CHARTBOOK ON PATIENT SAFETY

National Healthcare Quality and Disparities Report

Updated October 2018

Agency for Healthcare Research and Quality

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NATIONAL HEALTHCARE QUALITY AND DISPARITIES REPORT PATIENT SAFETY CHARTBOOK

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PATIENT SAFETY

This Patient Safety Chartbook is part of a family of documents and tools that support the *National Healthcare Quality and Disparities Report* (QDR). The QDR is an annual report to Congress mandated in the Healthcare Research and Quality Act of 1999 (P.L. 106-129). The QDR provides a comprehensive overview of the quality of healthcare received by the general U.S. population and disparities in care experienced by different racial and socioeconomic groups.

The purpose of the reports is to assess the performance of our healthcare system and to identify areas of strengths and weaknesses in the healthcare system along three main axes: access to health care, quality of health care, and QDR priorities.

The reports are based on more than 250 measures of quality and disparities covering a broad array of healthcare services and settings. Data generally cover 2001 through 2015. The reports are produced with the help of an Interagency Work Group led by the Agency for Healthcare Research and Quality (AHRQ) and submitted on behalf of the Secretary of Health and Human Services (HHS).

Chartbooks Organized Around Six Priority Areas

1. Making care safer by reducing harm caused in the delivery of care.
2. Ensuring that each person and family is engaged as partners in their care.
3. Promoting effective communication and coordination of care.
4. Promoting the most effective prevention and treatment practices for the leading causes of mortality, starting with cardiovascular disease.
5. Working with communities to promote wide use of best practices to enable healthy living.
6. Making quality care more affordable for individuals, families, employers, and governments by developing and spreading new healthcare delivery models**.**

Patient Safety is one of the six national priorities identified by the QDR. AHRQ has identified three long-term goals related to patient safety: reduce preventable hospital admissions and readmissions, reduce the incidence of adverse healthcare-associated conditions, and reduce harm from inappropriate or unnecessary care.

This chartbook focuses on adverse healthcare-associated conditions and harm from care. Preventable admissions and readmissions can result from problems with patient safety or problems with care coordination. We have chosen to include most measures of preventable admissions and readmissions in the Care Coordination chartbook. To access the most recent Care Coordination chartbook, please visit https://www.ahrq.gov/research/findings/nhqrdr/chartbooks/carecoordination/index.html.

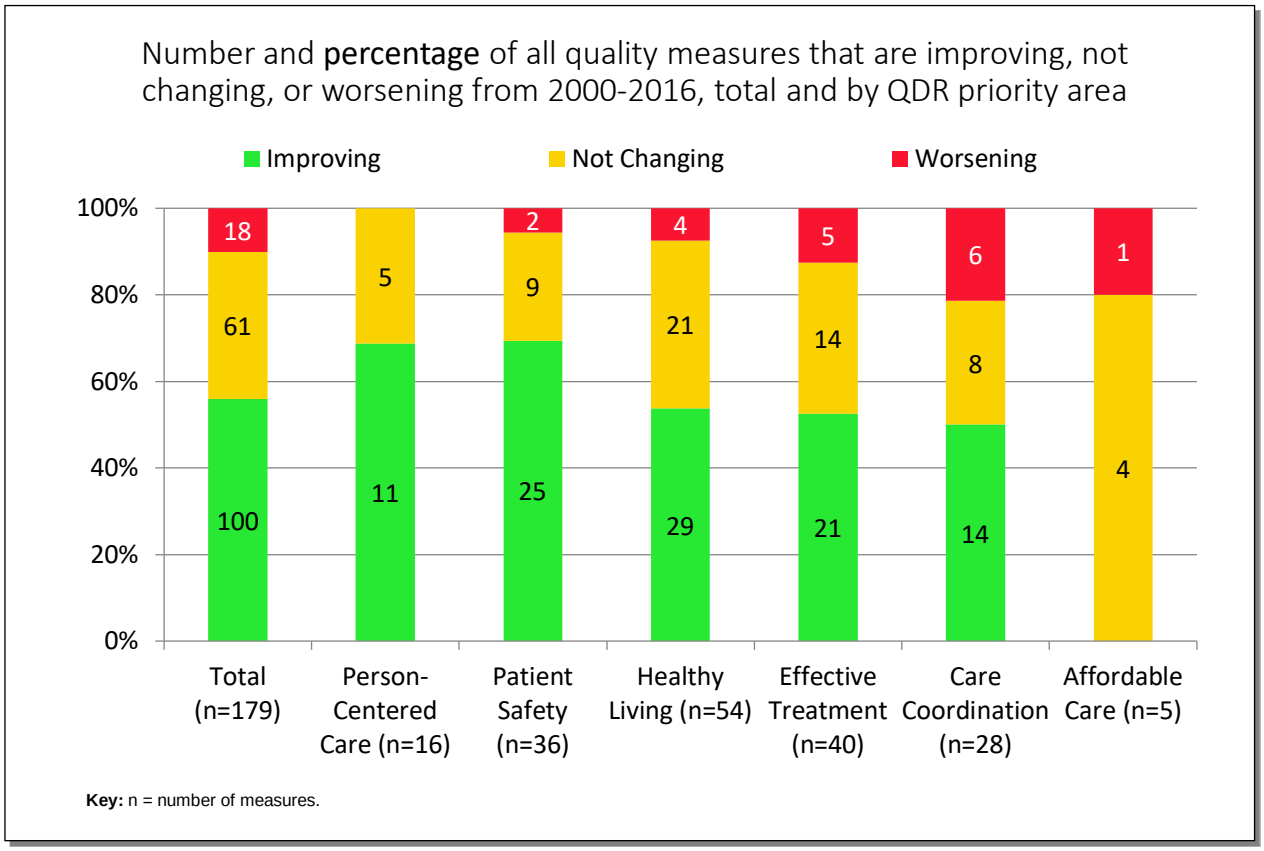
Chartbook Contents

This chartbook includes:

- Summary of trends across measures of patient safety from the QDR.
- Figures illustrating select measures of patient safety.
- Supplemental descriptions and data on patient safety measures from several outside sources.

Introduction and Methods contains information about methods used in the chartbook. A Data Query tool (http://nhqrnet.ahrq.gov/inhqrdr/data/query) provides access to most QDR data tables.

Summary of Trends Across QDR Priorities



Note: For most measures in the 2017 QDR, trend data are available from 2000, 2001, or 2002 through 2014, 2015, or 2016. For each measure with at least four estimates over time, unweighted log-linear regression is used to calculate average annual percentage change and to assess statistical significance. Measures are aligned so that positive change indicates improved access to care.

- **Improving** = Rates of change are positive at 1% per year or greater and are statistically significant.
- **No Change** = Rate of change is less than 1% per year or is not statistically significant.
- **Worsening** = Rates of change are negative at -1% per year or greater and are statistically significant.

- Through 2014 or 2015, across a broad spectrum of measures of healthcare quality, about 56% showed improvement (green).
- Person-Centered Care: Almost 70% of person-centered care measures were improving overall.
- Patient Safety: More than two-thirds of patient safety measures were improving overall.
    - The two measures with worsening results were “Postoperative physiologic and metabolic derangements per 1,000 elective surgery hospital discharges, adults” and “Adults who reported a home health provider asking to see all the prescription and over-the-counter medicines they were taking, when they first started getting home health care.”

- Healthy Living: More than half of healthy living measures were improving overall.
- Effective Treatment: More than half of effective treatment measures were improving overall.
- Care Coordination: Half of care coordination measures were improving overall.
- Care Affordability: Eighty percent of care affordability measures did not change overall.
- Access measures are not represented in this chart.

For more information about the 2017 National Healthcare Quality and Disparities Report, please visit: https://www.ahrq.gov/research/findings/nhqrdr/nhqdr17/index.html.

Patient Safety Measures That Were Improving Over Time

Through 2015 or 2016, the four measures with the most improvement overall are:

- Hospital admissions with central venous catheter-related bloodstream infection per 1,000 medical and surgical discharges of length 2 or more days, adults age 18 and over or obstetric admissions.
- Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions.
- Inpatient adverse events in adults receiving knee replacement.
- Hospital patients with an anticoagulant-related adverse drug event due to low-molecular-weight heparin (LMWH) and factor Xa.

The following list includes the remaining patient safety measures noted as improving from 2000, 2002, 2004, 2005, 2008, 2009, 2012 through 2015 or 2016. Only one measure that is improving has a baseline year as late as 2012. Improving measures are defined as rates of change that are positive at 1% per year or greater and that are statistically significant.

The remaining 21 measures from largest to smallest improvement are:

- Inpatient adverse events in adults receiving hip joint replacement due to fracture
- Adult surgery patients with postoperative pneumonia events
- Adults age 65 and over who received in the calendar year at least 1 of 11 prescription medications that should be avoided in older adults
- Deaths per 1,000 hospital admissions with expected low-mortality
- Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents
- Obstetric trauma per 1,000 vaginal deliveries without instrument assistance
- Reclosure of postoperative abdominal wound dehiscence per 1,000 abdominopelvic-surgery admissions of length 2 or more days, adults
- Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults
- Adult surgery patients with catheter-associated urinary tract infection
- Mechanical adverse events in adult patients receiving central venous catheter placement
- Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT) per 1,000 surgical hospital discharges, adults

- Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant
- Obstetric trauma per 1,000 instrument-assisted deliveries
- Birth trauma - injury to neonate per 1,000 selected live births
- Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, adults
- Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions
- Postoperative respiratory failure per 1,000 elective surgical hospital discharges, adults
- Postoperative hip fracture per 1,000 surgical admissions who were not susceptible to falling, adults
- Adults who reported a home health provider talking with them about how to set up their home so they can move around safely when they first started getting home health care
- Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, children
- Hospital admissions with iatrogenic pneumothorax per 1,000 medical and surgical admissions, adults

Patient Safety Measures That Were Not Changing Over Time

Through 2012, 2015, or 2016, the four select measures that were not changing overall, by topic area, are:

- Hospital patients with an anticoagulant-related adverse drug event to warfarin (Adverse drug events).
- Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care (Adverse drug events).
- Postoperative hemorrhage or hematoma with surgical drainage or evacuation per 1,000 surgical hospital discharges, adults (Procedure-related events).
- Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults (Healthcare-associated infections).

The remaining patient safety measures that were not changing from 2000, 2008, 2009, or 2012 through 2012, 2015, or 2016 follow. Not changing measures are defined as rate of change is less than 1% per year or is not statistically significant:

- Adults who reported a home health provider talking with them about all the prescription and over-the-counter medicines they were taking when they first started getting home health care
- Adult surgery patients with postoperative venous thromboembolic events
- Bloodstream infection in adult patients receiving central venous catheter placement
- Adults who reported that home health providers talked with them about the purpose for taking their new or changed prescription medicines in the last 2 months of care
- Adult home health patients age 18 and over who reported that home health providers talked with them about the side effects of medicines in the last 2 months of care

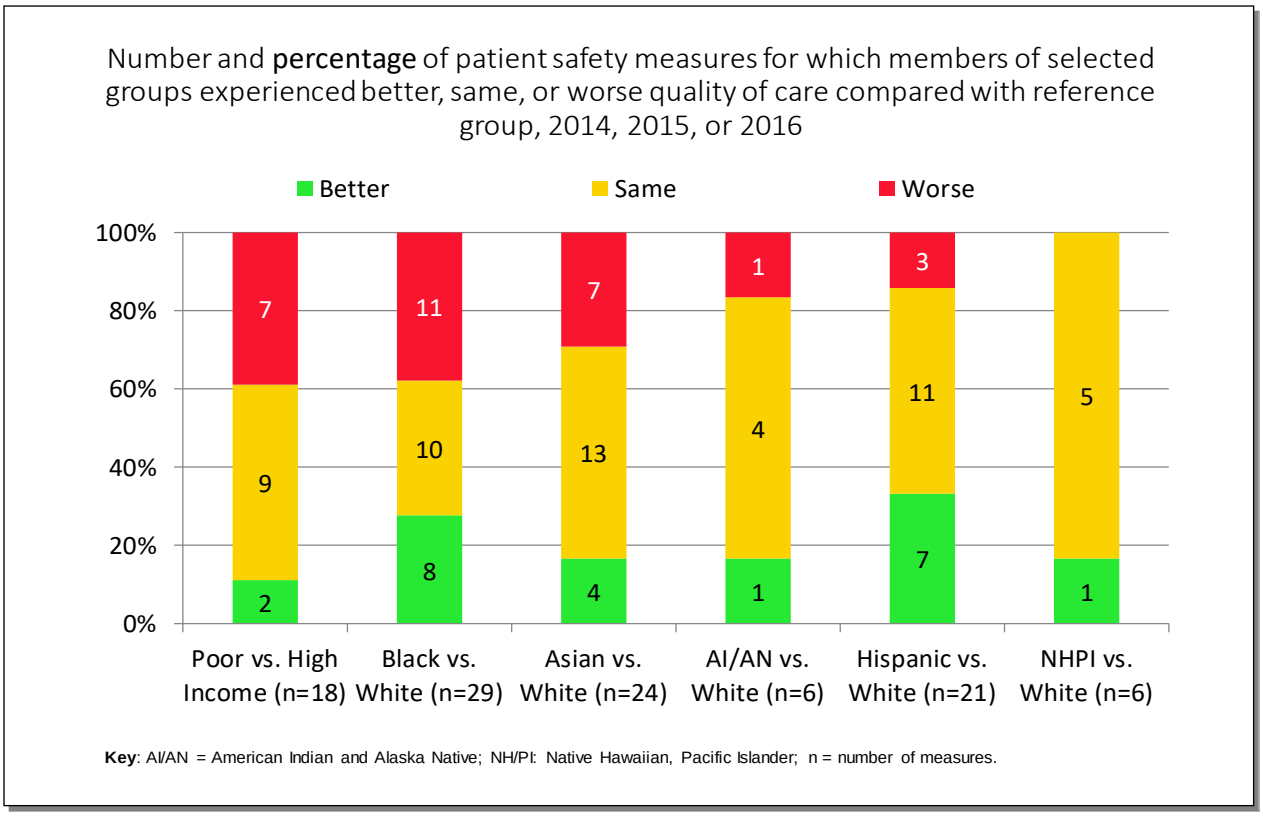
Patient Safety Measures That Were Worsening Over Time

Through 2015 or 2016, these are the only two measures that were worsening overall:

- Adults who reported a home health provider asking to see all the prescription and over-the-counter medicines they were taking when they first started getting home health care
- Postoperative physiologic and metabolic derangements per 1,000 elective surgical hospital discharges, adults

Worsening measures are defined as rates of change that are negative at -1% per year or greater and are statistically significant.

Summary of Quality Disparities



Note: Numbers of measures differ across groups in part because of data limitations. The measures shown here are from 2014 or later. This figure reflects the most current data year available. The relative difference between a selected group and its reference group is used to assess disparities. Poor indicates family income less than the Federal poverty level. High Income indicates family income four times the Federal poverty level or greater.

- **Better** = Selected group received better quality of care than reference group. Differences are statistically significant, are equal to or larger than 10%, and favor the selected group.
- **Same** = Selected group and reference group received about the same quality of care. Differences are not statistically significant or are smaller than 10%.
- **Worse** = Selected group received worse quality of care than reference group. Differences are statistically significant, are equal to or larger than 10%, and favor the reference group.

- People in poor households received worse care than people in high-income households for about 39% of patient safety measures.
- Blacks and Hispanics received worse care than Whites for about 38% and 14%, respectively, of patient safety measures.
- Asians and AI/ANs received worse care than Whites for about 29% and about 17%, respectively, of patient safety measures.

Changes in Disparities

One measure has subpopulations showing narrowing disparities over time:

- Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admission
  - Health insurance: Public vs. Any private
  - Health insurance: Uninsured vs. Any private
  - Race: Asian vs. White

No patient safety measures had worsening disparities over time.

Disparities Not Changing

Ninety-nine subgroup comparisons across 21 measures did not show any change over time. These include:

- Race gap: Black vs. White: Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions.
- Age gap: 65 years and over vs. 18-44 years: Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults.
- Gender gap: Female vs. Male: Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults.

Measures of Patient Safety

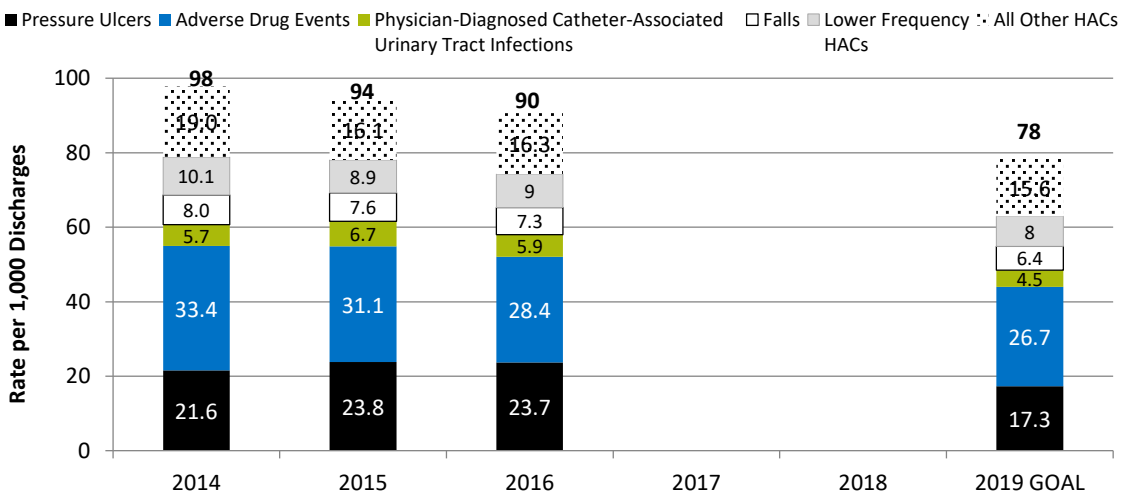
- Summary of information on patient safety from the National Healthcare Quality and Disparities Report
- Individual measures of patient safety, overall and by age, sex, race, ethnicity, income, education, insurance, health status, or presence of various health conditions
- Measures of patient safety by setting:
  - Hospitals
  - Home health
  - Ambulatory care
  - All settings: Infrastructure

Patient Safety in the Hospital Setting

- Hospitals are a common setting for patient safety events:
  - Many patients admitted to the hospital are in a clinically compromised state.
  - Care often includes the use of invasive devices and procedures, increasing patients' risk for infection and other harm.
- Measures address:
  - Overall hospital-acquired conditions (HACs).
  - Healthcare-associated infections (HAIs).
  - Procedure-related events.
  - Adverse drug events.

Hospital-Acquired Conditions

Distribution of hospital-acquired conditions, based on national rates per 1,000 adult hospital discharges, 2014-2016 and goal for 2019



Source: Agency for Healthcare Research and Quality (AHRQ), Medicare Patient Safety Monitoring System (MPSMS); Healthcare Cost and Utilization Project, Nationwide Inpatient Sample; Centers for Disease Control and Prevention, National Healthcare Safety Network., 2010-2016.
Denominator: Adult hospital discharges, age 18 and over.
Note: Lower Frequency HACs (<3/1,000 discharges) include central line-associated bloodstream infections, venous thromboembolisms, surgical site infections, obstetric adverse events, and ventilator-associated pneumonia. All Other Hospital-Acquired Conditions includes: inadvertent femoral artery puncture for catheter angiographic procedures, adverse events associated with hip joint replacement, adverse events associated with knee joint replacement, contrast nephropathy associated with catheter angiography, methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), *C. difficile*, mechanical complications associated with central venous catheters, postoperative cardiac events for cardiac and noncardiac surgery, postoperative pneumonia, iatrogenic pneumothorax, postoperative hemorrhage or hematoma, postoperative respiratory failure, and accidental puncture or laceration. For more information on methods, see https://www.ahrq.gov/professionals/quality-patient-safety/pfp/index.html. The 2016 data on this graph reflect interim results. Prior analysis suggests that the (pending) final data should be very similar.

Healthcare-Associated Infections

- Infections acquired during a hospital stay are among the most common complications of hospital care (AHRQ, 2016).
- On any given day, about 1 in 25 hospital patients has at least one healthcare-associated infection (HAI) (CDC, 2016a).
- HAIs often increase patients' length of stay in the hospital, their risk of mortality, and their hospital costs.
- New infections in critically ill infants, children, and other patients generally reduce their chances for recovery.
- For more information, go to the Patient Safety Primer: Health Care-Associated Infections at https://psnet.ahrq.gov/primers/primer/7.

Standardized Infection Ratios

- Standardized infection ratios (SIRs) compare the observed numbers of specific types of infections to the numbers of infections that were predicted to occur. The predicted numbers are based on various healthcare facility and patient population characteristics.
- SIRs are calculated based on infections that healthcare facilities report to the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) during a year.
- For various infections, CDC had previously used data from 2006-2011 to establish baseline predicted infection rates. New baselines were just established using 2015 data. Therefore, almost all 2015 national SIRs for various HAI types are very close to 1.0, and trends involving SIRs from previous years cannot be examined.
- SIRs facilitate comparative evaluations of hospital risk-adjusted performance.
- NHSN data had been predominantly from intensive care units, although general medical/surgical inpatient wards and other non-critical care locations are also increasingly represented. The numbers of units/facilities reporting to NHSN roughly quadrupled from 2009 to 2014.
- Statewide SIRs with 95% confidence intervals entirely above 1.0 indicate that, on average, a given State's hospitals had more HAIs of a specific type than hospitals of similar type and size had reported during the baseline period. Conversely, statewide SIRs with 95% confidence intervals entirely below 1.0 indicate that the State's hospitals generally had fewer HAIs of that type than hospitals of similar type and size had reported during the baseline period. Statewide SIRs with 95% confidence intervals that included 1.0 indicated that their hospitals had roughly the same number of infections (e.g., catheter-associated urinary tract infections as hospitals of similar type and size had reported during the referent period.

Measures of Patient Safety in the Hospital Setting: HAIs

- Distributions of State-specific SIRs for central line-associated bloodstream infections (CLABSIs) and NHSN-defined catheter-associated urinary tract infections (CAUTIs)
  - Restricted to acute care hospitals (excludes critical access hospitals, long-term acute care hospitals, and inpatient rehabilitation facilities)
  - Stratified by unit type:
    - Critical care units (excluding neonatal intensive care units)
    - General hospital wards

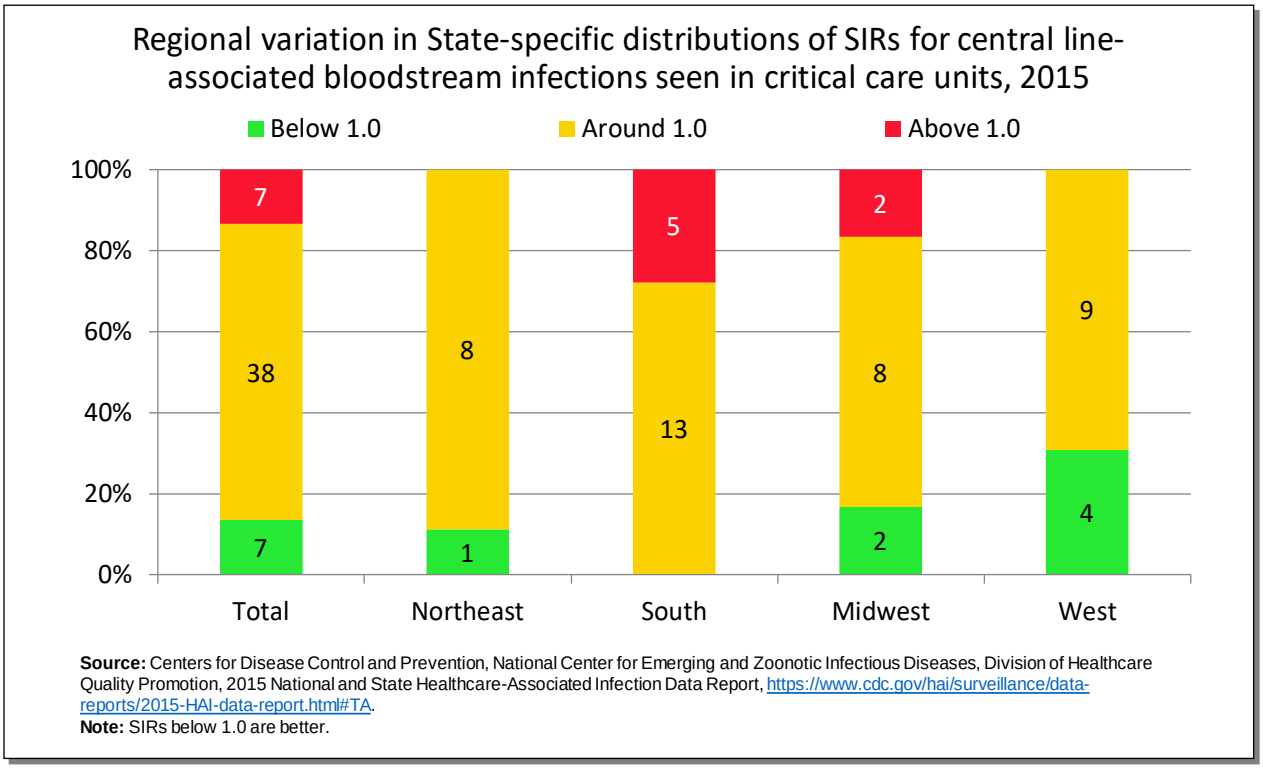
- Distributions of State-specific SIRs for hospital-onset *C. difficile* infections seen in acute care hospitals as defined above

A central line-associated bloodstream infection (CLABSI) is a laboratory-confirmed bloodstream infection (LCBI) where a central line (CL) or umbilical catheter (UC) was in place for >2 calendar days on the date of event, with day of device placement being Day 1 and the line also being in place on the date of event or the day before. If a CL or UC was in place for >2 calendar days and then removed, the date of event of the LCBI must be the day of discontinuation or the next day to be a CLABSI (CDC, 2017).

Catheter-associated urinary tract infections (CAUTIs) in the hospital setting are caused by instrumentation of the urinary tract (CDC, 2016b). Potential complications resulting from the development of CAUTI include cystitis, pyelonephritis, endocarditis, septic arthritis, and meningitis. The NHSN defines catheter-associated urinary tract infections (CAUTIs) based on symptomatic urinary tract infection (SUTI), asymptomatic bacteremic UTI (ABUTI), or urinary system infection (USI) criteria and using specific criteria related to the timing of catheter use and CAUTI diagnosis. These criteria, which differ from those used by MPSMS, can be found at https://www.cdc.gov/nhsn/pdfs/pscmanual/7psccauticurrent.pdf.

Clostridium difficile (*C. difficile*) is a bacterium that can cause potentially fatal diarrhea. *C. difficile* infections are often associated with the use of antibiotics prescribed for other reasons that alter the balance of intestinal bacteria. The NHSN defines hospital-onset *C. difficile* infections as those detected on the 4th day or later after admission to an inpatient location.

Regional Variation in Standardized Infection Ratios for Central Line-Associated Bloodstream Infections in Critical Care Units



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, 2015 National and State Healthcare-Associated Infection Data Report, https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html#TA.
Note: SIRs below 1.0 are better.

- NHSN calculated SIRs (and their 95% confidence intervals) for the 52 individual State-equivalent jurisdictions (50 States plus Washington, DC, and Puerto Rico). However, they were not infrequently based on small (e.g., <50) numbers of observed or predicted site-specific infections for an entire State. Therefore, we present data on regional variation in State-specific SIR distributions. The differences among States have not been assessed for statistical significance.
- The United States is divided into four regions:

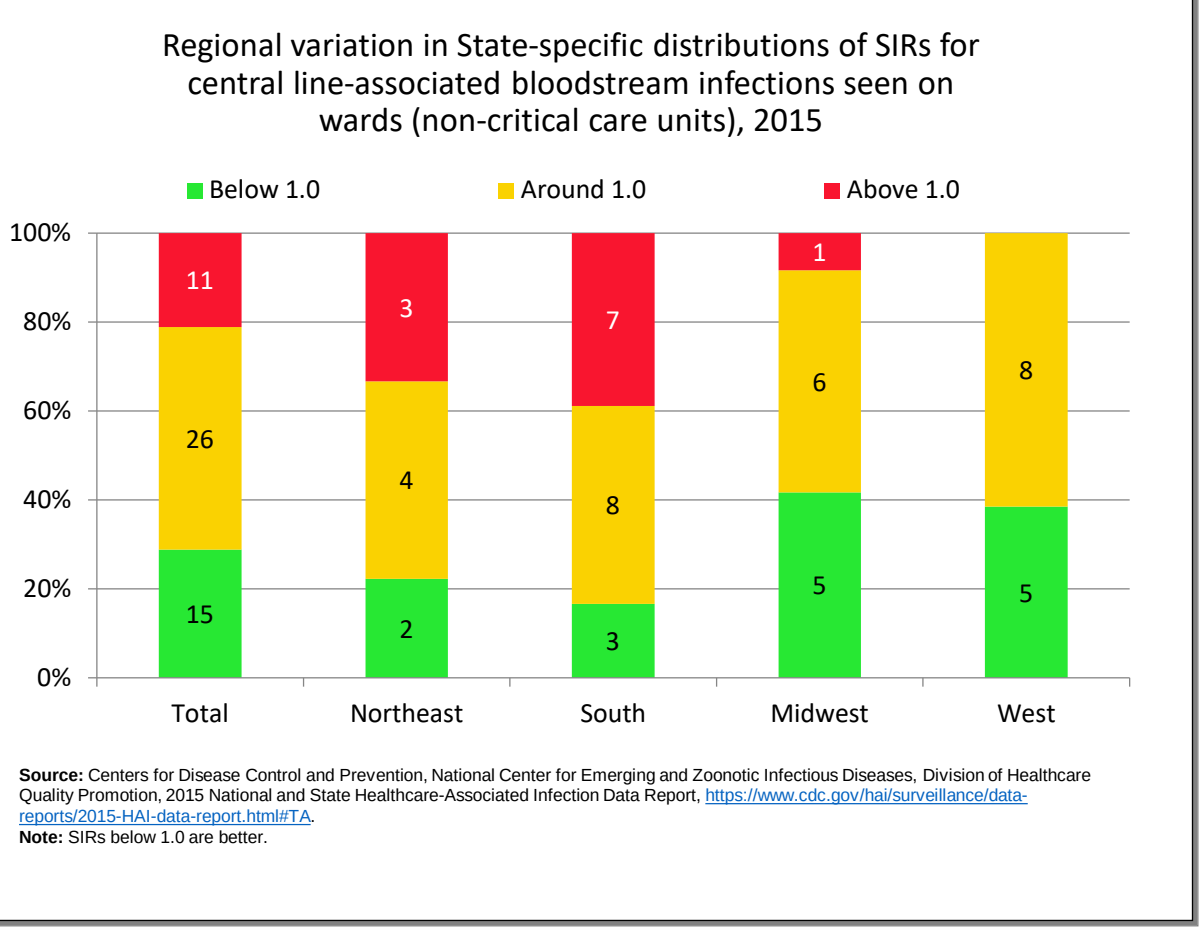
  - Northeast (9 State equivalents: CT, MA, ME, NH, NJ, NY, PA, RI, VT)
  - South (18 State equivalents: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, PR, SC, TN, TX, VA, WV)
  - Midwest (12 State equivalents: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)
  - West (13 State equivalents: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA WY)

- Statewide SIRS were classified as:

  - Below 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely below 1.0.
  - Around 1.0 if the 95% confidence intervals bounding the SIR point estimate included 1.0. This finding may reflect small numbers of infections.
  - Above 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely above 1.0.

- The confidence interval for the Total is: 0.074-2.071.
- For CLABSIs seen in critical care units of acute care hospitals, the West had the highest percentage (4/13 = 30.8%) of statewide SIRs that were below 1.0 as defined above.

Regional Variation in Standardized Infection Ratios for Central Line-Associated Bloodstream Infections on Wards



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, 2015 National and State Healthcare-Associated Infection Data Report, https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html#TA.
Note: SIRs below 1.0 are better.

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- The United States is divided into four regions:
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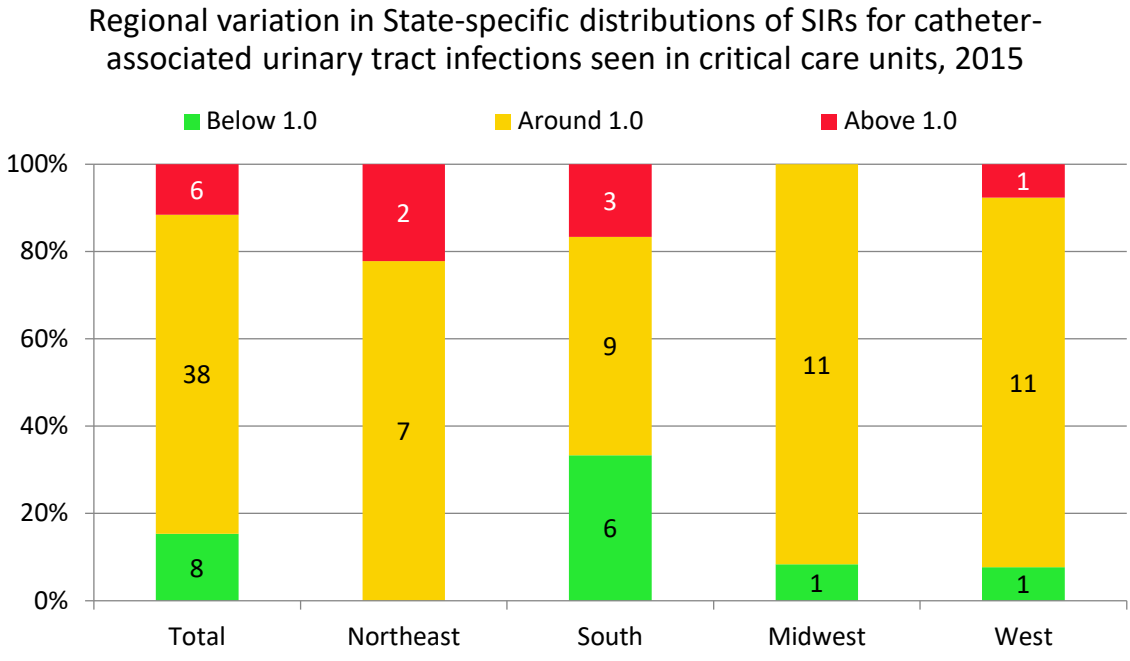
  - Midwest (12 State equivalents: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)
  - West (13 State equivalents: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA WY)
- Statewide SIRS were classified as:
  - Below 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely below 1.0.

- Around 1.0 if the 95% confidence intervals bounding the SIR point estimate included 1.0. This finding may reflect small numbers of infections.
- Above 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely above 1.0.

- The confidence interval for the Total is: 0.216-1.608.
- For CLABSIs seen on acute care hospital wards only (i.e., non-critical care unit locations), the Midwest had the highest percentage (5/12 = 41.7%) of State-wide SIRs that were below 1.0 as defined above.

Regional Variation in Standardized Infection Ratios for Catheter-Associated Urinary Tract Infections in Critical Care Units



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion. The 2015 National and State Healthcare-associated Infection Data Report. Available at: https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html#TA. Accessed June 22, 2018.
Note: SIRs below 1.0 are better

- Compared with rates of other hospital-acquired infections, CAUTI rates vary more among units in the same hospital (Dudeck, et al., 2015). ICU patients differ from non-ICU patients in their underlying health status, their risks of contracting CAUTIs, and the consequences of CAUTIs that occur.
- NHSN calculated SIRs (and their 95% confidence intervals) for the 52 individual State-equivalent jurisdictions (50 States plus Washington, DC, and Puerto Rico). However, they were not infrequently based on small (e.g., <100) numbers of observed or predicted site-specific infections for an entire State. Therefore, we present data on regional variation in State-specific SIR distributions. The differences among States have not been assessed for statistical significance.

- The United States is divided into four regions:
  - Northeast (9 State equivalents: CT, MA, ME, NH, NJ, NY, PA, RI, VT)
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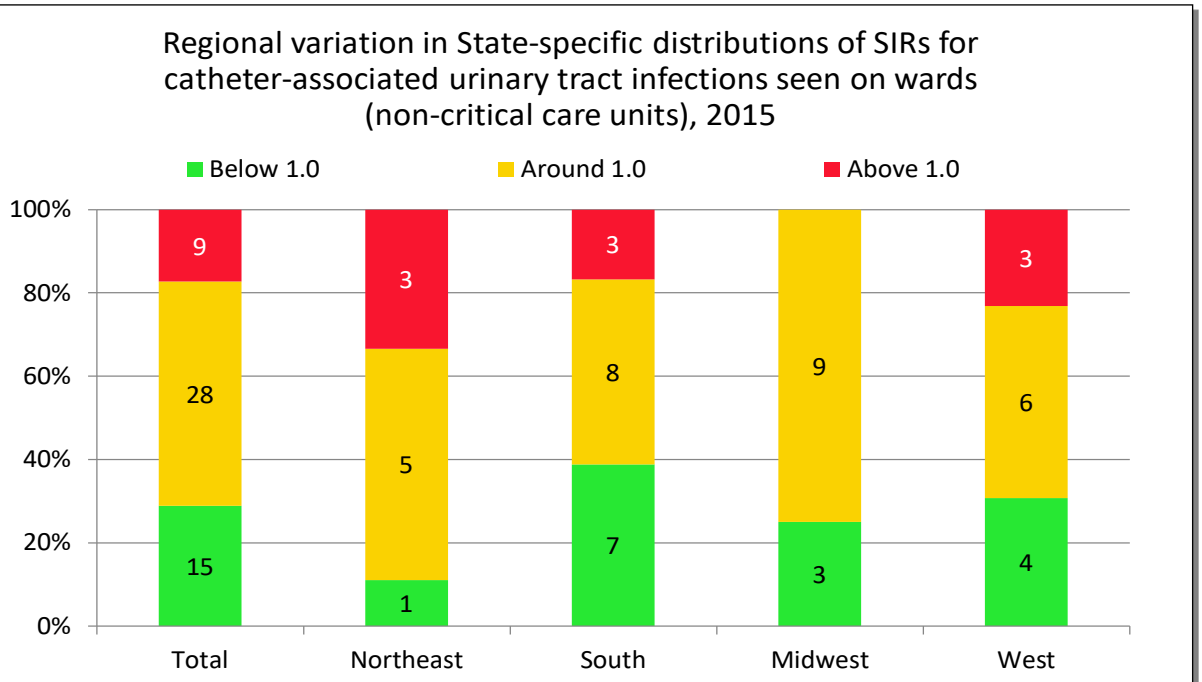
  - West (13 State equivalents: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA WY)
- Statewide SIRS were classified as:
  - Below 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely below 1.0.
  - Around 1.0 if the 95% confidence intervals bounding the SIR point estimate included 1.0. This finding may reflect small numbers of infections.
  - Above 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely above 1.0.
- The confidence interval for the Total is: 0.052-2.331.
- For CAUTIs seen in critical care units of acute care hospitals, the South had the highest percentage (6/18 = 33.3%) of statewide SIRs that were below 1.0 as defined above.

Regional Variation in Standardized Infection Ratios for Catheter-Associated Urinary Tract Infections on Wards



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, 2015 National and State Healthcare-Associated Infection Data Report, https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html#TA.
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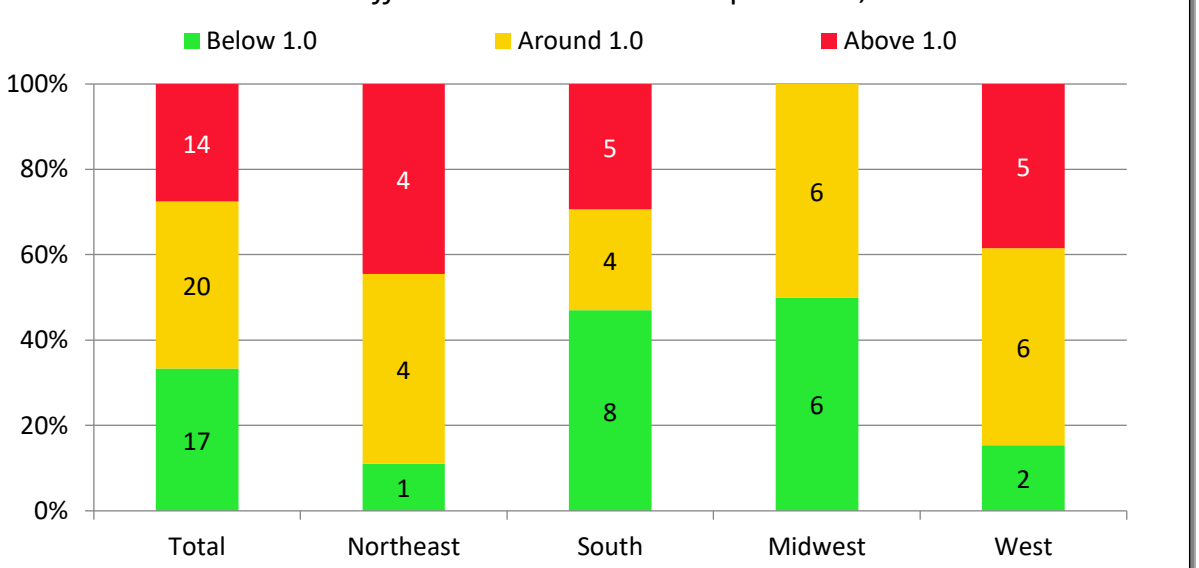
  - South (18 State equivalents: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, PR, SC, TN, TX, VA, WV)
  - Midwest (12 State equivalents: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)
  - West (13 State equivalents: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA WY)

- Statewide SIRS were classified as:

  - Below 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely below 1.0.
  - Around 1.0 if the 95% confidence intervals bounding the SIR point estimate included 1.0. This finding may reflect small numbers of infections.
  - Above 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely above 1.0.

- The confidence interval for the Total is: 0.358-2.194.
- For CAUTIs seen on acute care hospital wards only (not critical care locations), the South had the highest percentage (7/18 = 38.9%) of statewide SIRs that were below 1.0 as defined above.

Regional Variation in Standardized Infection Ratios for *Clostridium difficile* Infection



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality Promotion, 2015 National and State Healthcare-Associated Infection Data Report, https://www.cdc.gov/hai/surveillance/data-reports/2015-HAI-data-report.html#TA.
Note: SIRs below 1.0 are better.

- NHSN calculated SIRs (and their 95% confidence intervals) for the 52 individual State-equivalent jurisdictions (50 States plus Washington, DC, and Puerto Rico). However, they were not infrequently based on small (e.g., <100) numbers of observed or predicted site-specific infections for an entire State. Therefore, we present data on regional variation in State-specific SIR distributions. The differences among States have not been assessed for statistical significance.
- The United States is divided into four regions:
  - Northeast (9 State equivalents: CT, MA, ME, NH, NJ, NY, PA, RI, VT)
  - South (17 State equivalents: AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)
  - Midwest (12 State equivalents: IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI)
  - West (13 State equivalents: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA WY)
  - Data were not available for Puerto Rico.
- Statewide SIRS were classified as:
  - Below 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely below 1.0.
  - Around 1.0 if the 95% confidence intervals bounding the SIR point estimate included 1.0. This finding may reflect small numbers of infections.

  - Above 1.0 if the 95% confidence intervals bounding the SIR point estimate were entirely above 1.0.

- The confidence interval for the Total is: 0.606-1.436.
- For hospital-onset *C. difficile* infection seen anywhere in the hospital, the Midwest had the highest percentage (6/12 = 50.0%) of statewide SIRs that were below 1.0 as defined above.

Tools for Reducing Central Line-Associated Bloodstream Infections in Hospitals

- Purpose: To help hospitals prevent central line-associated bloodstream infections (CLABSIs) and improve safety culture
- Methods: Implementing evidence-based, practical resources and concepts from the Comprehensive Unit-based Safety Program (CUSP)
- Intended users: Hospital facilities
- Impact: Through use of the CUSP toolkit and CLABSI tools, more than 100 hospital ICUs in Michigan nearly eliminated CLABSIs. Nationwide, the use of this toolkit helped more than 1,000 hospital ICUs reduce rates of CLABSI by 41% in aggregate. See http://www.ahrq.gov/workingforquality/pias/mhhakcpia.htm.
- Available tools: Checklists, preventable incidence calculators, audit forms, event report templates
- Link: http://www.ahrq.gov/professionals/education/curriculum-tools/clabsitools/index.html

Tools for Reducing Catheter-Associated Urinary Tract Infections in Hospitals

- Purpose: To help hospitals prevent catheter-associated urinary tract infections (CAUTIs) and improve safety culture
- Method: Implementing evidence-based, practical resources and concepts from the Comprehensive Unit-based Safety Program (CUSP)
- Intended users: Hospital facilities
- Potential measures of effectiveness:

  - Number of symptomatic CAUTIs attributable to each unit per month
  - Days since last CAUTI

- Impact: Use of the CUSP for CAUTI toolkit helped more than 700 hospital non-ICU units reduce rates of CAUTI by 30%.
- Available tools: Guides, checklists, webinars, learning modules, data interpretation guides
- Link: http://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/cauti-hospitals/Index.html

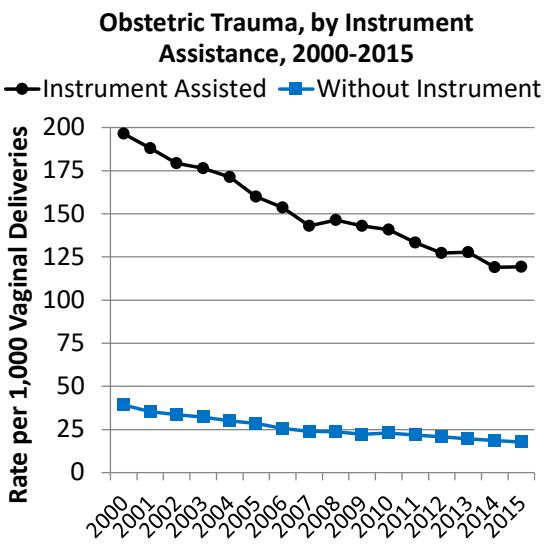
Procedure-Related Events

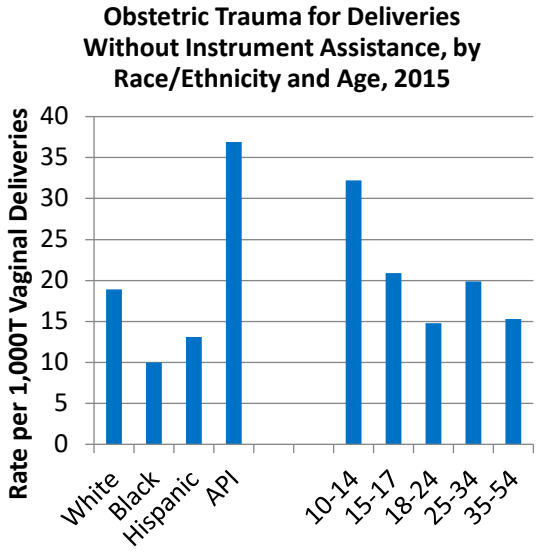
- More than 40 million operative procedures are performed in the United States each year.
- Postoperative adverse events are not uncommon and increase both hospitalization length of stay and cost (AHRQ, 2013).

- Measures include:
  - Obstetric trauma per 1,000 vaginal deliveries.
  - Percentage of adult patients receiving hip joint replacement due to fracture or degenerative conditions who experienced adverse events.
  - Risk-adjusted mortality at 30 postoperative days for colorectal surgery performed in adults.

Obstetric Trauma

Obstetric trauma per 1,000 vaginal deliveries, 2000-2015, by instrument assistance





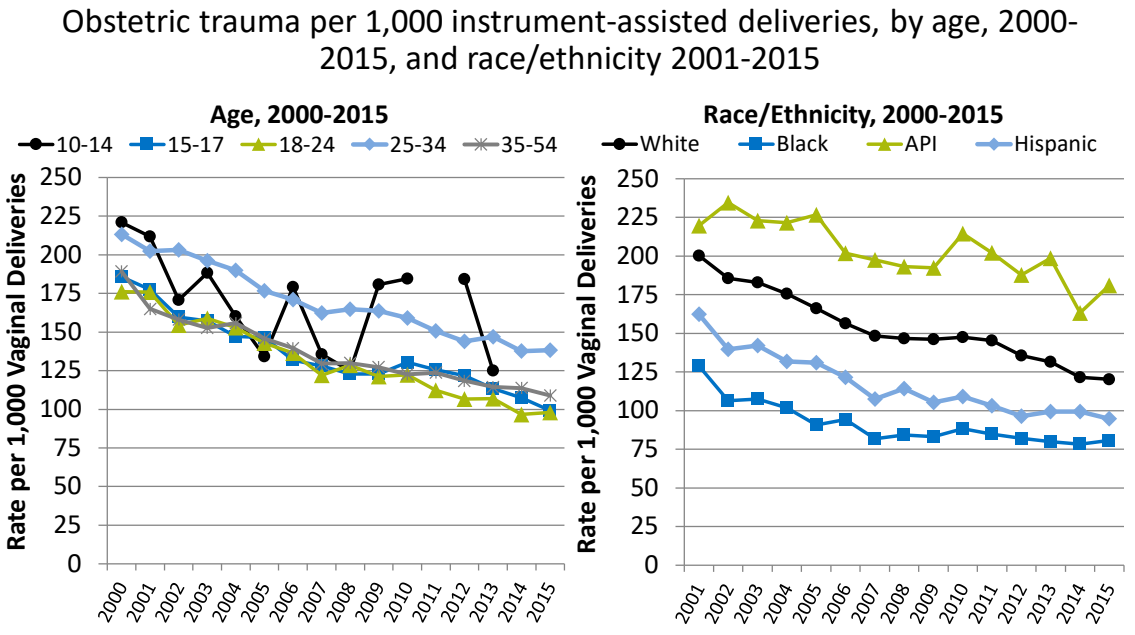
Key: API=Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2000-2011; disparities analytic file, 2012-2015, derived from the HCUP State Inpatient Databases (SID) and weighted to provide national estimates using the same methodology as the 2000-2011 NIS; and the AHRQ Quality Indicators, version 4.4. Estimates for 2015 were based on 9 months of data (January–September) with International Classification of Diseases, 9th Revision (ICD-9) coding. For more information on the sampling approach, included States, and special handling of 2015 data, see the HCUP Methods Series Report on Methods Applying AHRQ Quality Indicators to HCUP Data (www.hcup-us.ahrq.gov/reports/methods/2018-01.pdf).
Denominator: Vaginal deliveries, identified by diagnosis-related group (DRG) or Medicare Severity-DRG code. In the case of instrument-assisted delivery, the population was additionally identified with any listed ICD-9 procedure codes for instrument-assisted delivery.
Note: For this measure, lower rates are better. Consistent with the AHRQ Patient Safety Indicators software, obstetric trauma must involve 3rd or 4th degree lacerations of the perineum. Rates are adjusted by age using U.S. hospitalizations for 2010 as the standard population.

- **Importance:** Obstetric trauma occurring to the mother during childbirth can extend a patient's hospital stay after giving birth, may cause additional procedures to be performed, and may lead to poorer health outcomes for both the mother and child (Hines & Jiang, 2012). Vaginal deliveries that involve instruments, such as forceps and vacuums, are more likely to result in obstetric trauma, such as 3rd and 4th degree lacerations of the perineum.
- **Overall Rate:** In 2015, the rate of obstetric trauma was 119.3 for instrument-assisted vaginal deliveries and 17.7 per 1,000 vaginal deliveries without instrument assistance.
- **Trends:** From 2000 to 2015, obstetric trauma rates improved for vaginal deliveries both with and without instrument assistance.

- **Groups With Disparities:**

  - In 2015, the rate of obstetric trauma for vaginal deliveries without instrument assistance was worse for Asians and Pacific Islanders (36.9 per 1,000 vaginal deliveries) compared with Whites (18.9 per 1,000 vaginal deliveries).
  - In 2015, the rate of obstetric trauma for deliveries without instrument assistance was better for Blacks (10.0 per 1,000 vaginal deliveries) and Hispanics (13.1 per 1,000 vaginal deliveries) than for Whites (18.9 per 1,000 vaginal deliveries).
  - In 2015, the obstetric trauma rate for vaginal deliveries without instrument assistance was worse for patients ages 10-14 years (32.2%), 15-17 years (20.9%), and 25-34 years (19.9%) compared with patients ages 18-24 (14.8%) and 35 to 54 (15.3%).

Obstetric Trauma, by Age and Race/Ethnicity



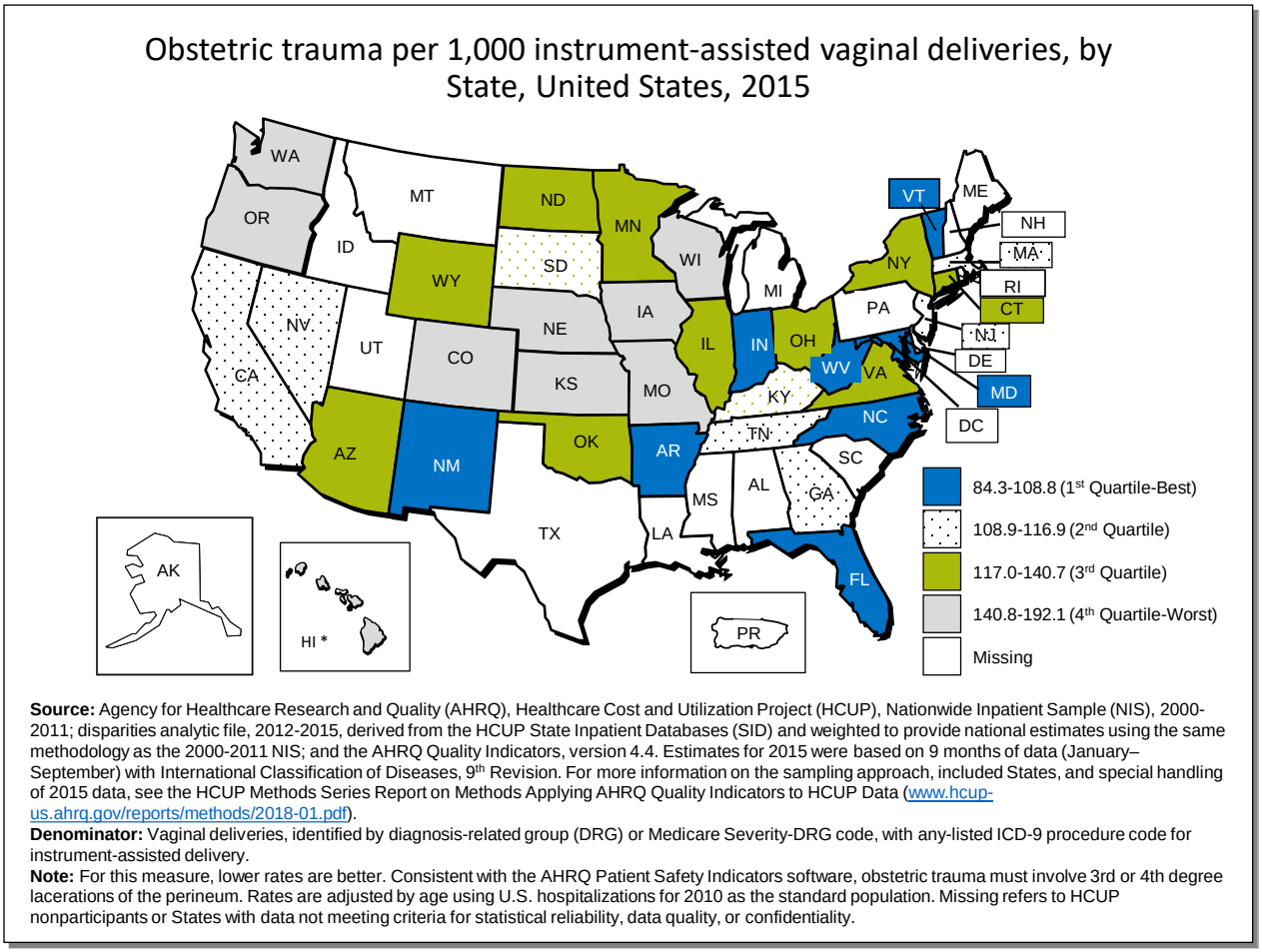
Key: API=Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2000-2011; disparities analytic file, 2012-2015, derived from the HCUP State Inpatient Databases (SID) and weighted to provide national estimates using the same methodology as the 2000-2011 NIS; and the AHRQ Quality Indicators, version 4.4. Estimates for 2015 were based on 9 months of data (January–September) with International Classification of Diseases, 9th Revision (ICD-9) coding. For more information on the sampling approach, included States, and special handling of 2015 data, see the HCUP Methods Series Report on Methods Applying AHRQ Quality Indicators to HCUP Data (www.hcup-us.ahrq.gov/reports/methods/2018-01.pdf).
Denominator: Vaginal deliveries, identified by diagnosis-related group (DRG) or Medicare Severity-DRG code. In the case of instrument-assisted delivery, the population was additionally identified with any listed ICD-9 procedure codes for instrument-assisted delivery.
Note: For this measure, lower rates are better. Consistent with the AHRQ Patient Safety Indicators software, obstetric trauma must involve 3rd or 4th degree lacerations of the perineum. Rates are adjusted by age using U.S. hospitalizations for 2010 as the standard population.

- **Groups With Disparities:**

  - In 2015, the rate of obstetric trauma for vaginal deliveries with instrument assistance was worse for Asians and Pacific Islanders (181.1 per 1,000 vaginal deliveries) compared with Whites (120.3 per 1,000 vaginal deliveries).

- In 2015, the rate of obstetric trauma for deliveries with instrument assistance was better for Blacks (80.7 per 1,000 vaginal deliveries) and Hispanics (94.7 per 1,000 vaginal deliveries) than for Whites (120.3 per 1,000 vaginal deliveries).
- In 2015, the obstetric trauma rate for vaginal deliveries with instrument assistance was worse for patients 25-34 years (138.4 per 1,000 vaginal deliveries) and 35-54 years (108.9 per 1,000 vaginal deliveries) compared with patients ages 18-24 years (98.1 per 1,000 vaginal deliveries) and 15-17 years (99.2 per 1,000 vaginal deliveries). For 2011, 2014, and 2015, data for ages 10-14 years are suppressed because they are statistically unreliable.

Obstetric Trauma, by State

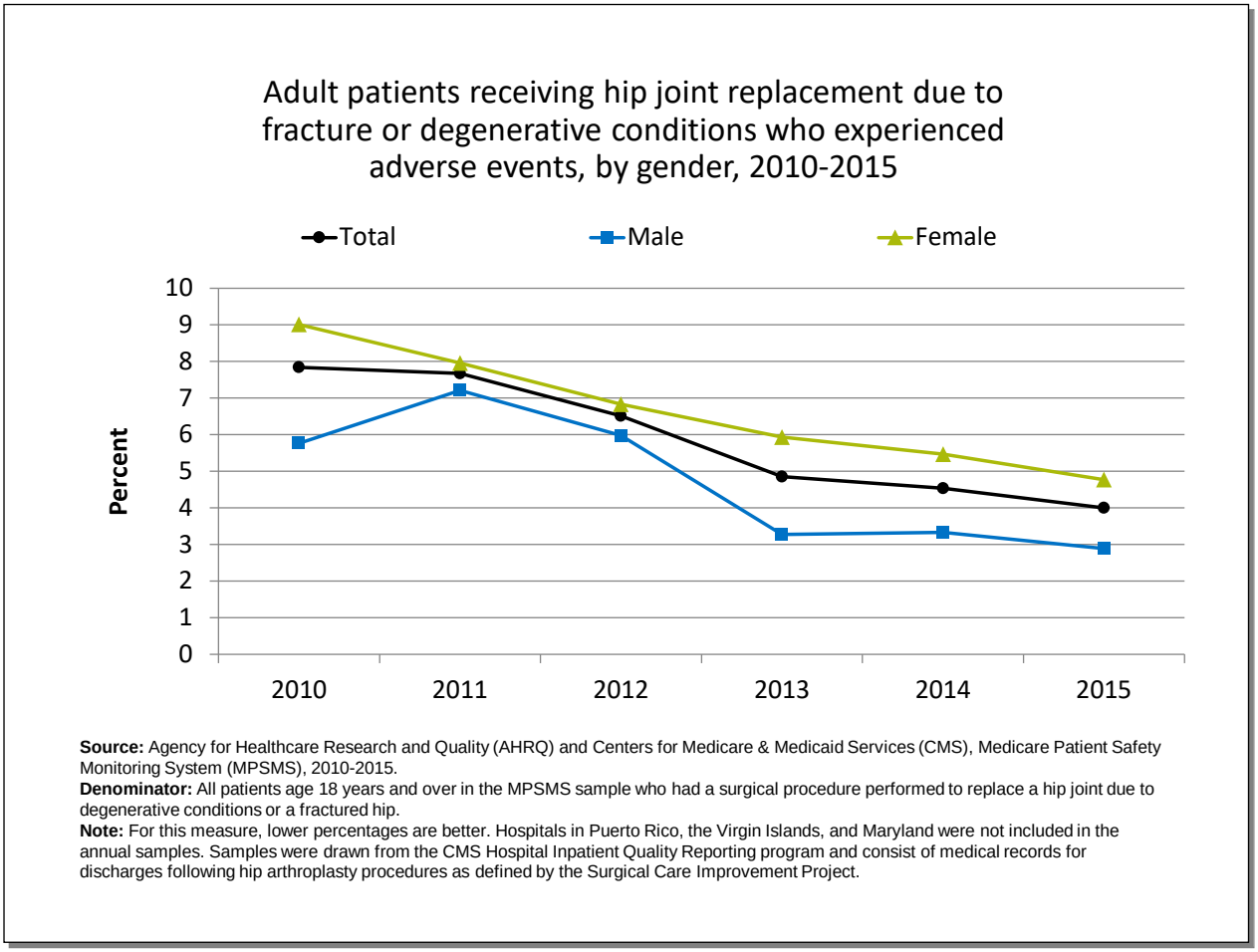


Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS), 2000-2011; disparities analytic file, 2012-2015, derived from the HCUP State Inpatient Databases (SID) and weighted to provide national estimates using the same methodology as the 2000-2011 NIS; and the AHRQ Quality Indicators, version 4.4. Estimates for 2015 were based on 9 months of data (January–September) with International Classification of Diseases, 9th Revision. For more information on the sampling approach, included States, and special handling of 2015 data, see the HCUP Methods Series Report on Methods Applying AHRQ Quality Indicators to HCUP Data (www.hcup-us.ahrq.gov/reports/methods/2018-01.pdf).
Denominator: Vaginal deliveries, identified by diagnosis-related group (DRG) or Medicare Severity-DRG code, with any-listed ICD-9 procedure code for instrument-assisted delivery.
Note: For this measure, lower rates are better. Consistent with the AHRQ Patient Safety Indicators software, obstetric trauma must involve 3rd or 4th degree lacerations of the perineum. Rates are adjusted by age using U.S. hospitalizations for 2010 as the standard population. Missing refers to HCUP nonparticipants or States with data not meeting criteria for statistical reliability, data quality, or confidentiality.

- **Note:** The HCUP disparities analytic files used to generate these data and the preceding two figures are limited to data from States (and hospitals within those States) meeting specific criteria for consistent coding of race/ethnicity. States listed as "missing" on this map include several that did not meet these criteria in 2015. Also, the differences among States have not been assessed for statistical significance.
- **Overall Rate:** In 2015, the national average was 119.3 obstetric trauma events occurring per 1,000 instrument-assisted vaginal deliveries.

- **Differences by State:** The following States in each quartile are listed in alphabetical order:
  - First quartile (best performers): 84.3–108.8 (AR, FL, IN, MD, NC, NM, VT, WV)
  - Second quartile: 108.9–116.9 (CA, GA, KY, SD, TN, MA, NJ, NV)
  - Third quartile: 117.0–140.7 (AZ, CT, IL, MN, ND, NY, OH OK, VA, WY)
  - Fourth quartile (worst performers): 140.8–192.1 (CO, HI, IA, KS, MO, NE, OR, WA, WI)
- In 2015, Vermont had the lowest obstetric trauma rate with 84.3 events per 1,000 instrument-assisted vaginal deliveries. Nebraska had the highest rate at 192.1 events per 1,000 instrument-assisted vaginal deliveries.
- States or Territories with data that are statistically unreliable are AK, DC, DE, LA, ME, PR, RI, SC, and UT.

Hip Joint Replacement With Adverse Events



Source: Agency for Healthcare Research and Quality (AHRQ) and Centers for Medicare & Medicaid Services (CMS), Medicare Patient Safety Monitoring System (MPSMS), 2010-2015.
Denominator: All patients age 18 years and over in the MPSMS sample who had a surgical procedure performed to replace a hip joint due to degenerative conditions or a fractured hip.
Note: For this measure, lower percentages are better. Hospitals in Puerto Rico, the Virgin Islands, and Maryland were not included in the annual samples. Samples were drawn from the CMS Hospital Inpatient Quality Reporting program and consist of medical records for discharges following hip arthroplasty procedures as defined by the Surgical Care Improvement Project.

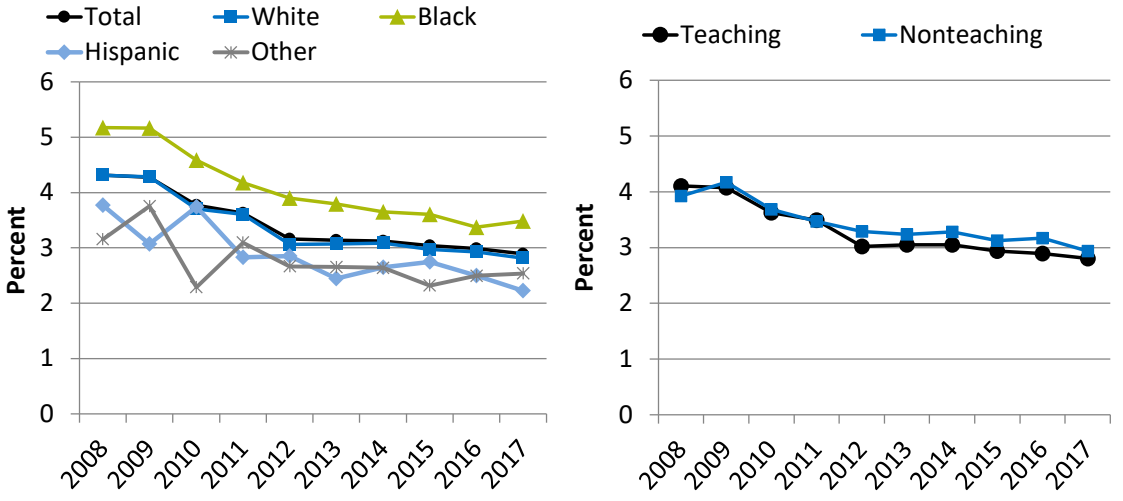
- **Importance:** Hip replacement is most commonly performed in older adults, who have an increased risk of adverse events after these procedures.
- **Overall Percentage:** In 2015, 4.0% of patients receiving a hip joint replacement due to fracture or degenerative conditions experienced adverse events.

- **Trends:**
  - From 2010 to 2015, there was an overall decrease in the frequency of adverse events among patients who had a hip joint replacement due to fracture or degenerative conditions.
  - From 2010 to 2015, the percentage of patients experiencing adverse events decreased for females who had a hip joint replacement due to fracture or degenerative conditions.

- **Groups With Disparities:**
  - In 2015, there were no statistically significant differences by gender in the percentage of hip replacement patients who had adverse events.
  - From 2010 to 2015, there were no statistically significant changes in disparities between male and female patients.

30-Day Mortality for Colorectal Surgery

Risk-adjusted mortality within 30 days postoperation for adults undergoing colorectal surgery in ACS NSQIP-participating hospitals in the United States, by race/ethnicity and hospital teaching status, 2008-2017



Source: American College of Surgeons (ACS), National Surgical Quality Improvement Program (NSQIP), 2008-2017.
Denominator: Adults age 18 years and over.
Note: For this measure, lower percentages are better. Participation in the ACS NSQIP is voluntary and current participation is weighted when calculating rates. Participating hospitals have changed over time; 209 hospitals participated in 2008 and 665 hospitals participated in 2017. Other includes Asian, American Indian or Alaska Native, and Native Hawaiian/Pacific Islander. White, Black, and Other are non-Hispanic. Hispanic includes all races.

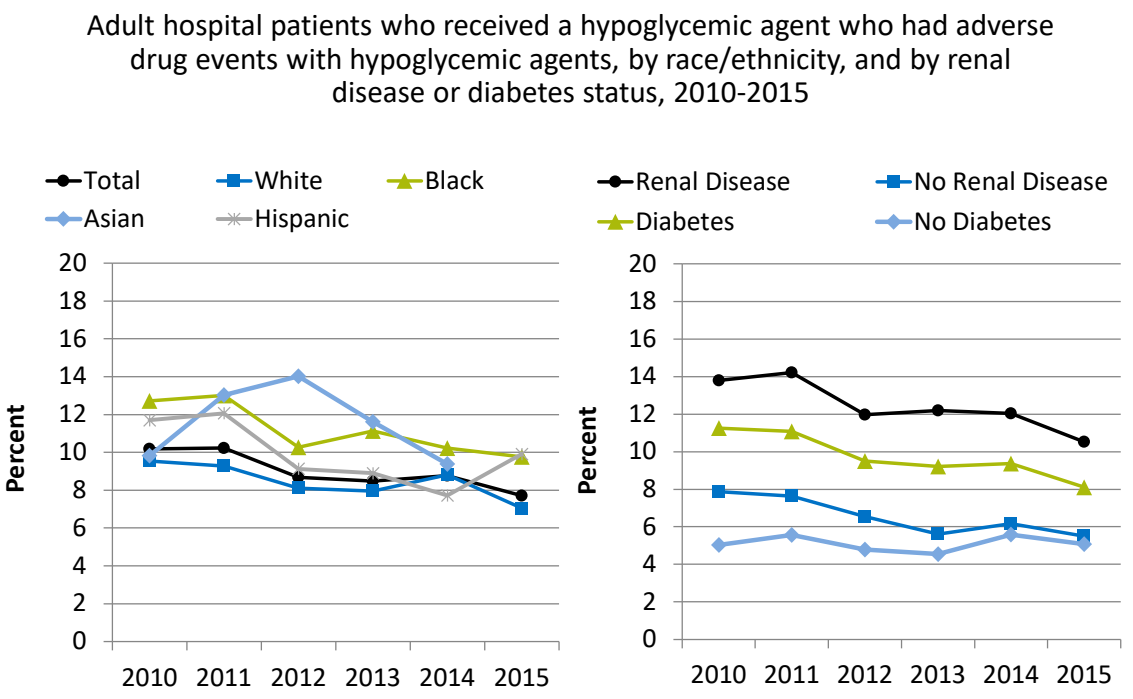
- **Importance:** Colorectal procedures have high rates of postoperative complications. Nonadherence to evidence-based best practices is associated with an increased risk of these complications (Arriaga, et al., 2009).

- **Overall Results:** In 2017, the risk-adjusted mortality was 2.9% among patients undergoing colorectal surgery at ACS NSQIP-participating hospitals.
- **Trends:** From 2008 to 2017, 30-day postoperative mortality after colorectal surgery improved overall and for White patients and Black patients.
- **Disparities:**
  - In 2017, 30-day postoperative mortality after colorectal surgery with was worse for Blacks (3.5%) compared with Whites (2.8%). For Hispanics, 30-day postoperative mortality was lower than for Whites (2.2%). Mortality for Asians, American Indians or Alaska Natives, and Native Hawaiian/Pacific Islanders was combined (2.5%).
  - Mortality in nonteaching hospitals (2.9%) was similar to that seen in teaching hospitals (2.8%).

Adverse Drug Events

- An adverse drug event (ADE) is an injury—including physical harm, mental harm, or loss of function—resulting from medical intervention involving a drug.
- An estimated 400,000 preventable ADEs occur each year in U.S hospitals, generating additional costs of $3.5 billion (IOM, 2007).
- The three initial targets of the HHS National Action Plan for Adverse Drug Event Prevention are:
  - Bleeding related to use of anticoagulants.
  - Hypoglycemia related to use of diabetic medications.
  - Accidental overdose, oversedation, and respiratory depression related to use of opioids.
- For more information, go to the Patient Safety Primer: Medication Errors and Adverse Drug Events at https://psnet.ahrq.gov/primers/primer/23/medication-errors.
- Measures include:
  - Percentage of hospitalized adult patients who received a hypoglycemic agent and had an adverse drug event.
  - Percentage of hospitalized adult patients who had an adverse drug event related to warfarin use.

Adverse Events With Hypoglycemic Agents

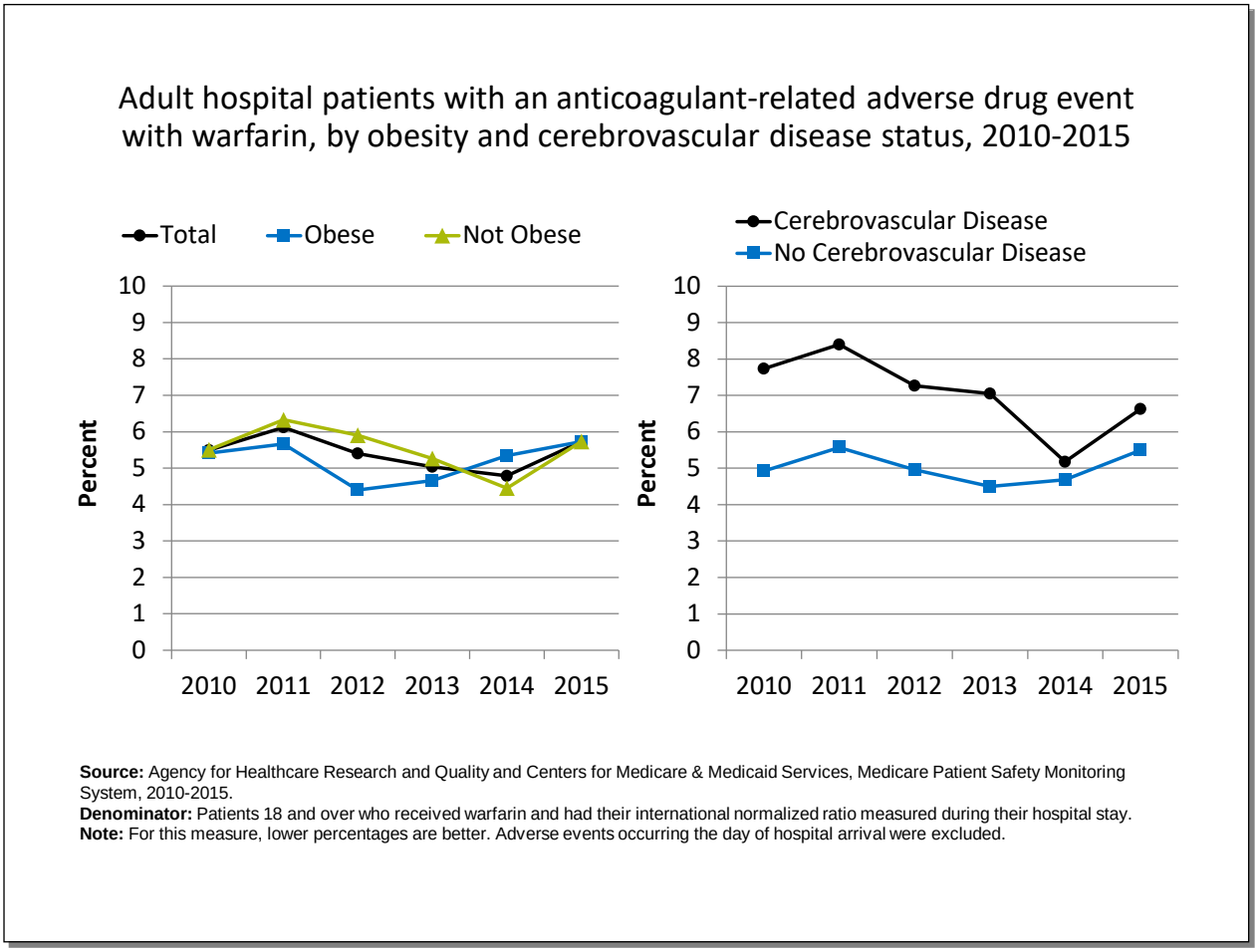


Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System, 2010-2015.
Note: For this measure, lower percentages are better. Hypoglycemic agents received by patients age 18 and over during a hospital stay include insulin, oral hypoglycemic agents, or both. White, Black, and Asian are non-Hispanic. Hispanic includes all races. Data for Asian populations in 2015 are not shown here due to a small sample size.

- **Importance:** Hypoglycemic agents ingested by mouth are typically used in patients with type 2 diabetes to control blood sugar levels. In some cases, diabetic patients use hypoglycemic agents together with insulin. The risk of chronic kidney disease increases for people with diabetes, and renal impairment can increase the risk of adverse events related to hypoglycemic agents.
- **Overall Percentage:** In 2015, 7.7% of hospital patients receiving hypoglycemic agents had an adverse drug event.
- **Trends:**
  - The overall percentage of adverse drug events associated with hypoglycemic agents fell from 2010 to 2015.
  - From 2010 to 2015, the percentage of adverse drug events associated with hypoglycemic agents fell for patients with diabetes and for those with and without renal disease.
  - From 2010 to 2015, the percentage of patients experiencing an adverse drug event with hypoglycemic agents fell for Whites and Blacks.

- **Groups With Disparities:**
  - In 2015, the percentage of hospital patients who had adverse drug events with hypoglycemic agents was higher for those with renal disease (10.5%) than for those without renal disease (5.5%).
  - Also in 2015, the percentage of hospital patients who had adverse drug events with hypoglycemic agents was higher for those with diabetes (8.1%) than for those without diabetes (5.1%).

Adverse Drug Events With Warfarin



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System, 2010-2015.
Denominator: Patients 18 and over who received warfarin and had their international normalized ratio measured during their hospital stay.
Note: For this measure, lower percentages are better. Adverse events occurring the day of hospital arrival were excluded.

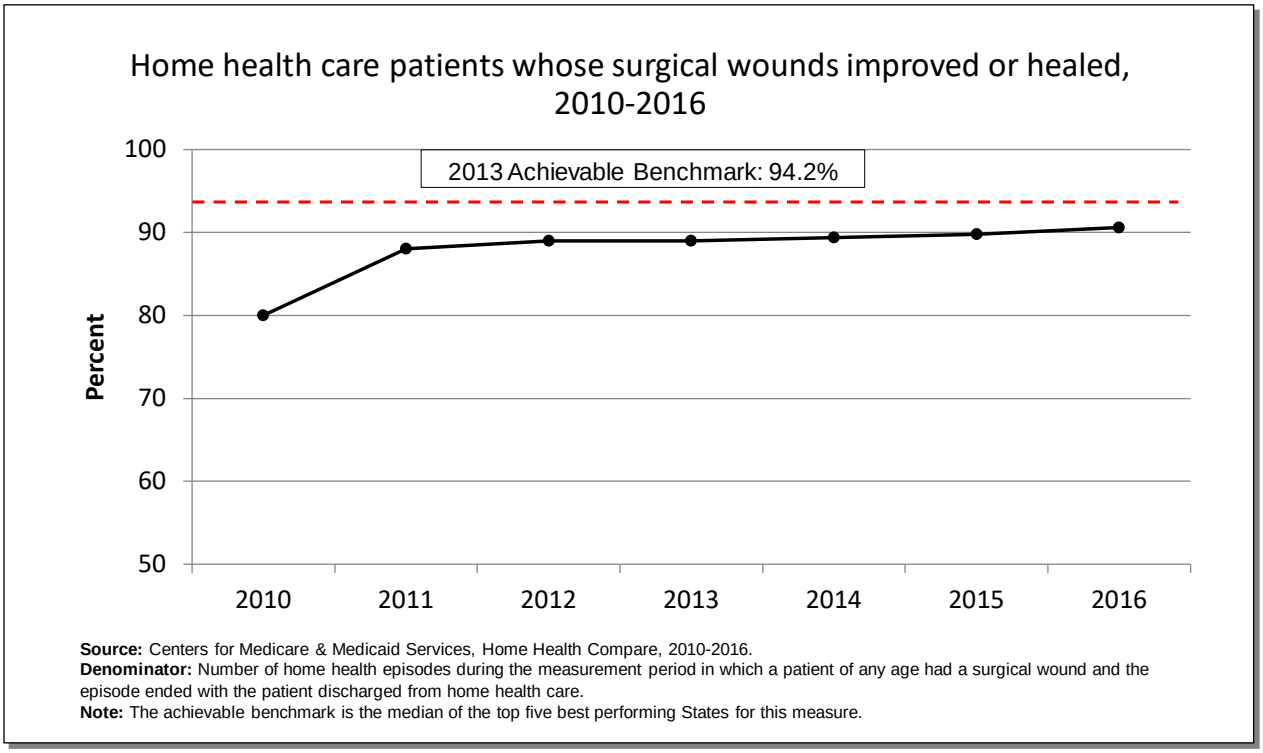
- **Importance:** Blood clots in arteries and veins can cause a blockage of blood flow and lead to strokes and heart attacks. Survivors of stroke have an increased risk of another stroke, and individuals who are obese are at higher risk of blood clots. Anticoagulants, such as warfarin, reduce this risk but pose an increased risk of bleeding.
- **Overall Percentage:** In 2015, 5.7% of adult hospital patients using warfarin experienced an anticoagulant-related adverse drug event.
- **Trends:** From 2010 to 2015, there was no statistically significant change overall in the percentage of hospital patients with an adverse drug event related to warfarin.

- **Groups With Disparities:**
  - In 2015, there were no statistically significant differences by obesity status or cerebrovascular disease status in the percentage of hospital patients who had an adverse drug event related to warfarin.
  - Over the entire 2010-2015 timeframe, there was no statistically significant change in the gap between obese patients and patients who were not obese in the percentage of patients who had a drug event related to warfarin. Similarly, there were no statistically significant changes in the gap between those with cerebrovascular disease and those without cerebrovascular disease.

Patient Safety in the Home Health Setting

- Home health agencies provide services to beneficiaries who are homebound and need skilled nursing care or therapy.
- Approximately 12 million individuals receive home health care from more than 33,000 providers for causes including acute illness, long-term health conditions, permanent disability, or terminal illness (NAHCH, 2010).
- Improvements among home health patients can reflect the quality of care from home health agencies.
- Measures include:
  - Home health care patients whose surgical wounds improved or healed, 2010-2016.
  - Home health care patients who got better at taking their drugs correctly by mouth, 2010-2016, and relative change by State, 2010-2016

Surgical Wound Improvement

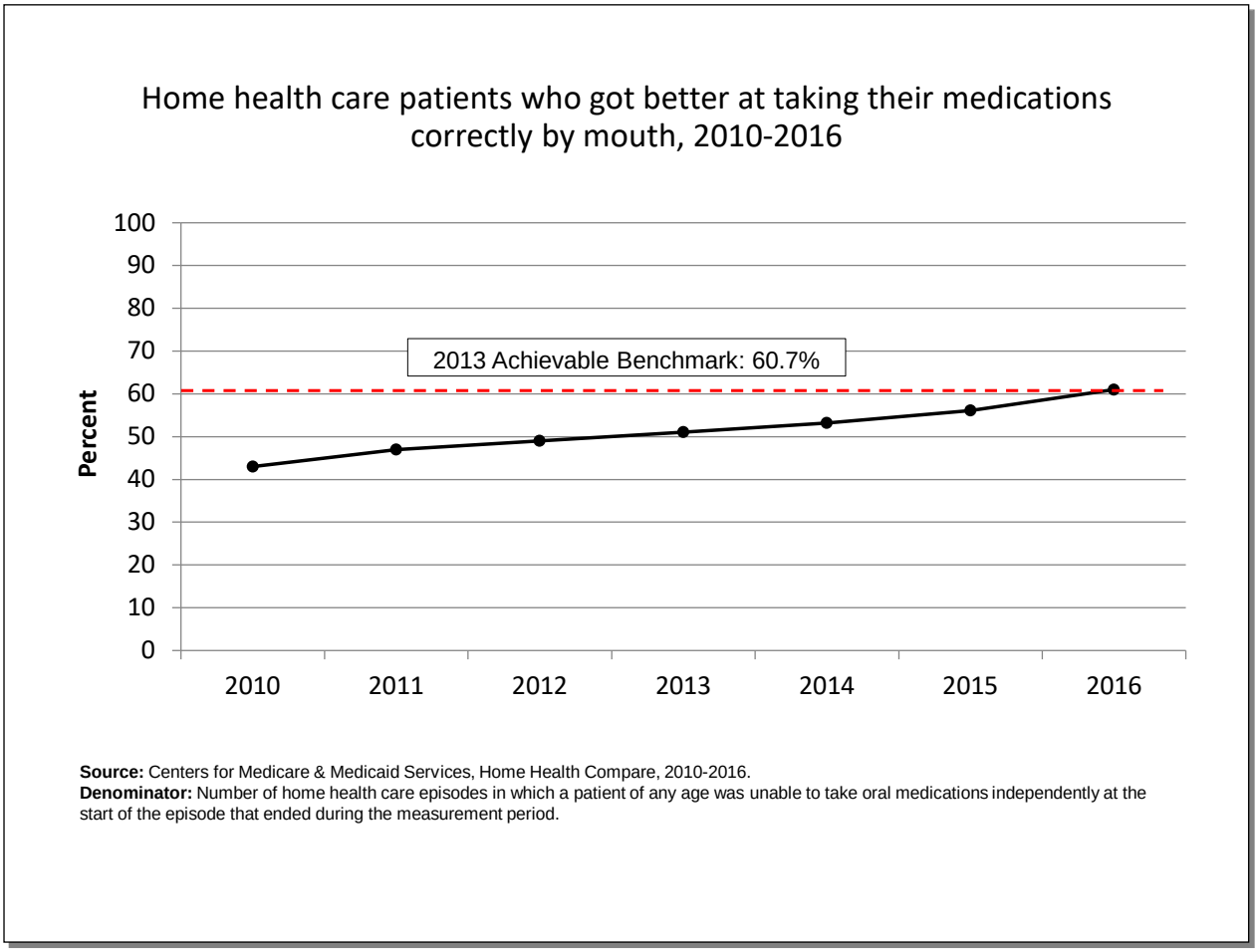


Source: Centers for Medicare & Medicaid Services, Home Health Compare, 2010-2016.
Denominator: Number of home health episodes during the measurement period in which a patient of any age had a surgical wound and the episode ended with the patient discharged from home health care.
Note: The achievable benchmark is the median of the top five best performing States for this measure.

- **Importance:** Normal wound healing after an operation is an important marker of good care. The home health team should regularly change wound dressing and teach the patient about wound care.
- **Overall Percentage:** In 2016, the percentage of home health patients with improvement in their surgical wounds was 90.6%.
- **Achievable Benchmark:**

  - The 2013 top 5 State achievable benchmark for improvement in surgical wounds was 94.2%. The States and State-equivalent jurisdictions that contributed to this benchmark are Idaho, Massachusetts, Mississippi, Puerto Rico, and South Carolina.

Improvement in Taking Medication Correctly

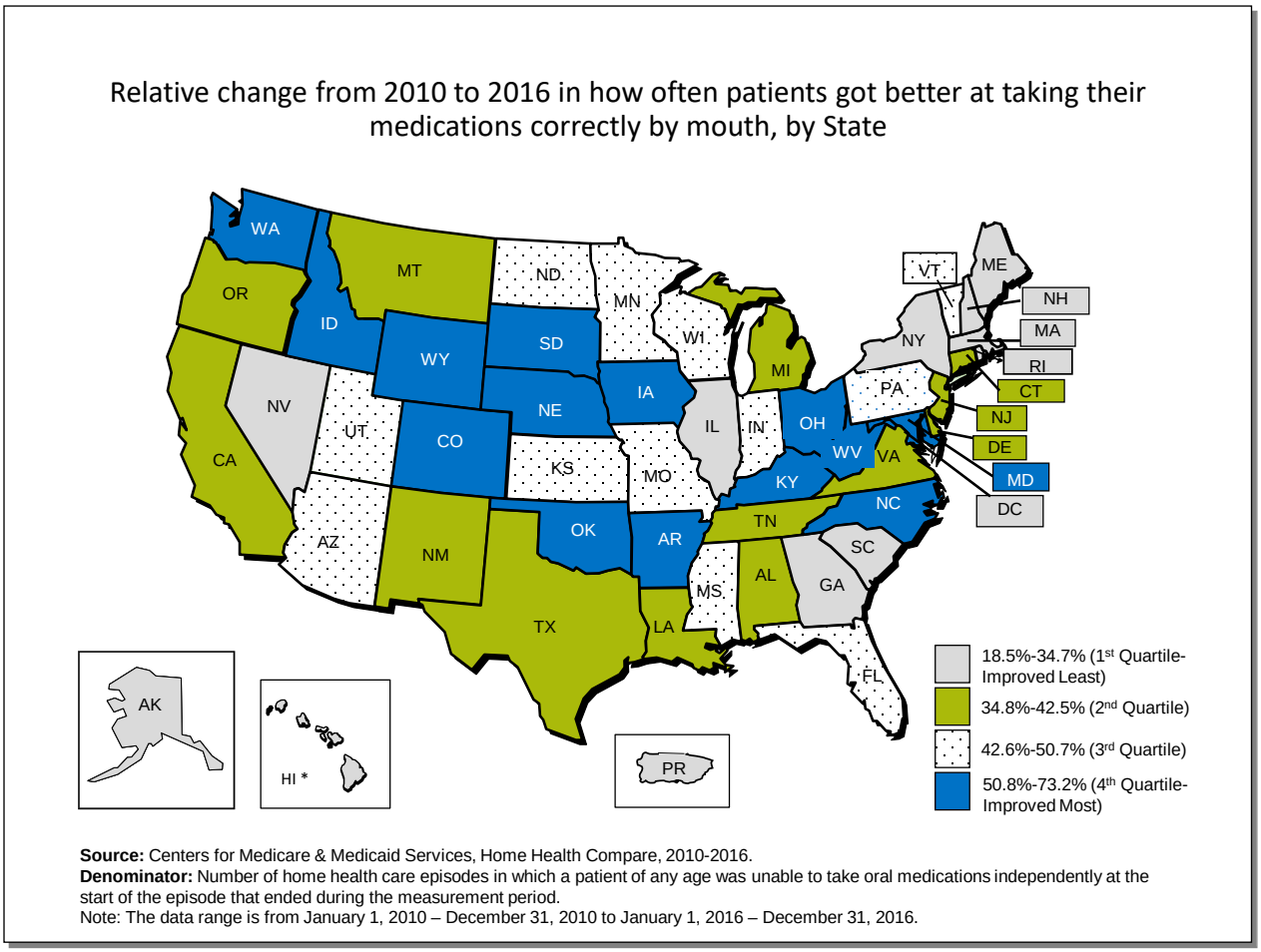


Source: Centers for Medicare & Medicaid Services, Home Health Compare, 2010-2016.
Denominator: Number of home health care episodes in which a patient of any age was unable to take oral medications independently at the start of the episode that ended during the measurement period.

- **Importance:** Taking medications correctly is important to the health status and quality of life of individuals living in the community. The home health team can help teach a patient ways to organize drugs and take them properly.
- **Overall Percentages:** In 2016, the percentage of home health patients with improvement in their ability to take medications by mouth was 61.0%, showing that the national benchmark was met.

- **Achievable Benchmark:**
  - In 2013, the achievable benchmark for improvement in taking drugs correctly by mouth was 60.7%. The States that contributed to the achievable benchmark are Iowa, Massachusetts, New Jersey, North Dakota, and South Carolina.
  - In 2016, the States that met the benchmark included Nevada, North Carolina, and Idaho, with the highest percentage of 73.2%.

Relative Change in Taking Medication Correctly, by State



Source: Centers for Medicare & Medicaid Services, Home Health Compare, 2010-2016.
Denominator: Number of home health care episodes in which a patient of any age was unable to take oral medications independently at the start of the episode that ended during the measurement period.
Note: The data range is from January 1, 2010 – December 31, 2010 to January 1, 2016 – December 31, 2016.

- **Overall:** This map shows overall trends from 2010 to 2016 across 52 State-equivalent jurisdictions in relative increases in the percentage of home health patients with improvement in their ability to take medications by mouth. Increasing rates of change are preferable, although a State that performed well in 2010 would have less room for improvement. From 2010 to 2016, the median relative rate of change across States was 43.2%. The differences among States have not been assessed for statistical significance.

- **Differences by State:** The following States in each quartile are listed in alphabetical order:

  - First quartile (worst performer): 18.5%-34.7% (AK, DC, GA, HI, IL, MA, ME, NH, NV, NY, PR, RI, SC)
  - Second quartile: 34.8%-42.5% (AL, CA, CT, DE, LA, MI, MT, NJ, NM, OR, TN, TX, VA)
  - Third quartile: 42.6%-50.7% (AZ, FL, IN, KS, MN, MO, MS, ND, PA, UT, VT, WI)
  - Fourth quartile (best performer): 50.8%-73.2% (AR, CO, IA, ID, KY, MD, NC, NE, OH, OK, SD, WA, WV, WY)

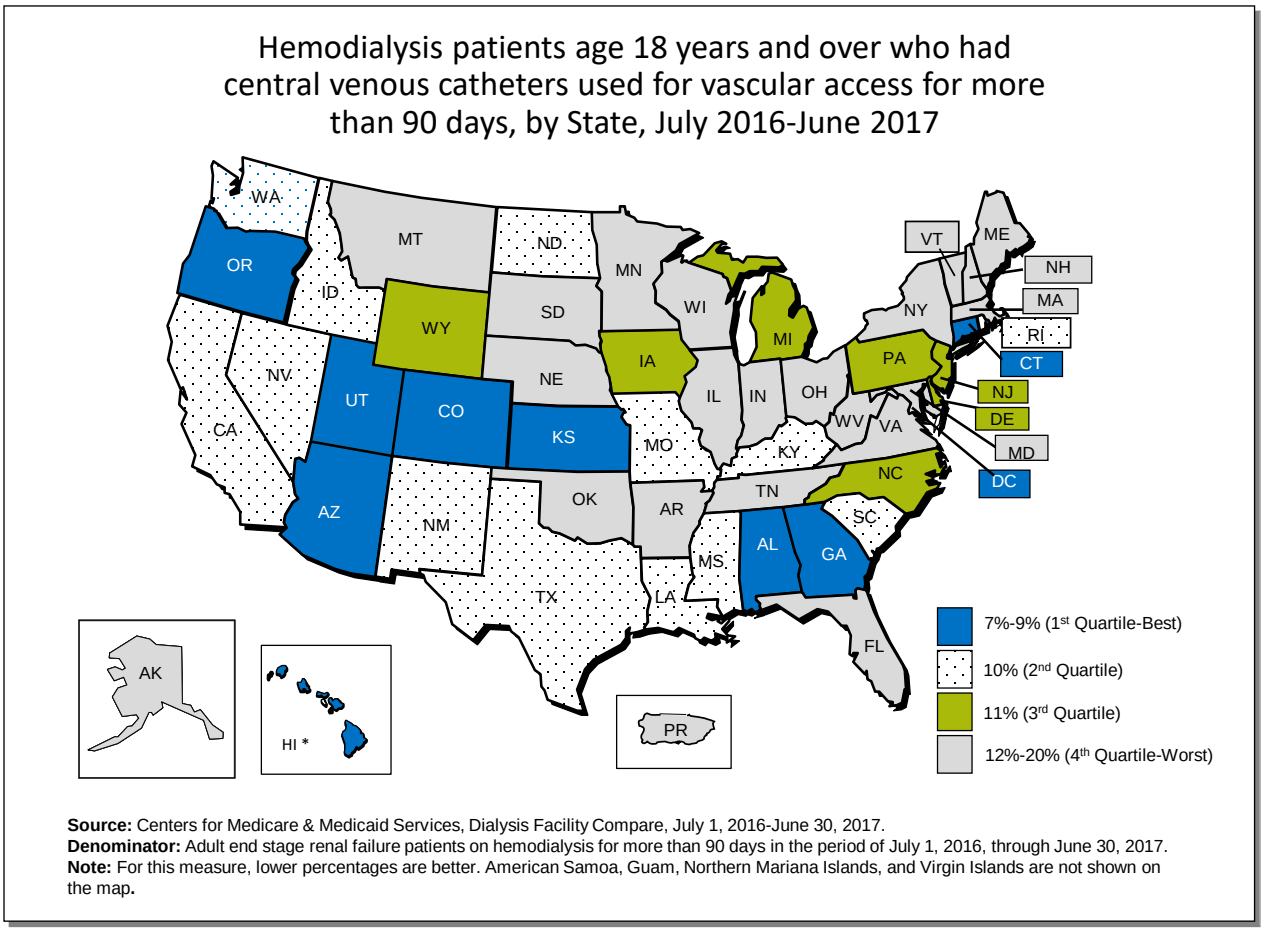
- The change from 2010 to 2016 in the percentage of home health patients with improvement in their ability to take medications by mouth was lowest for patients in the District of Columbia where a rise from 61.0% in 2010 to 72.3% in 2016 represents a relative increase of 18.5%. Improvement was greatest for Idaho, where a change from 37.0% in 2010 to 64.1% in 2016 represents a relative increase of 73.2%.

Patient Safety in the Ambulatory Setting

- Although patient safety initiatives frequently focus on inpatient hospital events, adverse effects of medical care may be identified and treated in outpatient settings.
- Adverse effects of medical care can follow ambulatory care or procedures provided in hospitals, emergency departments, physician offices, or other settings.
- For more information, go to the Patient Safety Primer: Ambulatory Care Safety at https://psnet.ahrq.gov/primers/primer/16/patient-safety-in-ambulatory-care.
- Measures include:

  - Percentage of hemodialysis patients with vascular catheter in use for 90 days or longer.
  - Adults age 65 years and over who received potentially inappropriate prescription medications during the calendar year.

Long-Term Use of Central Venous Catheters for Dialysis

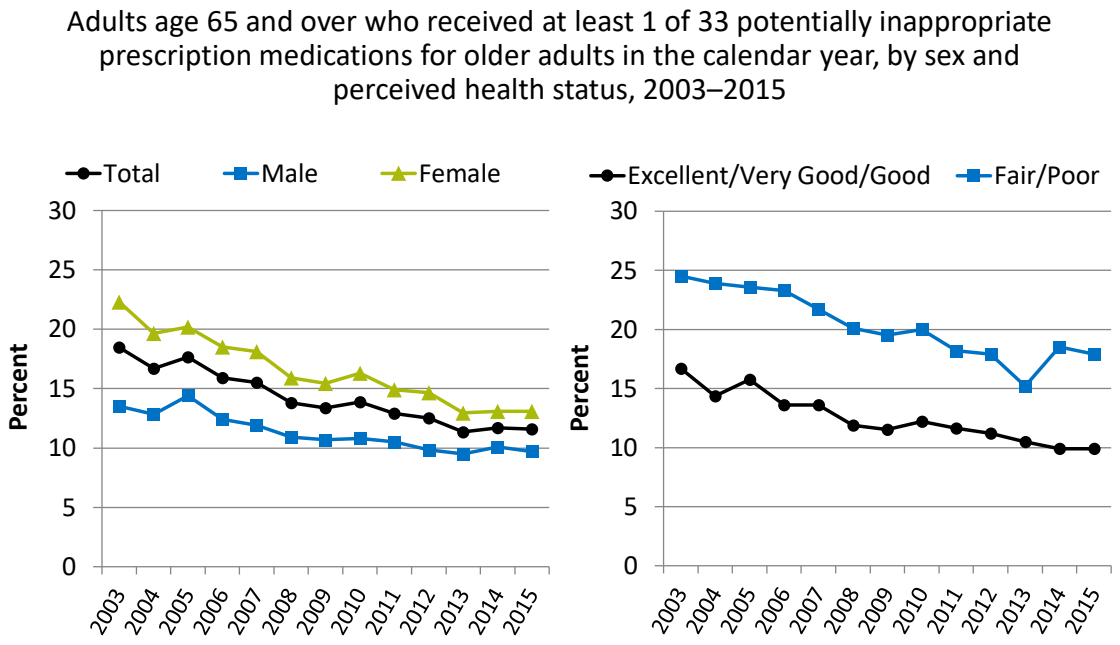


Source: Centers for Medicare & Medicaid Services, Dialysis Facility Compare, July 1, 2016-June 30, 2017.
Denominator: Adult end stage renal failure patients on hemodialysis for more than 90 days in the period of July 1, 2016, through June 30, 2017.
Note: For this measure, lower percentages are better. American Samoa, Guam, Northern Mariana Islands, and Virgin Islands are not shown on the map.

- **Importance:** In hemodialysis patients, central venous catheters (CVCs) are frequently used for vascular access until a fistula or graft is ready for use. Compared with other forms of vascular access for hemodialysis, CVC use is associated with higher rates of infection and other adverse events (Pisoni, et. al., 2015). To decrease the likelihood of adverse events, CVCs should be used for 90 days or less. The differences among states have not been assessed for statistical significance.
- **Overall Percentage:** Nationally, among adult end stage renal disease patients on any form of hemodialysis for 90 or more days during the observation period of July 1, 2016 through June 30, 2017, an average of 10% used CVCs for more than 90 days.
- **Differences by State:** Percentages for State-equivalent jurisdictions and U.S. territories were provided as whole numbers (with multiple tied values). Therefore, the quartiles have varying numbers of States, and ranges are approximate. The states and territories are listed in alphabetical order:

  - First quartile (best performers): 7%-9% (AL, AZ, CO, CT, DC, DE, GA, HI, KS, OR, UT)
  - Second quartile: 10% (CA, ID, KY, LA, MO, MS, ND, NM, NV, RI, SC, TX, WA)
  - Third quartile: 11% (IA, MI, NC, NJ, PA, WY)
  - Fourth quartile (worst performers): 12%-20% (AK, AR, FL, IL, IN, MA, MD, ME, MN, MT, NE, NH, NY, OH, OK, PR, SD, TN, VA, VT, WI, WV)

Receipt of Inappropriate Medications by Older Adults



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2003-2015.
Note: For this measure, lower percentages are better. Prescription medications received include all prescribed medications initially purchased or otherwise obtained as well as any refills. For more information on inappropriate medications, see the American Geriatrics Society 2012 Beers Criteria Update Expert Panel: American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. J Am Geriatr Soc 2012 Apr;60(4):616-31. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3571677/.

- **Importance:** Some drugs that are prescribed for older patients are known to be potentially harmful for this age group.
- **Overall Percentage:** In 2015, the percentage of adults age 65 years and over who received potentially inappropriate prescription medications was 11.6%.
- **Trends:** From 2003 to 2015, the percentage of adults age 65 years and over who received potentially inappropriate prescription medications improved overall, for both sexes, and for people with excellent/very good/good health status and people with fair/poor health status.
- **Groups With Disparities:**
  - In all years, the percentage of patients receiving potentially inappropriate medications was higher among females than males. This gap has not narrowed significantly over time.
  - In all years from 2003 to 2015, the percentage of patients receiving potentially inappropriate medications was higher among people with fair/poor health status compared with people with excellent/good health status.

AHRQ-Supported Tools for Improving Medication Safety in the Ambulatory Setting

- Purpose: To help primary care offices partner with patients and families to reduce medical errors related to medications.
- Methods: Implement "Create a Safe Medication List Together" (part of the Guide to Improving Patient Safety in Primary Care Settings by Engaging Patients and Families).
- Intended users: Primary care office managers and providers.
- Available tools: Quick start guide, checklists, patient reminder cards.
- Link: https://www.ahrq.gov/professionals/quality-patient-safety/patient-family-engagement/pfeprimarycare/medlist.html
- This intervention can help improve the following measures:
  - Adults age 65 years and over who received potentially inappropriate prescription medications during the calendar year
  - Medical Office Survey on Patient Safety Culture: question—Medication List Not Updated Since Last Visit

AHRQ-Supported Tools for Improving the Reliability of Office Lab Testing

- Purpose: To help primary care offices examine how they manage tests, from the moment they order tests until they give the patient the results and determine appropriate followup.
- Methods: Implement Improving Your Laboratory Testing Process: A Step-by-Step Guide for Rapid Cycle Patient Safety and Quality Improvement.
- Intended users: Primary care office staff and providers.
- Available tools: Surveys to assess an office's testing process, readiness to do the work, and patient experience, chart review checklist, and process mapping tool.
- Link: https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/ambulatory-care/labtesting-toolkit.html
- This intervention can help improve the following measure:
  - Medical Office Survey on Patient Safety Culture: question—Results From Lab or Imaging Test Are Not Available When Needed

Patient Safety Infrastructure: All Settings

- Patient safety infrastructure varies by State and healthcare facility.
- Patient safety and quality issues in hospitals relative to safety culture are described in data from the Hospital and Medical Office Surveys on Patient Safety culture.
- AHRQ also regulates the Patient Safety Organizations program.

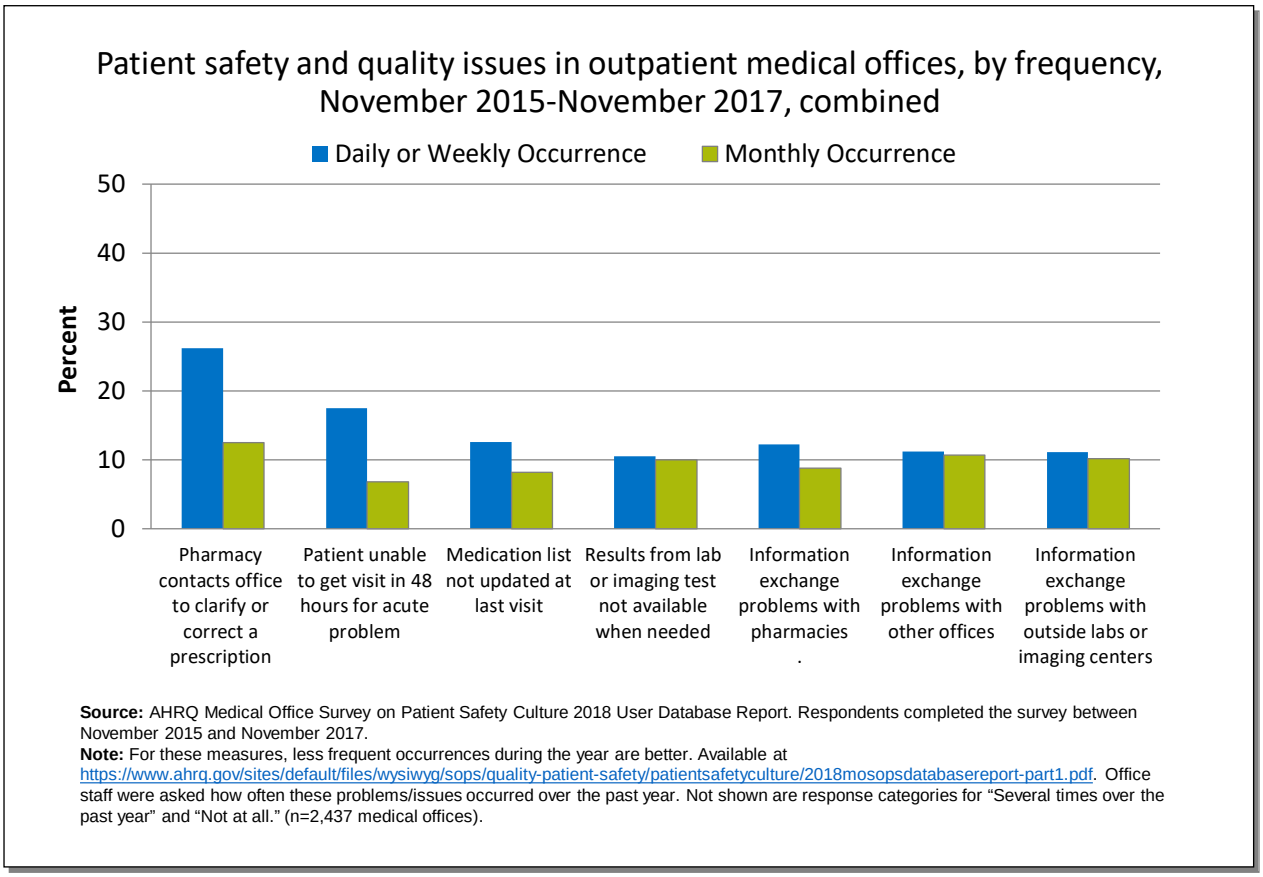
Medical Office Survey on Patient Safety Culture

- The AHRQ Medical Office Survey on Patient Safety Culture™ (SOPS™) database reviews patient safety and quality issues in outpatient medical offices, relative to safety culture.
- This voluntary database is composed of U.S. healthcare organizations that voluntarily submitted data.

- The survey can be used to:
  - Raise staff awareness about patient safety.
  - Diagnose and assess the current status of patient safety culture.
  - Identify strengths and areas for patient safety culture improvement.
  - Examine trends in patient safety culture change over time.
  - Evaluate the cultural impact of patient safety initiatives and interventions.
  - Conduct internal and external comparisons.

- More information is available at https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/index.html.
- A call for data submission goes out every 2 years, but organizations set their own schedules for administering the survey. Not all organizations administer the survey or submit their data every 2 years. Thus, the number of organizations in the database varies over time.

Medical Office Survey Results, by Frequency

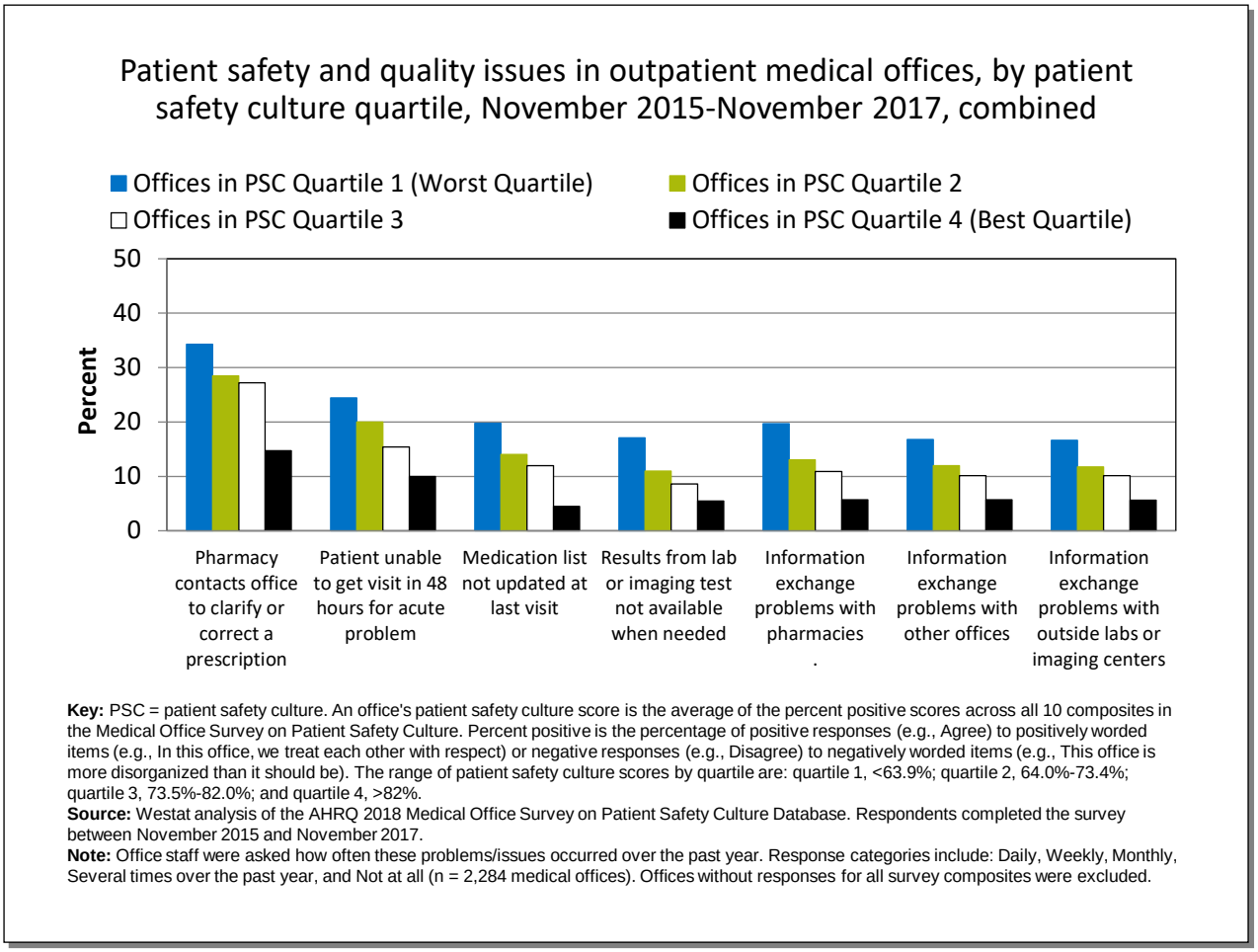


Source: AHRQ Medical Office Survey on Patient Safety Culture 2018 User Database Report. Respondents completed the survey between November 2015 and November 2017.
Note: For these measures, less frequent occurrences during the year are better. Available at https://www.ahrq.gov/sites/default/files/wysiwyg/sops/quality-patient-safety/patientsafetyculture/2018mosopsdatabasereport-part1.pdf. Office staff were asked how often these problems/issues occurred over the past year. Not shown are response categories for "Several times over the past year" and "Not at all." (n=2,437 medical offices).

- **Importance:** Most healthcare takes place in the outpatient, or ambulatory care, setting. Lack of access to care and lack of access to timely and accurate medical information and test results may contribute to patient safety events such as missed or delayed diagnoses, medication errors, failure to order appropriate diagnostic or laboratory tests, incorrect interpretation of tests, and inadequate followup on results.

- **Overall Percentage:**
  - In the November 2015-November 2017 timeframe, on average 26% of medical offices participating in the database reported daily or weekly occurrences of being contacted by the pharmacist for clarification or correction on a prescription.
  - In the November 2015-November 2017 timeframe, on average 18% of medical offices participating in the database reported daily or weekly occurrences of patients being unable to get an appointment within 48 hours for an acute or serious problem, 13% reported the patient's medication list not getting updated during their visit, and 12% reported an information exchange problem with pharmacies.

Medical Office Survey Results, by Quartile



Key: PSC = patient safety culture. An office's patient safety culture score is the average of the percent positive scores across all 10 composites in the Medical Office Survey on Patient Safety Culture. Percent positive is the percentage of positive responses (e.g., Agree) to positively worded items (e.g., In this office, we treat each other with respect) or negative responses (e.g., Disagree) to negatively worded items (e.g., This office is more disorganized than it should be). The range of patient safety culture scores by quartile are: quartile 1, <63.9%; quartile 2, 64.0%-73.4%; quartile 3, 73.5%-82.0%; and quartile 4, >82%.
Source: Westat analysis of the AHRQ 2018 Medical Office Survey on Patient Safety Culture Database. Respondents completed the survey between November 2015 and November 2017.
Note: Office staff were asked how often these problems/issues occurred over the past year. Response categories include: Daily, Weekly, Monthly, Several times over the past year, and Not at all (n = 2,284 medical offices). Offices without responses for all survey composites were excluded.

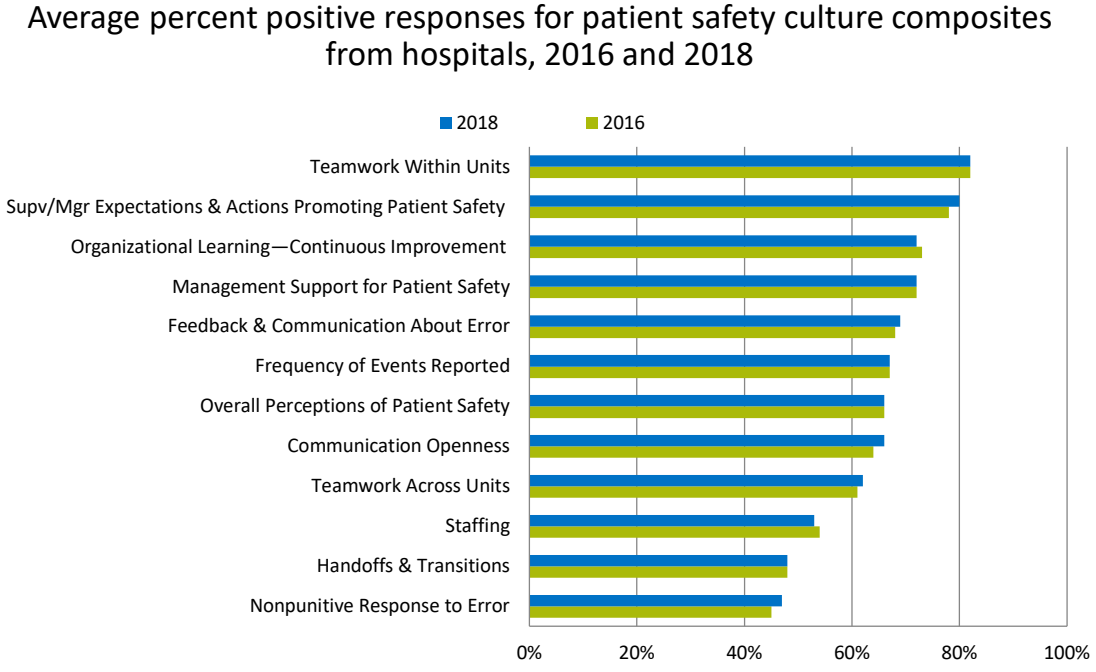
- **Importance**: As medical offices aim to improve their performance, there is growing recognition of the importance of establishing a culture of patient safety.
- **Overall Percentage:**
  - Patient safety and quality issues were less likely to be reported as occurring on a daily or weekly basis among respondents in medical offices with higher patient safety culture scores (PSC quartile 4) compared with medical offices with lower patient safety culture scores (PSC quartile 1).

- The difference in frequency of reporting daily or weekly issues by medical offices with the lowest patient safety culture scores compared with offices with the highest scores was about fourfold for medication lists not being updated; threefold for information exchange problems with pharmacies, lab and imaging test results not being available, and information exchange problems with other offices; and twofold or more for the other issues.

Hospital Survey on Patient Safety Culture

- The 2018 AHRQ Hospital Survey on Patient Safety Culture Database reviews patient safety and quality issues in hospitals, relative to safety culture.
- Similar to the Medical Office SOPS, the Hospital SOPS also provides a review of patient safety culture changes over time and number of events reported by selected staff positions.
- More information is available at https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/index.html.

Hospital Survey on Patient Safety Culture Results



Source: AHRQ 2018 Hospital Survey on Patient Safety Culture Database Report, 2016 (https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/patientsafetyculture/hospital/2016/2016_hospitalsops_report_pt1.pdf) and 2018 (https://www.ahrq.gov/sites/default/files/wysiwyg/sops/quality-patient-safety/patientsafetyculture/2018hospitalsopsreport.pdf).
Note: Hospital staff voluntarily assessed the culture of safety in their facilities. Percent positive is the percentage of positive responses (e.g., Agree) to positively worded items (e.g., People support one another in this unit) or negative responses (e.g., Disagree) to negatively worded items (e.g., We have problems in this unit).

- **Change Over Time:**
  - Five of 12 composites of questions about patient safety culture demonstrated a slightly higher percentage of positive responses from hospital respondents in 2018 compared with 2016.

- Two of 12 composites of questions about patient safety culture had a slightly lower percentage of positive responses from hospital respondents in 2018 compared with 2016.
- Five composites (Teamwork Within Units, Management Support for Patient Safety, Frequency of Events Reported, Overall Perceptions of Patient Safety, and Handoffs & Transitions) had similar percent positive responses in the 2 years.

- **Areas of Strength and Weakness:**

  - Teamwork Within Units and Supervisor/Manager Expectations & Actions Promoting Patient Safety had the highest percent positive responses.
  - Handoffs and Transitions and Nonpunitive Response to Error had the lowest percent positive responses.

Patient Safety Organization Program

- The PSO Program was created by the Patient Safety and Quality Improvement Act of 2005 and implemented by the Agency for Healthcare Research and Quality:

  - PSOs engage with healthcare providers in patient safety and healthcare quality improvement activities.

- PSOs help providers:

  - Assess patient safety culture.
  - Maintain and promote privacy and confidentiality.
  - Offer collaborative initiatives, education, and training to improve patient safety culture.

- Working with a Patient Safety Organization gives providers many benefits, which are evidenced by stories from the field showing improved safety. When a provider works with a PSO, many of the following long-recognized impediments to successful improvement projects can be overcome:

  - ***Provider fear of increased liability from participating in quality initiatives:*** The law provides confidentiality protections and privilege protections (inability to introduce the protected information in a legal proceeding), when certain requirements are met.
  - ***Inability of all licensed or certified healthcare facilities and clinicians to participate:*** Unlike State protections that often target hospitals or physicians, these protections are broad.
  - ***Lack of nationwide and uniform protections:*** These protections are especially valuable for systems with facilities in multiple States; a corporate system can share its protected data systemwide with all of its affiliated providers, if it chooses to do so.
  - ***Insufficient volume:*** Patient safety events are often too rare for a facility to identify causal factors with certainty. Each provider benefits from the insights that it can obtain from a PSO that aggregates large volumes of event data from multiple providers. Moreover, their data remains protected even when the PSO is aggregating it with data from other providers.

- ***Inability to protect deliberations or analyses at a facility:*** The law permits providers to undertake deliberations and analyses at their facilities that become protected as Patient Safety Work Product immediately as long as they are conducted in the provider's Patient Safety Evaluation System.

- The Patient Safety and Quality Improvement Act of 2005 may be accessed here: https://pso.ahrq.gov/legislation.
- More information on how to become a Patient Safety Organization is available here: https://pso.ahrq.gov/become_PSO.

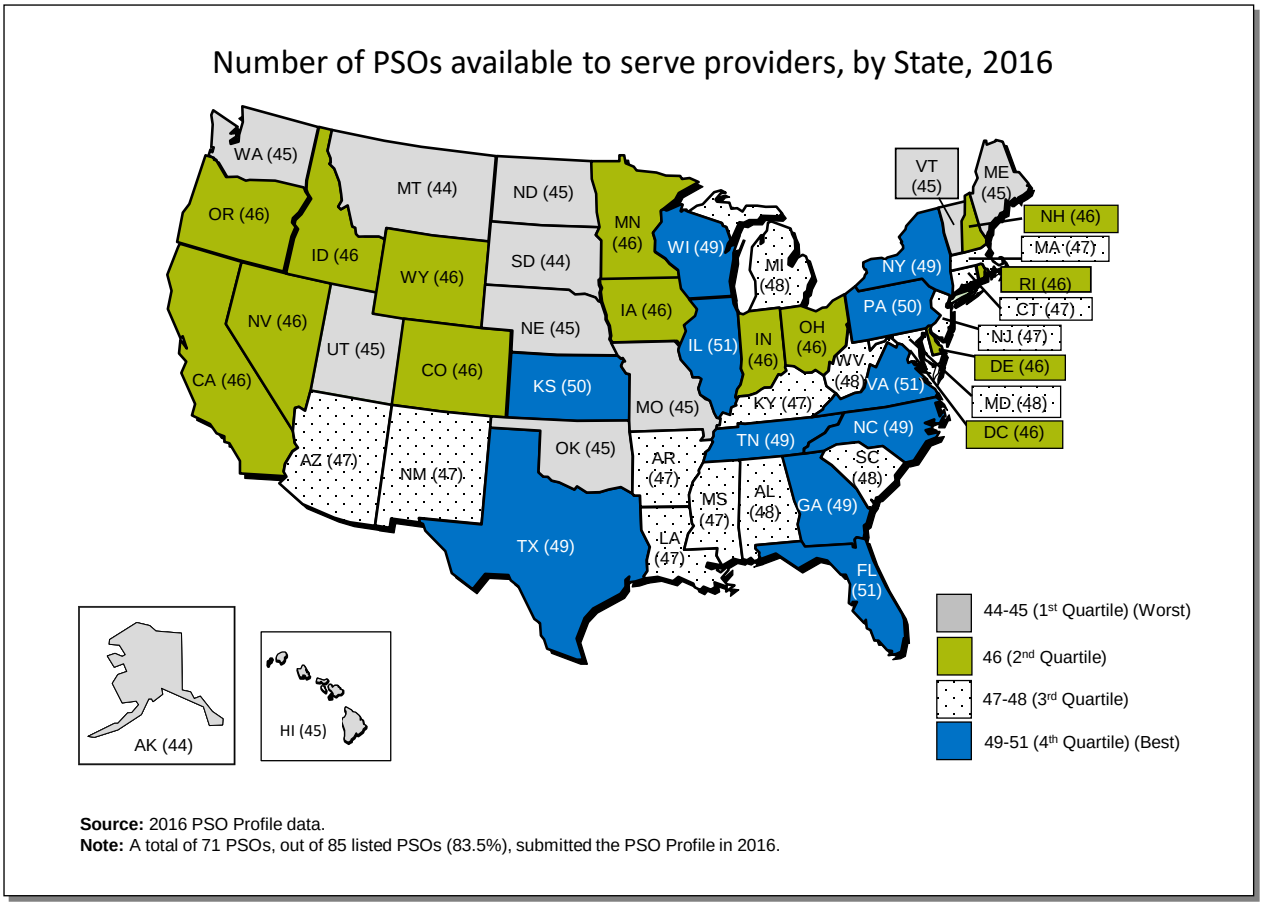
PSO Profile and Provider Profile

- The PSO and Provider Profile is an Annual collection of information self-reported about the characteristics of AHRQ-listed PSOs and the providers with which they have bona fide contracts
- The following Information was derived from the PSO Profile and Provider Profile:

  - Number of PSOs available to serve providers, by State, 2016
  - Number of PSOs by clinical specialty, 2013 and 2016
  - Number of PSOs by type of business, 2013 and 2016
  - PSOs by legal entity and component status, 2013 through 2016
  - Number of PSO-contracted provider types, 2013 through 2016
  - Distribution of general (acute care) hospitals, by bed size, working with PSOs and in the United States, 2013 and 2016

- The importance of a PSO profile is to help the PSO program understand the characteristics and reach of each PSO.
- More information on the PSO Profile and the latest profile form is available at https://www.psoppc.org/psoppc_web/publicpages/dataSubmission.

Available PSOs



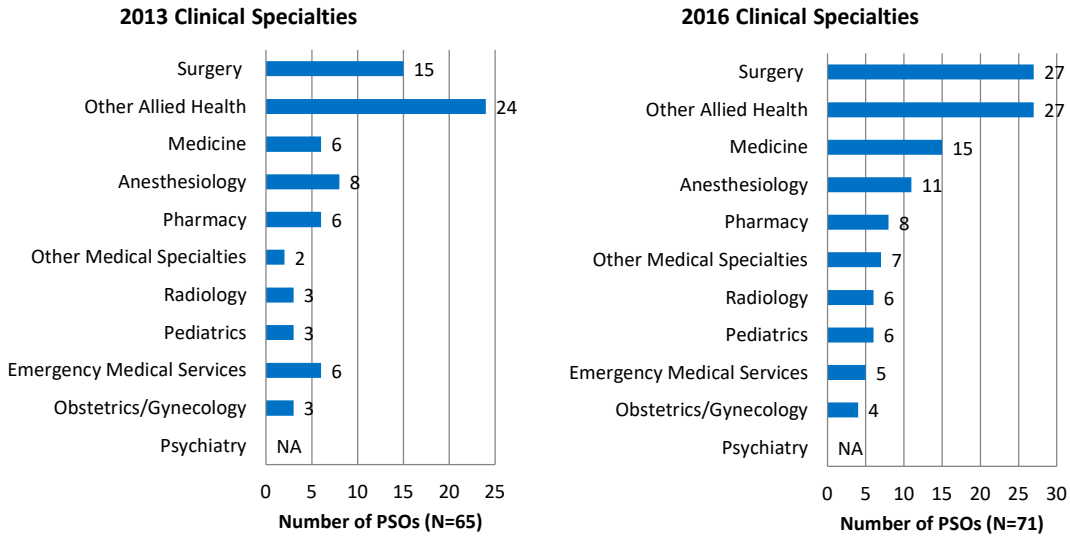
Source: 2016 PSO Profile data.
Note: A total of 71 PSOs, out of 85 listed PSOs (83.5%), submitted the PSO Profile in 2016.

- PSOs play an important role because they can make an impact on improving quality and patient safety nationally and disseminate lessons learned to their network of contracted providers quickly and efficiently.
- The data are based on responses to question #14 on the 2016 PSO Profile Form: *Which geographic area does the PSO serve?*
  - The question is interpreted as an accounting of the geographic areas the PSO is available to serve, regardless of whether services are currently being rendered in that area.
  - There are two available responses to this question: (1) National; and (2) State and/or territory.
- All 71 PSOs that completed the 2016 PSO Profile responded to question #14.
  - Forty-four of 71 PSOs (62%) reported the ability to serve all States by selecting the answer option "National."
  - The remaining 27 PSOs (38%) selected the answer option "State and/or territory," with a followup question to indicate all States and territories they served.
- Based on information provided by these PSOs, the States with the most PSO coverage were Florida, Illinois, and Virginia, with 51 PSOs available to serve.

- The States with the least PSO coverage were Alaska, Montana and South Dakota with only 44 PSOs available to serve.
- Overall, a larger number of PSOs that reported the ability to serve one or more States served States in the eastern half of the United States.

PSOs by Clinical Specialty

Number of PSOs by clinical specialty, 2013 and 2016



Key: NA = not applicable.
Source: 2013 and 2016 PSO Profile data.
Note: PSOs were directed to "Select all (specialty focus) that apply." Therefore, the sum of the clinical specialties in the figure may exceed the total number of PSOs that responded to the question, if a PSO selected two or more specialties.

- PSOs served a wide range of clinical specialties that could identify and address adverse events in a variety of healthcare areas that are embedded in a complex healthcare delivery system.
- The data are based on responses to question #13 on the 2013 and 2016 PSO Profile Form: *Does the PSO have a specific specialty focus?*
- The language of question #13 in the PSO Profile indicates that the clinical specialty options listed as possible answers "include all relevant subspecialties."

  - The question language slightly differed from 2013 to 2016. The 2013 PSO Profile question read, "Does the PSO have a specific specialty focus? Select all that apply" and the 2016 PSO Profile question read, "Does the PSO have a specific specialty focus? Specialties below include all relevant subspecialties. Select all that apply."

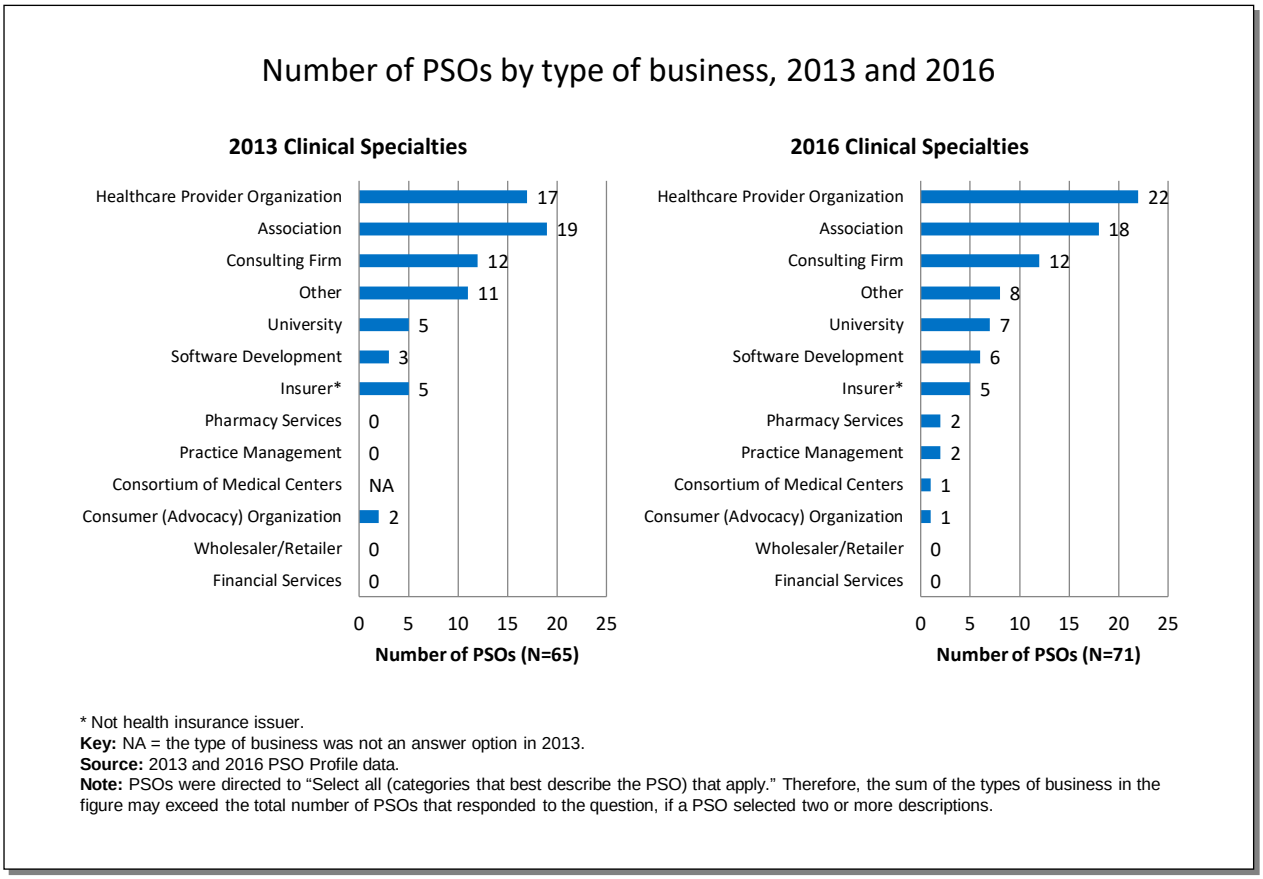
- To more concisely present information obtained on question #13, the PSO Privacy Protection Center condensed subspecialties under relevant clinical specialty categories after consulting with clinical subject matter experts. Subspecialties were condensed as follows:

  - Medicine: Internal Medicine, Family Medicine, Cardiology, Pulmonology, Neurology, and Gastroenterology
  - Surgery: Colorectal Surgery, General Surgery, Neurological Surgery, Orthopedic Surgery, Pediatric Surgery, Thoracic Surgery, Urology, and Vascular Surgery
  - Other Medical Specialties: Otolaryngology, Ophthalmology, and Dermatology
  - Other Allied Health: Dentistry, Nursing, Physical Medicine and Rehabilitation, Podiatry, and Other

- All 71 PSOs that completed the 2016 PSO Profile responded to question #13:

  - The most common specialty focus areas reported in 2016 were Surgery, Other Allied Health, and Medicine.
  - The specialty focus areas of Surgery, Medicine, and Other Medical Specialties exhibited the greatest increase in PSOs from 2013 to 2016.
  - The specialty focus area of Emergency Medicine exhibited a net loss of one PSO from 2013 to 2016.

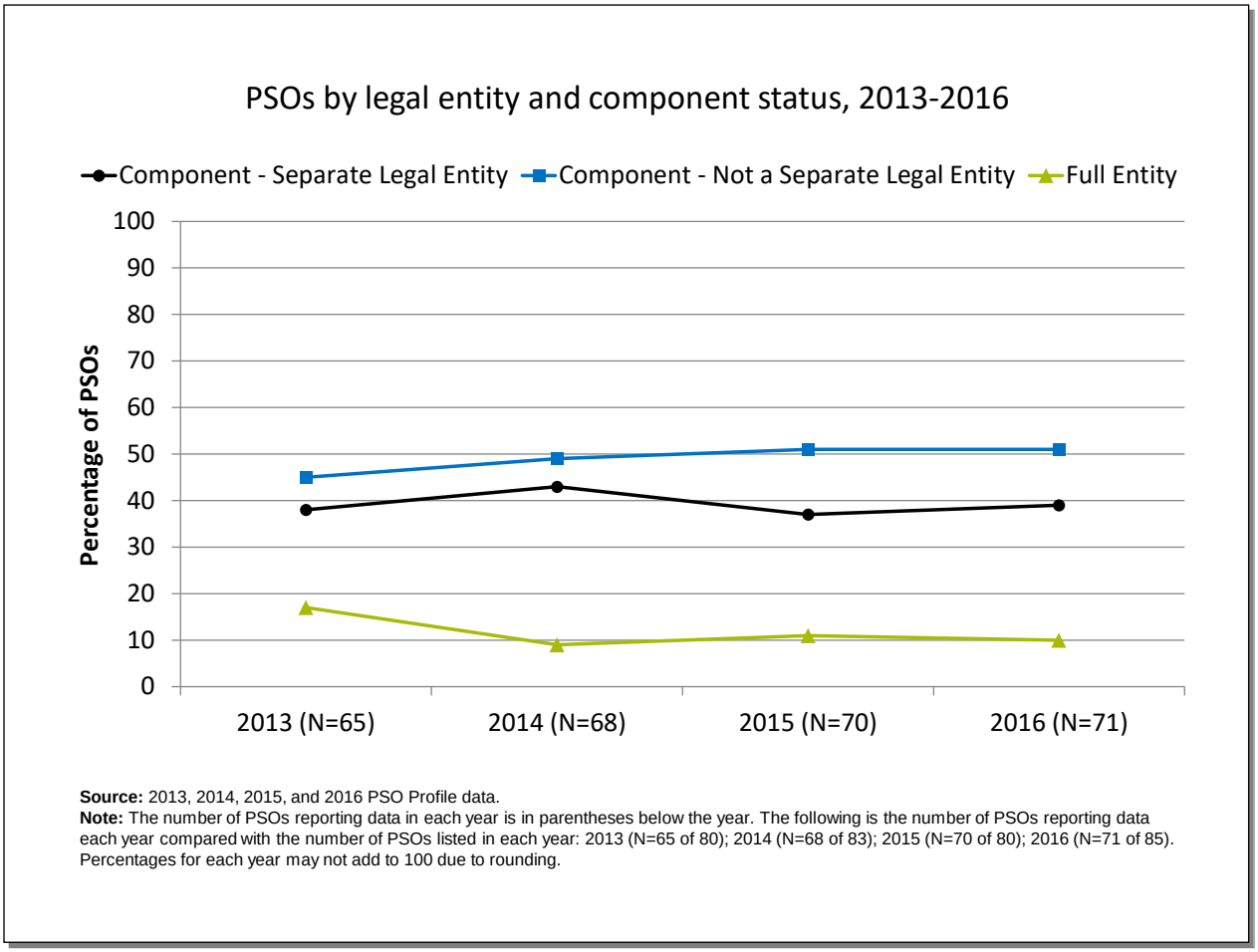
PSOs by Type of Business



* Not health insurance issuer.
Key: NA = the type of business was not an answer option in 2013.
Source: 2013 and 2016 PSO Profile data.
Note: PSOs were directed to "Select all (categories that best describe the PSO) that apply." Therefore, the sum of the types of business in the figure may exceed the total number of PSOs that responded to the question, if a PSO selected two or more descriptions.

- PSOs are not limited to only healthcare organizations. It is important to understand the kinds of expertise and service that PSOs self-identified that could inform providers of PSO business offerings.
- The data are based on responses to question #6 on the 2016 PSO Profile Form: Which of the following best describes the PSO (or if the component PSO is not a separate legal entity, please describe its parent(s))?
- All 71 PSOs that completed the 2016 PSO Profile responded to question #6.
- The most common types of business were Healthcare Provider Organization, Association, and Consulting Firm.
- The business types of Healthcare Provider Organization and Software Development exhibited the greatest increases from 2013 to 2016.
- The business types of Association, Consumer (Advocacy) Organization, and Other exhibited decreases from 2013 to 2016.

PSOs by Legal Entity and Component Status



Source: 2013, 2014, 2015, and 2016 PSO Profile data.
Note: The number of PSOs reporting data in each year is in parentheses below the year. The following is the number of PSOs reporting data each year compared with the number of PSOs listed in each year: 2013 (N=65 of 80); 2014 (N=68 of 83); 2015 (N=70 of 80); 2016 (N=71 of 85). Percentages for each year may not add to 100 due to rounding.

- This figure shows the variability in the business models of PSOs and their operation as separate legal entities as well as units or divisions of a larger parent organization.
- In each year, all PSOs that completed the annual PSO Profile Form answered this question.

- A PSO is a component PSO when the PSO activities are encompassed within a unit or division of the parent organization. The PSO has the primary activity to improve safety and quality of care delivery (e.g., a division of a healthcare system may be listed as a component PSO of the system) pursuant to the Patient Safety Act and Rule.
  - Component PSOs may be a separate legal entity from their parent organizations as well as a division or unit within the broader legal entity and may be governed by multiple parent organizations.
  - Additional details on the component status of PSOs may be found in the Patient Safety Rule (2008): https://pso.ahrq.gov/sites/default/files/Patient Safety Rule.pdf.

- The data are based on responses to the 2013, 2014, 2015, and 2016 PSO Profile Forms: *Is the PSO a component PSO?*
- Fifty-one percent of PSOs in 2016 were components of other organizations but were not separate legal entities, which is an increase from 45 percent in 2013.
- Thirty-nine percent of PSOs in 2016 were components of other organizations and represented separate legal entities, which is consistent with the 2013 percentage.
- Ten percent of PSOs in 2016 were full entity PSOs, which is a decrease from 17 percent in 2013.

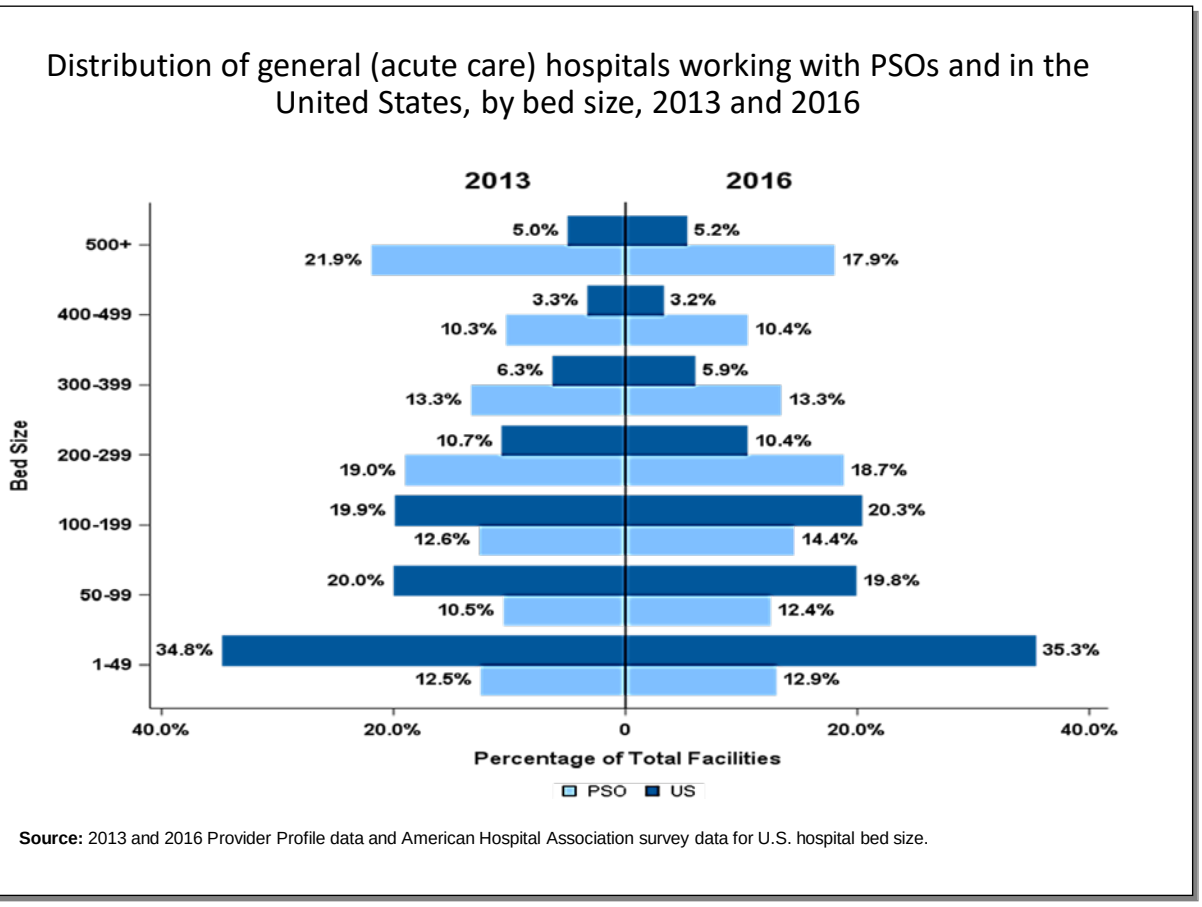
Number of PSO-contracted provider types, 2013-2016

Provider Type	2013 (N 4,464)	2014 (N 5,406)	2015 (N 5,065)	2016 (N 3,911)
General Hospitals	1,580 (35.4%)	1,850 (34.2%)	1,553 (30.7%)	2,011 (51.4%)
Specialty Hospitals	349 (7.8%)	354 (6.5%)	359 (7.1%)	386 (9.9%)
Critical Access Hospitals	NA	NA	43 (0.8%)	100 (2.6%)
Licensed Practitioner Groups	310 (6.9%)	335 (6.2%)	169 (3.3%)	493 (12.6%)
Specialized Treatment Facilities (e.g., Dialysis, Chemotherapy, Psychiatric)	1,937 (43.4%)	1,958 (36.2%)	1,956 (38.6%)	31 (0.8%)
Long-Term Care (includes Skilled Nursing Facilities or Intermediate/Long-Term Care Facilities and Assisted Living Facilities)	20 (0.4%)	35 (0.6%)	31 (0.6%)	166 (4.2%)
Retail Pharmacy	3 (0.1%)	167 (3.1%)	168 (3.3%)	2 (0.1%)
Other*	265 (5.9%)	707 (13.1%)	786 (15.5%)	722 (18.5%)

***** Other includes outpatient clinic/services/care; federally qualified health centers; ambulatory surgery centers; independent laboratories, freestanding imaging centers, tissue banks, etc.; urgent care/emergency medicine; ambulance, emergency medical technician, paramedic services, etc.; home health care (including in-home treatment services, hospice care, etc.); and mail order pharmacy.
Key: NA = a response option that was not available on the Provider Profile form in a specific year.
Source: 2013, 2014, 2015, and 2016 Provider Profile data.
Note: Percentages may not add to 100 due to rounding.

- The table shows the diversity of the types of providers that are contracted with the PSOs and shows that the patient safety events reported are not limited to those that occur in a hospital setting. This information is important to show the volume and types of facilities and settings that are contracted with PSOs.
- The PSO program collected profile data from PSOs about their contracted providers, including the type of provider. The sample sizes (N) indicated at the top of each column show the number of provider contracts for which provider type data were submitted. All provider profiles submitted included provider type.
- The data are based on responses to question #1 on the Provider Profile Form: *Type of provider*.
- Changes in the number of providers within each type occur for several reasons, including listing of new PSOs, delisting of PSOs no longer in operation, and changes in the composition of provider types among contracted providers.
- The number of general hospitals participating with PSOs grew 27.3 percent, from 1,580 in 2013 to 2,011 in 2016.
- The overall reduction of providers in the provider profile data is associated with the reduction of specialized treatment facilities that worked with a PSO that relinquished its listing.

General Hospitals Working With PSOs



Source: 2013 and 2016 Provider Profile data and American Hospital Association survey data for U.S. hospital bed size.

- This figure compares the makeup and bed size of facilities among facilities contracting with PSOs and in the entire United States, over time. It is important to understand how the distribution of U.S. hospitals by bed size surveyed by the American Hospital Association

(AHA) compares with the distribution of U.S. hospitals contracted with a PSO and that PSOs work with all sizes of hospitals. As indicated earlier, an important part of collecting data using the PSO profile form is understanding the characteristics of the PSO and the provider members. In this analysis, hospital provider bed size was used for comparison purposes to observe differences and similarities between the PSO sample and the AHA (global) population, and identify and track distribution changes over time.

- The data were obtained from:
  - Responses to question #3 on the 2013 Provider Profile Form and #2 on the 2016 Provider Profile Form – What was the number of licensed beds at the end of the most recent calendar year for which data are available?
    - Captures bed size data from the general acute care hospitals that are contracted with reporting PSOs.
  - Responses to the AHA Survey of U.S. hospitals.
    - The AHA Survey captures similar information about many of the active acute care hospitals in the United States. For both data collections, however, the available information is self-reported by respondents. Thus, the number of hospitals of a certain size contracted with PSOs may exceed the number of active hospitals of that size per the AHA Survey. The AHA reported more than 6,200 hospitals in 2016.
- When compared with the distribution of U.S. hospitals by bed size (which has more hospitals with under 200 beds than hospitals with 200+ beds), PSOs are more likely to work with hospitals of larger bed sizes and less likely to work with hospitals of smaller bed sizes.
- The distribution of U.S. hospitals by bed size working with PSOs has remained relatively consistent between 2013 and 2016.
- The PSOs saw a slight increase in the number of contracted hospitals with smaller bed sizes (i.e., fewer than 300 beds) between 2013 and 2016.
- The data on this chart are based on slightly different numbers from the data presented in the table above.
  - The table is based on question #1 of the Provider Profile, which asks the PSO to select the "*Type of provider*."
  - In 2013, 18 of 1,580 general hospital providers answered 0 to question #3 on the Provider Profile about the number of beds in the facility.
  - In 2016, 23 of 2,011 general hospital providers answered 0 to question #2 on the Provider Profile about the number of beds in the facility.
  - This chart is based on a separate question that asks "(To be completed for any hospitals and/or skilled nursing facility/long term care facility (if any) What is the number of licensed beds at the end of the most recent calendar year for which data are available?"

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