

<b>HIIN Improvement Calculator: References</b>		
<b>Cost Per Harm References</b>		
Harm	Cost per Case (Study Year USD)	AHRQ Reference
Central Line-Associated Bloodstream Infection (CLABSI)	\$17,000 (2009)	CDC Vital Signs- Central Line Associated Blood Stream Infections- US 2001, 2008, 2009. March 3, 2011 MMWR (e-release March 1, 2011). <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm?s_cid=mm6008a4_w">http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6008a4.htm?s_cid=mm6008a4_w</a>
Venous Thromboembolism (VTE) (post-surgery)	\$8,000 (2004)	Spyropoulos AC, Lin J. Direct medical costs of venous thromboembolism and subsequent hospital readmission rates: an administrative claims analysis from 30 managed care organizations. J Manag Care Pharm. 2007 Jul-Aug;13(6):475-86. <a href="http://www.ncbi.nlm.nih.gov/pubmed/17672809">http://www.ncbi.nlm.nih.gov/pubmed/17672809</a> Maynard G, Stein J. Preventing hospital-acquired venous thromboembolism: A guide for effective quality improvement. Prepared by the Society of Hospital Medicine. AHRQ Publication No. 08-0075. Rockville, MD: Agency for Healthcare Research and Quality. August 2008. <a href="http://www.ahrq.gov/qual/vtguide/">http://www.ahrq.gov/qual/vtguide/</a>
Pressure Ulcer	\$17,000 (2009)	Federal Register: April 30, 2008 (Volume 73, Number 84). Centers for Medicare and Medicaid Services. Medicare Program: Proposed Changes to the Hospital Inpatient Prospective Payment Systems and Fiscal Year 2009 Rates, 23528–23938 [08–1135]. <a href="http://www.ncbi.nlm.nih.gov/pubmed/19827228">http://www.ncbi.nlm.nih.gov/pubmed/19827228</a>
Surgical Site Infection (SSI)	\$21,000 (2007)	CDC (Scott, RD), The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospital and the Benefits of Prevention. March 2009. Available at <a href="http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf">http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf</a>
Ventilator-Associated Pneumonia	\$21,000 (2007)	CDC (Scott, RD), The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospital and the Benefits of Prevention. March 2009. Available at <a href="http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf">http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf</a>
Catheter-Associated Urinary Tract Infection (CAUTI)	\$1,000 (2007)	CDC (Scott, RD), The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospital and the Benefits of Prevention. March 2009. Available at <a href="http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf">http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf</a>
Adverse Drug Event	\$5,000 (1995)	Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events. JAMA 1995; 274:29-34. <a href="http://www.ncbi.nlm.nih.gov/pubmed/7791255">http://www.ncbi.nlm.nih.gov/pubmed/7791255</a> Reducing and Preventing Adverse Drug Events To Decrease Hospital Costs: Research in Action, Issue 1. March 2001. Agency for Healthcare Research and Quality, Rockville, MD. <a href="http://archive.ahrq.gov/research/findings/factsheets/errors-safety/aderia/ade.html">http://archive.ahrq.gov/research/findings/factsheets/errors-safety/aderia/ade.html</a>
Clostridium Difficile	\$9,600 (2015)	CDC. News Release: Nearly half a million Americans suffered from Clostridium difficile infections in a single year. February 2015. Available at: <a href="http://www.cdc.gov/media/releases/2015/p0225-clostridium-difficile.html">http://www.cdc.gov/media/releases/2015/p0225-clostridium-difficile.html</a>
Injury from Fall	\$12,965 (2014)	Kandilov AM, Coomer NM, and Dalton K. "The Impact of Hospital-Acquired Conditions on Medicare Program Payments." Medicare & Medicaid Research Review, 2014, vol. 4, no. 4. pp. E1 -E23
All Other HACs	\$17,000	HHS computation based on costs above
Harm	Cost per Case (Study Year USD)	HSAG/Mathematica Policy Research Reference
Readmissions	\$15,477	Hines, Al, Barrett ML, Jiang J, Steiner C., "Conditions with the Largest Number of Adult Hospital Readmissions by Payer, 2011." Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality (AHRQ), Statistical Brief, April 2014.
<b>Methods References</b>		
1) US Department of Health and Human Services. Interim update on 2013 annual hospital-acquired condition rate and estimates of cost savings and deaths averted from 2010 to 2013.		
2) Scott RD (2009). The direct medical costs of healthcare-associated infections in US hospitals and the benefits of prevention. Division of Healthcare Quality Promotion National Center for Preparedness, Detection, and Control of Infectious Diseases, Centers for Disease Control and Prevention.		

Mortality References				
Measure name	HIIN definition	Mortality rate	Source	Source year
CAUTI	CAUTIs/1000 catheter days	10%	GUIDELINE FOR PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS 2009 <a href="http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf">http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf</a>	2009
CLABSI	CLABSIs/1000 line days	18%	AHRQ Tools for Reducing Central Line-Associated Blood Stream Infections <a href="http://www.ahrq.gov/professionals/education/curriculum-tools/clabsitools/index.html#ref2">http://www.ahrq.gov/professionals/education/curriculum-tools/clabsitools/index.html#ref2</a>	2014
Falls	Falls/1000 patient days	n/a (less than 1% for >=65 in all settings (not just hospital))	<a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6416a12.htm">http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6416a12.htm</a>	2015
Rate of Pressure Ulcers (Stage 3+)	Stage 3 or 4 PU/1000 Med or Surg Discharges	7%	<a href="http://www.ahrq.gov/sites/default/files/publications/files/hacrate2013_0.pdf">http://www.ahrq.gov/sites/default/files/publications/files/hacrate2013_0.pdf</a>	2013
Prevalence Hospital Acquired Pressure Ulcers (Stage 2+)	HAPU (stage 2+)/100 patients	n/a		
SSI	NHSN defined SSIs/100 patients	3%	<a href="http://www.cdc.gov/nhsn/PDFs/pscmanual/9pscscsscurrent.pdf">http://www.cdc.gov/nhsn/PDFs/pscmanual/9pscscsscurrent.pdf</a>	2016
VAC	VAC (including VAPs and IVACS)/1000 vent days	39%	Descriptive Epidemiology and Attributable Morbidity of Ventilator-Associated Events Michael Klompas MD MPH, Ken Kleinman ScD, Michael V. Murphy BA and for the CDC Prevention Epicenters Program Infection Control and Hospital Epidemiology Vol. 35, No. 5 (May 2014), pp. 502-510	2014
IVAC	IVAC and VAPs only/1000 vent days	31%	Descriptive Epidemiology and Attributable Morbidity of Ventilator-Associated Events Michael Klompas MD MPH, Ken Kleinman ScD, Michael V. Murphy BA and for the CDC Prevention Epicenters Program Infection Control and Hospital Epidemiology Vol. 35, No. 5 (May 2014), pp. 502-510	2014
PE and VTE	post-op PE and VTE/1000 discharge days	10-15%	<a href="http://www.ahrq.gov/sites/default/files/publications/files/vteguide.pdf">http://www.ahrq.gov/sites/default/files/publications/files/vteguide.pdf</a>	2016
ADE- excessive anticoagulation	Excessive anticoagulation/100 patients taking warfarin	11%	Piazza, G., Nguyen, T. N., Cios, D., Labreche, M., Hohlfelder, B., Fanikos, J., ... Goldhaber, S. Z. (2011). Anticoagulation-associated adverse drug events. <i>The American Journal of Medicine</i> , 124(12), 1136–1142. <a href="http://doi.org/10.1016/j.amjmed.2011.06.009">http://doi.org/10.1016/j.amjmed.2011.06.009</a>	2011
Post-operative Sepsis	Post-op Sepsis cases/1000 elective surg discharges	26%	Vogel, T. R., Dombrovskiy, V. Y., Carson, J. L., Graham, A. M., & Lowry, S. F. (2010). Postoperative sepsis in the United States. <i>Annals of Surgery</i> , 252(6), 1065–1071. <a href="http://doi.org/10.1097/SLA.0b013e3181dcf36e">http://doi.org/10.1097/SLA.0b013e3181dcf36e</a>	2010
Overall Sepsis	Deaths from hospital acquired sepsis/1000 discharges	36%	<a href="http://www.cdc.gov/nchs/data/databriefs/db62.htm">http://www.cdc.gov/nchs/data/databriefs/db62.htm</a>	
C.difficile	Hospital-onset c difficile/1000 patient days	11%*	<a href="http://www.cdc.gov/media/releases/2015/p0225-clostridium-difficile.html">http://www.cdc.gov/media/releases/2015/p0225-clostridium-difficile.html</a>	2015
Patient Handling	Number of harm from patient handling/100 FTEs	n/a		
Workplace Violence	Number of harm from workplace violence/100 FTEs	n/a		
MRSA bacteremia	MRSA bacteremia/100 patient days	27%*	<a href="http://wwwnc.cdc.gov/eid/article/18/7/10-1371_article">http://wwwnc.cdc.gov/eid/article/18/7/10-1371_article</a>	2012