

National Scorecard on Rates of Hospital-Acquired Conditions 2010 to 2015: Interim Data From National Efforts to Make Health Care Safer

Summary

Preliminary¹ estimates for 2015 show a 21 percent decline in hospital-acquired conditions (HACs) since 2010. A cumulative total of 3.1 million fewer HACs were experienced by hospital patients over the 5 years (2011, 2012, 2013, 2014, and 2015) relative to the number of HACs that would have occurred if rates had remained steady at the 2010 level. The preliminary 2015 rate is 115 HACs per 1,000 discharges, down from 2013 and 2014, which had held at 121 HACs per 1,000 discharges. We estimate that nearly 125,000 fewer patients died in the hospital as a result of HACs and that approximately \$28 billion in health care costs were saved from 2010 to 2015 due to the reductions in HACs.

Although the precise causes of the decline in patient harm are not fully understood, the increase in safety has occurred during a period of concerted attention by hospitals throughout the country to reduce adverse events. This effort has been spurred in part by Medicare payment incentives and catalyzed by the U.S. Department of Health and Human Services (HHS) Partnership for Patients (PfP) initiative, which was started in 2011.

Results

The methods for this preliminary 2015 update on the rates and counts of HACs and associated costs and deaths averted are largely unchanged from those previously described for 2010 to 2014. The details of these methods and the resulting data for the prior periods are online² and details specific to this preliminary 2015 report are provided in Appendix B.

Preliminary estimates for 2015 show the national HAC rate as nearly 21 percent lower than in 2010 (see Exhibits 1 and 2). As a result of the reduction in the rate of HACs, we estimate that approximately 980,000 fewer incidents of harm occurred in 2015 than would have occurred if the rate of HACs had remained steady at the 2010 level (Exhibit 3).

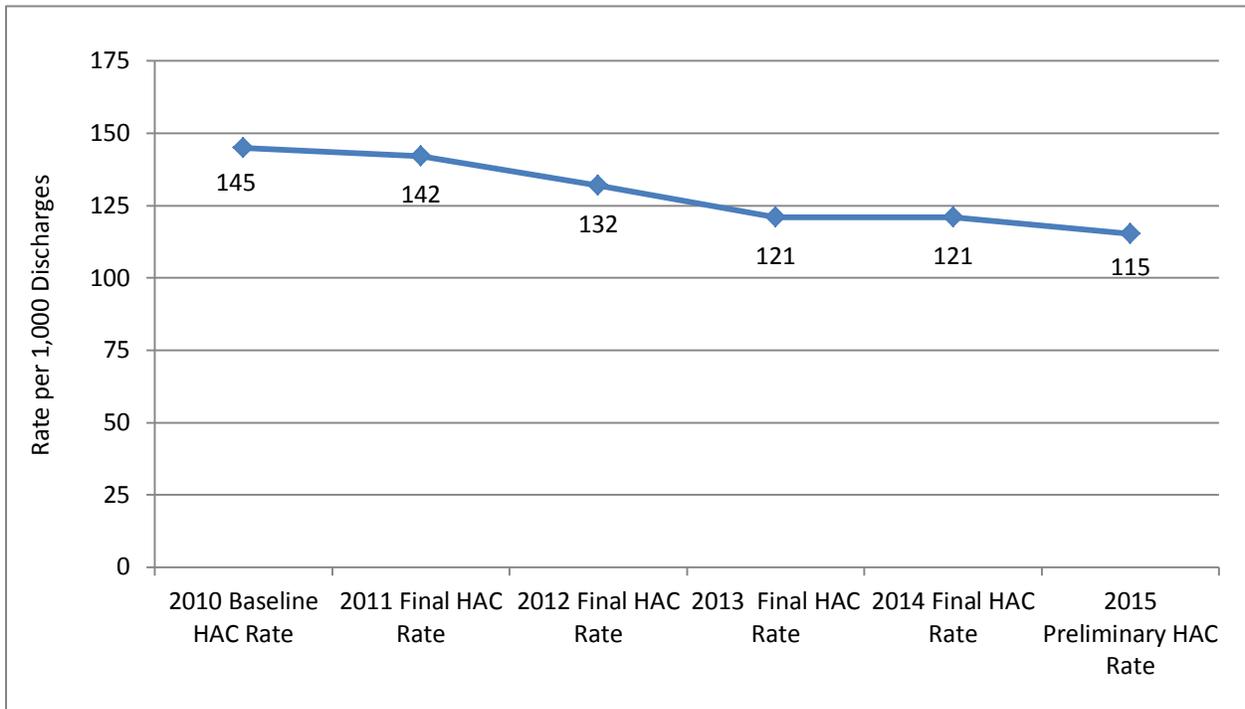
Cumulatively, approximately 3.1 million fewer incidents of harm occurred in 2011, 2012, 2013, 2014, and 2015 (compared with 2010). About 42 percent of this reduction is from adverse drug events, about 23 percent from pressure ulcers, and about 15 percent from catheter-associated urinary tract infections (CAUTIs) (Exhibit 4). These HACs constituted about 34 percent, 27 percent, and 8 percent, respectively, of the HACs measured in the 2010 baseline rate.³

¹ See Appendix A for information on how this Interim Report for 2015 differs from the interim reports issued in 2015 and 2014 for 2014 and 2013, respectively.

² Refer to the AHRQ Partnership for Patients Web page for methods and data:
<http://www.ahrq.gov/professionals/quality-patient-safety/pfp/index.html>.

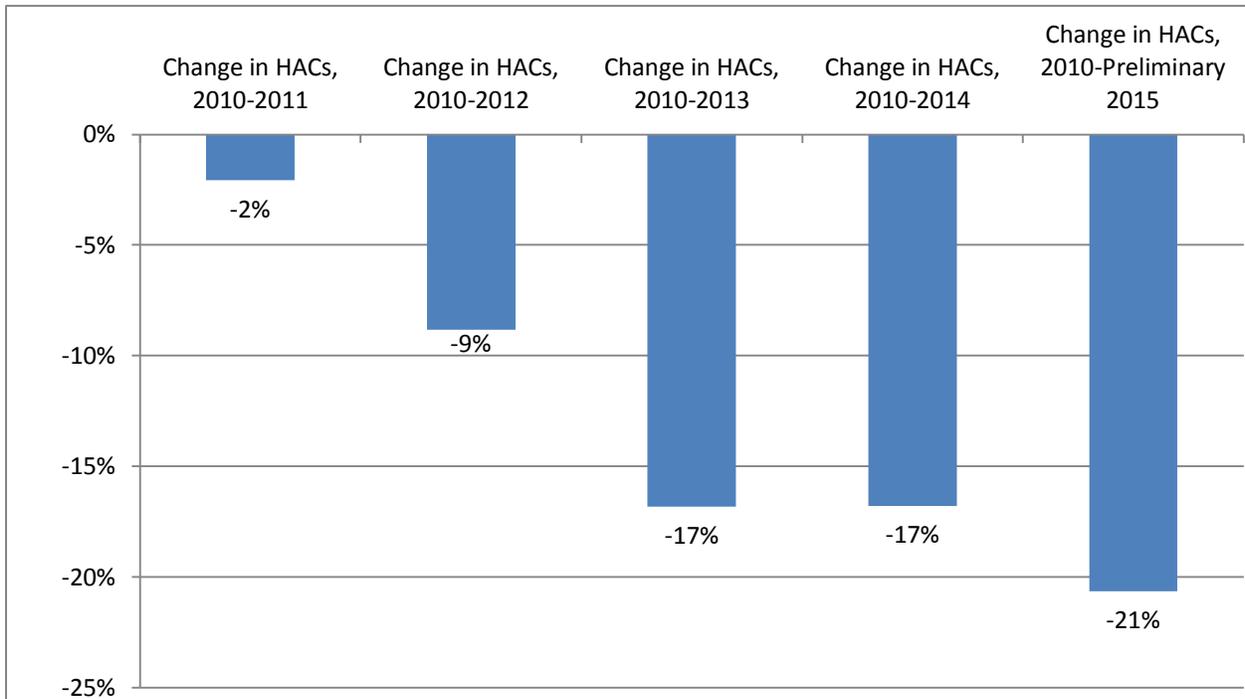
³ See <http://www.ahrq.gov/professionals/quality-patient-safety/pfp/index.html#methods>.

Exhibit 1. HAC Rates, 2010 to 2015 (Preliminary)



Source: AHRQ National Scorecard Estimates from Medicare Patient Safety Monitoring System, National Healthcare Safety Network, and Healthcare Cost and Utilization Project.

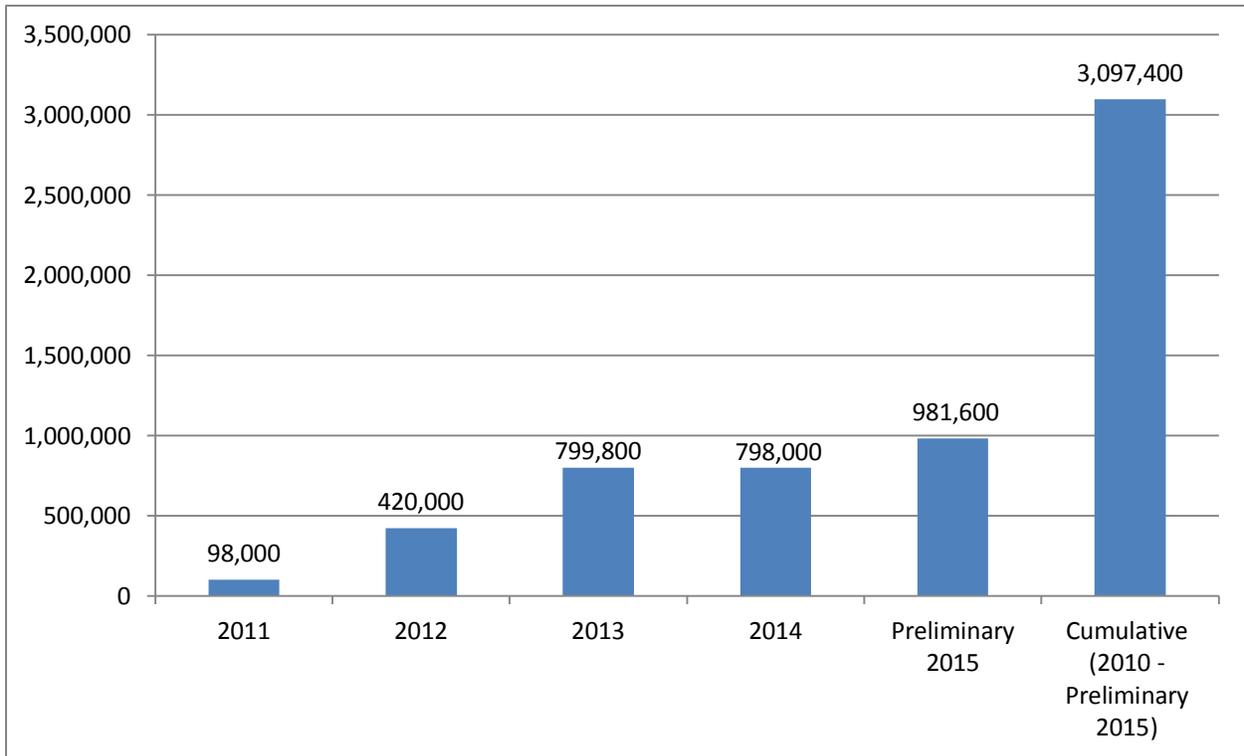
Exhibit 2. Annual and Cumulative Changes in HACs, 2010 to 2015



Source: AHRQ National Scorecard Estimates from Medicare Patient Safety Monitoring System, National Healthcare Safety Network, and Healthcare Cost and Utilization Project.

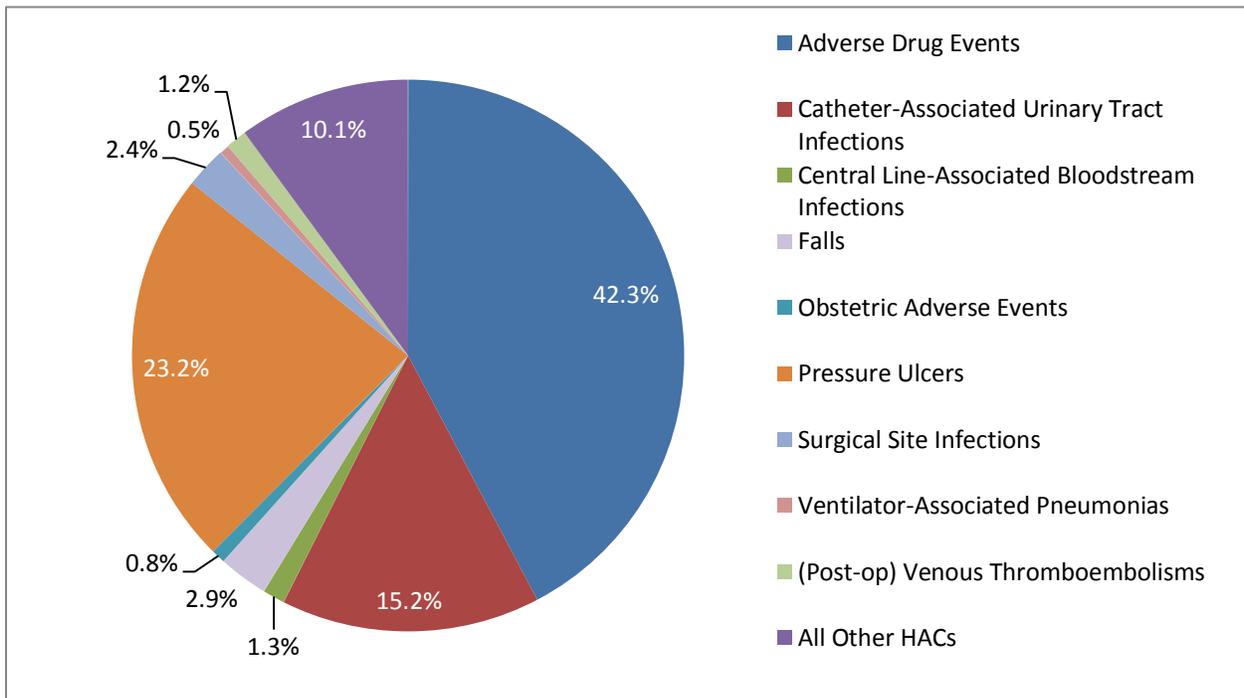
Note: Percentages are rounded.

Exhibit 3. Total Annual and Cumulative HAC Reductions (Compared With 2010 Baseline)



Source: AHRQ National Scorecard Estimates from Medicare Patient Safety Monitoring System, National Healthcare Safety Network, and Healthcare Cost and Utilization Project.

Exhibit 4. Change in HACs, 2011-2015 (Total = 3,097,400)

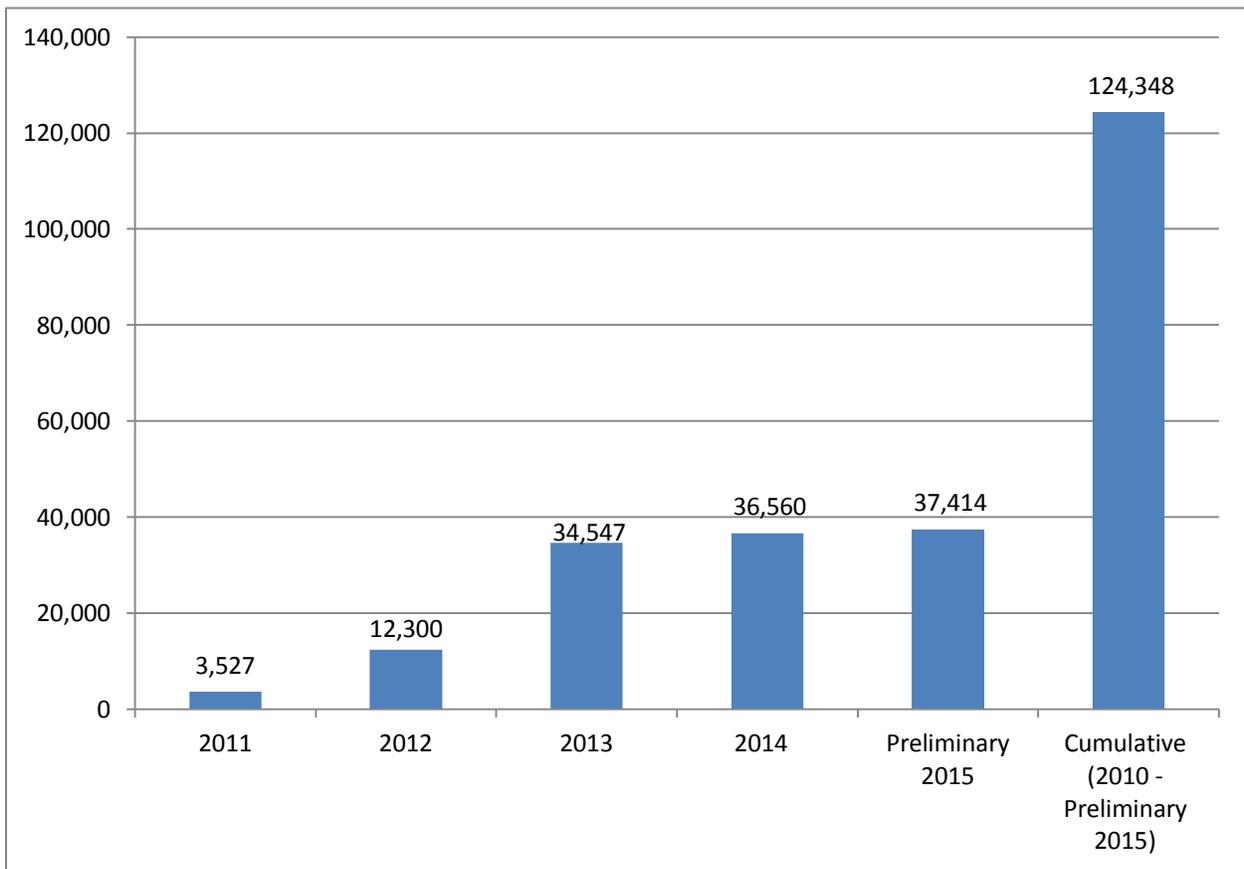


Source: AHRQ National Scorecard Estimates from Medicare Patient Safety Monitoring System, National Healthcare Safety Network, and Healthcare Cost and Utilization Project.

Preliminary 2015 estimates indicate that more than 37,000 fewer patients died in hospitals in 2015 as a result of the decline in HACs compared with the number of deaths related to HACs that would have occurred if the rate of HACs had remained steady at the 2010 level (Exhibit 5).

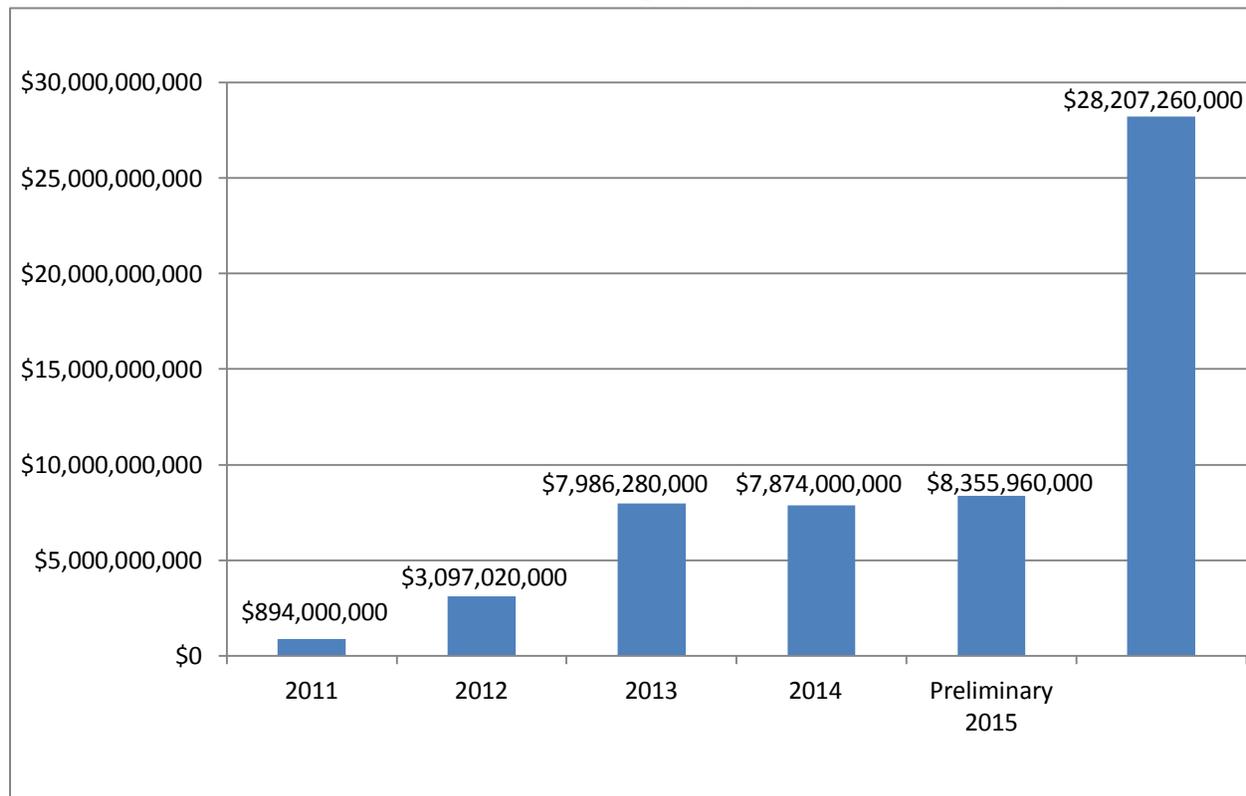
Cumulative deaths averted from 2010 through 2015 are estimated at nearly 125,000. As shown in Exhibit B2, there is variation across types of HACs in the cost savings per HAC averted and in the level of increased mortality associated with the HAC. Due to this variation, costs associated and deaths averted by HAC type are not directly proportional to the HAC reductions shown in Exhibit 4.

Exhibit 5. Total Annual and Cumulative Deaths Averted (Compared With 2010 Baseline)



Preliminary 2015 estimates indicate that the decline in HACs resulted in estimated cost savings of approximately \$8.3 billion in 2015. Estimated cumulative savings for 2011, 2012, 2013, 2014, and 2015 are approximately \$28.2 billion (Exhibit 6).

Exhibit 6. Total Annual and Cumulative Cost Savings (Compared With 2010 Baseline)



Discussion

The preliminary estimate of a 21 percent reduction in HACs from 2010 to 2015 indicates that hospitals have made substantial progress in improving safety. An estimated 3.1 million fewer HACs were experienced by patients from 2010 to 2015 than would have occurred if the HAC rate had remained at the 2010 level.

The reasons for this progress are not fully understood. Likely contributing causes are:

- Financial incentives created by the Centers for Medicare & Medicaid Services (CMS) and other payers' payment policies,
- Public reporting of hospital-level results,
- Technical assistance offered to hospitals by the Quality Improvement Organization (QIO) program, and
- Technical assistance and catalytic efforts of the HHS PfP initiative led by CMS.⁴

Numerous other public and private initiatives to improve health care quality and patient safety were implemented during these years; for example, the widespread implementation and

⁴ For example, one focus of efforts to reduce adverse drug events associated with anticoagulants focused on increased testing of INR levels in inpatients receiving warfarin and physicians acting on high or rising INR levels. A publication in 2016 by Metersky, et al., indicated that daily INR testing was associated with fewer warfarin adverse events. See: <https://www.ncbi.nlm.nih.gov/pubmed/26662851>.

improved use of electronic health records (EHRs) in hospitals.⁵ Crucially, the progress was made possible by the results of investments made by the Agency for Healthcare Research and Quality (AHRQ). AHRQ works with its HHS colleagues, researchers, doctors, nurses, other health care professionals, and health care teams across the country to create new knowledge about how to improve care and make it safer.⁶ Areas of focus include preventing healthcare-associated infections (HAIs), combating antibiotic resistance, and reducing diagnostic error.

As part of its work, AHRQ has developed a variety of methods, tools, and resources to help hospitals and other providers prevent HACs, such as infections, pressure ulcers, and falls.⁷ Much more work remains, even with the preliminary data indicating a 21 percent decline in the HACs we have measured for the PfP since 2010.

A reduction of nearly 125,000 in deaths associated with HACs in the 2011 to 2015 period as a result of the decline in HACs is encouraging. As indicated in the results section in the final 2013 report,⁸ the estimate of deaths averted is less precise than the estimated reduction in HAC rates. We directly estimate the size of the reduction in HAC rates but rely on analysis from other researchers of the complex relationship between HACs and mortality to extrapolate the impact of the reduction in HACs on deaths averted. These estimates used in our analysis originate from a variety of sources and methodologies.

Similarly, we preliminarily estimate an associated reduction of \$28.2 billion in health care costs from 2011 to 2015 as a result of the reduction in HACs. As is the case for the estimate of deaths averted, there is less precision regarding the cost savings estimates than there is about the estimates of the magnitude of reduction in HACs. Even with less precision, the estimates of deaths averted and cost savings are compelling.

Despite the progress to date in reducing HACs, much work remains to be done to ensure that the U.S. health care system is as safe as it can possibly be. HHS and other public and private partners are continuing to work to improve patient safety. These data through 2015 indicate that it is possible to make substantial progress in reducing virtually all types of HACs simultaneously, as shown in Exhibit 7. CMS and HHS leaders have termed this objective as achieving “Safety Across the Board” and believe it should be a national goal.

AHRQ’s patient safety programs continue to enable and guide improvements in health care delivery. In addition to sustaining further improvements in the safety of hospital care, the

⁵ A paper by Furukawa, et al. (see <https://www.ncbi.nlm.nih.gov/pubmed/26854418>) indicated that in 2012 and 2013, adverse events were less frequent at hospitals that had implemented a full EHR. Although the paper did not study trends in EHR adoption or trends in adverse event rates, one may hypothesize that part of the HAC reduction seen from 2010 to 2013 and 2014 could have been partially due to increased EHR adoption and increases and improvements in EHR use.

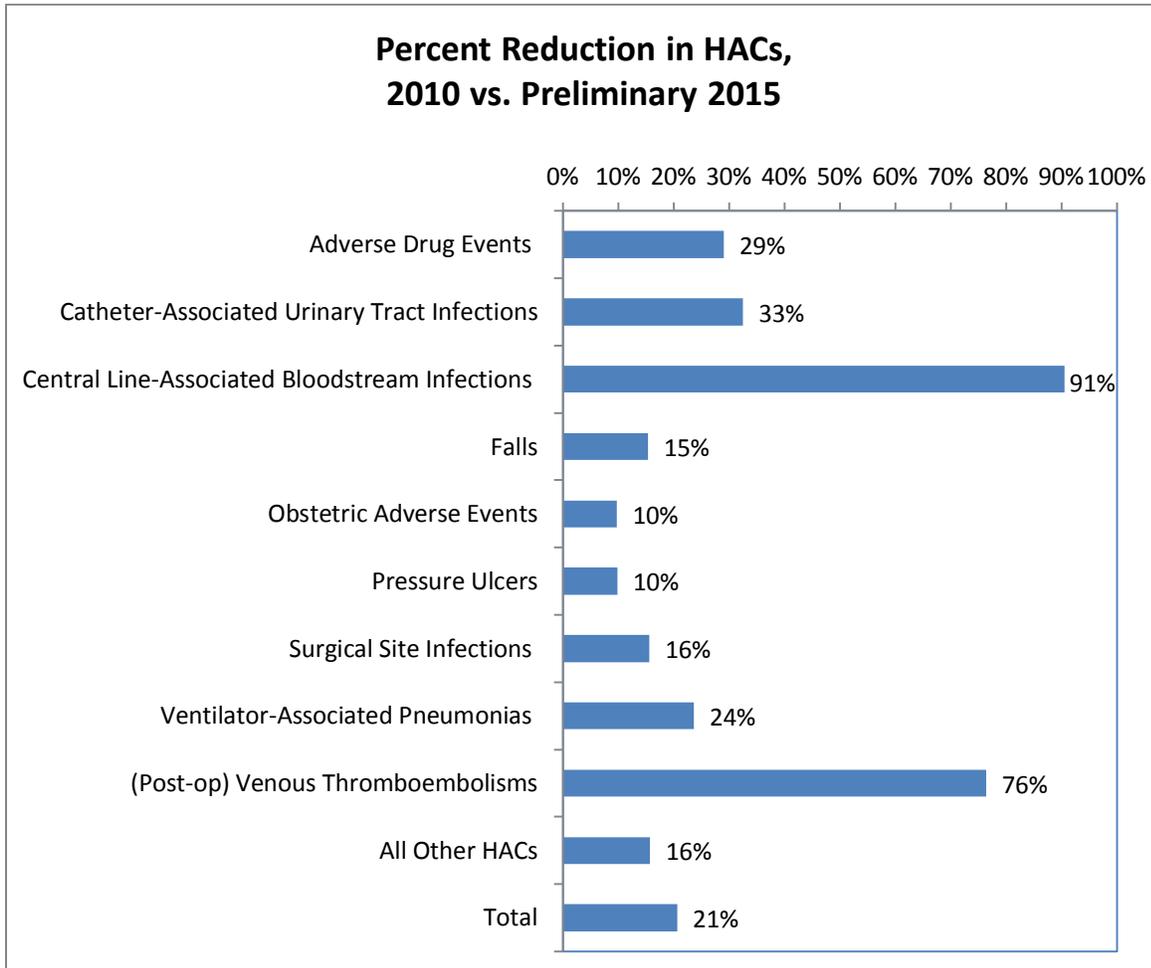
⁶ For example, AHRQ released the Making Healthcare Safer II report (available at: <http://www.ahrq.gov/research/findings/evidence-based-reports/ptsafetyuptp.html>) in 2013, and this report identified and recommended numerous practices that have been effective in improving patient safety in hospitals.

⁷ The AHRQ-developed pressure ulcer and falls toolkits are online at: <http://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/index.html> and <http://www.ahrq.gov/professionals/systems/hospital/fallpxtoolkit/index.html>.

⁸ Online at <http://www.ahrq.gov/professionals/quality-patient-safety/pfp/hacrate2013.html>.

Agency has substantially expanded its efforts in order to extend the success that hospitals have achieved to all health care settings. As part of this initiative, AHRQ is actively targeting current challenges such as diagnostic error and antibiotic resistance and developing and disseminating evidence-based practices that will sustain national progress in making health care safer.

Exhibit 7. Percent Reduction in HACs, 2010 vs. Preliminary 2015



Appendix A: Differences Between This Interim 2015 Report and the 2014 and 2013 Interim Reports

The interim national HAC rate for 2015 has been calculated as 115 HACs per 1,000 discharges. This report is different from the reports issued in late 2015 and 2014 for 2014 and 2013, respectively, in the following ways:

- Unlike when the 2013 and 2014 interim reports were prepared with full-year data, the Medicare Patient Safety Monitoring System (MPSMS) data for 2015 Q4 are not currently available. The rate for the 2015 Q4 MPSMS data has been estimated as 93 percent of the 2015 Q1-Q3 rate, based on the mean rate for Q1-Q3 compared with Q4 rates for the MPSMS data from 2010 to 2014. The delayed availability of MPSMS data for 2015 Q4 is due in part to the changeover from ICD-9 to ICD-10 that occurred on October 1, 2015, and also due in part to delays in contracting for MPSMS data analysis that occurred in mid-2016.
- The MPSMS methodology to identify adverse events within each chart is identical to prior years. However, the 2015 MPSMS 4-condition sample (based on patients with acute myocardial infarction, congestive heart failure, pneumonia, and major surgery) is an approximation of the previous 4-condition samples used from 2010 to 2014. It had to be reconstructed by requesting charts from available all-payer data.

The current analysis is based in part on a set of charts in which patients with an ICD-9 coded diagnosis of venous thromboembolism (VTE) are underrepresented and another set of charts in which they are overrepresented, although not for surgical patients. The sample used to derive the data in this report may have reduced the preliminary 2015 rate of the MPSMS postoperative VTE measure included in the overall HAC rate.

It should be noted that for every year from 2010 to 2014, the VTE adverse events contributed less than 1 percent to the total for the national HAC rate, so the influence on the overall HAC estimate is likely to be very small. Additional analyses are underway with respect to determining how to align the available 2015 charts into a sample that is as close as possible to the 2010-2014 samples.

As in previous years, this report is not final for the following additional reasons:

- The Patient Safety Indicator (PSI) data from the AHRQ Healthcare Cost and Utilization Project (HCUP) used in six measures (see Exhibit B.1) included in the National HAC rate are currently based on 2014 data rather than 2015 data. These data are derived from voluntary submissions from 47 States and the District of Columbia, and final data for 2015 are unlikely to be available until late 2017.
- The Centers for Disease Control and Prevention (CDC) data for surgical site infections (SSIs) are also based on 2014 data from the CDC National Healthcare Safety Network (NHSN) data and HCUP, so 2015 data are also unlikely to be available until late 2017.
- The PSI and SSI data have been “normalized” compared with 2010 based on the 2014 HCUP data on hospital discharges among patients 18 years old and over, rather than the 2015 HCUP data, which are not currently available. To allow comparisons across all years, the rates and total numbers of adverse events are based on 32,750,000 discharges

of patients 18 years old and over per year. (HCUP data for calendar years 2013 and 2014 indicated fewer than 30 million discharges.)

For additional details on methods and final data for 2010 to 2014, see *Methods To Estimate the Baseline 2010 PFP National Hospital-Acquired Condition Rate*, AHRQ Pub. No. 14-0046-EF, available at <http://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/pfp/pfphac.pdf> and other documents on the AHRQ PFP Web site, <http://www.ahrq.gov/professionals/quality-patient-safety/pfp/index.html>.

Appendix B: Incidence of Hospital-Acquired Conditions in the Partnership for Patients: Estimates and Projected and Measured Impact

Exhibit B.1 provides the Interim 2015 data on HACs. The HACs that are the focus of the PfP initiative are shown, as well as the source of the data and the corresponding measures related to each HAC. The interim rate for 2015 is 115 HACs per 1,000 discharges, which is a 20.6 percent reduction from the 2010 baseline of 145 HACs per 1,000 discharges before the start of the PfP initiative.⁹

Exhibit B.1. Interim 2015 AHRQ National Scorecard Data on HACs

PfP Hospital-Acquired Conditions — Partnership for Patients Hospital-Acquired Condition	PfP Hospital-Acquired Conditions — Source (and Data Year)	PfP Hospital-Acquired Conditions — Measure	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP HACs (Normalized to 32,750,000 Discharges—Based on 2010 Baseline)	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP Measured HACs per 1,000 Discharges
ADEs	MPSMS (2015)	ADE Associated With Digoxin	5,700	0.17
	MPSMS (2015)	ADE Associated With Hypoglycemic Agents	630,000	19.2
	MPSMS (2015)	ADE Associated With IV Heparin	180,000	5.5
	MPSMS (2015)	ADE Associated With Low Molecular Weight Heparin and Factor Xa Inhibitor	180,000	5.5
	MPSMS (2015)	ADE Associated With Warfarin	150,000	4.6
	MPSMS (2015)	Total ADE (rounded sum of above 5 measures)	1,150,000	35.1
CAUTIs	MPSMS (2015)	Catheter-Associated Urinary Tract Infections	270,000	8.2
CLABSIs	MPSMS (2015)	Blood Stream Infections Associated With Central Venous Catheters	1,700	0.05
Falls	MPSMS (2015)	In-Hospital Patient Falls	220,000	6.7
Obstetric Adverse Events	PSI (2014)	OB Trauma in Vaginal Delivery With (PSI 18) and Without Instrument (PSI 19)	74,000	2.3

⁹ The 2010 baseline data are online at <http://www.ahrq.gov/professionals/quality-patient-safety/pfp/index.html#methods>.

PfP Hospital-Acquired Conditions — Partnership for Patients Hospital-Acquired Condition	PfP Hospital-Acquired Conditions — Source (and Data Year)	PfP Hospital-Acquired Conditions — Measure	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP HACs (Normalized to 32,750,000 Discharges—Based on 2010 Baseline)	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP Measured HACs per 1,000 Discharges
Pressure Ulcers	MPSMS (2015)	Hospital-Acquired Pressure Ulcers	1,190,000	36.3
Surgical Site Infections	NHSN (2014)	SSIs for 17 selected procedures	81,000	2.5
VAPs	MPSMS (2015)	Ventilator-Associated Pneumonia	29,000	0.89
VTEs	MPSMS (2015)	Postoperative Venous Thromboembolisms	6,600	0.20
All Other Hospital-Acquired Conditions	MPSMS (2015)	Femoral Artery Puncture for Catheter Angiographic Procedures	90,000	2.7
	MPSMS (2015)	Adverse Events Associated With Hip Joint Replacements	16,000	0.49
	MPSMS (2015)	Adverse Events Associated With knee Joint Replacements	11,000	0.34
	MPSMS (2015)	Contrast Nephropathy Associated With Catheter Angiography	220,000	6.7
	MPSMS (2015)	Hospital-Acquired MRSA	6,300	0.19
	MPSMS (2015)	Hospital-Acquired VRE	3,800	0.12
	MPSMS (2015)	Hospital-Acquired Antibiotic-Associated <i>C. difficile</i>	100,000	3.1
	MPSMS (2015)	Mechanical Complications Associated With Central Venous Catheters	80,000	2.4

PfP Hospital-Acquired Conditions — Partnership for Patients Hospital-Acquired Condition	PfP Hospital-Acquired Conditions — Source (and Data Year)	PfP Hospital-Acquired Conditions — Measure	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP HACs (Normalized to 32,750,000 Discharges—Based on 2010 Baseline)	Interim 2015 PfP HACs Based on 2015 Q1-Q3 MPSMS Data and 2014 PSI and NHSN Data — PfP Measured HACs per 1,000 Discharges
Hospital-Acquired Conditions (continued)	MPSMS (2015)	Postoperative Cardiac Events for Cardiac and Non-Cardiac Surgeries	35,000	1.1
	MPSMS (2015)	Postoperative Pneumonia	51,000	1.6
	PSI (2014)	Iatrogenic Pneumothorax (PSI 6)	12,000	0.37
	PSI (2014)	Post-Op Hemorrhage or Hematoma (PSI 9)	19,000	0.58
	PSI (2014)	Post-Op Respiratory Failure (PSI 11)	53,000	1.6
	PSI (2014)	Accidental Puncture or Laceration (PSI 15)	56,000	1.7
	MPSMS (2015) and PSI (2014)	Total All Other HACs (sum of above 14 measures)	753,100	23.0
Final total interim 2015 PfP HACs and HACs per 1,000 discharges (rounded)			3,775,400	115

Source: AHRQ National Scorecard Estimates from Medicare Patient Safety Monitoring System, National Healthcare Safety Network, and Healthcare Cost and Utilization Project.

As noted in the 2013 final report (see footnote 7), the overall measurement strategy for the PfP was published in the *Journal of Patient Safety* in September 2014,¹⁰ and specific details as to how the HAC data and rates shown were acquired and calculated were posted starting in May 2014 on the AHRQ Web site; methods and data are online (see footnote 1).

Exhibit B.2 contains projections of the estimated impact of the initiative that would be launched in April 2011 as the Partnership for Patients. Several projections were needed for each of the types of hospital-acquired conditions (HACs) that were selected for special focus. For each

¹⁰ Abstract is available at <http://www.ncbi.nlm.nih.gov/pubmed/25119788>.

HAC, the incidence, preventability, cost, and additional mortality were assessed and a goal was set as to the percentage of preventable HACs to be prevented.¹¹

The basis of the derivation of the overall 44 percent preventability estimate (which corresponds to the previously referenced 2010 Office of Inspector General estimate) is shown in Exhibit B.2, as is the basis for the PfP goal of a 40 percent reduction in *preventable* HACs. Also shown is the estimate that, if 44 percent were considered preventable, the overall PfP goal to prevent 40 percent of *preventable* HACs would result in reducing the *overall* rate of HACs by approximately 17.6 percent. Complete references to the documents accessed to make these assessments and projections, organized by HAC type, are provided at the end of the 2013 final report (see footnote 7).

¹¹ In 2011, this work was completed using the best available information to generate 2010 incidences and other information regarding the HACs. The sources of the estimates were identified based primarily on peer-reviewed articles published through early 2011. Other sources included reports and other information from HHS and other federally sponsored programs, as well as expert opinions. After these estimates were made, processes were established to measure and estimate national HACs starting with a 2010 measured baseline (4,757,000 HACs). In order to produce consistent estimates of cost savings and deaths averted for 2010 to 2013, the per-HAC estimates established for the costs and deaths associated with HACs in 2011 have not been modified.

Exhibit B.2. Estimates, Goals, and Projections for HACs at the Launch of PfP Initiative in 2011

PfP Hospital-Acquired Condition	Estimated U.S. National Incidence of HACs (2010)	Estimated HAC Preventability as of 2010/2011	PfP Goal at Launch of Program (Percentage of Preventable HACs)	Combined Goal for HAC Reduction (Preventability x Goal)	PfP HAC Reduction Goal (Fewer HACs in 2014* vs. 2010 Baseline)	Estimated PfP Additional Cost* per HAC	Estimated PfP Additional Inpatient Mortality per HAC	Projected PfP Cost Savings in 2014 If 2014 Goal Met	Projected Reductions in Deaths Associated With HACs in 2014 If 2014 Goal Met
Adverse Drug Events	1,900,000	50%	50%	25%	475,000	\$5,000	.020	\$2,375,000,000	9,500
Catheter-Associated Urinary Tract Infections	530,000	40%	50%	20%	106,000	\$1,000	.023	\$106,000,000	2,470
Central Line-Associated Bloodstream Infections	40,000	50%	50%	25%	10,000	\$17,000	.185	\$170,000,000	1,850
Falls	200,000	25%	50%	12.5%	25,000	\$7,234	.055	\$180,850,000	1,375
Obstetric Adverse Events	380,000	30%	50%	15%	57,000	\$3,000	.0015	\$171,000,000	84
Pressure Ulcers	250,000	50%	50%	25%	62,500	\$17,000	.072	\$1,062,500,000	4,525
Surgical Site Infections	110,000	35%	20%	7%	7,700	\$21,000	.028	\$161,700,000	217
Ventilator-Associated Pneumonias	40,000	50%	50%	25%	10,000	\$21,000	.144	\$210,000,000	1,438
(Post-op) Venous Thrombo-embolisms	100,000	40%	50%	20%	20,000	\$8,000	.104	\$160,000,000	2,080
All Other HACs	2,430,000	44%	25%	11%	267,300	\$17,000	.045	\$4,544,100,000	12,109
Totals	5,980,000	44.1%	39.3%	17.4%	1,040,500	NA	NA	\$9,141,150,000	35,647

* Additional costs per HAC for Falls and Pressure Ulcers were modified in 2012 from earlier higher projections. The earlier estimates had been wrongly based on the full cost of a hospital stay that included a fall or a hospital-acquired pressure ulcer, rather than on the incremental cost due to the HAC.

Note: For Projected Reductions in Deaths Associated With HACs in 2014 If 2014 Goal Met, the sum of the categories does not add exactly to the total shown due to rounding.