy-in and feedback of the tool • Communicate use of decision-tool to clinicians and front line staff through educational sessions (morning report, grand rounds, nursing huddles/blitzes, etc.) • Implement the decision-tool via approaches such as a nursing checklist for PICC use vs. use of other non-central venous access devices, computerized decision support within the electronic health	• The Michigan Appropriateness Guide to Intravenous Catheters [MAGIC][1] • Centers for Disease Control & Prevention Guidelines for Prevention of IV catheter-related infections, 2011; • SHEA Compendium for preventing catheter-related infections 2014 • Infusion Nursing Standards of Practice 2011 (Free) • Infusion Therapy Standards of Practice 2016 (Paid) • Criteria for PICC Use – Review of MAGIC – American Journal of Nursing • Making the MAGIC: Criteria for Appropriate PICC Use in Hospitalized Patients

	system, etc.	
3. Reduce short term PICC use (e.g., PICC ≤ 5 days) for peripherally compatible therapies	• Use the WISE Tool to understand drivers of short-term PICC use • Assess staff knowledge and competency in placing peripheral IV catheters. Lack of skills in placing peripheral IV devices is a key driver of PICC use. • Consider supervised peripheral IV insertion to ensure staff competency in placing these devices in appropriate sites with appropriate strategies • Consider incorporating vein visualization technology (infra-red viewers) for patients with difficult or poor intravenous access. Visualization technology has been shown to improve success rates, decrease unsuccessful insertion attempts, improve satisfaction and avoid PICC placement • Invest in alternatives to PICCs (especially if venous access <14 days is anticipated) including devices such as ultrasound guided peripheral intravenous catheters (USGPIV) and midlines. • Consider creating specialized IV teams for difficult IV access to help gain access in patients with poor peripheral veins	• Review HMS quarterly data for use of PICCs for 5 or fewer days • The WISE Tool for Assessment of Short Term PICC Use • The Michigan Appropriateness Guide to Intravenous Catheters [MAGIC][1] • Infusion Nursing Standards of Practice 2011 • Infusion Therapy Standards of Practice 2016 • Studies showing value of vein visualization: *Aulagnier, et al.* http://onlinelibrary.wiley.com/doi/10.1111/acem.12437/abstract;jsessionid=E7EEF45DA39327CEC8ACC3889BDED500.f02t03 *Chiao, et al.* http://bja.oxfordjournals.org/content/early/2013/02/04/bja.aet003.full • Studies showing value of ultrasound guidance for peripheral IV placement: *Stolz A, et al*. http://www.vascular-access.info/article/ultrasound-guided-peripheral-venous-access--a-meta-analysis-and-systematic-review Scoppettuolo, et al. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4742453/
4. Increase use of single lumen PICCs; decrease use of multi-lumen PICCs	• Consider implementing a strategy that defaults to use of single lumen PICCs unless an approved indication/rationale for placing a multi-lumen PICC exists • If/when a double lumen or greater PICC is requested, ask clinical providers for justification regarding why a multi-lumen PICC is necessary • Develop a list of criteria for when a multi-lumen PICC might be necessary. One such criteria is the Michigan “Less Lumens / Less Risk” criteria • Inserters placing PICCs should review justification for multi-lumen PICCs and make the final decision regarding the appropriate number of lumens in conjunction with ordering providers • Include pharmacists for discussions regarding medication incompatibility to understand whether strategies such as spacing out medication administration or diluting medications to ensure safe peripheral infusion can be considered • If a PICC is required for continued treatment in the outpatient setting, consider down-grading to single lumen device to reduce risk of	• Review HMS quarterly data for rates of single and multi-lumen PICC use • Incorporate the Michigan “Less Lumens / Less Risk” Criteria for guiding use of single vs. multi-lumen PICCs • Estimate cost and complication savings from greater use of single lumen PICCs • Share stories of successful use of single lumen PICCs in scenarios where a multi-lumen device would otherwise have been inserted *Sharp R, et al. The patient experience of PICC insertion.* Chopra V, et al. Limiting the Number of PICC Lumens to Improve Outcomes and Reduce Cost: A Simulation Study

	complications	
5. Avoid PICC Placement in Patients with eGFR < 45 ml/min (CKD Stage IIIb)	• Use of PICCs in patients with advanced kidney disease (per the National Kidney Foundation, those with an estimated GFR (*eGFR*) < 45 ml/min) is contraindicated as these patients are likely to progress to hemodialysis. PICC placement in such patients is the strongest risk factor for subsequent fistula failure and is contraindicated if renal replacement therapy is likely • When PICC placement in patients with *eGFR < 45* is requested, empower PICC inserters to ask for approval from nephrology and explore alternative devices prior to placing the PICC • Patients with *eGFR < 45* are candidates for small bore central catheters (SBCCs) rather than PICC if long-term venous access is necessary. SBCCs do not lead to stenosis of arm veins • Develop strategies to place SBCCs in consultation with interventional radiology or other operators that oversee PICC placement • Consider changes to the electronic health system that flag patients with reduced *eGFR* to indicate a contra-indication to PICC use	• Review HMS quarterly data regarding PICC placement in those with CKD or those with an eGFR < 45 ml/min • National Kidney Foundation Guidelines for PICC Avoidance in CKD • Shingarev et al. How Safe Are PICCs for Hemodialysis patients? • MCGill RL, et al. Inpatient Venous Access Practices: PICC Culture and the kidney patient • Save the Vein: A Handout and Guide for Nurses • American Board of Internal Medicine Choosing Wisely Recommendation from the Amercian Society of Nephrology • Insist on / Require Nephrology consult prior to PICC placement in patients with eGFR < 45 ml/min