CHARTBOOK ON PATIENT SAFETY

National Healthcare Quality and Disparities Report

AHRQ
Agency for Healthcare Research and Quality

NATIONAL HEALTHCARE QUALITY AND DISPARITIES REPORT
CHARTBOOK ON PATIENT SAFETY

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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CONTENTS

PATIENT SAFETY

This Patient Safety Chartbook is part of a family of documents and tools that support the *National Healthcare Quality and Disparities Report* (NHQDR). The NHQDR is an annual report to Congress mandated in the Healthcare Research and Quality Act of 1999 (P.L. 106-129). The NHQDR 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 healthcare, quality of healthcare, and NHQDR 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 2000 through 2018. The reports are produced with the help of a Federal Interagency Work Group led by the Agency for Healthcare Research and Quality (AHRQ) and submitted on behalf of the Secretary of the U.S. Department of Health and Human Services (HHS). To access the most recent NHQDR, including methodologies and measure lists, go to https://www.ahrq.gov/research/findings/nhqrdr19/index.html.

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, such as 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 NHQDR. These priority areas are interrelated and work to support all priority areas and can support necessary and critical improvements in making care safer. Readers can access the latest NHQDR chartbooks at https://www.ahrq.gov/research/findings/nhqrdr/chartbooks/index.html.

Priority 1: Making Care Safer by Reducing Harm Caused in the Delivery of Care

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 inappropriate or unnecessary 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, go to https://www.ahrq.gov/research/findings/nhqrdr/chartbooks/carecoordination/index.html.

Patient Safety Origins in the United States

Patient safety is the freedom from accidental or preventable injuries produced by medical care (Kohn, et al., 2000). Patient safety research examines systems-based gaps to improve safety and patient outcomes.

Medical error and other patient safety issues can be deadly:

- One estimate of the number of hospital-acquired conditions in U.S. hospitals in 2017 was approximately 2,550,000 cases (AHRQ, 2019a).
- One estimate of the age-standardized mortality rate due to adverse effects of medical treatment was 1.15 per 100,000 population in 2016 (Sunshine, et al.)

The Agency for Healthcare Research and Quality is one of the lead Federal agencies for patient safety research. AHRQ partners with many Federal agencies, including the Centers for Medicare & Medicaid Services, Centers for Disease Control and Prevention, Food and Drug Administration, Health Resources and Services Administration, and others to support patient safety and quality improvement work.

Key Definitions

The patient safety field uses terms including ***adverse event*** and ***patient safety event*** to describe incidents in which patient harm may occur as a result of healthcare (rather than from an underlying disease). Among other terms used by organizations such as The Joint Commission are ***sentinel events***. These patient safety events result in death, permanent harm, or serious temporary harm to a patient.

Some events pose hazards to patients but do not result in harm. These patient safety events are called ***near-misses***. A patient experiences a near-miss when he or she is exposed to a hazardous situation but does not experience harm (either through luck or early detection).

These definitions are defined on AHRQ's PSNet website (https://psnet.ahrq.gov/primer/patient-safety-101). More information on sentinel events is available at https://www.jointcommission.org/resources/patient-safety-topics/sentinel-event/.

Patient Safety Research Landscape

Since 1999, the patient safety field has made advances such as the reduction of select healthcare-associated infections and medication-related events. These advances have been made through novel strategies, such as clinical decision support, surveillance, treatment protocols, and education and training through simulation. Advancements in safety research and implementation are further described on AHRQ's PSNet.

In April 2020, AHRQ published Making Healthcare Safer III, the third compendium of existing and emerging patient safety best practices. In September 2020, AHRQ and the Institute for Healthcare Improvement copublished the National Action Plan to Advance Patient Safety. This plan was developed with AHRQ and several organizations committed to patient safety. It focuses on culture, leadership and governance; patient and family engagement; workforce safety; and learning systems—all foundational needs for safe care.

The body of research examining disparities in patient safety continues to evolve in the United States and abroad (Thomas, et al., 2020; Metersky, et al., 2011; Piccardi, et al., 2018; Noursi, et al., 2020; Fasano, et al., 2020).

Chartbook Content

This chartbook includes:

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

References:

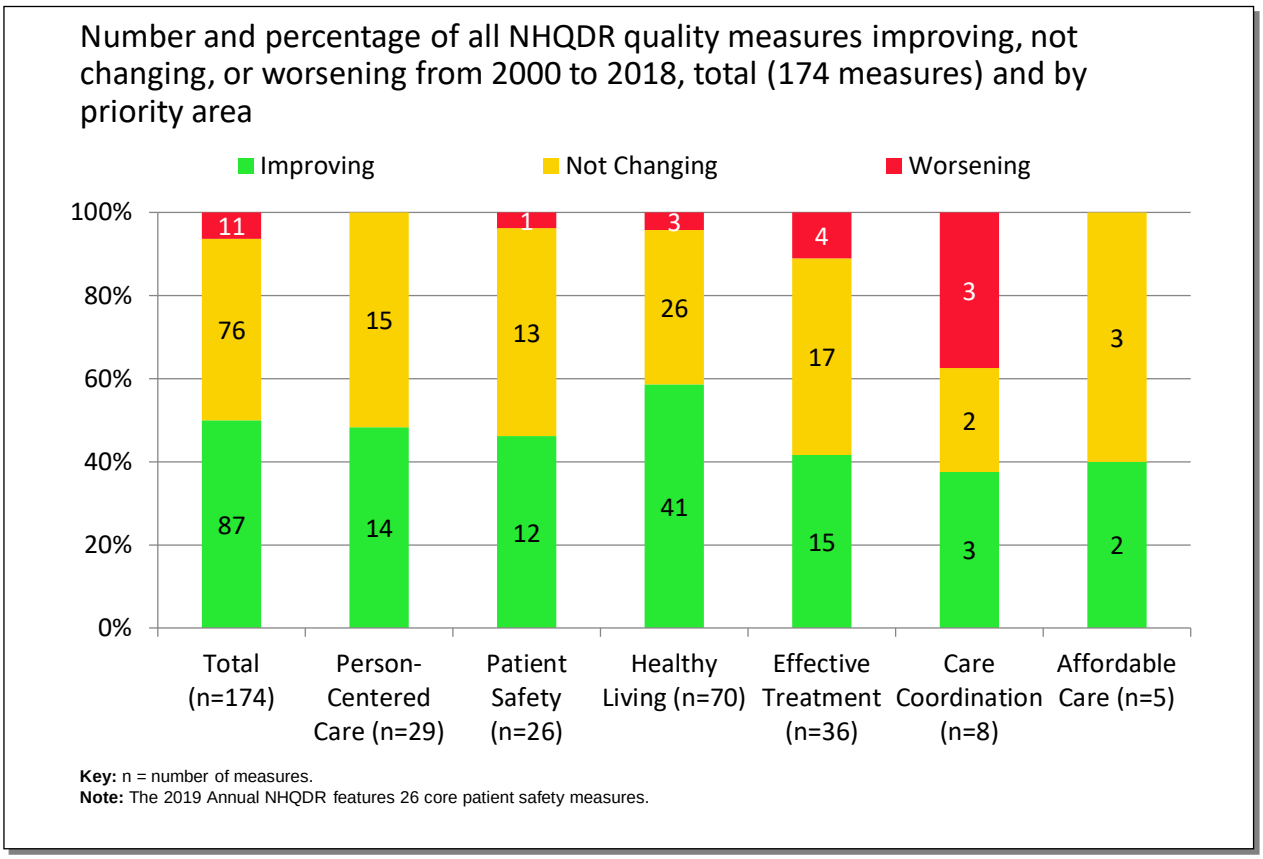
- Introduction and Methods contains information about methods used in the chartbook.
- A Data Query tool provides access to most NHQDR data tables (https://nhqrnet.ahrq.gov/inhqrdr/data/query).

Data Sources:

- Agency for Healthcare Research and Quality (AHRQ):
  - Healthcare Cost and Utilization Project (HCUP)
  - Medical Expenditure Panel Survey (MEPS)
  - Medicare Patient Safety Monitoring System (MPSMS)[i]
- Centers for Disease Control and Prevention (CDC):
  - National Vital Statistics System – Natality (NVSS-N)
- Centers for Medicare & Medicaid Services (CMS):
  - Home Health Care Consumer Assessment of Healthcare Providers and Systems (HHCAHPS)
  - Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)
  - Hospital Inpatient Quality Reporting (HIQR) (formerly the Quality Improvement Organization)
  - Outcome and Assessment Information Set (OASIS)
  - Minimum Data Set (MDS)

[i] CMS developed MPSMS and currently, AHRQ leads and manages MPSMS. MPSMS was scheduled to be replaced with the Quality and Safety Reporting System (QSRS) in October 2020.

Trends Across NHQDR Priorities



Note: For most measures in the 2019 NHQDR, trend data are available from 2000–2014 at the earliest to 2012–2018 at the latest. This slide is limited to those measures that have the minimum four data points that AHRQ requires to conduct a trend analysis. For each measure with at least four estimates over time, unweighted log-linear regression is used to calculate average annual percentage change (APC) and to assess the statistical significance of the rate of change (p <0.10). Rates are aligned so that positive change indicates improved care.

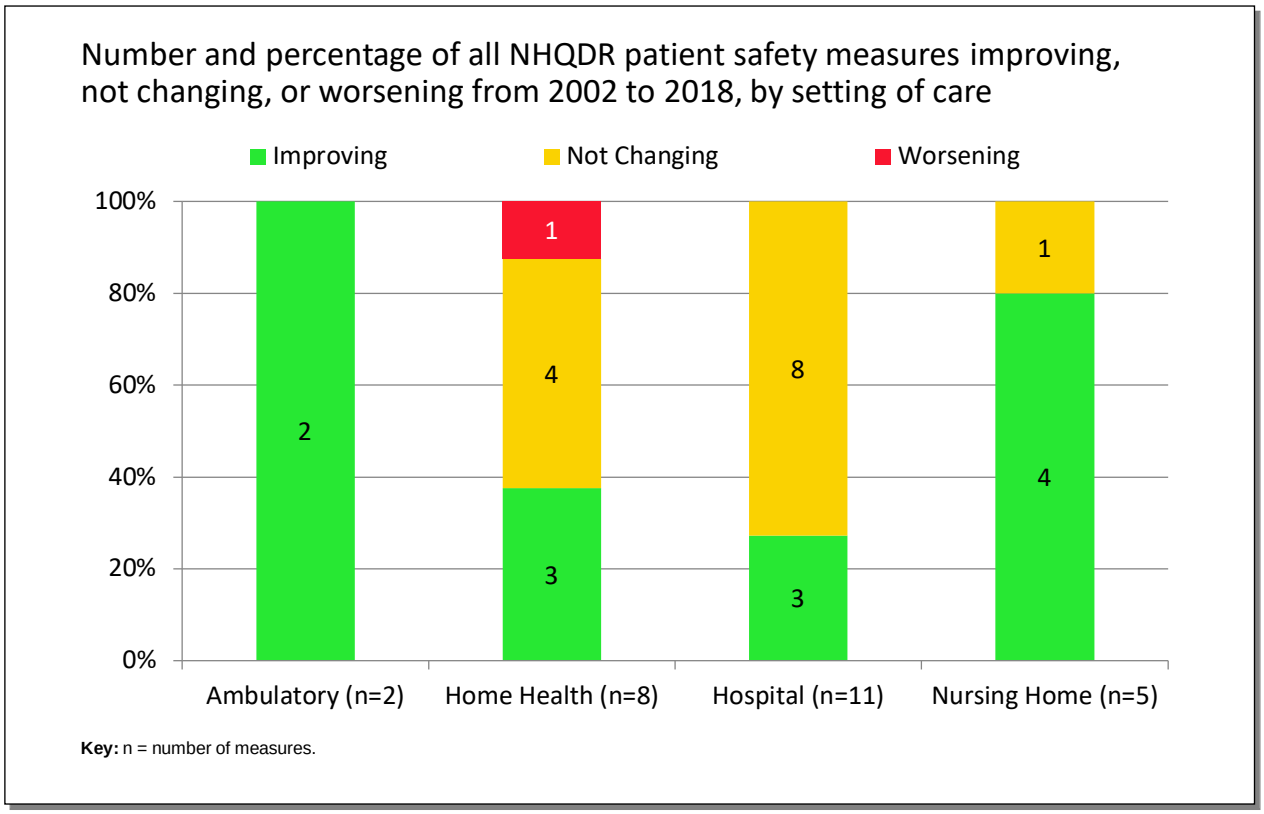
- **Improving** = Rates of change are positive and greater than 1% per year and are statistically significant.
- **Not Changing** = Rates of change are between -1% and 1% per year or not statistically significant.
- **Worsening** = Rates of change are negative and less than -1% per year and are statistically significant.

- Through 2018, across a broad spectrum of healthcare quality measures, half (50%) showed improvement (green).
- Person-Centered Care: Just under half of person-centered care measures were improving overall.
- Patient Safety: Just under half of patient safety measures were improving overall.
  - The one measure with worsening results was "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: Nearly 60% of healthy living measures were improving overall.
- Effective Treatment: More than 40% of effective treatment measures were improving overall.
- Care Coordination: More than one-third of care coordination measures were improving overall.

- Affordable Care: Forty percent of affordable care measures were improving overall.
- Access measures are not represented on this slide. For more information, refer to the 2019 National Healthcare Quality and Disparities Report.

Trends in Patient Safety

Trends by Setting of Care



- **Importance:** The chartbook is organized around setting of care; stratifying trends by care setting provides insight into which settings are exhibiting more or fewer measures improving.
- **Findings:**
  - Both ambulatory care measures, 80% of nursing home measures, and three-eighths of home health measures were improving, compared with just over one-quarter of hospital measures.
  - The home health measure that is worsening is "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," which declined from 78.8% in 2012 to 76.5% in 2018.

Ambulatory Measures:

- Improving:

1. 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

2. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults

Home Health Measures:

- Improving:

1. 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
2. Home health care patients whose management of oral medications improved
3. Home health care patients whose surgical wound was improved

- Not Changing:

1. 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
2. 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
3. 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
4. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care

- Worsening:

1. 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

Hospital Measures:

- Improving:

1. Hospital patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) and factor Xa inhibitor
2. Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant
3. Mechanical adverse events in adult patients receiving central venous catheter placement

- Not Changing:

1. Adult surgery patients with catheter-associated urinary tract infection
2. Adult surgery patients with postoperative pneumonia events
3. Adult surgery patients with postoperative venous thromboembolic events
4. Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents
5. Hospital patients with an anticoagulant-related adverse drug event to warfarin

6. Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions
7. Inpatient adverse events in adults receiving hip joint replacement due to fracture
8. Inpatient adverse events in adults receiving knee replacement

Nursing Home Measures:

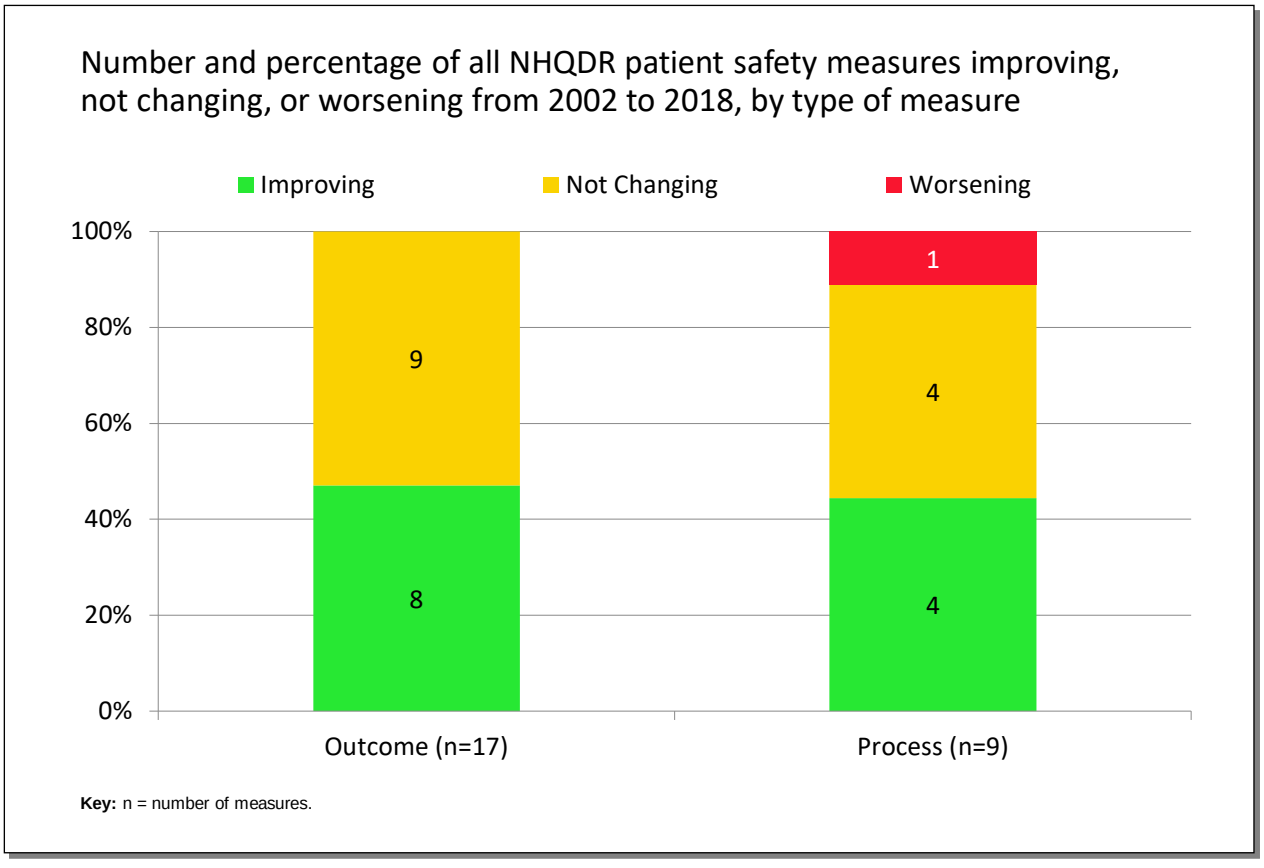
- Improving:

1. High-risk, long-stay nursing home patients with pressure ulcer
2. Long-stay nursing home residents with a urinary tract infection
3. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder
4. Short-stay nursing home patients with pressure ulcers that are new or worsened

- Not Changing:

1. Long-stay nursing home patients experiencing one or more falls with major injury

Trends by Type of Measure



- **Importance:** The ultimate goal of quality improvement is to produce better patient outcomes. Improvements in processes may or may not lead to improved patient outcomes.

- **Findings:**
  - Almost half (47%) of outcome measures improved, while 44% of process measures improved. Note that type of measure and setting of care are related; 11 of 17 outcome measures are hospital measures, while 0 of 9 process measures are hospital measures.
  - The process measure that is worsening is "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," which declined from 78.8% in 2012 to 76.5% in 2018.

Outcome Measures:

- Improving:

1. Home health care patients whose management of oral medications improved
2. Home health care patients whose surgical wound was improved
3. High-risk, long-stay nursing home patients with pressure ulcers
4. Long-stay nursing home residents with a urinary tract infection
5. Short-stay nursing home patients with pressure ulcers that are new or worsened
6. Hospital patients who received a hypoglycemic agent who had an adverse drug events with hypoglycemic agents
7. Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant
8. Mechanical adverse events in adult patients receiving central venous catheter placement

- Not Changing:

1. Adult surgery patients with catheter-associated urinary tract infection
2. Adult surgery patients with postoperative pneumonia events
3. Adult surgery patients with postoperative venous thromboembolic events
4. Hospital patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) and factor Xa inhibitor
5. Hospital patients with an anticoagulant-related adverse drug event to warfarin
6. Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions
7. Inpatient adverse events in adults receiving hip joint replacement due to fracture
8. Inpatient adverse events in adults receiving knee replacement
9. Long-stay nursing home patients experiencing one or more falls with major injury

Process Measures:

- Improving:

1. 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
2. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults

3. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder
4. 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

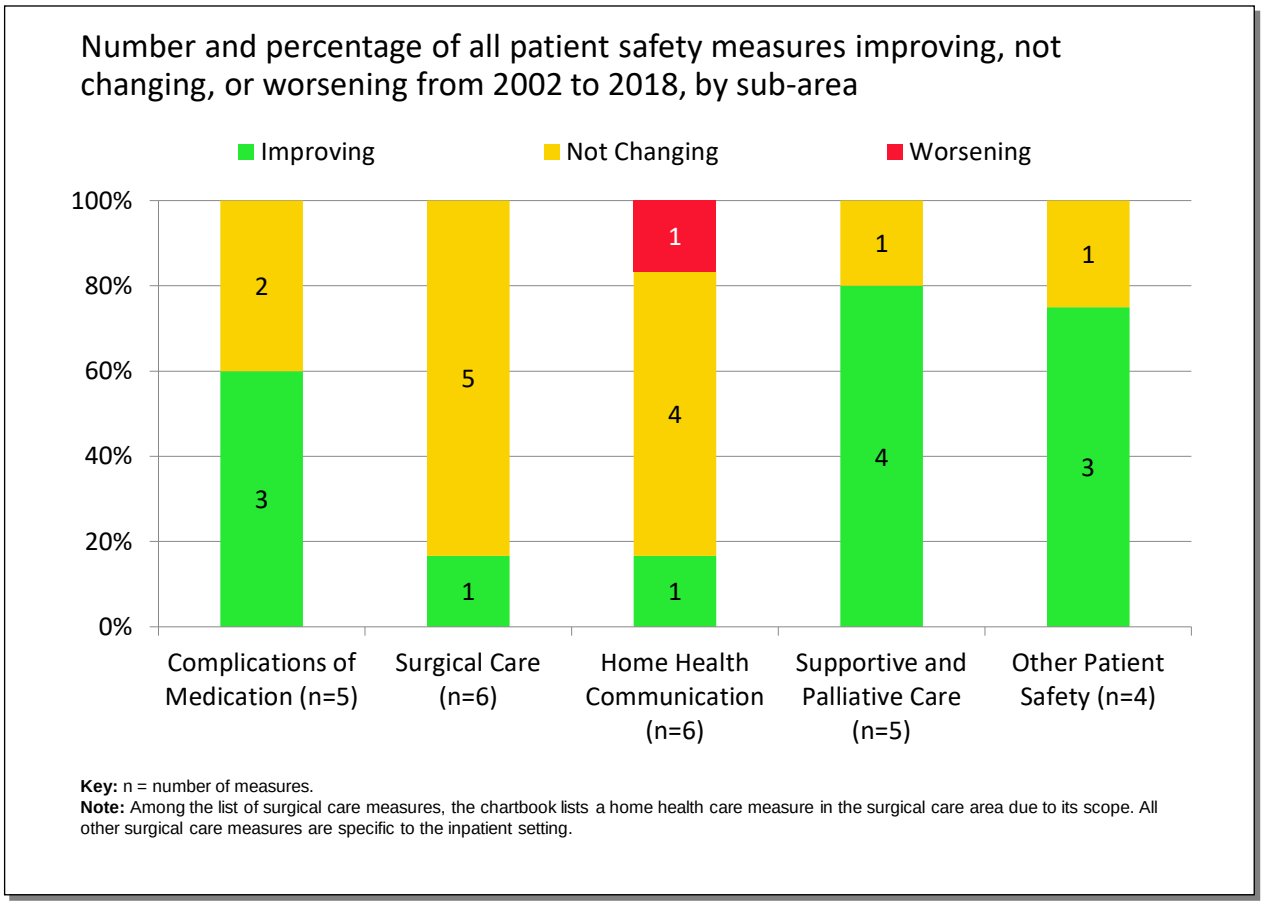
- Not Changing:

1. 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
2. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care
3. 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
4. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care

- Worsening:

1. 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

Trends by Sub-Area



Key: n = number of measures.
Note: Among the list of surgical care measures, the chartbook lists a home health care measure in the surgical care area due to its scope. All other surgical care measures are specific to the inpatient setting.

- **Importance**: Improvement is not concentrated in one aspect of care but is spread over multiple aspects of care.
- **Findings:**

  - Four out of five (80%) ~~of~~ Supportive and Palliative Care measures were improving, as were three-quarters (75%) of Other Patient Safety measures and nearly two-thirds (60%) of Complications of Medication measures. Just 1 of 6 (17%) Surgical Care measures and 1 of 6 (17%) Home Health Communication measures were improving.
  - Home Health Communication is the only area in which any measure was worsening.

    - The measure that was worsening is "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," which declined from 78.8% in 2012 to 76.5% in 2018.

Complications of Medication:

- Improving:

  1. Home health care patients whose management of oral medications improved
  2. Hospital patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) and factor Xa inhibitor
  3. Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant

- Not Changing:

  1. Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents
  2. Hospital patients with an anticoagulant-related adverse drug event to warfarin

Surgical Care:

- Improving:

  1. Home health care patients whose surgical wound was improved

- Not Changing:

  1. Adult surgery patients with postoperative pneumonia events
  2. Adult surgery patients with postoperative venous thromboembolic events
  3. Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions
  4. Inpatient adverse events in adults receiving hip joint replacement due to fracture
  5. Inpatient adverse events in adults receiving knee replacement

Home Health Communication:

- Improving:

    1. 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

- Not Changing:

    1. 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
    2. 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
    3. 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
    4. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care

- Worsening:

    1. 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

Supportive and Palliative Care:

- Improving:

    1. Long-stay nursing home residents with a urinary tract infection
    2. Short-stay nursing home patients with pressure ulcers that are new or worsened
    3. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder
    4. High-risk, long-stay nursing home patients with pressure ulcers

- Not Changing:

    1. Long-stay nursing home patients experiencing one or more falls with major injury

Other Patient Safety (detailed sub-area in parentheses):

- Improving:

    1. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (Inappropriate Treatment)
    2. 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 (Inappropriate Treatment)
    3. Mechanical adverse events in adult patients receiving central venous catheter placement (Other Complications of Hospital Care)

- Not Changing:

    1. Adult surgery patients with catheter-associated urinary tract infection (Healthcare-Associated Infections)

Patient Safety Trends Overall

Improving

- Measure years are from 2002, 2012, 2013, or 2014 through 2017 or 2018.
- Improving measures are defined as rates of change that are positive and greater than 1% per year and are statistically significant.
- The measure of improvement is the average annual percentage change (APC). Rates are aligned so that positive change indicates improved care.

Of 26 measures, 12 were improving. The four measures with the largest rate of improvement are:

- Hospital patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) and factor Xa inhibitor (MPSMS).
- Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant (MPSMS).
- Long-stay nursing home residents with a urinary tract infection (MDS).
- Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS).

The remaining eight measures from largest to smallest rate of improvement are:

- Home health care patients whose management of oral medications improved (OASIS).
- Mechanical adverse events in adult patients receiving central venous catheter placement (MPSMS).
- 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 (MEPS).
- Home health care patients whose surgical wound was improved (OASIS).
- Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS).
- Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (MEPS).
- High-risk, long-stay nursing home patients with pressure ulcers (MDS).
- 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 (HHCAHPS).

Not Changing

- Measure years are from 2012, 2013, or 2014 through 2017 or 2018.
- Measures not changing are defined as rates of change that are no greater than 1% per year (positive or negative) or are not statistically significant.

Of 26 measures, 13 were not changing. Of the measures not changing over time, four were HHCAHPS measures regarding home health communication about medication:

- 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 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
- 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
- Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care

One MDS measure examined nursing home care:

- Long-stay nursing home patients experiencing one or more falls with major injury

The remaining eight MPSMS measures cover inpatient care:

- Adult surgery patients with postoperative pneumonia events
- Hospital patients with an anticoagulant-related adverse drug event to warfarin
- Hospital patients who received a hypoglycemic agent who had an adverse drug events with hypoglycemic agents
- Adult surgery patients with catheter-associated urinary tract infection
- Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions
- Inpatient adverse events in adults receiving hip joint replacement due to fracture
- Inpatient adverse events in adults receiving knee replacement
- Adult surgery patients with postoperative venous thromboembolic events

Worsening

- Worsening measures are defined as having rates of change that are negative, less than -1% per year, and statistically significant.
- The percentage of 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 declined from 78.8% in 2012 to 76.5% in 2018.
- For trend and disparity analyses of the Home Health Consumer Assessment of Healthcare Providers and Systems (HHCAHPS) survey measure, see Slide 92. CAHPS® is a registered trademark of the Agency for Healthcare Research and Quality.

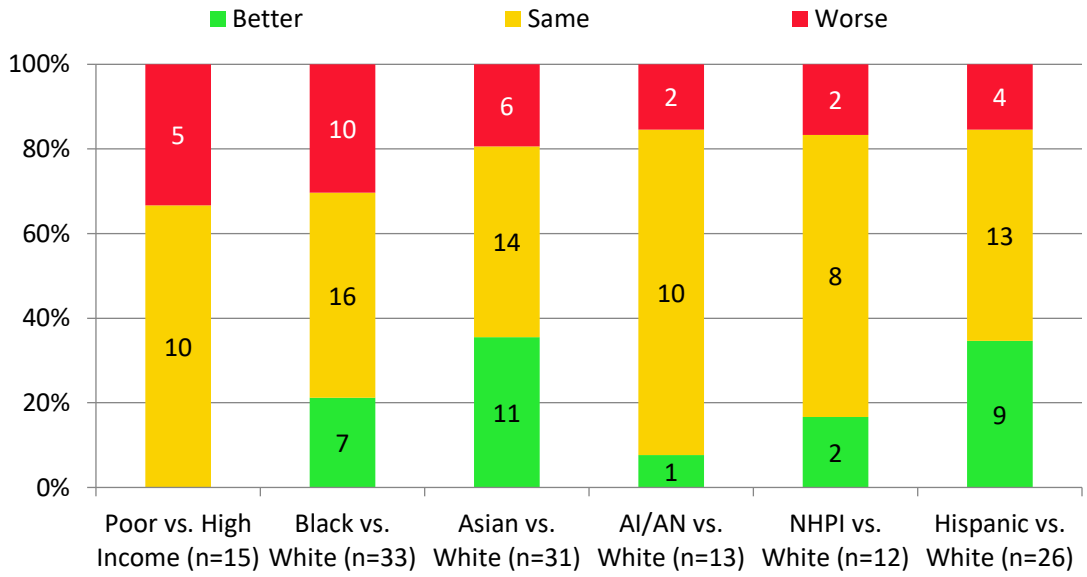
Of 26 measures, only one measure was worsening overall:

- 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 (HHCAHPS)

Disparities in Patient Safety

Overall Disparities

Number and percentage of NHQDR patient safety measures for which members of selected groups experienced better, same, or worse quality of care compared with reference group, 2016, 2017, or 2018



Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander; n = number of measures.
Note: Poor indicates family income less than the Federal poverty level. High Income indicates family income four times the Federal poverty level or greater.

Note: Numbers of measures differ across groups because of data limitations. The data shown here are from 2016 or later. This figure reflects the most current data year available and is not limited to measures that met the criteria for conducting a trend analysis (i.e., may include fewer than four data points). The absolute and relative differences between a selected group and its reference group are used to assess disparities.

- **Better** = Selected group received better quality of care than reference group. The absolute difference is statistically significant (p <0.05) and the relative difference is equal to or larger than 10% and favors the selected group.
- **Same** = Selected group and reference group received about the same quality of care. The absolute difference is not statistically significant, or the relative difference is smaller than 10%.
- **Worse** = Selected group received worse quality of care than reference group. The absolute difference is statistically significant, and the relative difference is equal to or larger than 10% and favors the reference group.

- People in poor households received worse care than people in high-income households for one-third (33%) of included patient safety measures.
- Blacks received worse care than Whites for nearly one-third (30%) of included patient safety measures.
- Asians received worse care than Whites for nearly one-fifth (19%) of included patient safety measures.

- American Indians and Alaska Natives (AI/ANs) received worse care than Whites for 15% of included patient safety measures.
- Native Hawaiians/Pacific Islanders (NHPIs) received worse care than Whites for nearly one-fifth (17%) of included patient safety measures.
- Hispanics received worse care than Whites for 15% of included patient safety measures.

Measure List:

Poor vs. High Income Disparities:

- Same Performance:

    1. 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 (HCUP)
    2. Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions (HCUP)
    3. Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT) per 1,000 surgical hospital discharges, adults (HCUP)
    4. Postoperative acute kidney injury requiring dialysis per 1,000 elective surgical hospital discharges, adults (HCUP)
    5. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (MEPS)
    6. Postoperative hip fracture per 1,000 surgical admissions who were not susceptible to falling, adults (HCUP)
    7. Birth trauma - injury to neonate per 1,000 selected live births (HCUP)
    8. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, adults (HCUP)
    9. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, children (HCUP)
    10. Hospital admissions with iatrogenic pneumothorax per 1,000 medical and surgical admissions, adults (HCUP)

- Worse Performance:

    1. Postoperative respiratory failure per 1,000 elective surgical hospital discharges, adults (HCUP)
    2. Reclosure of postoperative abdominal wound dehiscence per 1,000 abdominopelvic-surgery admissions of length 2 or more days, adults (HCUP)
    3. Deaths per 1,000 hospital admissions with expected low mortality (HCUP)
    4. Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults (HCUP)
    5. Postoperative physiologic and metabolic derangements per 1,000 elective surgical hospital discharges, adults (HCUP)

Black vs. White Disparities:

- Better Performance:

1. Long-stay nursing home patients experiencing one or more falls with major injury (MDS)
2. Postoperative hip fracture per 1,000 surgical admissions who were not susceptible to falling, adults (HCUP)
3. 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 (HHCAHPS)
4. Long-stay nursing home residents with a urinary tract infection (MDS)
5. Birth trauma - injury to neonate per 1,000 selected live births (HCUP)
6. Hospital admissions with iatrogenic pneumothorax per 1,000 medical and surgical admissions, adults (HCUP)
7. 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 (HHCAHPS)

- Same Performance:

1. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, children (HCUP)
2. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (MEPS)
3. Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant (MPSMS)
4. Reclosure of postoperative abdominal wound dehiscence per 1,000 abdominopelvic-surgery admissions of length 2 or more days, adults (HCUP)
5. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, adults (HCUP)
6. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care (HHCAHPS)
7. Deaths per 1,000 hospital admissions with expected low mortality (HCUP)
8. 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 (HHCAHPS)
9. Home health patients whose management of oral medications improved (OASIS)
10. Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions (HCUP)
11. 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 (HHCAHPS)
12. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS)
13. Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents (MPSMS)

14. 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 (MEPS)
15. Adult surgery patients with catheter-associated urinary tract infection (MPSMS)
16. Hospital patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) and factor Xa (MPSMS)

- Worse Performance:

1. High-risk, long-stay nursing home patients with pressure ulcers (MDS)
2. 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 (HCUP)
3. Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT) per 1,000 surgical hospital discharges, adults (HCUP)
4. Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS)
5. Postoperative acute kidney injury requiring dialysis per 1,000 elective surgical hospital discharges, adults (HCUP)
6. Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults (HCUP)
7. Home health care patients whose surgical wound was improved (OASIS)
8. Postoperative respiratory failure per 1,000 elective surgical hospital discharges, adults (HCUP)
9. Postoperative physiologic and metabolic derangements per 1,000 elective surgical hospital discharges, adults (HCUP)
10. 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 (HHCAHPS)

Asian vs. White Disparities:

- Better Performance:

1. Adult surgery patients with postoperative venous thromboembolic events (MPSMS)
2. Adult surgery patients with postoperative pneumonia events (MPSMS)
3. Deaths per 1,000 hospital admissions with expected low mortality (HCUP)
4. Long-stay nursing home patients experiencing one or more falls with major injury (MDS)
5. Postoperative hip fracture per 1,000 surgical admissions who were not susceptible to falling, adults (HCUP)
6. Long-stay nursing home residents with a urinary tract infection (MDS)
7. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (MEPS)
8. 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 (HHCAHPS)
9. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS)

10. Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT) per 1,000 surgical hospital discharges, adults (HCUP)
11. High-risk, long-stay nursing home patients with pressure ulcers (MDS)

- Same Performance:

1. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, children (HCUP)
2. Reclosure of postoperative abdominal wound dehiscence per 1,000 abdominopelvic-surgery admissions of length 2 or more days, adults (HCUP)
3. Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS)
4. Birth trauma - injury to neonate per 1,000 selected live births (HCUP)
5. 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 (HCUP)
6. 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 (HHCAHPS)
7. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care (HHCAHPS)
8. Postoperative respiratory failure per 1,000 elective surgical hospital discharges, adults (HCUP)
9. 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 (HHCAHPS)
10. 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 (HHCAHPS)
11. 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 (HHCAHPS)
12. Hospital admissions with iatrogenic pneumothorax per 1,000 medical and surgical admissions, adults (HCUP)
13. Postoperative physiologic and metabolic derangements per 1,000 elective surgical hospital discharges, adults (HCUP)
14. Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents (MPSMS)

- Worse Performance:

1. Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults (HCUP)
2. Postoperative acute kidney injury requiring dialysis per 1,000 elective surgical hospital discharges, adults (HCUP)
3. Home health care patients whose management of oral medications improved (OASIS)
4. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, adults (HCUP)
5. Home health care patients whose surgical wound was improved (OASIS)

6. Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions (HCUP)

AI/AN vs. White Disparities:

- Better Performance:

1. 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 (HHCAHPS)

- Same Performance:

1. 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 (HHCAHPS)
2. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care (HHCAHPS)
3. 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 (HHCAHPS)
4. Long-stay nursing home patients experiencing one or more falls with major injury (MDS)
5. 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 (HHCAHPS)
6. Home health care patients whose management of oral medications improved (OASIS)
7. 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 (HHCAHPS)
8. Home health care patients whose surgical wound was improved (OASIS)
9. Long-stay nursing home residents with a urinary tract infection (MDS)
10. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS)

- Worse Performance:

1. High-risk, long-stay nursing home patients with pressure ulcers (MDS)
2. Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS)

NHPI vs. White Disparities:

- Better Performance:

1. 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 (HHCAHPS)
2. Long-stay nursing home residents with a urinary tract infection (MDS)

- Same Performance:

    1. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS)
    2. Adults who reported that home health providers talked with them about when to take medicines in the last 2 months of care (HHCAHPS)
    3. 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 (HHCAHPS)
    4. 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 (HHCAHPS)
    5. 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 (HHCAHPS)
    6. 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 (HHCAHPS)
    7. Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS)
    8. High-risk, long-stay nursing home patients with pressure ulcers (MDS)

- Worse Performance:

    1. Home health care patients whose surgical wound was improved (OASIS)
    2. Home health care patients whose management of oral medications improved (OASIS)

Hispanic vs. White Disparities:

- Better Performance:

    1. Adult surgery patients with postoperative venous thromboembolic events (MPSMS)
    2. Deaths per 1,000 hospital admissions with expected low mortality (HCUP)
    3. Postoperative hip fracture per 1,000 surgical admissions who were not susceptible to falling, adults (HCUP)
    4. Reclosure of postoperative abdominal wound dehiscence per 1,000 abdominopelvic-surgery admissions of length 2 or more days, adults (HCUP)
    5. Long-stay nursing home patients experiencing one or more falls with major injury (MDS)
    6. Long-stay nursing home residents with a urinary tract infection (MDS)
    7. Hospital admissions with iatrogenic pneumothorax per 1,000 medical and surgical admissions, adults (HCUP)
    8. Birth trauma - injury to neonate per 1,000 selected live births (HCUP)
    9. Postoperative pulmonary embolism (PE) or deep vein thrombosis (DVT) per 1,000 surgical hospital discharges, adults (HCUP)

- Same Performance:

    1. Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults (MEPS)
    2. Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents (MPSMS)
    3. 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 (HCUP)
    4. Postoperative physiologic and metabolic derangements per 1,000 elective surgical hospital discharges, adults (HCUP)
    5. Short-stay nursing home patients with pressure ulcers that are new or worsened (MDS)
    6. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, adults (HCUP)
    7. Low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder (MDS)
    8. Accidental puncture or laceration during procedure per 1,000 medical and surgical admissions, children (HCUP)
    9. Deaths per 1,000 elective-surgery admissions having developed specified complications of care during hospitalization, adults ages 18-89 or obstetric admissions (HCUP)
    10. Postoperative respiratory failure per 1,000 elective surgical hospital discharges, adults (HCUP)
    11. Postoperative acute kidney injury requiring dialysis per 1,000 elective surgical hospital discharges, adults (HCUP)
    12. Adult surgery patients with catheter-associated urinary tract infection (MPSMS)
    13. Adverse drug event with IV heparin in adult hospital patients who received an anticoagulant (MPSMS)

- Worse Performance:

    1. Home health care patients whose management of oral medications improved (OASIS)
    2. Home health care patients whose surgical wound was improved (OASIS)
    3. Sepsis diagnoses per 1,000 elective-surgery admissions of length 4 or more days, adults (HCUP)
    4. High-risk, long-stay nursing home patients with pressure ulcers (MDS)

Trends in Disparities

Trends in disparities over time are only examined when a disparity existed in the earliest year of data available. Trends are assessed using unweighted regression. The average annual change (AAC) is computed for the selected group and the reference group. The difference between the AAC for the selected group and the AAC for the reference group is calculated and its statistical significance is assessed (p <0.10). Rates are aligned so that change in the positive direction indicates improvement.

- **Improving:** The baseline disparity is shrinking. The difference in AAC is greater than 1 and is statistically significant.

- **No change:** The baseline disparity is not changing. The difference in AAC is between -1 and 1 or is not statistically significant.
- **Worsening:** The baseline disparity is becoming larger. The difference in AAC is less than -1 or and is statistically significant.

One patient safety measure had worsening disparities over time:

- Home health care patients whose management of oral medications improved

Twenty subgroup comparisons across 13 measures did not show any change over time, including:

- **Race.** Black vs. White: Hospital patients who received a hypoglycemic agent who had an adverse drug event with hypoglycemic agents
- **Age.** 65 years and over vs. 18-44 years: 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
- **Sex.** 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

Individual measures are presented by the setting in which care was provided:

- Hospitals
- Ambulatory care
- Nursing homes
- Home health care
- Infrastructure: Ambulatory surgery centers and medical offices

Select patient safety measure results are presented overall and by age, sex, race, ethnicity, health status, or presence of various health conditions. Unless otherwise noted, the measures presented for each setting are included in the summary analysis shown earlier.

Patient Safety in the Hospital Setting

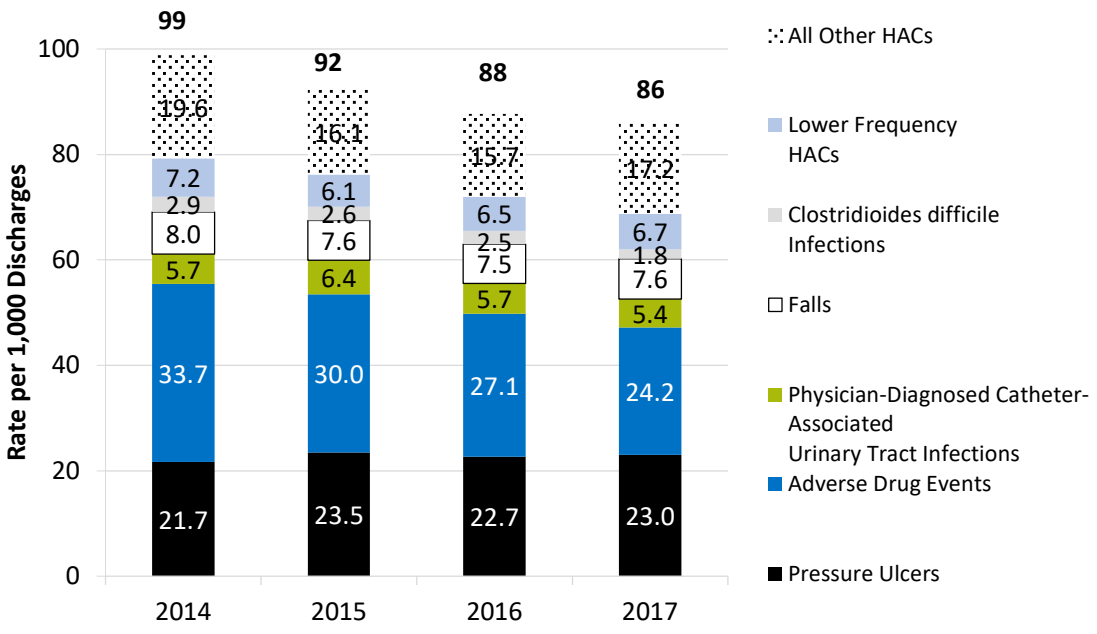
To date, patient safety research has more closely examined adverse events and quality improvement activities implemented in hospital settings.

In this section, measures address:

- Overall hospital-acquired conditions (HACs).
- Healthcare-associated infections (HAIs).
- Procedure-related events.
- Maternal morbidity and mortality measures.
- Adverse drug events.

Hospital-Acquired Conditions

Distribution of hospital-acquired conditions, based on national rates per 1,000 adult hospital discharges, 2014-2017



Source: Agency for Healthcare Research and Quality, Medicare Patient Safety Monitoring System; Healthcare Cost and Utilization Project, Nationwide Inpatient Sample; Centers for Disease Control and Prevention, National Healthcare Safety Network, 2014-2017.
Denominator: Adult hospital discharges, age 18 and over. This measure is not iincluded in the summary analysis.

- From 2014 to 2017, adverse drug events had a 28% reduction.
- From 2014 to 2017, *Clostridioides difficile* (*C. difficile*) infections had a 37% reduction. 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.
- The 2017 all other HACs include 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), 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, refer to the AHRQ National Scorecard on Hospital-Acquired Conditions: Final Results for 2014–2017, https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/pfp/Updated-hacreportFInal2017data.pdf.

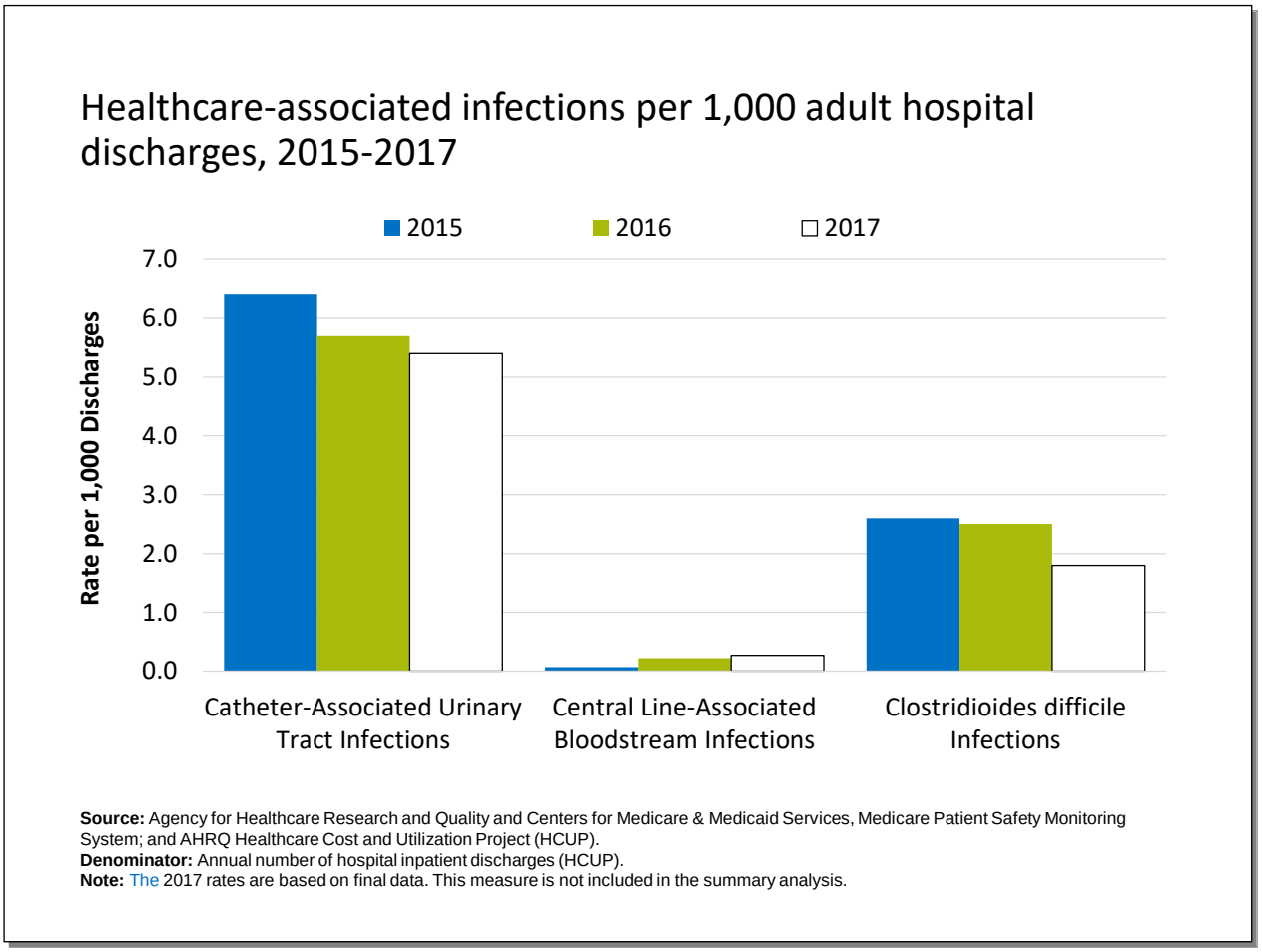
- For general information on HACs and measurement, refer to Quality Measure Tools & Resources, Content last reviewed August 2018. Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/index.html.

Healthcare-Associated Infections

Infections acquired during a hospital stay are among the most common complications of hospital care (AHRQ, 2019c). On any given day, about 1 in 25 hospital patients has at least one HAI (Magill, et al., 2014). HAIs often increase patients' length of stay in the hospital, risk of death, and hospital costs. New infections in critically ill infants, children, and other patients generally reduce their chances for recovery.

For more information, refer to the HAI and Antibiotic Use Prevalence Survey, https://www.cdc.gov/hai/eip/antibiotic-use.html.

Rate of Healthcare-Associated Infections



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System; and AHRQ Healthcare Cost and Utilization Project (HCUP).
Denominator: Annual number of hospital inpatient discharges (HCUP).
Note: The 2017 rates are based on final data. This measure is not included in the summary analysis.

For additional information on the data and methods used in calculating the rates shown in this figure, check the AHRQ National Scorecard on Hospital-Acquired Conditions: Final Results for 2014–2017. https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/pfp/Updated-hacreportFInal2017data.pdf.

Standardized Infection Ratios

Standardized infection ratios (SIRs) compare the observed numbers of specific types of infections with the numbers of infections predicted.

- The predicted numbers are based on various healthcare facility and patient population characteristics.
- SIRs are calculated based on infections healthcare facilities report to the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) during a year.

Importance:

- SIRs facilitate comparative evaluations of hospital risk-adjusted performance.

Methods:

- For various infections, CDC had previously used data from 2006-2011 to establish baseline predicted infection rates.
- New baselines were recently 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.
- 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.
- SIRs differ from the rates presented in "Healthcare-associated infections per 1,000 adult hospital discharges, 2015-2017" calculated from the MPSMS in that they are not measures of the rate of disease in a population but rather are based on the number of observed infections divided by the number of infections that we would expect to see given a standardized population. The CDC's NHSN and AHRQ's MPSMS collect data through different mechanisms and with different clinical specifications, which will produce differences in the rates when calculated across the two sources.

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
  - Stratified by unit type

- Distributions of State-specific SIRs for hospital-onset *Clostridioides difficile* (*C. difficile*) infections seen in acute care hospitals

SIRs were calculated for all 50 States, Washington DC, and Puerto Rico. Statewide SIRS were classified as:

- Below 1.0 if the 95% confidence intervals bounding the SIR point estimates were entirely below 1.0.
- Around 1.0 if the 95% confidence intervals bounding the SIR point estimates included 1.0.
- Above 1.0 if the 95% confidence intervals bounding the SIR point estimates were entirely above 1.0.

The following measures are organized by:

- Infection type: CLABSI, CAUTI, or *C. difficile*.
- Where data were collected: critical care units vs. wards.
- Summary level: National SIR vs. national summary of States vs. regional summary of States.

A 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, 2021a).

CAUTIs in the hospital setting are caused by instrumentation of the urinary tract (CDC, 2021b). Potential complications resulting from the development of CAUTI include cystitis, pyelonephritis, endocarditis, septic arthritis, and meningitis. NHSN defines CAUTIs based on symptomatic urinary tract infection, asymptomatic bacteremic UTI, or urinary system infection 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.

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.

Infections counted for SIRs are restricted to acute care hospitals (excluding critical access hospitals, long-term acute care hospitals, and inpatient rehabilitation facilities) and are stratified by unit type:

- Critical care units (excluding neonatal intensive care units)
- General hospital wards

Data were submitted to NHSN by hospitals in all 50 U.S. States, Washington, DC, Guam, Puerto Rico, and the U.S. Virgin Islands. SIRs were not calculated for States or territories with fewer than five facilities reporting data. Too few hospitals were located in Guam and the Virgin Islands for the calculation of State-level SIRs for any of the measures presented here. For the same

reason, SIRs were not calculated for Vermont in 2017 or 2018 for "Central line-associated bloodstream infections seen in critical care units" and "Catheter-associated urinary tract infections seen in critical care units" or for Puerto Rico in any year for "Hospital-onset *Clostridioides difficile* infections seen hospital wide." In all years, however, data received from all States and all of the listed territories were included in the calculation of the U.S. national SIR.

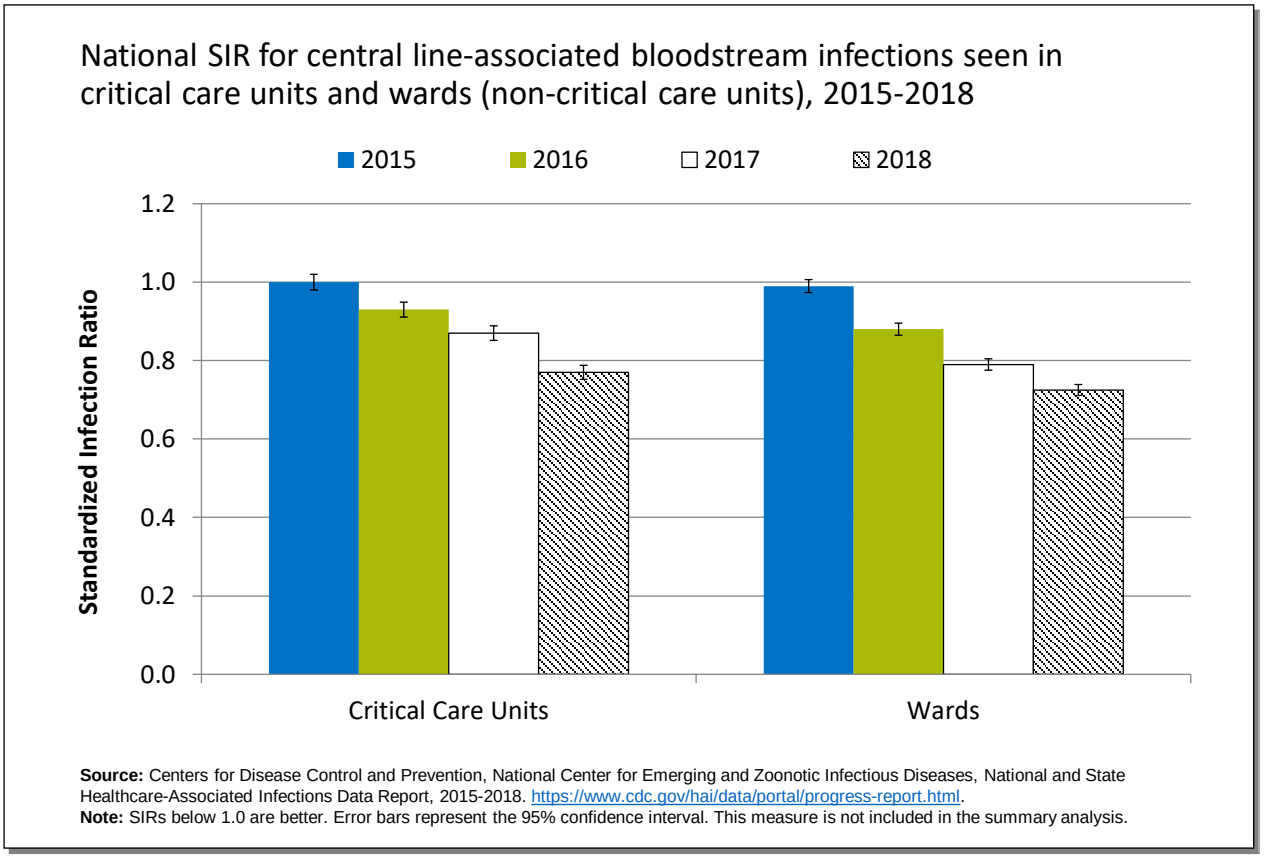
NHSN calculated SIRs (and their 95% confidence intervals) for 52 individual State-equivalent jurisdictions (50 States plus Washington, DC, and Puerto Rico). However, the State-level SIRs were not infrequently based on small numbers (i.e., <50) of observed or predicted site-specific infections. Therefore, SIRs are displayed for the entire United States or are summarized by whether the State SIRs were above, around, or below 1.0 and are aggregated across the entire country or by the U.S. census region.

The differences among regions have not been assessed for statistical significance.

The United States is divided into four Census 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)

Infection Ratios for Central-Line Associated Bloodstream Infections



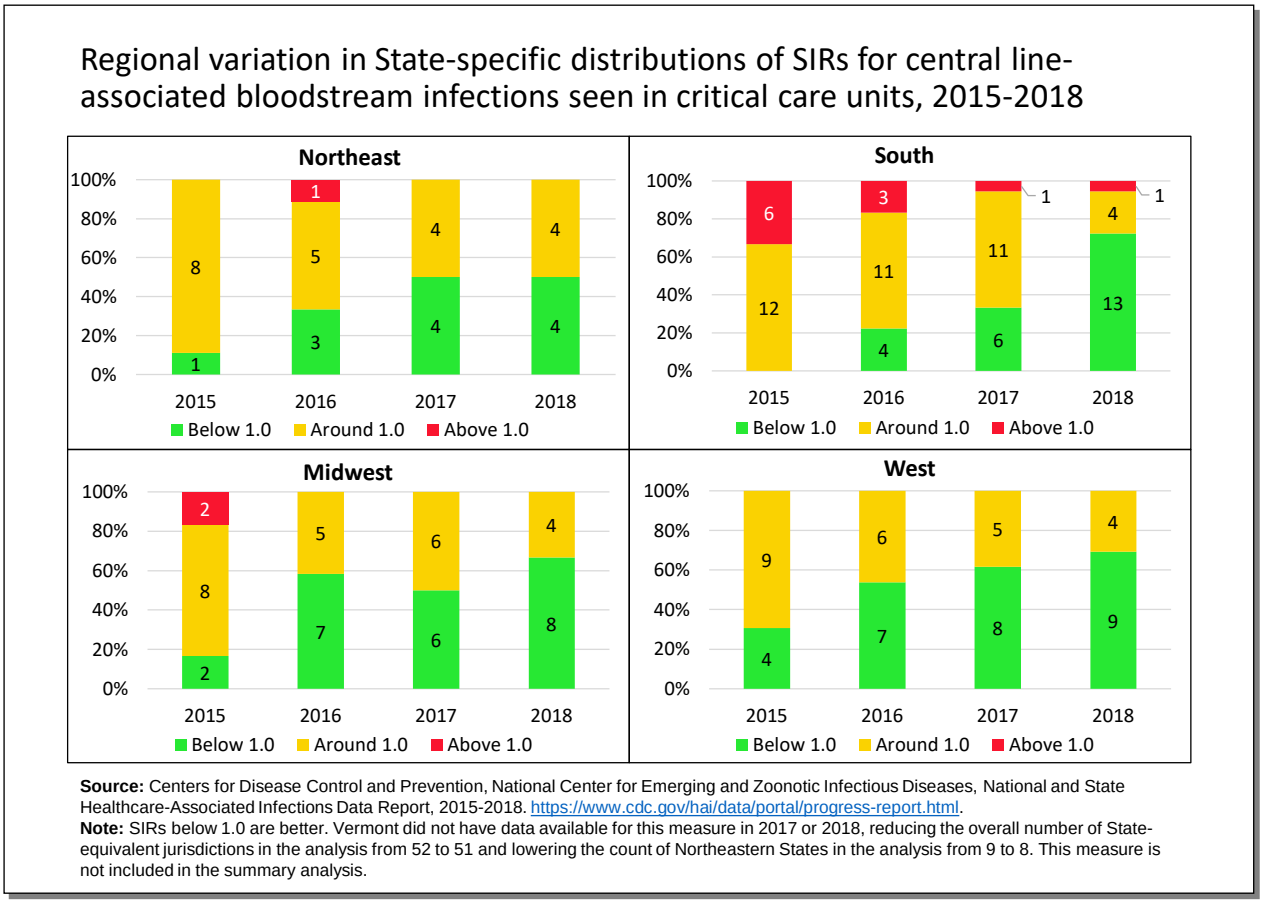
Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Error bars represent the 95% confidence interval. This measure is not included in the summary analysis.

- **Importance:** Primary bloodstream infections associated with a central venous catheter account for approximately 8.3% of HAIs in acute care hospitals (Magill, et al., 2014). In addition, CLABSI SIRs are higher among critical care units than among non-critical care wards (CDC, 2021a).

95% Confidence Intervals:

- CLABSI critical care:
  - 2015, 0.981-1.021
  - 2016, 0.912-0.950
  - 2017, 0.848-0.885
  - 2018, 0.752-0.788
- CLABSI wards:
  - 2015, 0.976-1.009
  - 2016, 0.861-0.892
  - 2017, 0.773-0.802
  - 2018, 0.711-0.739

Regional Variation in Infection Ratios for CLABSIs in Critical Care Units

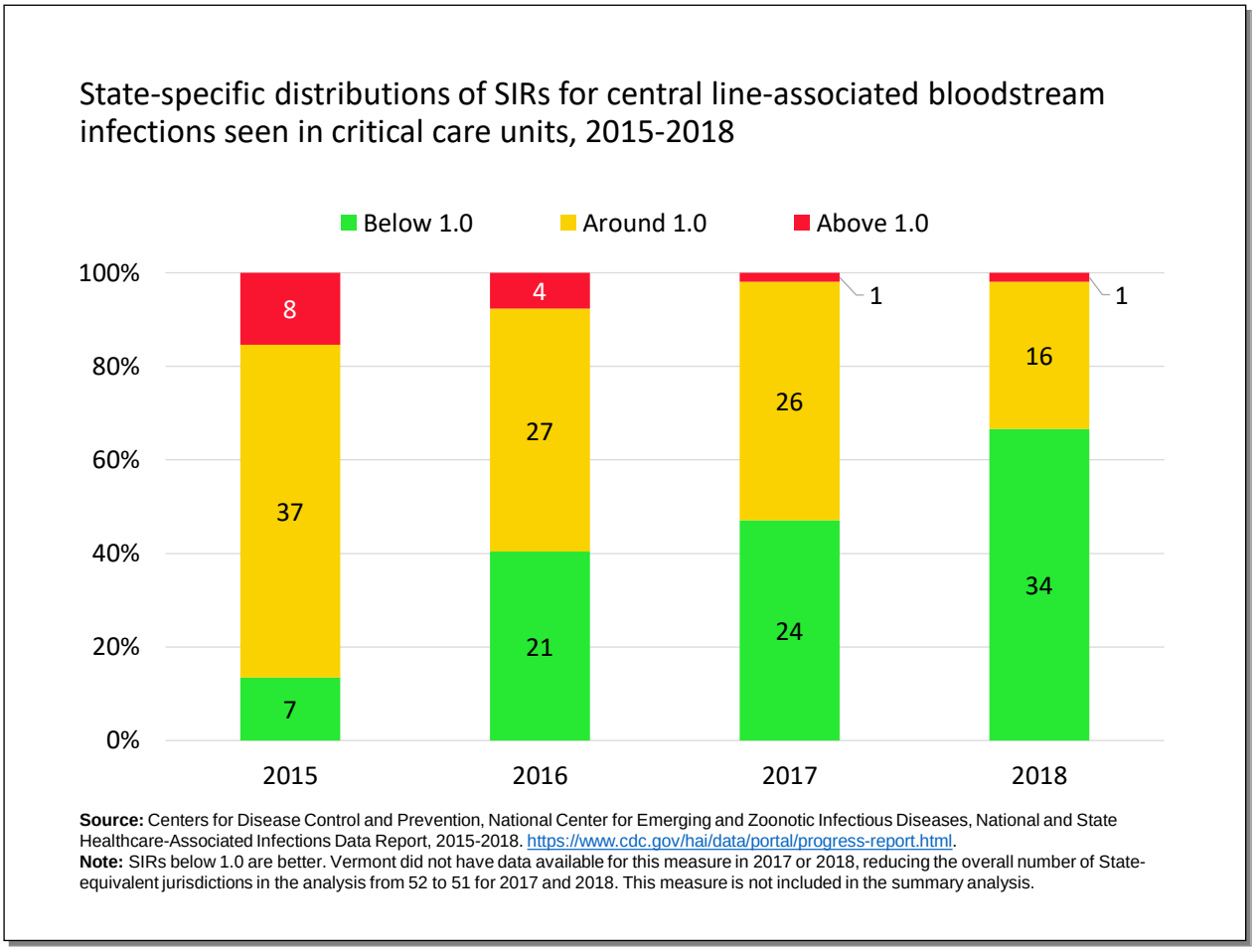


Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Vermont did not have data available for this measure in 2017 or 2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 and lowering the count of Northeastern States in the analysis from 9 to 8. This measure is not included in the summary analysis.

- For CLABSIs in critical care units:
  - The South had the highest percentage of States with SIRs under 1.0 in 2018 (72%).
  - The Northeast had the lowest percentage of States with SIRs under 1.0 in 2018 (50%).
  - The South was the only region with a State with a SIR above 1.0 in 2018.

- The United States is divided into four Census 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)

State-Specific Distribution of Infection Ratios for CLABSIs in Critical Care Units

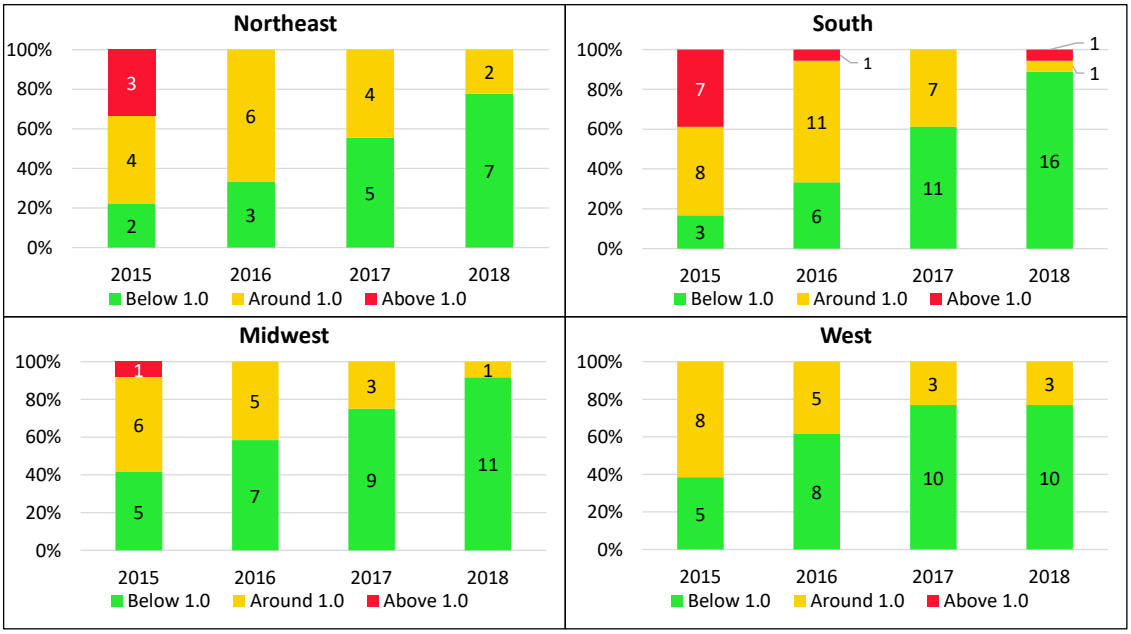


Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Vermont did not have data available for this measure in 2017 or 2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 for 2017 and 2018. This measure is not included in the summary analysis.

- For CLABSIs seen in critical care units of acute care hospitals in 2018:
  - State-specific SIRs ranged from 0.320 (minimum) to 2.008 (maximum).
  - Roughly half of State-specific SIRs fell in the range of 0.668 (25th percentile) to 0.862 (75th percentile).

Regional Variation in Infection Ratios for CLABSIs in Wards

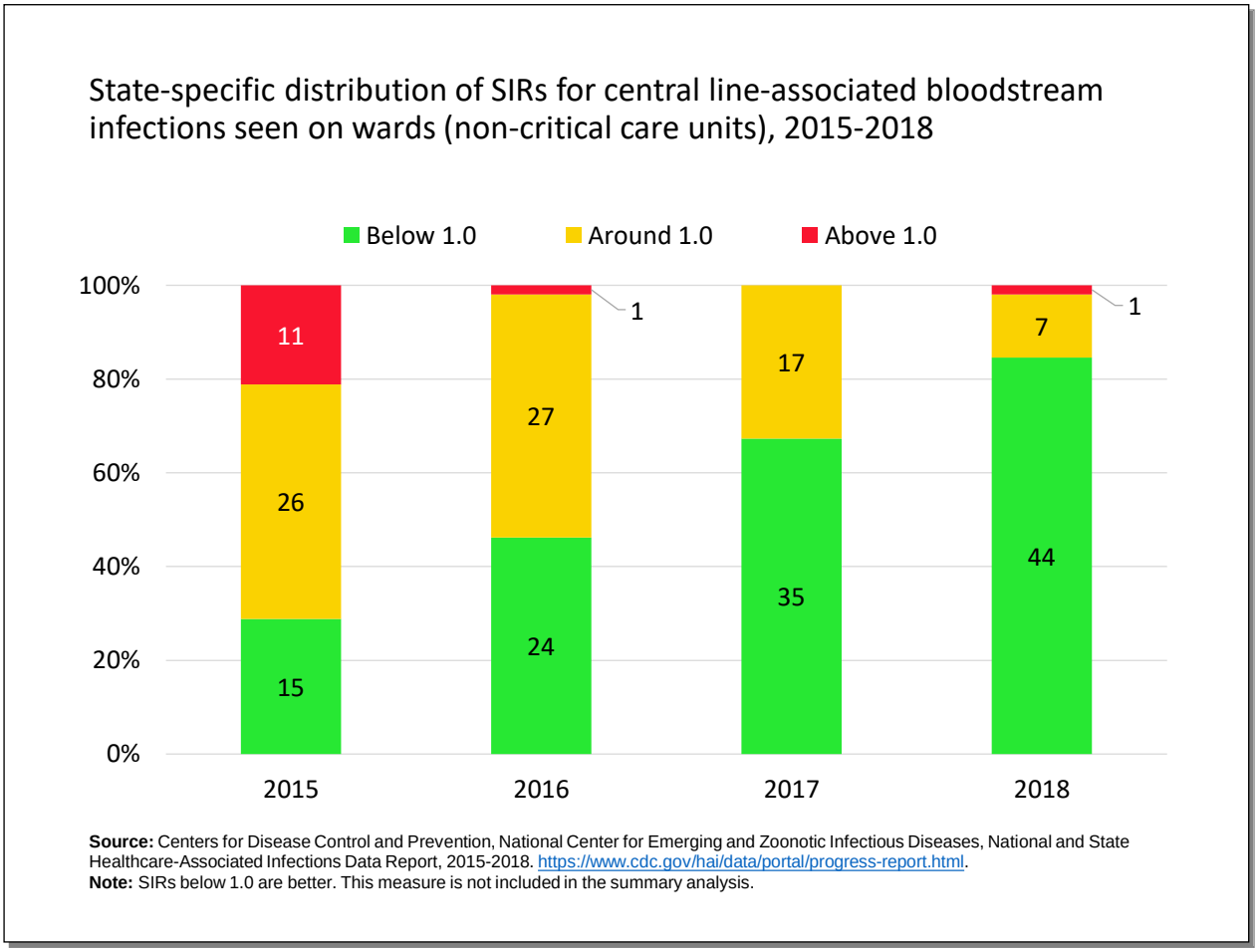
Regional variation in State-specific distributions of SIRs for central line-associated bloodstream infections seen on wards (non-critical care units), 2015-2018



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. This measure is not included in the summary analysis.

- For CLABSIs in non-critical care units of acute care hospitals:
  - The Midwest had the highest percentage of States with SIRs under 1.0 in 2018 (92%).
  - The West had the lowest percentage of States with SIRs under 1.0 in 2018 (77%).
  - The South was the only region with a State with a SIR above 1.0 in 2018.
- The United States is divided into four Census 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)

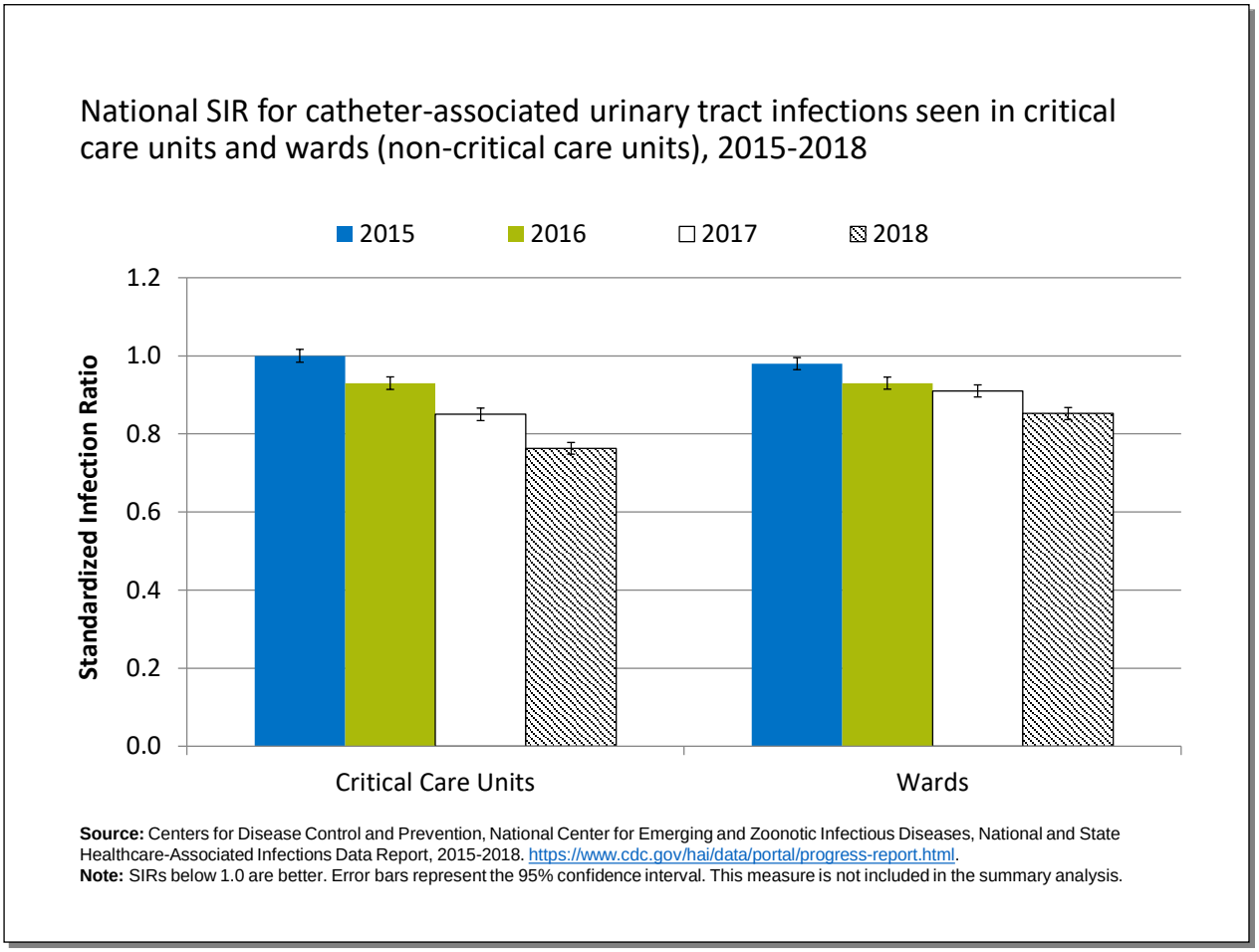
State-Specific Distribution of Infection Ratios for CLABSIs in Wards



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. This measure is not included in the summary analysis.

- For CLABSIs seen in non-critical care units of acute care hospitals in 2018:
  - State-specific SIRs ranged from 0.000 (minimum) to 1.635 (maximum).
  - The interquartile range of State-specific SIRs was 0.610 (25th percentile) to 0.813 (75th percentile).

Standardized Infection Ratios for Catheter-Associated Urinary Tract Infections



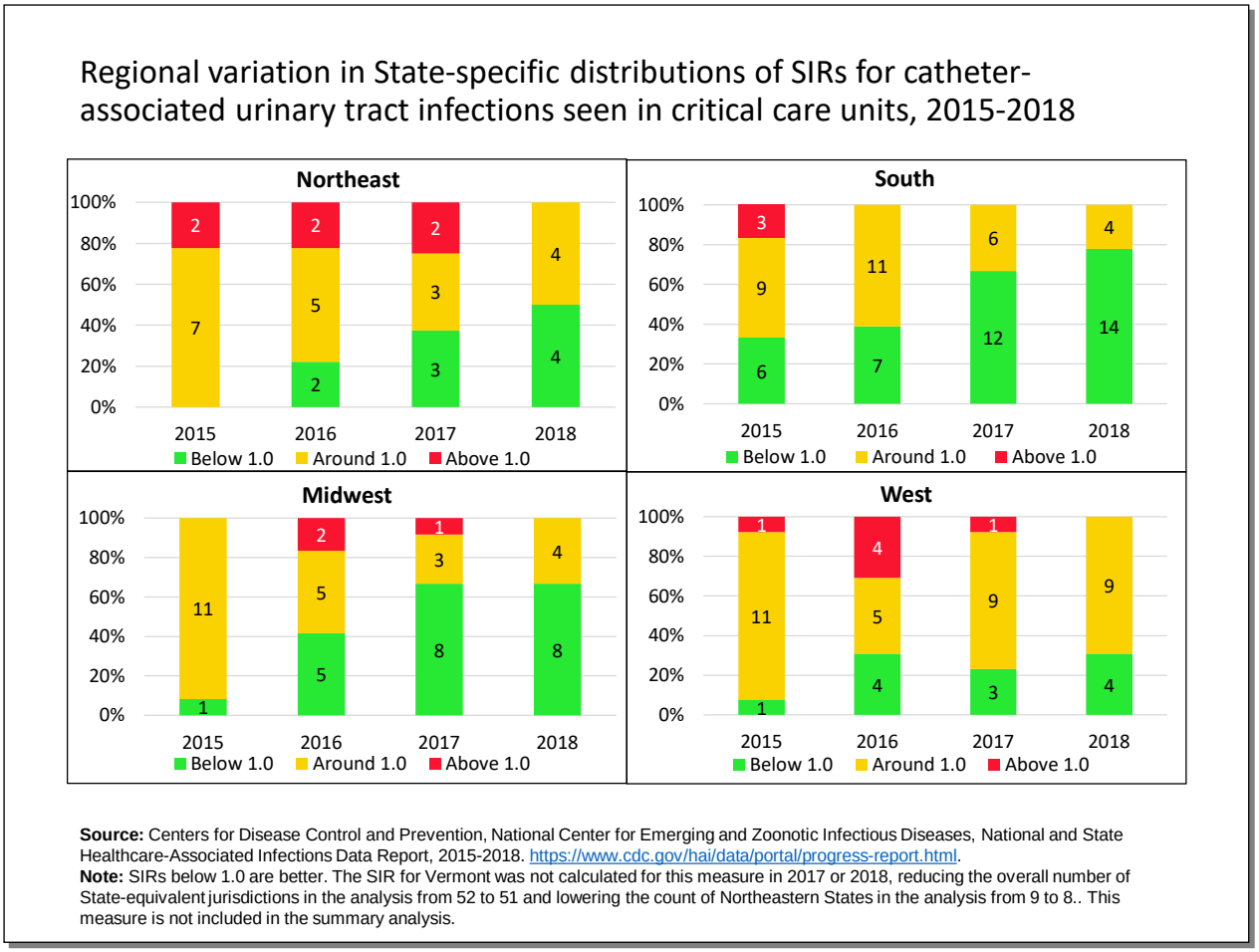
Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Error bars represent the 95% confidence interval. This measure is not included in the summary analysis.

- **Importance:** 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.

95% Confidence Intervals

- CAUTI, critical care:
  - 2015, 0.986-1.019
  - 2016, 0.911-0.943
  - 2017, 0.834-0.866
  - 2018, 0.748-0.778
- CAUTI, wards:
  - 2015, 0.969-1.000
  - 2016, 0.918-0.949
  - 2017, 0.893-0.924
  - 2018, 0.836-0.867

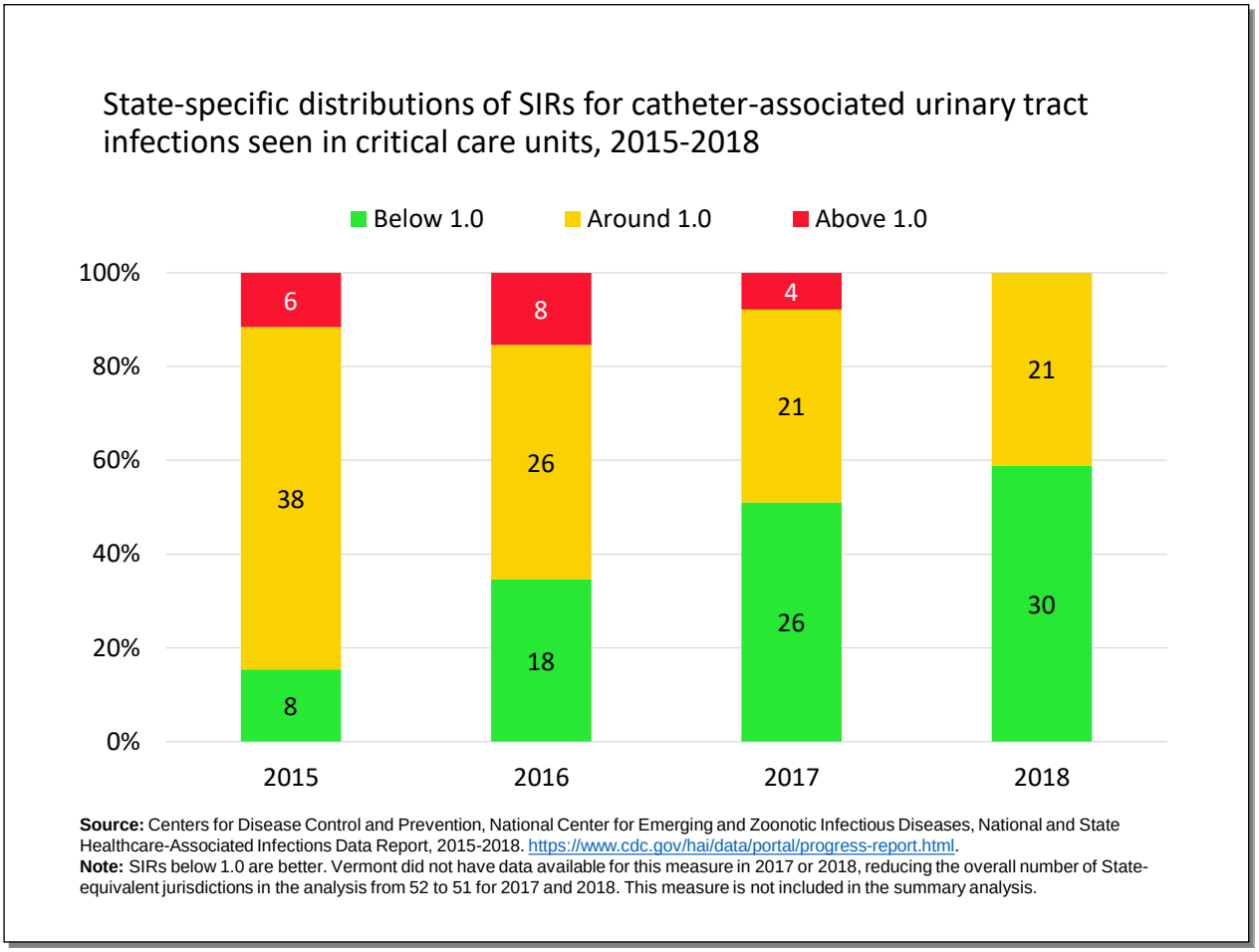
Regional Variation in Infection Ratios for CAUTIs in Critical Care Units



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. The SIR for Vermont was not calculated for this measure in 2017 or 2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 and lowering the count of Northeastern States in the analysis from 9 to 8.. This measure is not included in the summary analysis.

- For CAUTIs in critical care units of acute care hospitals:
  - The South had the highest percentage of States with SIRs under 1.0 in 2018 (78%).
  - The West had the lowest percentage of States with SIRs under 1.0 in 2018 (31%).
  - No regions had a SIR above 1.0 in 2018.
- The United States is divided into four Census 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)

State-Specific Distribution of Infection Ratios for CAUTIs in Critical Care Units

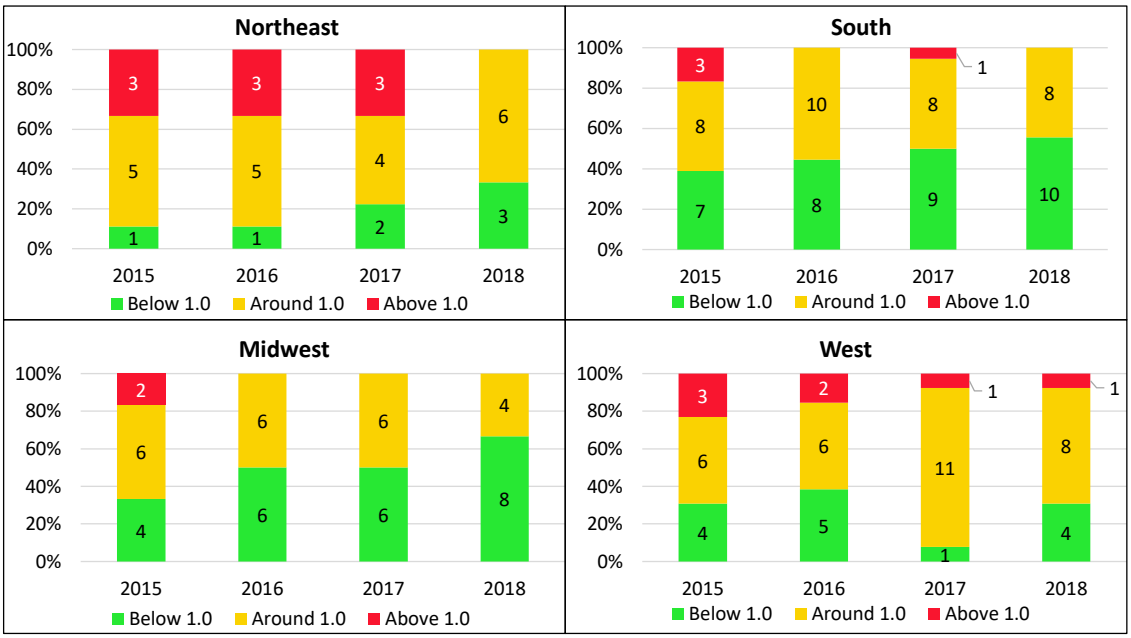


Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Vermont did not have data available for this measure in 2017 or 2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 for 2017 and 2018. This measure is not included in the summary analysis.

- For CAUTIs seen in critical care units of acute care hospitals in 2018:
  - State-specific SIRs ranged from 0.490 (minimum) to 1.561 (maximum).
  - Roughly half of State-specific SIRs fell in the range of 0.668 (25th percentile) to 0.858 (75th percentile).

Regional Variation in Infection Ratios for CAUTIs in Wards

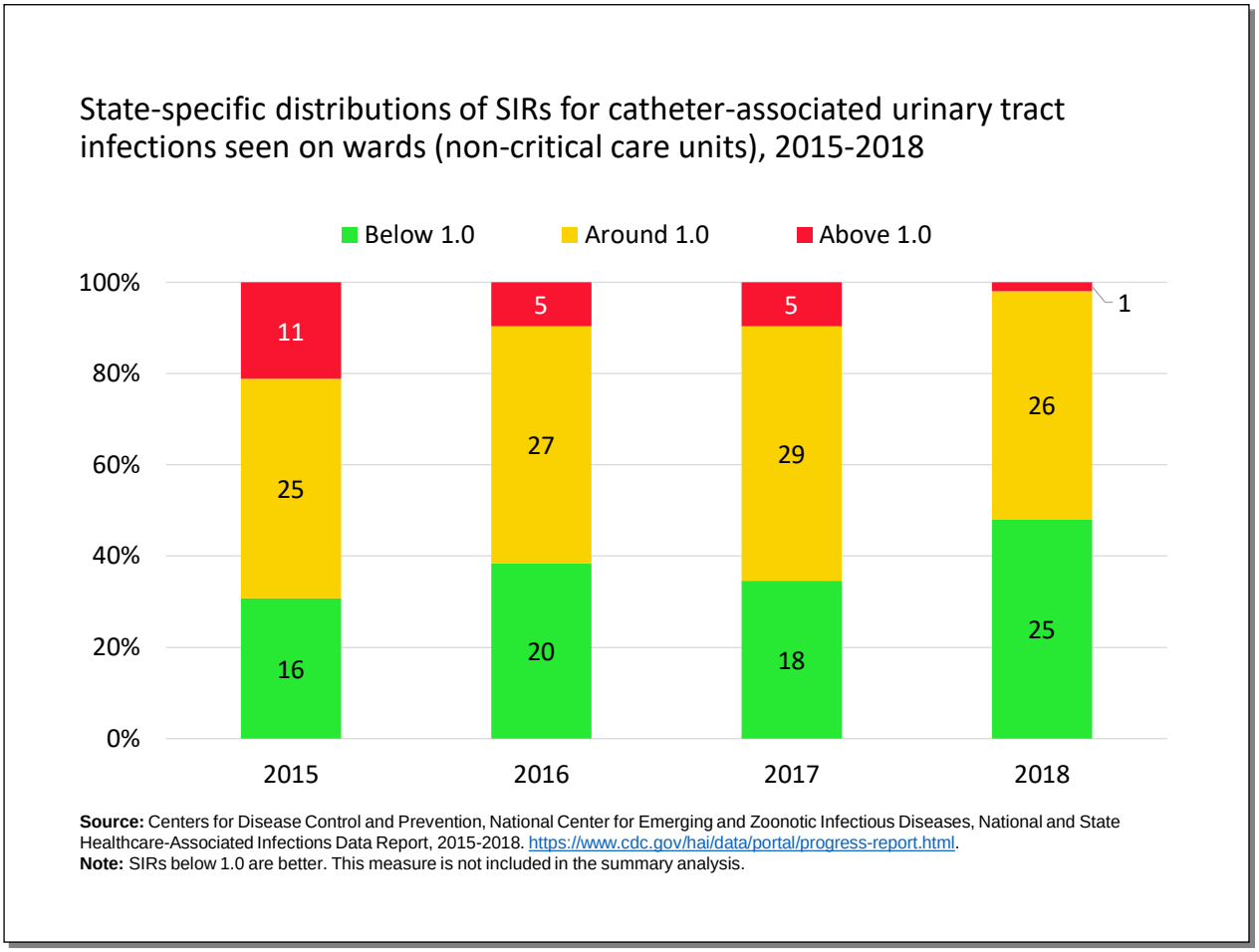
Regional variation in State-specific distributions of SIRs for catheter-associated urinary tract infections seen on wards (non-critical care units), 2015-2018



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. This measure is not included in the summary analysis.

- For CAUTIs seen on acute care hospital wards only (not critical care locations):
  - The Midwest had the highest percentage of States with SIRs under 1.0 in 2018 (67%).
  - The West had the lowest percentage of States with SIRs under 1.0 in 2018 (31%).
  - The West was the only region with a State with a SIR above 1.0 in 2018.
- The United States is divided into four Census 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)

State-Specific Distribution of Infection Ratios for CAUTIs

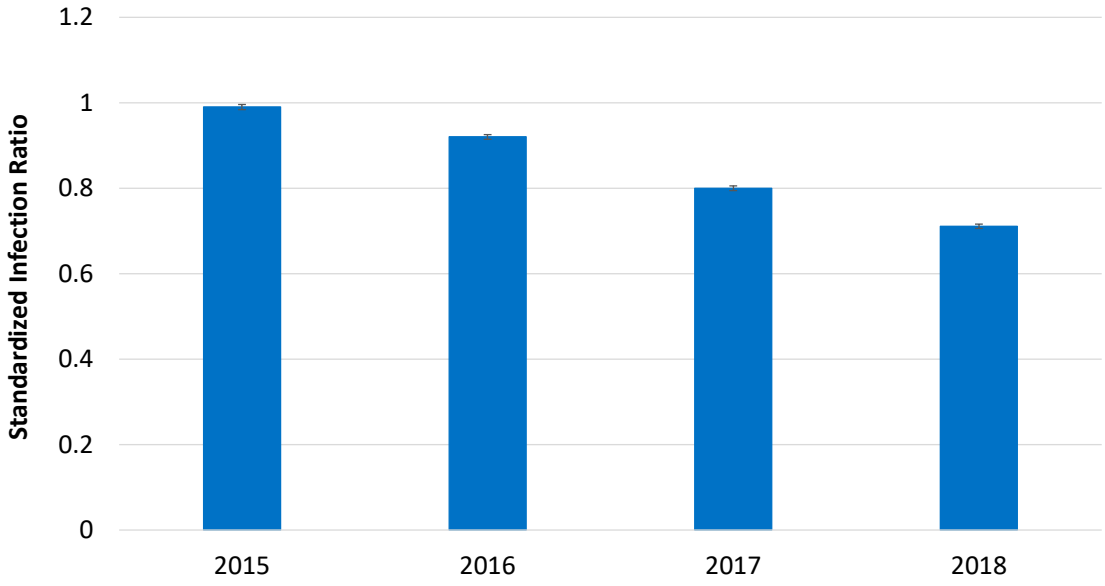


Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. This measure is not included in the summary analysis.

- For CAUTIs seen on wards (non-critical care units) of acute care hospitals in 2018:
  - State-specific SIRs ranged from 0.439 (minimum) to 1.653 (maximum).
  - The interquartile range of State-specific SIRs (i.e., capturing the middle half of the SIRs) was 0.755 (25th percentile) to 0.950 (75th percentile).

Nationwide Infection Ratio for *Clostridioides difficile*

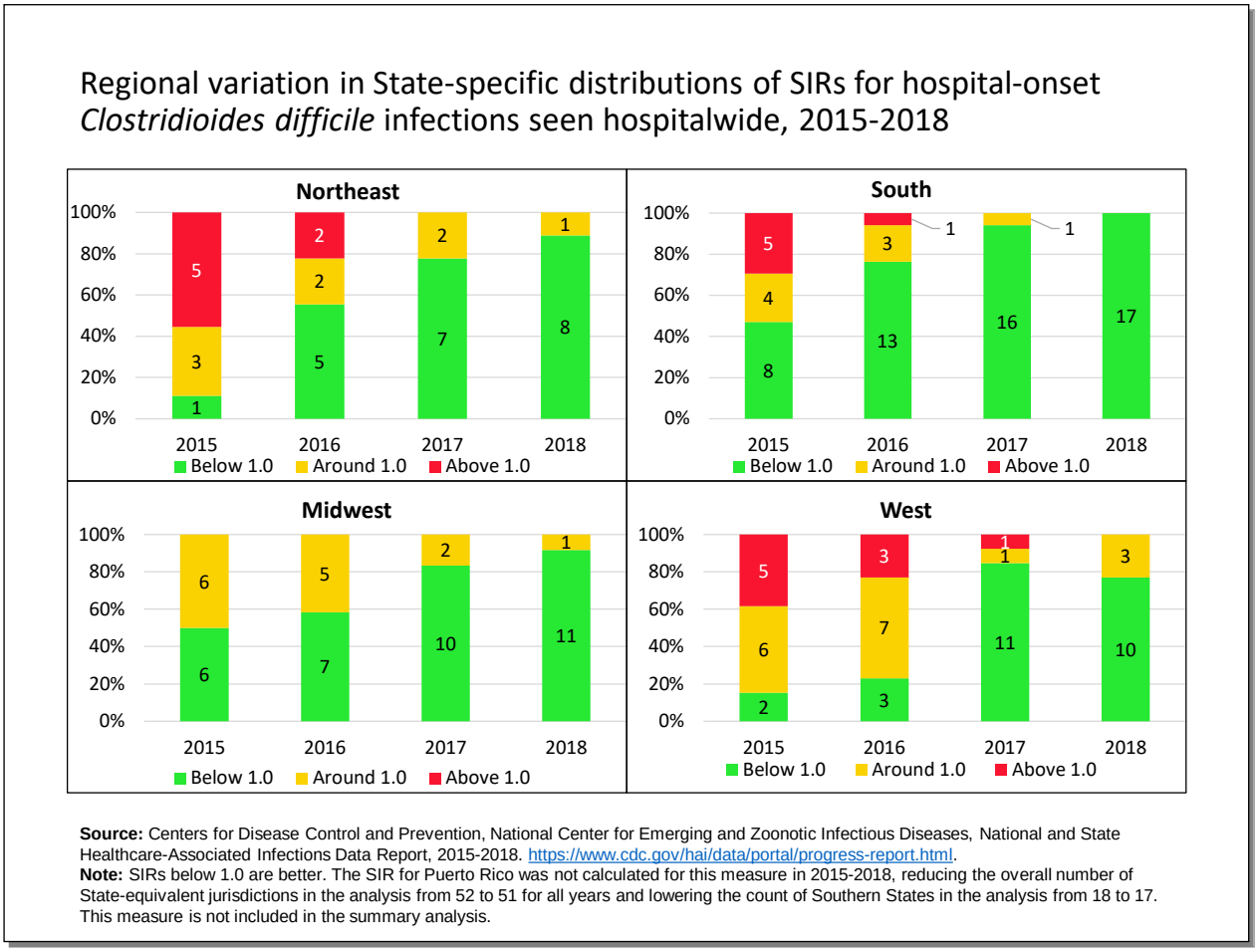
National SIR for hospital-onset *Clostridioides difficile* infections seen hospitalwide, 2015-2018



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. Error bars represent the 95% confidence interval. This measure is not included in the summary analysis.

- 95% Confidence Intervals
  - 2015, 0.987-0.999
  - 2016, 0.915-0.926
  - 2017, 0.799-0.810
  - 2018, 0.706-0.716

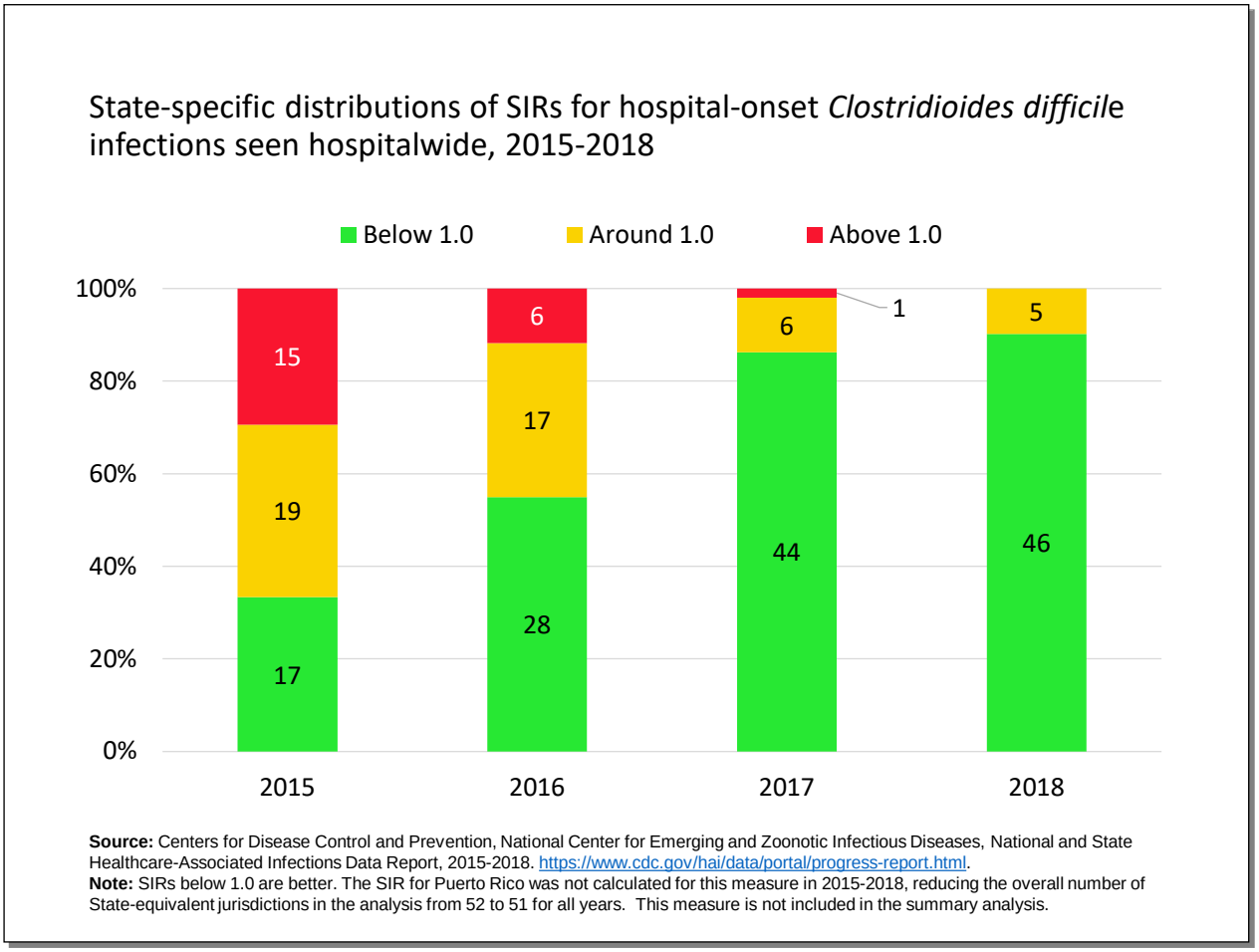
Regional Variation in Infection Ratios for *C. difficile*



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. The SIR for Puerto Rico was not calculated for this measure in 2015-2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 for all years and lowering the count of Southern States in the analysis from 18 to 17. This measure is not included in the summary analysis.

- For *Clostridioides difficile* infections seen hospitalwide:
  - The South had the highest percentage of States with SIRs under 1.0 in 2018 (100%).
  - The West had the lowest percentage of States with SIRs under 1.0 in 2018 (77%).
  - No regions had a SIR above 1.0 in 2018.
- The United States is divided into four Census 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)

State-Specific Distribution of Infection Ratios for *C. difficile*



Source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, National and State Healthcare-Associated Infections Data Report, 2015-2018. https://www.cdc.gov/hai/data/portal/progress-report.html.
Note: SIRs below 1.0 are better. The SIR for Puerto Rico was not calculated for this measure in 2015-2018, reducing the overall number of State-equivalent jurisdictions in the analysis from 52 to 51 for all years. This measure is not included in the summary analysis.

- For hospital-onset *C. difficile* infection seen anywhere in the hospital in 2018:
  - State-specific SIRs ranged from 0.526 (minimum) to 0.956 (maximum).
  - Roughly half of State-specific SIRs fell in the range of 0.661 (25th percentile) to 0.799 (75th percentile).

Tools for Reducing Central Line-Associated Bloodstream Infections in Hospitals

- **Purpose:** To help hospitals prevent 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
- **Available Tools:** Checklists, preventable incidence calculators, audit forms, event report templates
- **Link:** https://www.ahrq.gov/professionals/education/ curriculum-tools/clabsitools/index.html

Through use of the CUSP toolkit and CLABSI tools, more than 100 hospital intensive care units (ICUs) in Michigan nearly eliminated CLABSIs. Nationwide, the use of this toolkit helped more than 1,100 hospital ICUs reduce rates of CLABSI by 40% in aggregate. Refer to https://www.ahrq.gov/workingforquality/priorities-in-action/michigan-health-and-hospital-association-keystone-center.html.

Tools for Reducing Catheter-Associated Urinary Tract Infections in Hospitals

- **Purpose:** To help hospitals prevent CAUTIs and improve safety culture
- **Methods:** Implementing evidence-based, practical resources and concepts from the Comprehensive Unit-based Safety Program (CUSP)
- **Intended Users:** Hospital facilities
- **Available Tools**: Guides, checklists, webinars, learning modules, data interpretation guides
- **Link:** https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/cauti-hospitals/index.html
- **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%.

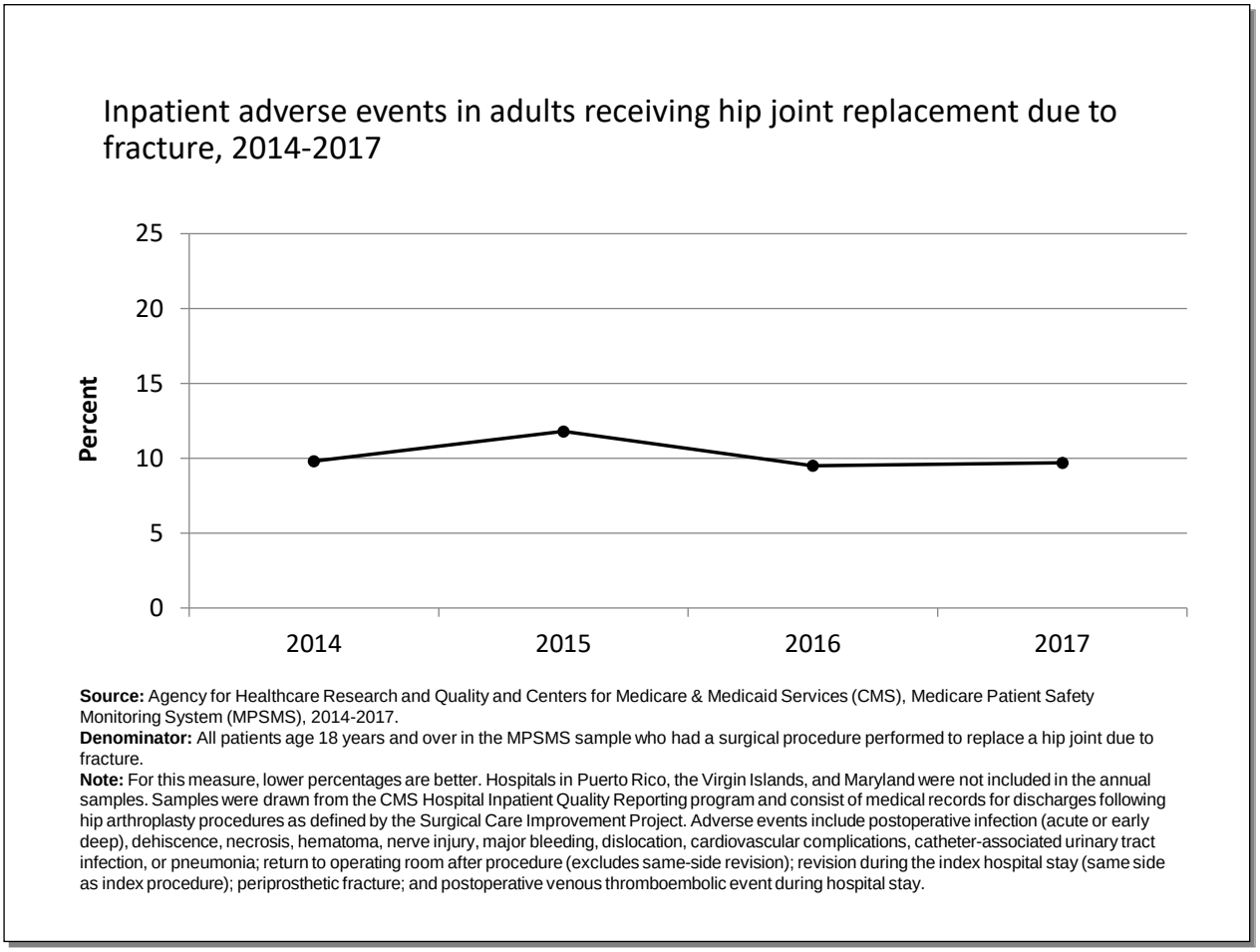
Procedure-Related Events

More than 20 million invasive, therapeutic surgeries are performed in the United States each year (Steiner, et al., 2017). Postoperative adverse events are not uncommon and are associated with higher rates of mortality and morbidity (Sunshine, et al., 2019). Postoperative adverse events also increase both hospitalization length of stay and cost (AHRQ, 2013).

Procedure-Related Event Measures

- Adverse events related to hip/knee replacement
  - Inpatient adverse events in adults receiving hip joint replacement due to degenerative conditions
  - Inpatient adverse events in adults receiving hip joint replacement due to fracture
  - Inpatient adverse events in adults receiving knee replacement
- Other postoperative events
  - Adult surgery patients with postoperative pneumonia events

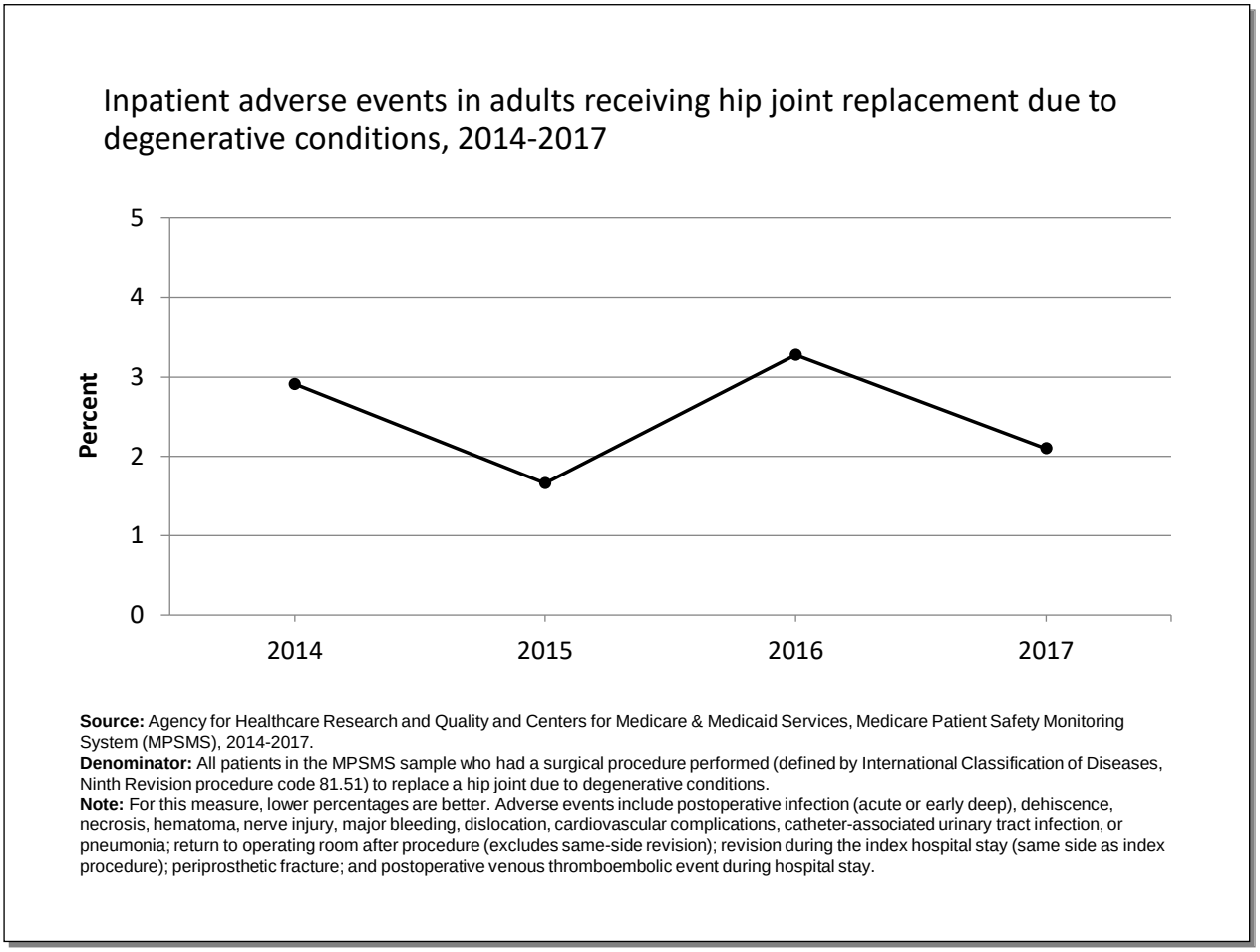
Inpatient Adverse Events Related to Hip Replacement Due to Fracture



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services (CMS), Medicare Patient Safety Monitoring System (MPSMS), 2014-2017.
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 fracture.
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. Adverse events include postoperative infection (acute or early deep), dehiscence, necrosis, hematoma, nerve injury, major bleeding, dislocation, cardiovascular complications, catheter-associated urinary tract infection, or pneumonia; return to operating room after procedure (excludes same-side revision); revision during the index hospital stay (same side as index procedure); periprosthetic fracture; and postoperative venous thromboembolic event during hospital stay.

- **Importance:** Hip replacement is most commonly performed in older adults, who have an increased risk of adverse events after these procedures. Hip and knee replacements are the most common major surgeries for Medicare beneficiaries (Fingar, et al., 2014).
- **Overall Percentage:** In 2017, 9.7% of adult patients receiving a hip joint replacement due to fracture experienced adverse events.
- **Trends:** Between 2014 and 2017, there was no change in the percentage of adult patients experiencing adverse events when receiving a hip joint replacement due to fracture for all reported subpopulations and the total.

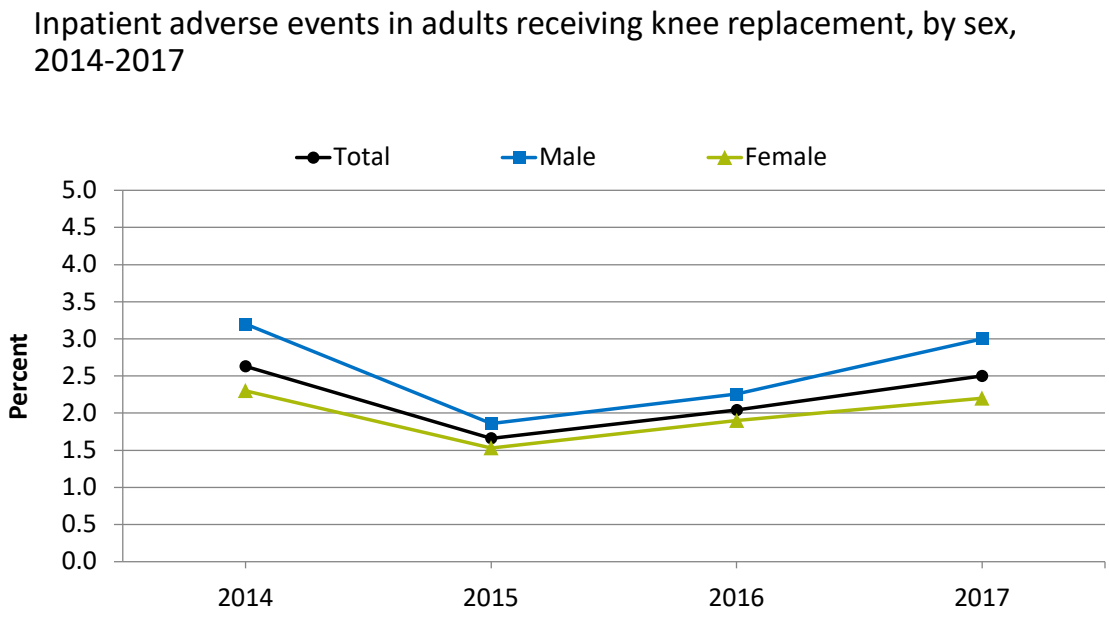
Inpatient Adverse Events Related to Hip Replacement Due to Degenerative Conditions



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System (MPSMS), 2014-2017.
Denominator: All patients in the MPSMS sample who had a surgical procedure performed (defined by International Classification of Diseases, Ninth Revision procedure code 81.51) to replace a hip joint due to degenerative conditions.
Note: For this measure, lower percentages are better. Adverse events include postoperative infection (acute or early deep), dehiscence, necrosis, hematoma, nerve injury, major bleeding, dislocation, cardiovascular complications, catheter-associated urinary tract infection, or pneumonia; return to operating room after procedure (excludes same-side revision); revision during the index hospital stay (same side as index procedure); periprosthetic fracture; and postoperative venous thromboembolic event during hospital stay.

- **Importance:** Although a common procedure for Medicare beneficiaries, hip replacements can lead to complications, such as dislocation, periprosthetic fracture, and infection, which negatively affect patients' outcomes, including satisfaction, quality of life, mental health, and function (Carpenter, et al., 2020).
- **Overall Percentage:** In 2017, 2.1% of adults receiving a hip joint replacement due to degenerative conditions experienced an adverse event in the hospital.
- **Trend:** The percentage of patients experiencing adverse events in the hospital after receiving a hip joint replacement did not improve between 2014 and 2017.

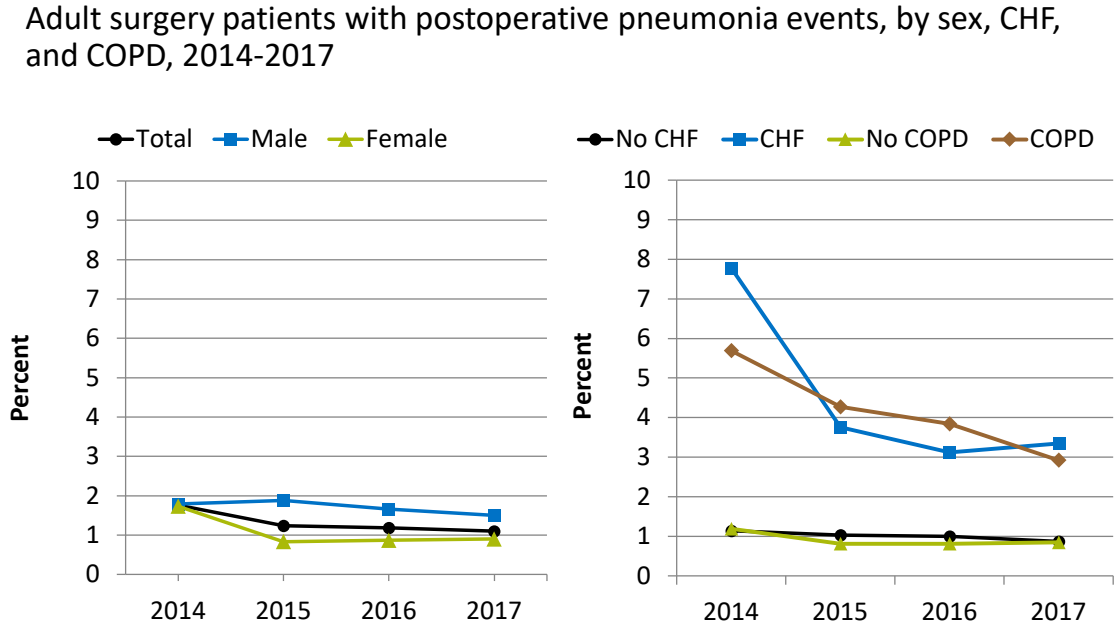
Inpatient Adverse Events Related to Knee Replacement



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System (MPSMS), 2014-2017.
Denominator: All patients in the MPSMS sample who undergo a knee joint replacement (defined by International Classification of Diseases, Ninth Revision procedure code 81.54).
Note: For this measure, lower percentages are better. Adverse events include postoperative infection (acute or early deep), dehiscence, necrosis, hematoma, nerve injury, major bleeding, dislocation, cardiovascular complications, catheter-associated urinary tract infection, or pneumonia; return to operating room after procedure (excludes same-side revision); revision during the index hospital stay (same side as index procedure); periprosthetic fracture; and postoperative venous thromboembolic event during hospital stay.

- **Importance:** Knee replacement is one of the most common procedures experienced by Medicare beneficiaries.
- **Overall Percentage:** In 2017, 2.5% of adults experienced adverse events following a knee replacement procedure.
- **Trends:** The adverse event rate for adults receiving knee replacement did not improve between 2014 and 2017 overall or for men or women.
- **Groups With Disparities:** No significant disparities were found in 2014 or 2017.

Surgery Patients With Postoperative Pneumonia Events



Key: CHF = congestive heart failure (also includes pulmonary edema); COPD = chronic obstructive pulmonary disease.
Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System (MPSMS), 2014-2017.
Denominator: All patients from the MPSMS sample who had at least one of the selected major surgical procedures identified as part of the Surgical Care Improvement Project and did not have pneumonia before the procedure.
Note: For this measure, lower percentages are better.

- **Importance:** Pneumonia is a common postoperative adverse event associated with significant morbidity and mortality. Risk factors differ by type of surgery but frequently include advanced age and chronic conditions such as congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) (Chughtai, et al., 2017).
- **Overall Percentage:** In 2017, 1.1% of adults who had at least one of several selected surgical procedures subsequently contracted pneumonia.
- **Trends:** There were no statistically significant changes in the percentage of patients who contracted pneumonia after one of several selected surgical procedures between 2014 and 2017 overall or for men or women. Rates by CHF and COPD status were not analyzed for trends.
- **Groups With Disparities:**
  - **With CHF:** In 2017, patients with CHF were more likely to contract postoperative pneumonia than those without CHF (3.4% vs. 0.9%).
  - **With COPD:** In 2017, patients with COPD were more likely to contract postoperative pneumonia than those without COPD (2.9% vs. 0.9%).

Maternal Morbidity and Mortality

Maternal mortality, defined as the risk of dying from causes associated with childbirth, is considered a sentinel event in that it is a rare and negative maternal outcome (Adams, et al., 2009). The United States has one of the highest maternal mortality rates compared with other high-income industrialized countries, with 17.4 deaths per 100,000 live births in 2018 (CDC, 2020a). About 700 women die from pregnancy-related complications annually. One-third of pregnancy related deaths occur 1 week to 1 year after delivery. Three in five pregnancy-related deaths are preventable (CDC, 2019).

Persistent racial and ethnic disparities in maternal mortality have also accompanied the rise in maternal deaths, with Black women having a pregnancy-related mortality rate 3 times as high as that of non-Hispanic White women (Petersen, et al., 2019).

Like maternal mortality, severe maternal morbidity, which encompasses unintended outcomes of labor and delivery that result in short-term or long-term health issues, has similarly increased in the United States in recent decades (ACOG, Kilpatrick, & Ecker, 2016).

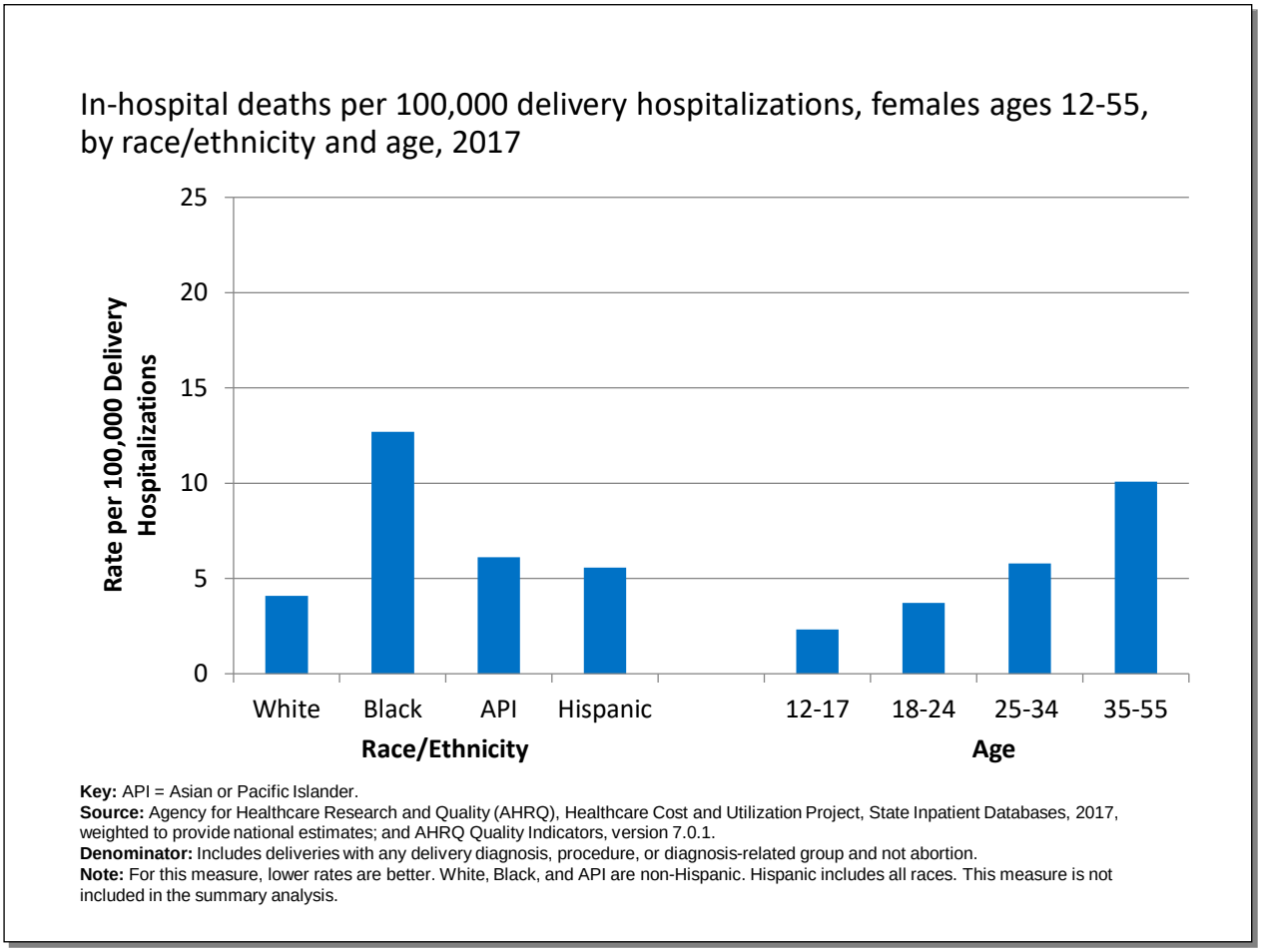
Many cases of maternal morbidity and mortality are potentially preventable. Factors that contribute to these events have been categorized at the patient, provider, health facility, and system level (Petersen, et al.).

Maternal Morbidity and Mortality Measures

- In-hospital deaths per 100,000 delivery hospitalizations
- Severe maternal morbidity per 1,000 delivery hospitalizations
- Severe postpartum hemorrhage per 1,000 delivery hospitalizations
- Eclampsia or preeclampsia per 1,000 delivery hospitalizations
- Venous thromboembolism (VTE) or pulmonary embolism (PE) per 1,000 delivery discharges
- Cesarean deliveries among low-risk first births

Three maternal morbidity and mortality measures have been added to the three included in prior NHQDR releases to further understanding of the significance of these events and opportunities for improvement in maternal healthcare.

In-Hospital Maternal Deaths

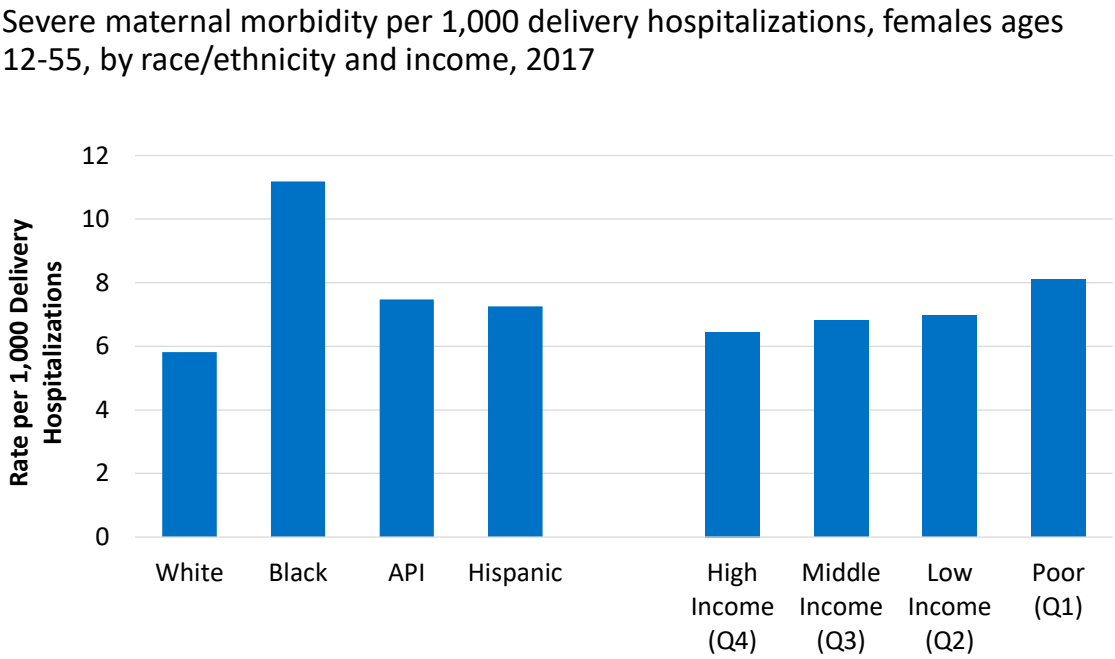


Key: API = Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project, State Inpatient Databases, 2017, weighted to provide national estimates; and AHRQ Quality Indicators, version 7.0.1.
Denominator: Includes deliveries with any delivery diagnosis, procedure, or diagnosis-related group and not abortion.
Note: For this measure, lower rates are better. White, Black, and API are non-Hispanic. Hispanic includes all races. This measure is not included in the summary analysis.

- **Importance:** Pregnancy-related mortality in the United States has risen from 7.2 deaths per 100,000 live births in 1987 to 17.3 deaths in 2017 (CDC, 2020b). Severe maternal morbidity, including mortality, disproportionately affects minority and low-income women (Fingar, et al., 2018). About one-third of pregnancy-related deaths occur at delivery or within 1 week of delivery. Maternal deaths that occur during hospital stays may provide a window into both system and provider-level factors that can play a role in preventing maternal death (CDC, 2019).
- **Overall Rate:** In 2017, the rate of deaths per 100,000 delivery hospitalizations among women ages 12-55 was 6.0 (data not shown).
- **Groups With Disparities:**
  - Race/Ethnicity:
    - In-hospital deaths were more than three times as high among Black females compared with White females (12.7 vs. 4.1 per 100,000 delivery hospitalizations).

- Age:
  - Compared with females ages 18-24, females ages 25-34 were more likely to die during a delivery hospitalization (5.8 vs. 3.7 per 100,000 delivery hospitalizations).
  - Compared with females ages 18-24, females ages 35-55 were more likely to die during a delivery hospitalization (10.1 vs. 3.7 per 100,000 delivery hospitalizations).

Severe Maternal Morbidity by Race/Ethnicity and Income

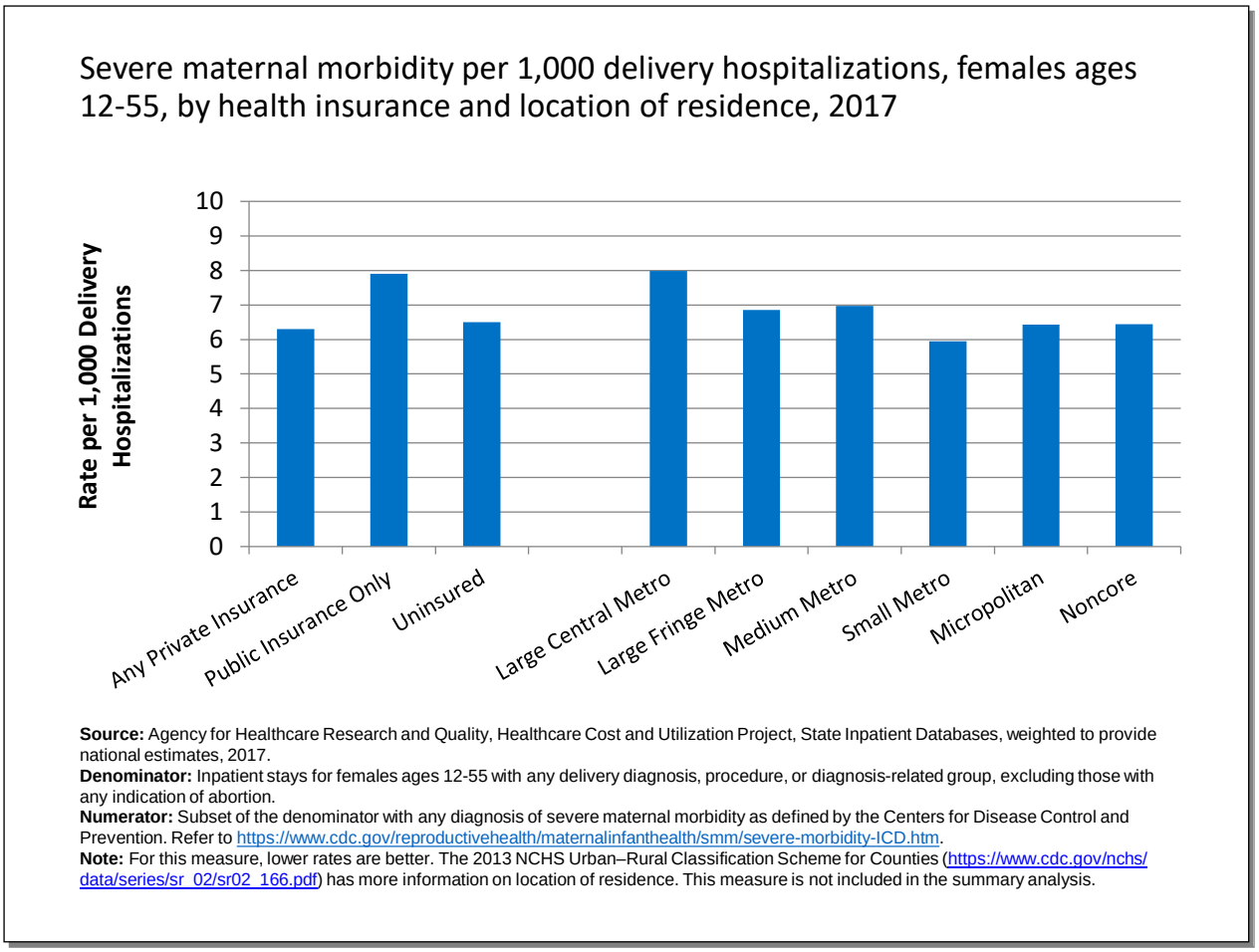


Key: API = Asian or Pacific Islander; Q = quartile.
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases, weighted to provide national estimates, 2017.
Denominator: Inpatient stays for females ages 12-55 with any delivery diagnosis, procedure, or diagnosis-related group, excluding those with any indication of abortion.
Numerator: Subset of the denominator with any diagnosis of severe maternal morbidity as defined by the Centers for Disease Control and Prevention. Refer to https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm.
Note: For this measure, lower rates are better. White, Black, and API are non-Hispanic. Hispanic includes all races. Poor indicates that the median household income of the patient's ZIP Code falls in the lowest quartile nationally. High Income indicates that the median household income of the patient's ZIP Code falls in the highest quartile nationally. This measure is not included in the summary analysis.

- **Importance:** Like maternal mortality, severe maternal morbidity, which encompasses unintended outcomes of labor and delivery that result in short-term or long-term health issues, has similarly increased in the United States in recent decades. The perinatal period presents unique patient safety challenges, including potential overuse and underuse of interventions, misdiagnosis, and emotional harm, which contribute to maternal morbidity and perinatal adverse events (AHRQ, 2019d).
- **Overall Rate:** Overall in 2017, 7.1 females experienced severe maternal morbidity per 1,000 delivery hospitalizations (data not shown).

- **Groups With Disparities:**
  - Race/Ethnicity:
    - In 2017, Black females were more likely to experience severe maternal morbidity compared with White females (11.2 vs. 5.8 per 1,000 delivery hospitalizations).
    - In 2017, Asian/Pacific Islander females were more likely to experience severe maternal morbidity compared with White females (7.5 vs. 5.8 per 1,000 delivery hospitalizations).
    - In 2017, Hispanic females were more likely to experience severe maternal morbidity compared with White females (7.3 vs. 5.8 per 1,000 delivery hospitalizations).
  - **Income:**
    - In 2017, poor females were more likely to experience severe maternal morbidity compared with high-income females (8.1 vs. 6.5 per 1,000 delivery hospitalizations).

Severe Maternal Morbidity, by Insurance and Location of Residence

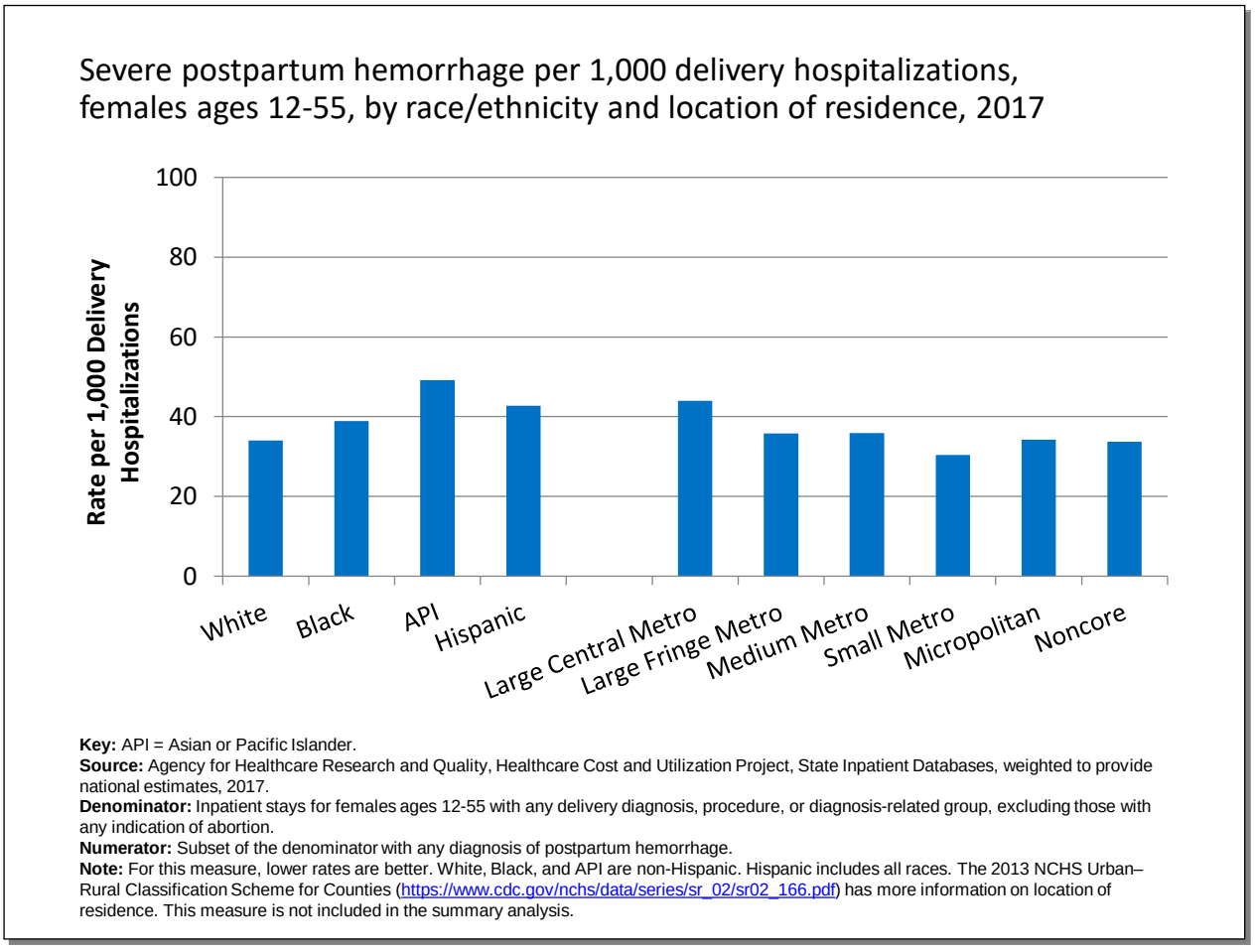


Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases, weighted to provide national estimates, 2017.
Denominator: Inpatient stays for females ages 12-55 with any delivery diagnosis, procedure, or diagnosis-related group, excluding those with any indication of abortion.
Numerator: Subset of the denominator with any diagnosis of severe maternal morbidity as defined by the Centers for Disease Control and Prevention. Refer to https://www.cdc.gov/reproductivehealth/maternalinfanthealth/smm/severe-morbidity-ICD.htm.
Note: For this measure, lower rates are better. The 2013 NCHS Urban–Rural Classification Scheme for Counties (https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf) has more information on location of residence. This measure is not included in the summary analysis.

- **Overall Rate:** Overall in 2017, 7.1 females experienced severe maternal morbidity per 1,000 delivery hospitalizations (data not shown).

- **Groups With Disparities:**
  - Health Insurance:
    - In 2017, females with public insurance only were more likely to experience severe maternal morbidity compared with females with any private insurance (7.9 vs. 6.3 per 1,000 delivery hospitalizations).
  - Location of Residence:
    - In 2017, females living in large central metro counties were more likely to experience severe maternal morbidity compared with women living in large fringe metro counties (8.0 vs. 6.9 per 1,000 delivery hospitalizations).
    - In 2017, females living in small metro counties were less likely to experience severe maternal morbidity compared with women living in large fringe metro counties (6.0 vs. 6.9 per 1,000 delivery hospitalizations).

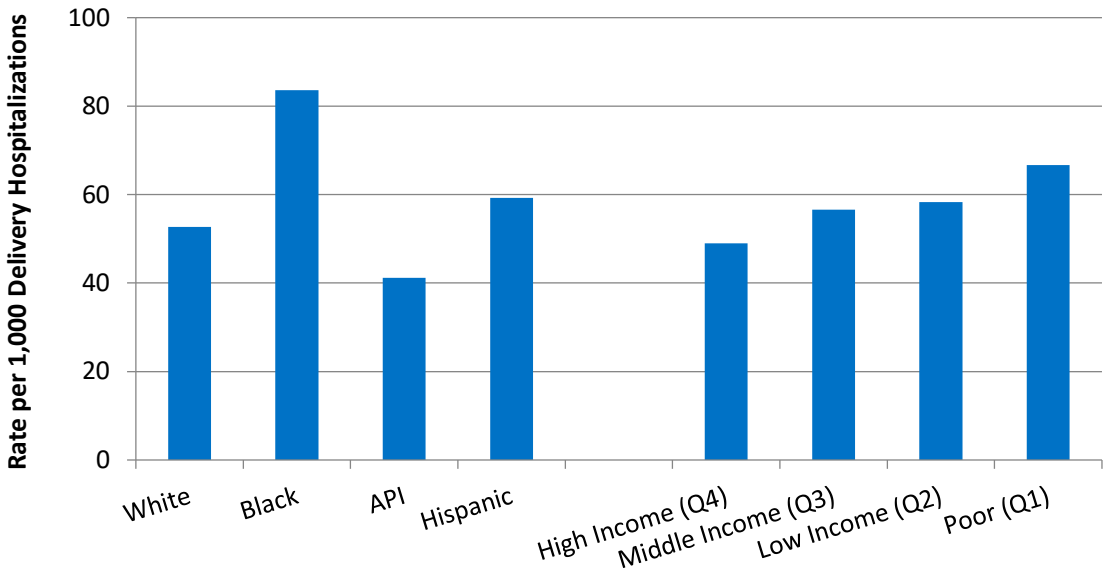
Severe Postpartum Hemorrhage



Key: API = Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases, weighted to provide national estimates, 2017.
Denominator: Inpatient stays for females ages 12-55 with any delivery diagnosis, procedure, or diagnosis-related group, excluding those with any indication of abortion.
Numerator: Subset of the denominator with any diagnosis of postpartum hemorrhage.
Note: For this measure, lower rates are better. White, Black, and API are non-Hispanic. Hispanic includes all races. The 2013 NCHS Urban–Rural Classification Scheme for Counties (https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf) has more information on location of residence. This measure is not included in the summary analysis.

- **Importance:** Postpartum hemorrhage is when a woman has heavy bleeding after a vaginal delivery that does not slow or stop. Females who experience postpartum hemorrhage may have a drop in blood pressure. They may experience postpartum hemorrhage rapidly, which can lead to death (Ngwenya, 2016). Women of color experience higher rates of postpartum hemorrhage (Gyamfi-Bannerman, et al., 2018).
- **Overall Rate:** Overall in 2017, 38.0 females experienced severe postpartum hemorrhage per 1,000 delivery hospitalizations (data not shown).
- **Groups With Disparities:**
  - Race/Ethnicity:
    - In 2017, Black females were more likely to experience severe postpartum hemorrhage compared with White females (38.9 vs. 34.0 per 1,000 delivery hospitalizations).
    - In 2017, Asian/Pacific Islander females were more likely to experience severe postpartum hemorrhage compared with White females (49.2 vs. 34.0 per 1,000 delivery hospitalizations).
    - In 2017, Hispanic females were more likely to experience severe postpartum hemorrhage compared with White females (42.7 vs. 34.0 per 1,000 delivery hospitalizations).
  - Location of Residence:
    - In 2017, females living in large central metro counties were more likely to experience severe postpartum hemorrhage compared with females living in large fringe metro counties (44.0 vs. 35.8 per 1,000 delivery hospitalizations).
    - In 2017, females living in small metro counties were less likely to experience severe postpartum hemorrhage compared with females living in large fringe metro counties (30.4 vs. 35.8 per 1,000 delivery hospitalizations).

Eclampsia and Preeclampsia, by Race/Ethnicity and Income

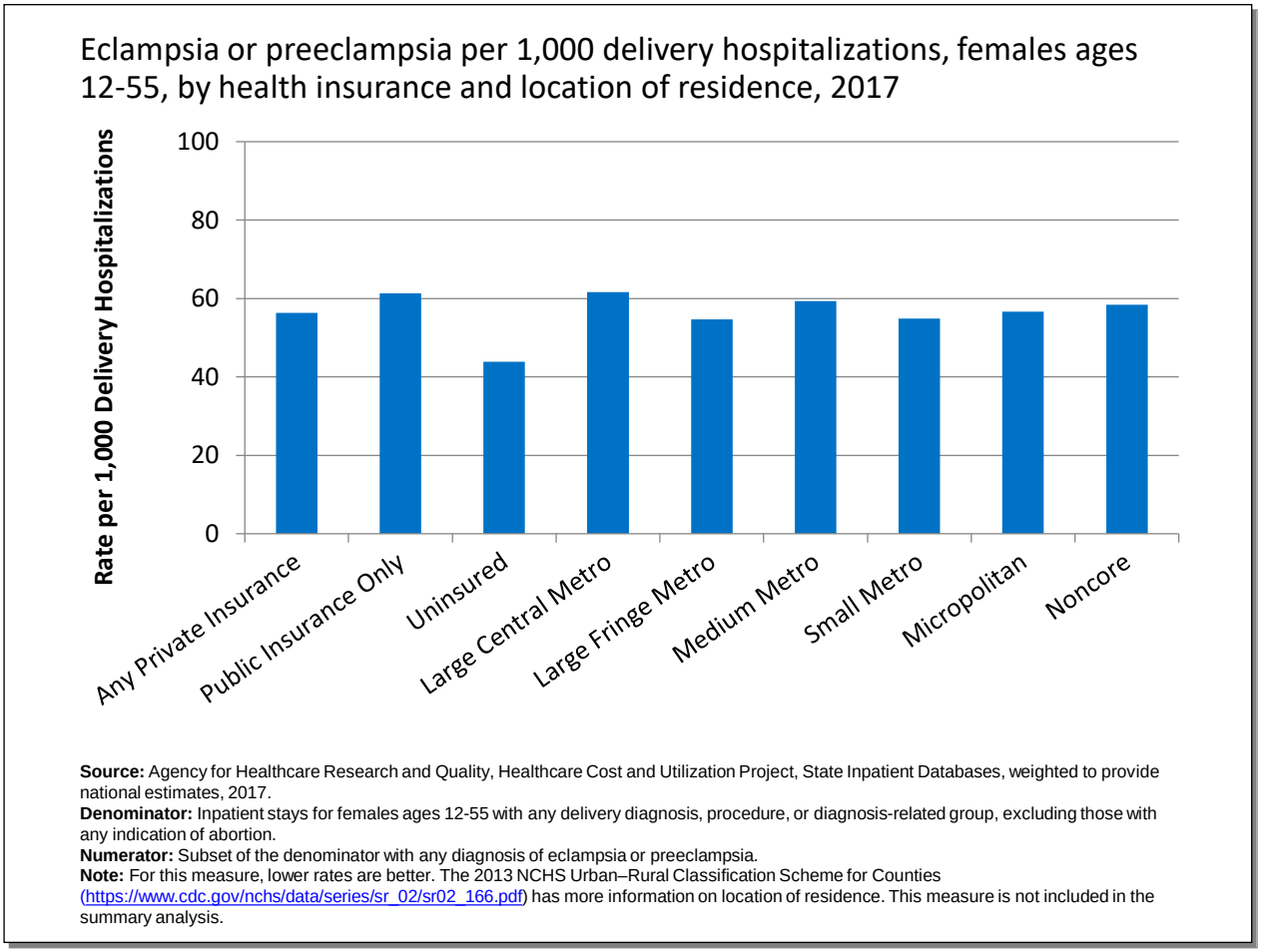


Key: API = Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases, weighted to provide national estimates, 2017.
Denominator: Inpatient stays for females ages 12-55 with any delivery diagnosis, procedure, or diagnosis-related group, excluding those with any indication of abortion.
Numerator: Subset of the denominator with any diagnosis of eclampsia or preeclampsia.
Note: For this measure, lower rates are better. White, Black, and API are non-Hispanic. Hispanic includes all races. Poor indicates that the median household income of the patient's ZIP Code falls in the lowest quartile nationally. High Income indicates that the median household income of the patient's ZIP Code falls in the highest quartile nationally. This measure is not included in the summary analysis.

- **Importance:** High blood pressure occurs in 1 in every 12-17 pregnancies among women ages 22-44 years (Bateman, et al., 2012). Complications due to high blood pressure can result in preeclampsia (untreated high blood pressure that may result in organ damage) or eclampsia (the onset of seizures or a coma in women with preclampsia) (Medline Plus, 2021a, 2021b).
- **Overall Rate:** In 2017, 58.3 females ages 12-55 experienced eclampsia or preeclampsia per 1,000 delivery hospitalizations (data not shown).
- **Groups With Disparities:**
  - Race/Ethnicity:
    - In 2017, eclampsia or preeclampsia were more common among Black females compared with White females (83.6 vs. 52.7 per 1,000 delivery hospitalizations).
    - In 2017, eclampsia or preeclampsia were less common among Asian/Pacific Islander females compared with White females (41.2 vs. 52.7 per 1,000 delivery hospitalizations).
    - In 2017, eclampsia or preeclampsia were more common among Hispanic females compared with White females (59.3 vs. 52.7 per 1,000 delivery hospitalizations).

- Income:
  - In 2017, eclampsia or preeclampsia were more common among middle-income females compared with high-income females (56.6 vs. 49.0 per 1,000 delivery hospitalizations).
  - In 2017, eclampsia or preeclampsia were more common among low-income females compared with high-income females (58.3 vs. 49.0 per 1,000 delivery hospitalizations).
  - In 2017, eclampsia or preeclampsia were more common among poor females compared with high-income females (66.7 vs. 49.0 per 1,000 delivery hospitalizations).

Eclampsia and Preeclampsia, by Health Insurance and Location of Residence

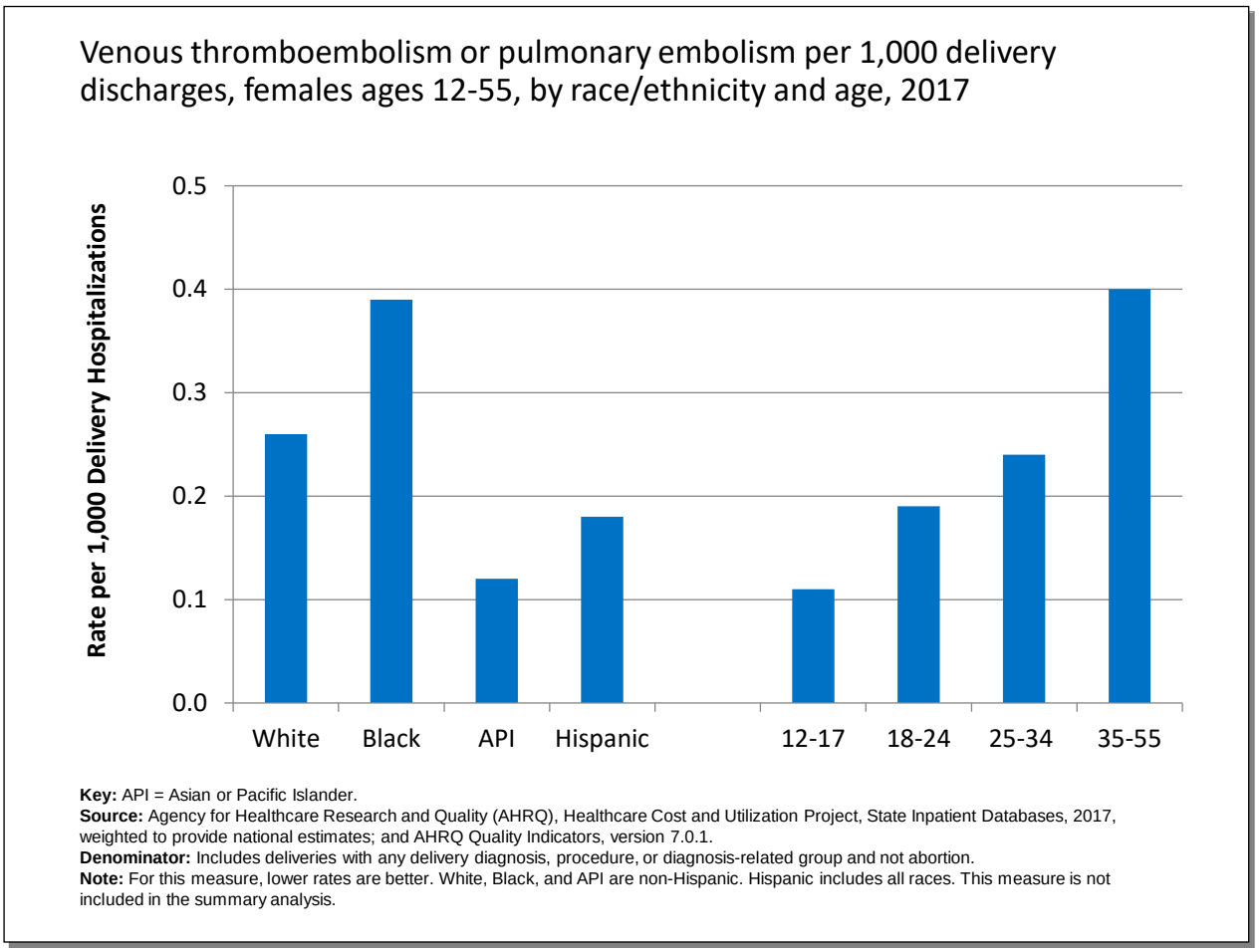


Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases, weighted to provide national estimates, 2017.
Denominator: Inpatient stays for females ages 12-55 with any delivery diagnosis, procedure, or diagnosis-related group, excluding those with any indication of abortion.
Numerator: Subset of the denominator with any diagnosis of eclampsia or preeclampsia.
Note: For this measure, lower rates are better. The 2013 NCHS Urban–Rural Classification Scheme for Counties (https://www.cdc.gov/nchs/data/series/sr_02/sr02_166.pdf) has more information on location of residence. This measure is not included in the summary analysis.

- **Overall Rate:** In 2017, 58.3 females ages 12-55 experienced eclampsia or preeclampsia per 1,000 delivery hospitalizations (data not shown).

- **Groups With Disparities:**
  - Health Insurance:
    - In 2017, eclampsia or preeclampsia were less common among uninsured females compared with females with any private insurance (43.9 vs. 56.3 per 1,000 delivery hospitalizations).
  - Location of Residence:
    - In 2017, eclampsia or preeclampsia were more common among females residing in large central metro counties compared with females residing in large fringe metro counties (61.6 vs. 54.7 per 1,000 delivery hospitalizations).

Venous Thromboembolism or Pulmonary Embolism

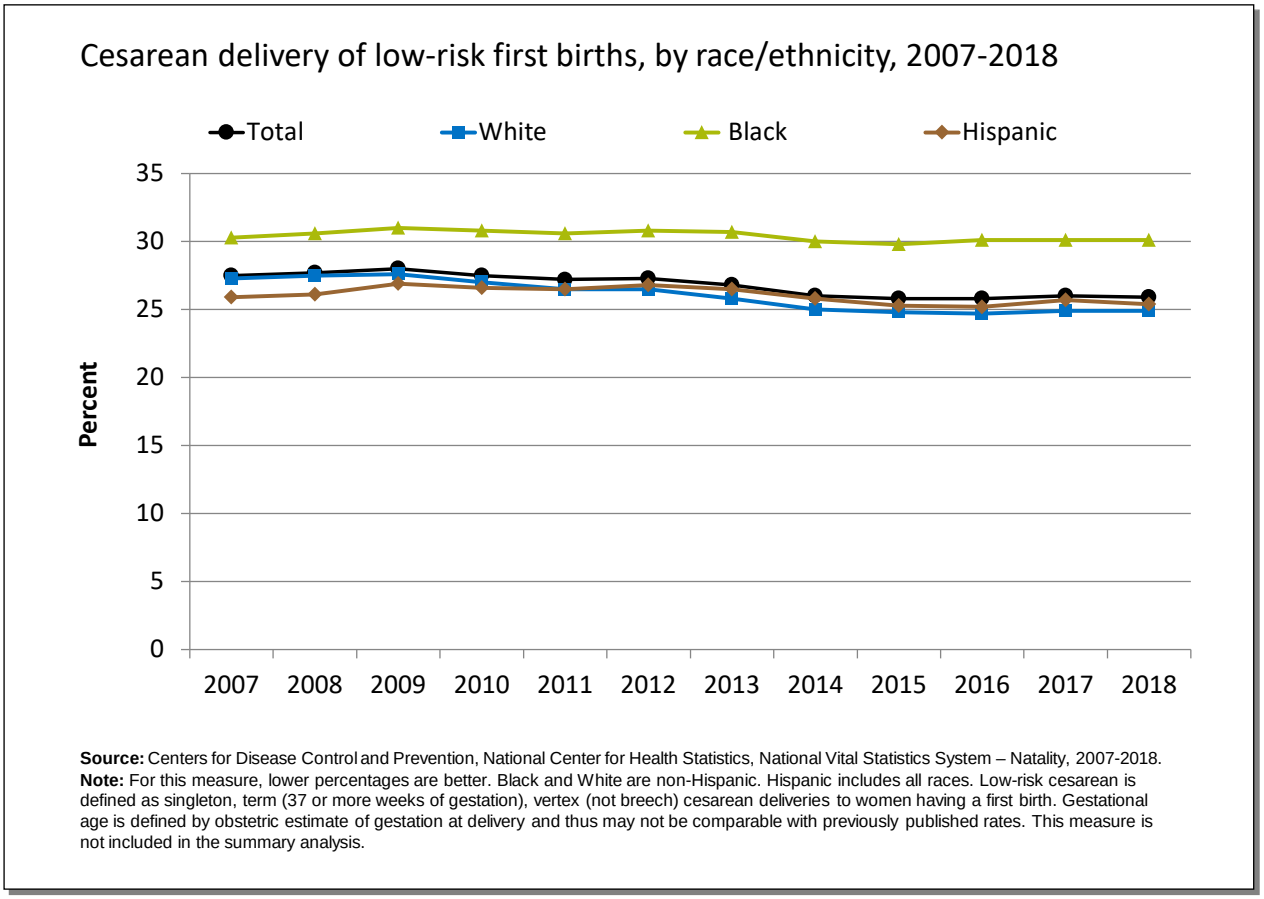


Key: API = Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project, State Inpatient Databases, 2017, weighted to provide national estimates; and AHRQ Quality Indicators, version 7.0.1.
Denominator: Includes deliveries with any delivery diagnosis, procedure, or diagnosis-related group and not abortion.
Note: For this measure, lower rates are better. White, Black, and API are non-Hispanic. Hispanic includes all races. This measure is not included in the summary analysis.

- **Importance:** Venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), is one cause of pregnancy-related mortality. Deaths due to PE account for 9.2% of all pregnancy-related deaths or approximately 1.5 deaths per 100,000 live births (Abe, et al., 2019). Reductions in VTE and PE could save lives.

- **Overall Rate:** In 2017, the overall rate of VTE or PE among females ages 12-55 was 0.25 per 1,000 delivery discharges (data not shown).
- **Groups With Disparities:**
  - Race/Ethnicity:
    - Hispanic females were less likely to experience VTE/PE during a delivery hospitalization than White females (0.18 vs. 0.26 per 1,000 delivery discharges).
    - Asian and Pacific Islander females also had a lower VTE/PE rate than White females (0.12 vs. 0.26 per 1,000 delivery discharges).
    - Black females, however, were more likely than White females to experience VTE/PE (0.39 vs. 0.26 per 1,000 delivery discharges).
  - Age:
    - Compared with females ages 18-24, females ages 25-34 were more likely to experience VTE/PE (0.24 vs. 0.19 per 1,000 delivery discharges).
    - Compared with females ages 18-24, females ages 35-55 were also more likely to experience VTE/PE (0.40 vs. 0.19 per 1,000 delivery discharges).

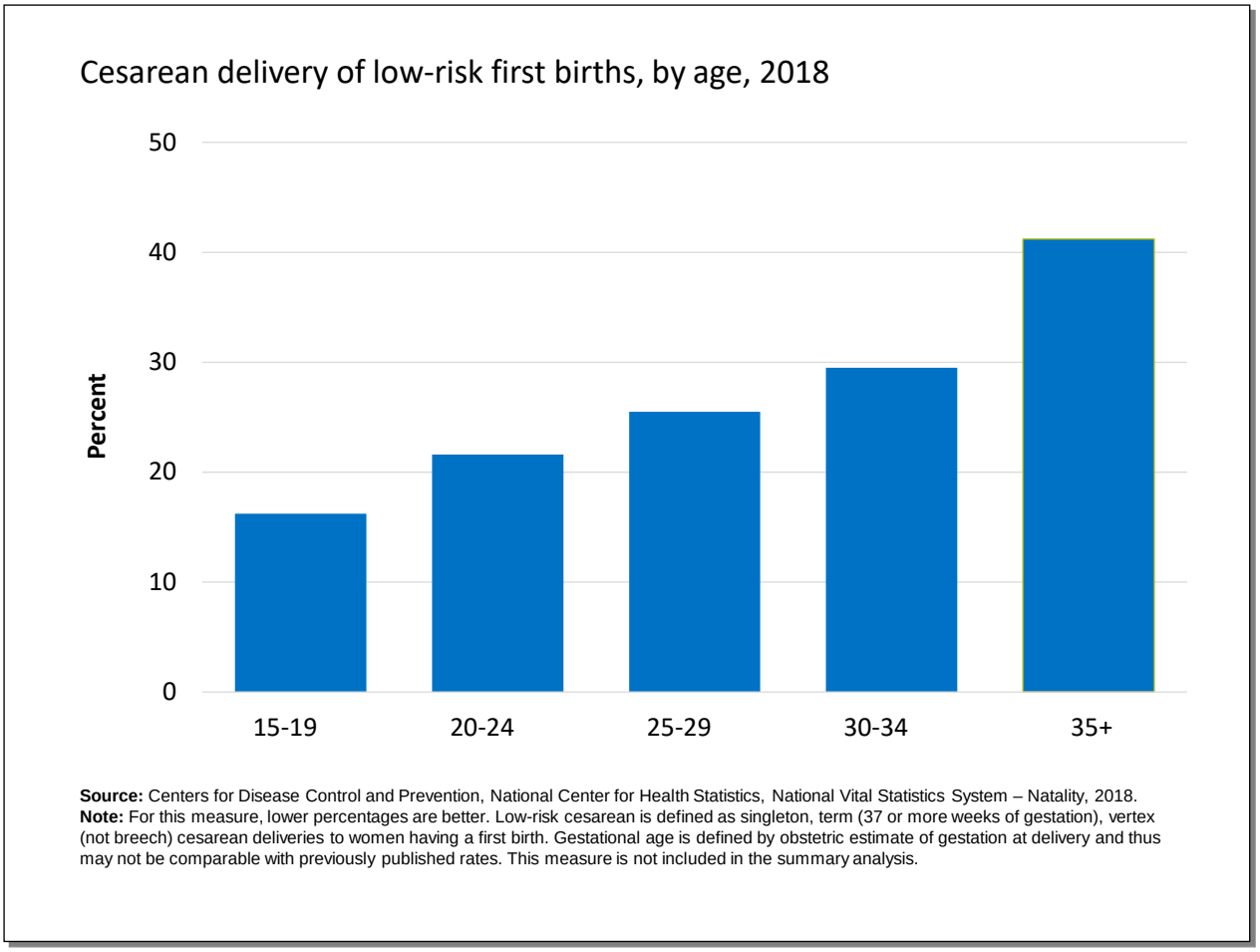
Cesarean Delivery of Low-Risk First Births, by Race/Ethnicity



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System – Natality, 2007-2018.
Note: For this measure, lower percentages are better. Black and White are non-Hispanic. Hispanic includes all races. Low-risk cesarean is defined as singleton, term (37 or more weeks of gestation), vertex (not breech) cesarean deliveries to women having a first birth. Gestational age is defined by obstetric estimate of gestation at delivery and thus may not be comparable with previously published rates. This measure is not included in the summary analysis.

- **Importance:** Cesarean deliveries are associated with heightened levels of adverse events and complications for future pregnancies. Limiting cesarean deliveries in low-risk births is seen as an important part of reducing cesarean deliveries overall.
- **Overall Percentage:** In 2018, cesarean deliveries made up 25.9% of low-risk first births.
- **Trends:** From 2007 to 2018, the percentage of females having cesarean deliveries for low-risk first births improved (decreased) for non-Hispanic Whites from 27.3% to 24.9%.
- **Groups With Disparities:** In 2007 and in 2018, the percentage of females having cesarean deliveries for low-risk first births was higher for Blacks compared with Whites (30.3% vs. 27.3% in 2007; 30.1% vs. 24.9% in 2018). This disparity has not narrowed over time.

Cesarean Delivery of Low-Risk First Births, by Age



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System – Natality, 2018.
Note: For this measure, lower percentages are better. Low-risk cesarean is defined as singleton, term (37 or more weeks of gestation), vertex (not breech) cesarean deliveries to women having a first birth. Gestational age is defined by obstetric estimate of gestation at delivery and thus may not be comparable with previously published rates. This measure is not included in the summary analysis.

- **Overall Percentage:** In 2018, the percentage of cesarean deliveries among low-risk first births was 25.9% (data not shown).
- **Groups With Disparities:**
  - Females ages 15-19 giving birth for the first time had lower rates of cesarean delivery than females ages 20-24 (16.2% vs. 21.6%).
  - Females ages 25-29, 30-34, and 35 and over giving birth for the first time all had higher rates of cesarean delivery compared with females ages 20-24 (25.5%, 29.5%, and 41.2%, respectively, vs. 21.6%).

Resources: Perinatal Safety Toolkit

- AHRQ developed the Safety Program for Perinatal Care (SPPC) to improve the patient safety culture of labor and delivery units and decrease maternal and neonatal adverse events resulting from poor communication and system failures.
- The SPPC is organized around three program pillars:
  - Teamwork and Communication Skills
  - Perinatal Safety Strategies
  - In Situ Simulation Training.
- The Toolkit for Improving Perinatal Safety is available online.

Adverse Drug Events

An estimated one-third of all adverse events that occur in the inpatient setting are adverse drug events (ODPHP, 2020a). The HHS National Action Plan for Adverse Drug Event Prevention targets three areas:

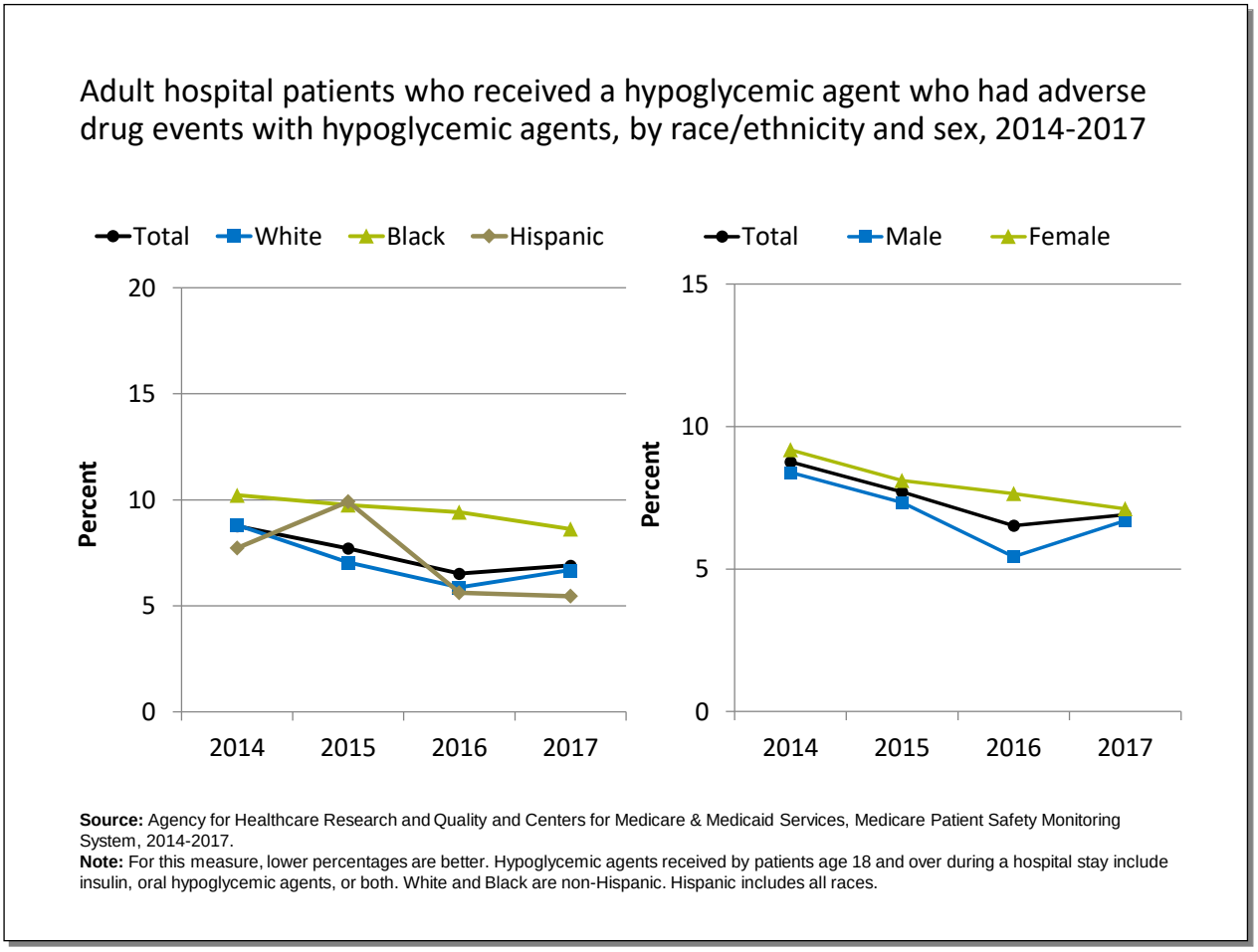
- Bleeding related to use of anticoagulants.
- Hypoglycemia related to use of diabetes medications.
- Accidental overdose, oversedation, and respiratory depression related to use of opioids.

An adverse drug event (ADE) is an injury—including physical harm, mental harm, or loss of function—resulting from medical intervention involving a drug. More information is available in Patient Safety Primer: Medication Errors and Adverse Drug Events at https://psnet.ahrq.gov/primers/primer/23/medication-errors. More information is available in the HHS National Action Plan for Adverse Drug Event Prevention at https://health.gov/hcq/ade-action-plan.asp.

Adverse Drug Event Measures

- Hospitalized adult patients who received a hypoglycemic agent and had an adverse drug event
- Hospitalized adult patients who had an adverse drug event related to warfarin use
- Hospitalized patients with an anticoagulant-related adverse drug event to low-molecular-weight heparin (LMWH) or factor Xa inhibitor

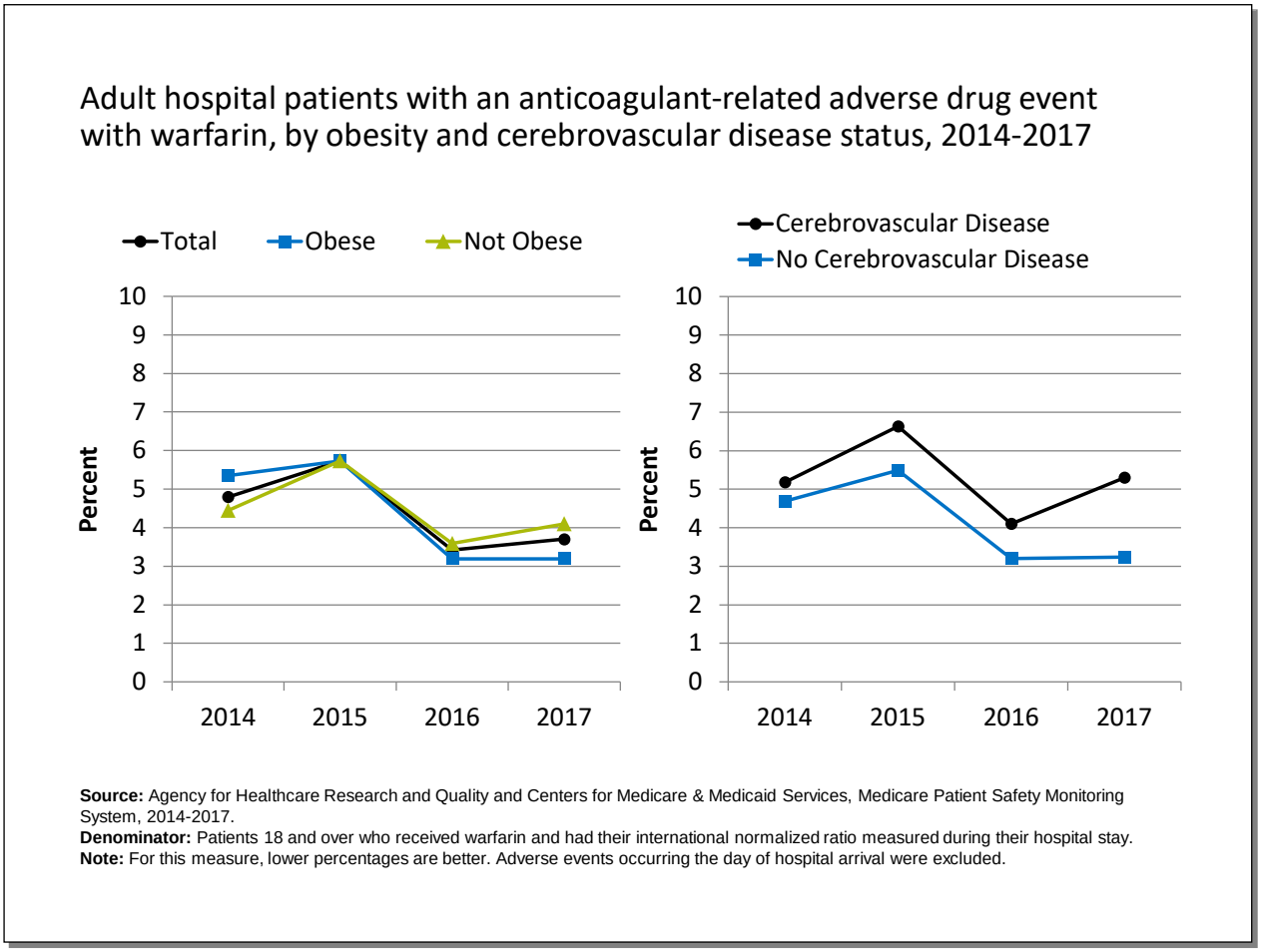
Hospital Patients With Adverse Drug Events With Hypoglycemic Agents, by Race/Ethnicity and Disease Status



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System, 2014-2017.
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 and Black are non-Hispanic. Hispanic includes all races.

- **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 2017, 6.9% of hospital patients receiving hypoglycemic agents had an adverse drug event.
- **Trends:**
  - From 2014 to 2017, the percentage of patients experiencing an adverse drug event with hypoglycemic agents fell for Blacks. There were no statistically significant changes for Whites, Hispanics, or overall.
  - The percentage of patients experiencing an adverse drug event with hypoglycemic agents fell (improved) for females, from 9.2% in 2014 to 7.1% in 2017, with no statistically significant improvement for males or overall.
- **Groups With Disparities:**
  - In 2017, there were no statistically significant disparities by sex.

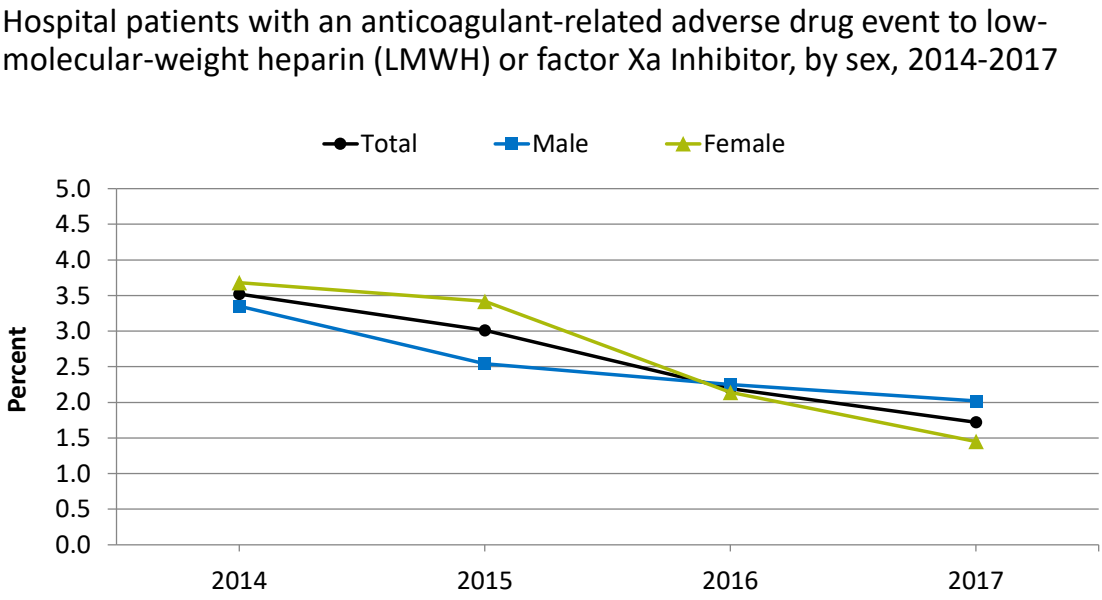
Hospital Patients With Adverse Events With Warfarin



Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System, 2014-2017.
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. Stroke survivors have an increased risk of another stroke, and obese individuals are at higher risk of blood clots. Anticoagulants, such as warfarin, reduce this risk but pose an increased risk of bleeding.
- **Overall Percentage:** In 2017, 3.7% of adult hospital patients using warfarin experienced an anticoagulant-related adverse drug event.
- **Trends:** From 2014 to 2017, there was no statistically significant change overall in the percentage of hospital patients with an adverse drug event related to warfarin. No trend analysis was performed by obesity status or cerebrovascular disease status.
- **Groups With Disparities:** In 2017, there were no statistically significant disparities by obesity status or cerebrovascular disease status in the percentage of hospital patients who had an adverse drug event related to warfarin.

Hospital Patients With Adverse Events With Heparin or Factor Xa Inhibitor, by Sex



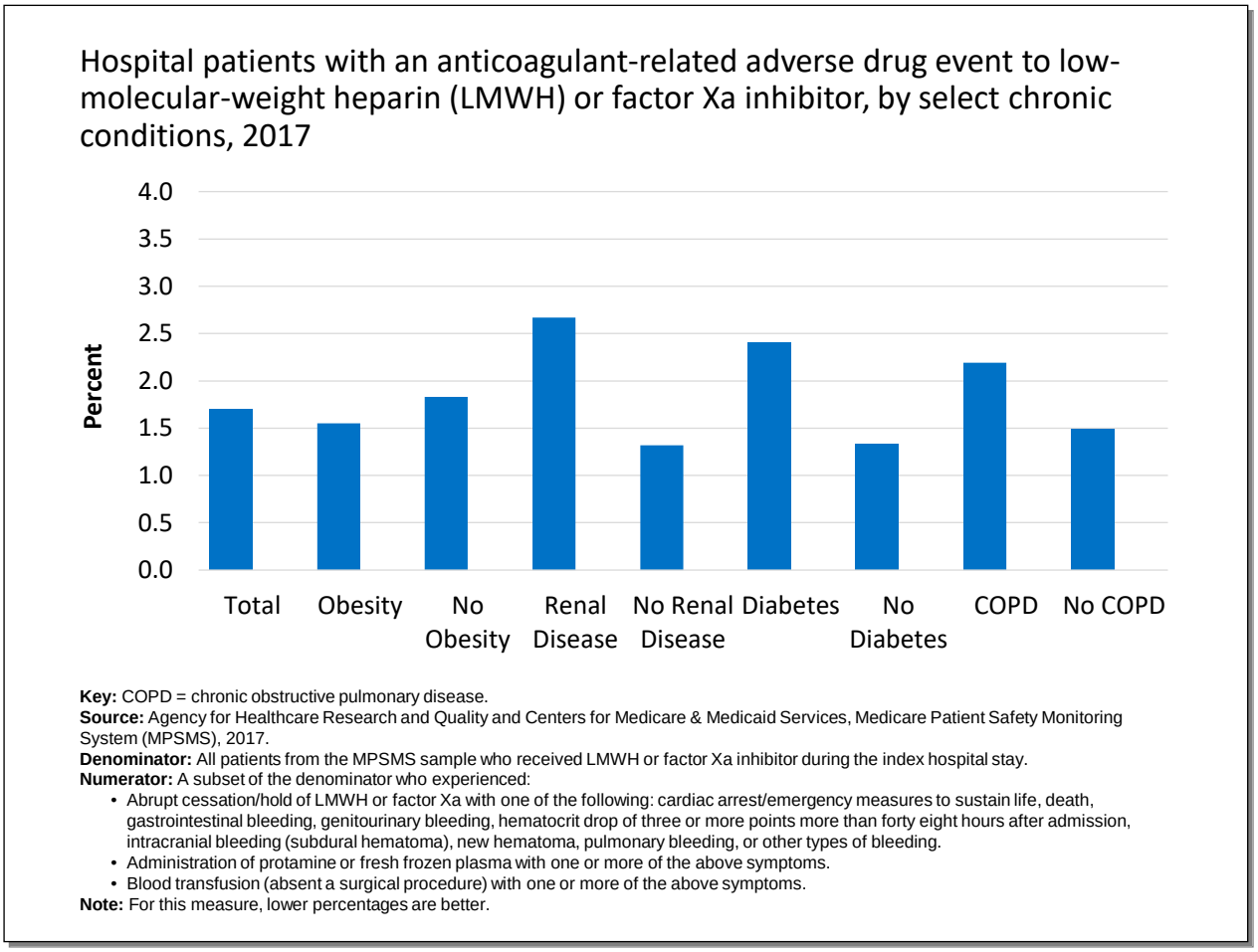
Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System (MPSMS), 2014-2017.
Denominator: All patients from the MPSMS sample who received LMWH or factor Xa inhibitor during the index hospital stay.
Numerator: A subset of the denominator who experienced:

- Abrupt cessation/hold of LMWH or factor Xa with one of the following: cardiac arrest/emergency measures to sustain life, death, gastrointestinal bleeding, genitourinary bleeding, hematocrit drop of 3 or more points more than 48 hours after admission, intracranial bleeding (subdural hematoma), new hematoma, pulmonary bleeding, or other types of bleeding.
- Administration of protamine or fresh frozen plasma with one or more of the above symptoms.
- Blood transfusion (absent a surgical procedure) with one or more of the above symptoms.

Note: For this measure, lower percentages are better.

- **Importance:** Low-molecular-weight heparin (LMWH) and factor Xa inhibitors are widely used to prevent and treat venous thromboembolism and acute coronary syndromes. Although these drugs have been shown to improve outcomes, adverse events associated with bleeding remain a concern, and uncertainties remain about safety for specific patient populations, including pregnant women (Lim, 2010; Sobieraj, et al., 2012).
- **Overall Percentage:** In 2017, 1.7% of patients who received LMWH or factor Xa inhibitor during an index hospital stay experienced an anticoagulant-related adverse event.
- **Trends:** The overall percentage of patients experiencing adverse drug events associated with LMWH or factor Xa inhibitor fell (improved) from 3.5% in 2014 to 1.7% in 2017. The percentage also improved for males and females, from 3.4% and 3.7%, respectively, in 2014 to 2.0% and 1.5% in 2017.
- **Groups With Disparities:** In 2017, there were no statistically significant disparities by sex.

Hospital Patients With Adverse Events With Heparin or Factor Xa Inhibitor, by Select Chronic Conditions



Key: COPD = chronic obstructive pulmonary disease.
Source: Agency for Healthcare Research and Quality and Centers for Medicare & Medicaid Services, Medicare Patient Safety Monitoring System (MPSMS), 2017.
Denominator: All patients from the MPSMS sample who received LMWH or factor Xa inhibitor during the index hospital stay.
Numerator: A subset of the denominator who experienced:

- Abrupt cessation/hold of LMWH or factor Xa with one of the following: cardiac arrest/emergency measures to sustain life, death, gastrointestinal bleeding, genitourinary bleeding, hematocrit drop of three or more points more than forty eight hours after admission, intracranial bleeding (subdural hematoma), new hematoma, pulmonary bleeding, or other types of bleeding.
- Administration of protamine or fresh frozen plasma with one or more of the above symptoms.
- Blood transfusion (absent a surgical procedure) with one or more of the above symptoms.

Note: For this measure, lower percentages are better.

- **Importance:** Low-molecular-weight heparin (LMWH) and factor Xa inhibitors are widely used to prevent and treat venous thromboembolism and acute coronary syndromes. There are concerns about correct dosages for these drugs among morbidly obese patients and about their effects on pregnant patients and those with renal disease (Lim, 2010; Lobo, 2007).
- **Overall Percentage:** In 2017, 1.7% of patients who received LMWH or factor Xa inhibitor during an index hospital stay experienced an anticoagulant-related adverse event.
- **Groups With Disparities:**
  - **Obesity/COPD:** In 2017, there was no statistically significant difference in the rate of anticoagulant-related adverse events between obese patients and those who were not obese (1.6% vs. 1.8%) or those with or without COPD (2.2% vs. 1.5%).
  - **Renal Disease:** In 2017, patients with renal disease were more likely to experience anticoagulant-related adverse events than those without renal disease (2.7% vs. 1.3%).
  - **Diabetes:** In 2017, diabetic patients were more likely to experience anticoagulant-related adverse events than those without diabetes (2.4% vs. 1.3%).

Adverse Drug Event Prevention Resources

AHRQ offers several resources to improve the quality and safety of ambulatory care in nursing homes. These include:

- Patient Guide to Using Blood Thinners: Blood Thinner Pills: Your Guide to Using Them Safely
- MATCH Toolkit (medication reconciliation)

Visit AHRQ.gov for more tools and resources for ambulatory care.

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. Ambulatory care is delivered in outpatient settings, or settings where patients are not admitted for care. Examples of ambulatory care settings include medical offices and clinics, ambulatory surgery centers, hospital outpatient departments, and dialysis centers.

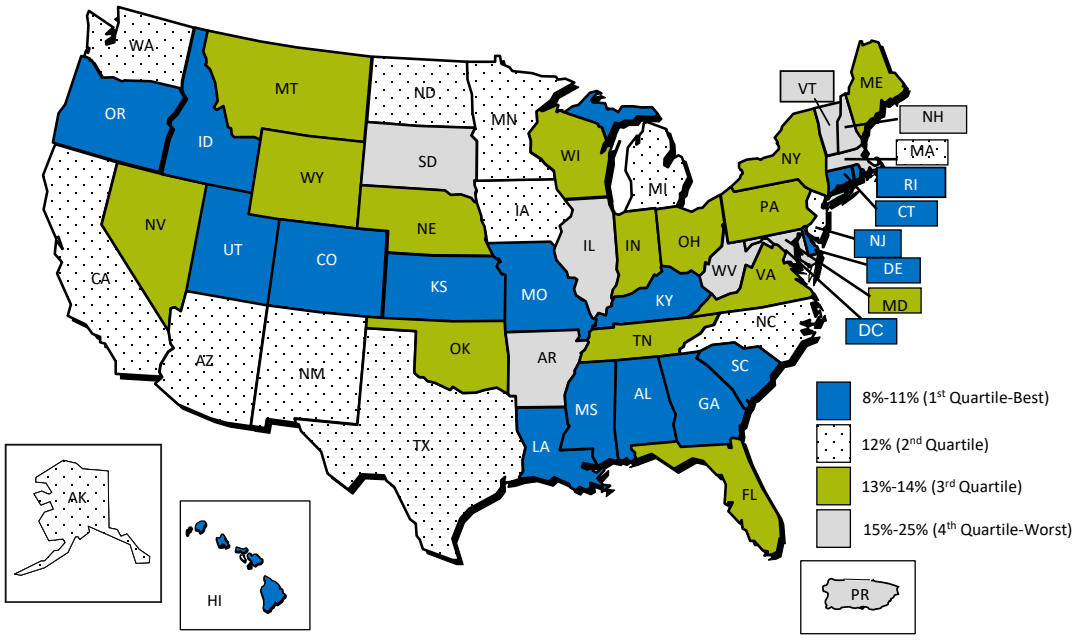
Adverse effects of medical care can follow ambulatory care or procedures provided in hospitals, emergency departments, physician offices, or other settings. More information is available in Patient Safety Primer: Ambulatory Care Safety at https://psnet.ahrq.gov/primers/primer/16/patient-safety-in-ambulatory-care.

In this section, measures address:

- Hemodialysis patients age 18 years and over who had central venous catheters used for vascular access for more than 90 days.
- Adults age 65 and over who received during the calendar year at least 1 of 33 potentially inappropriate prescription medications.
- Doctor's office, emergency department, and outpatient department visits where antibiotics were prescribed for a diagnosis of common cold per 10,000 population.

Hemodialysis Patients With Central Venous Catheters for More Than 90 Days

Hemodialysis patients age 18 years and over who had central venous catheters used for vascular access for more than 90 days, by State, July 2018-June 2019



Source: Centers for Medicare & Medicaid Services, Dialysis Facility Compare, July 1, 2018-June 30, 2019.
Denominator: Adult end stage renal failure patients on hemodialysis for more than 90 days in the time from July 1, 2018, through June 30, 2019.
Note: For this measure, lower percentages are better. American Samoa, Guam, Northern Mariana Islands, and the Virgin Islands are not shown on the map but do have data.

- **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.
- **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, 2018, through June 30, 2019, an average of 13% used CVCs for more than 90 days (data not shown).
- **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.

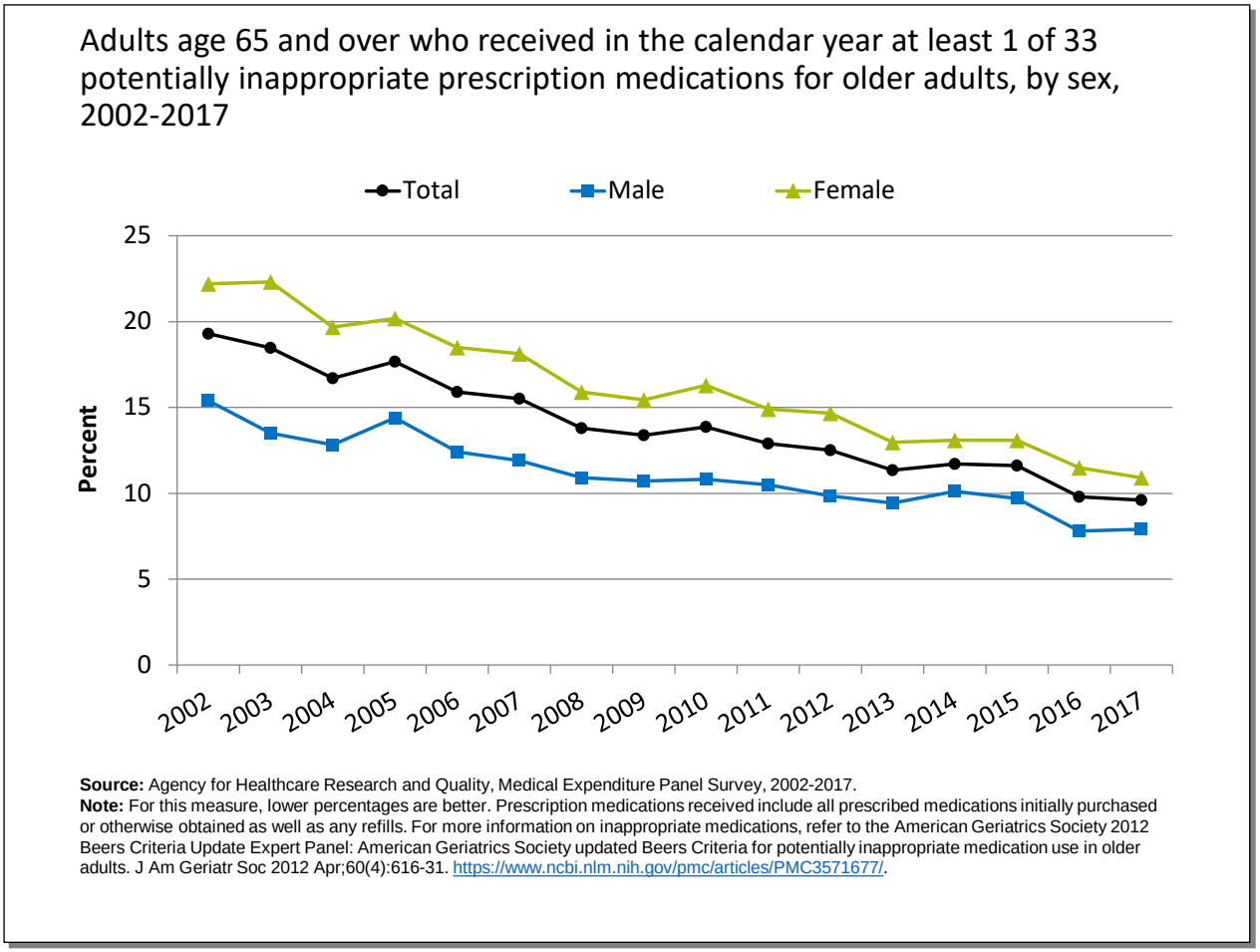
  The States and territories are listed in alphabetical order:

  - First quartile (best performers): 8%-11% (AL, CO, CT, DC, DE, GA, HI, ID, KS, KY, LA, MO, MS ,NJ, OR, RI, SC, UT)
  - Second quartile: 12% (AK, AZ, CA, IA, MA, MI, MN, MP, NC, ND, NM, TX, WA)

- Third quartile: 13%-14% (FL, GU, IN, MD, ME, MT, NE, NV, NY, OH, OK, PA, TN, VA, WI, WY)
- Fourth quartile (worst performers): 15%-25% (AR, AS, IL, NH, PR, SD, VI, VT, WV)

The differences among States have not been assessed for statistical significance.

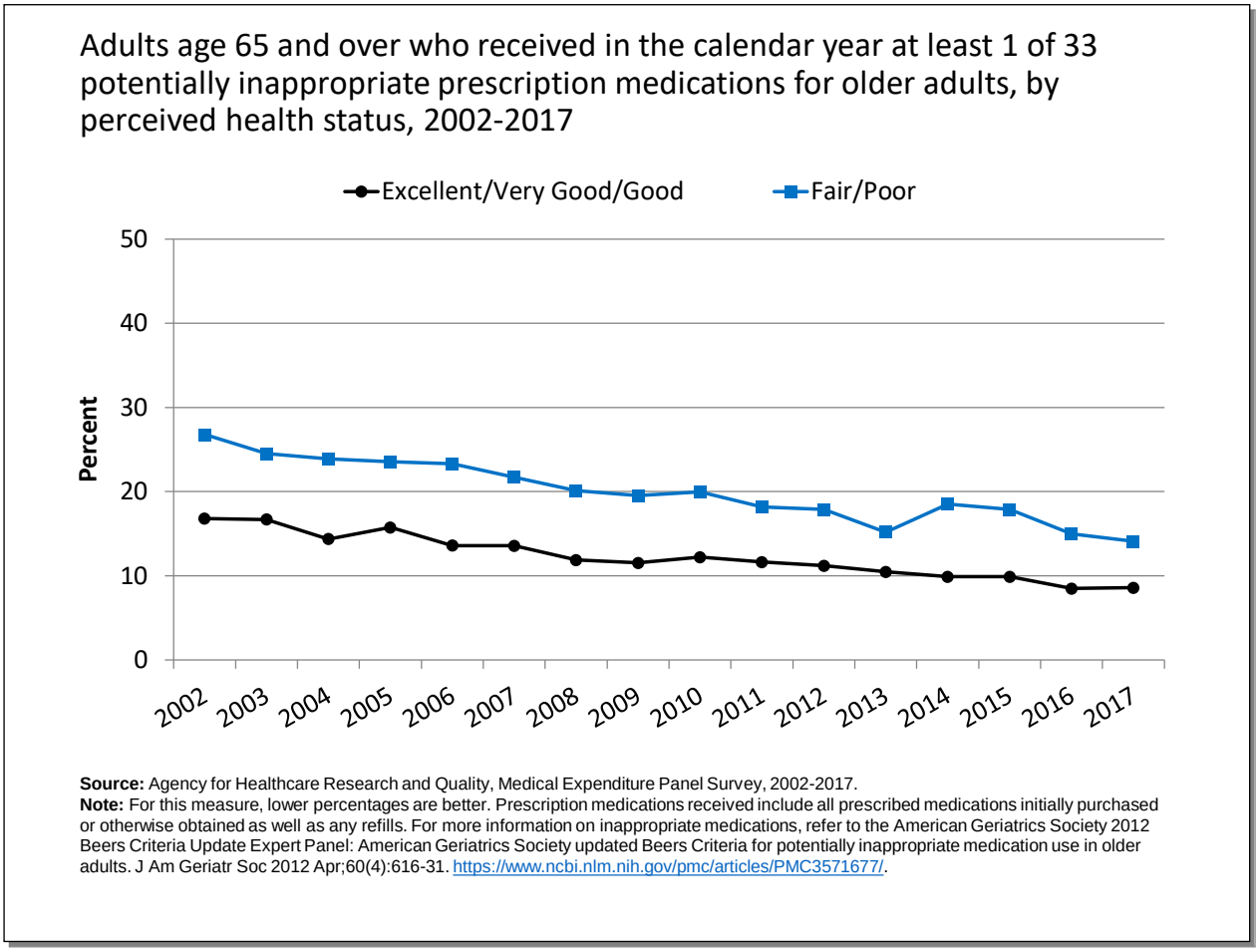
Older Adults Who Received Inappropriate Medications, by Sex



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2017.
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, refer to 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 2017, 9.6% of adults age 65 years and over received potentially inappropriate prescription medications.
- **Trends:** From 2002 to 2017, the percentage of adults age 65 years and over who received potentially inappropriate prescription medications fell (improved) overall and for both sexes.
- **Groups With Disparities:** In 2017, the percentage of female adults age 65 years and over receiving at least 1 of 33 prescription medications potentially inappropriate for older adults was higher (worse) than the percentage of male adults age 65 years and older (10.9% vs. 7.9%).
- **Changes in Disparities:** In 2002, the percentage of patients receiving potentially inappropriate medications was higher among females than males. This gap has not narrowed significantly over time.

Older Adults Who Received Inappropriate Medications, by Perceived Health Status

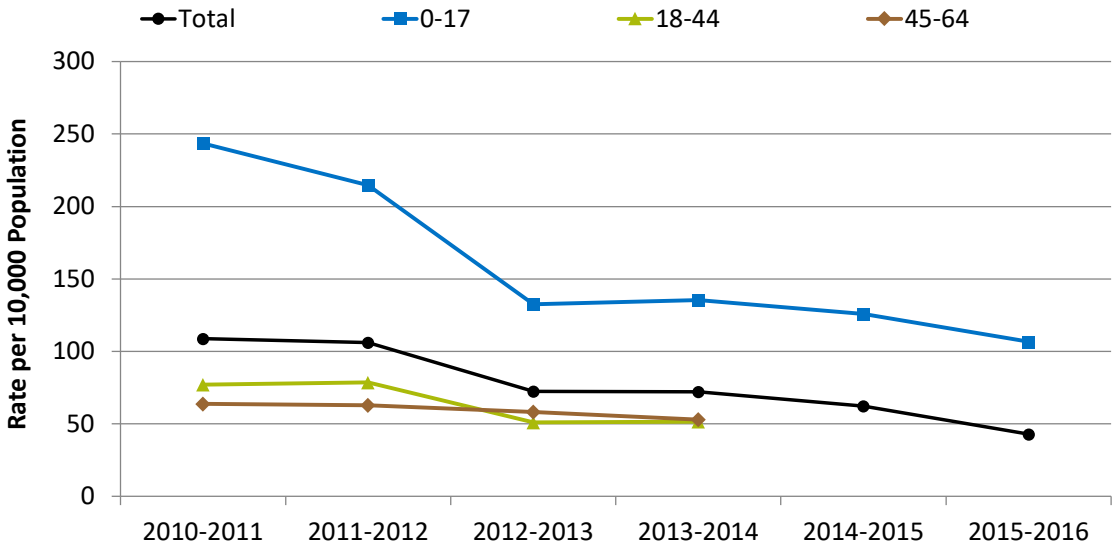


Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2017.
Note: For this measure, lower percentages are better. Prescription medications received include all prescribed medications initially purchased or otherwise obtained as well as any refills. For more information on inappropriate medications, refer to 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.
- **Trends:** No trend analysis was performed by perceived health status.
- **Groups With Disparities:** In 2017, the percentage of patients receiving potentially inappropriate medications was higher (worse) among people with fair/poor health status compared with people with excellent/very good/good health status (14.1% vs. 8.6%).

Antibiotic Prescriptions for Common Cold

Doctor's office, emergency department, and outpatient department visits where antibiotics were prescribed for a diagnosis of common cold per 10,000 population, by age, 2010-2011 to 2015-2016



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey, 2010-2011 to 2015-2016.
Denominator: 2000-based postcensal estimates of the civilian noninstitutionalized population as of July 1 of each data year.
Note: For this measure, lower rates are better. Colds were identified as a primary diagnosis of any of the following International Classification of Diseases, Ninth Revision codes: Acute nasopharyngitis [common cold] (460), Chronic rhinitis (472.0), Acute laryngopharyngitis (465.0), Acute upper respiratory infections of other multiple sites (465.8), and Acute upper respiratory infections of unspecified site (465.9). Data for age 65 and over in all years, and data for ages 18-44 and 45-64 in 2014-2015 and 2015-2016 do not meet the criteria for statistical reliability, data quality, or confidentiality and are not included.

- **Importance:** The inappropriate use of antibiotics has substantial patient safety implications, including the development of antibiotic resistance without corresponding clinical benefit and unnecessary exposure of patients to the risk of adverse reactions to the antibiotics. The high volume of cases of inappropriate use of antibiotics also results in higher and unnecessary costs for care.
- **Overall Rate:** In 2015-2016, the rate of doctor's office, emergency department, and outpatient department visits where antibiotics were prescribed for a diagnosis of common cold was 42.9 per 10,000 population.
- **Trends:**
  - The overall rate of antibiotics prescribed for a diagnosis of common cold has fallen (improved) over time, from 108.8 in 2010-2011 to 42.9 in 2015-2016.
  - The rate also fell (improved) for the 0-17 age group (2010-2011 to 2015-2016) and for the 45-64 age group (2010-2011 to 2013-2014).
- **Disparities:** No disparity analysis was done due to the lack of data for multiple age stratifications.

- **Improvement Efforts:** Most of the data shown here predate and therefore do not reflect the impact of recent concentrated national efforts to improve antibiotic management, including:

  - The 2015 National Action Plan for Combating Antibiotic-Resistant Bacteria.
  - The Centers for Disease Control and Prevention campaign to reduce unnecessary antibiotic use and subsequent revisions of primary care, specialty, and hospital guidelines regarding the appropriate use of antibiotics. See, for example, Antibiotic Use in the United States, 2017: Progress and Opportunities. https://www.cdc.gov/antibiotic-use/stewardship-report/outpatient.html.

AHRQ Supported Resource To Improve Patient Safety in Ambulatory Settings

- **Tool:** Toolkit To Engage High-Risk Patients in Safe Transitions Across Ambulatory Settings
- **Purpose:** To actively engage patients and their care partners to prevent errors during transitions of care
- **Intended Users:** Primary care office managers and providers
- **Available Tools:**

  - Implementation guide
  - Preintervention assessment of current practices to identify gaps
  - Patient appointment aid to encourage patients to ask questions and communicate needs and preferences
  - Checklist for clinicians to help them prepare patients for new healthcare appointments
  - Educational training video for clinicians

- **Link:** https://www.ahrq.gov/professionals/quality-patient-safety/hais/tools/ambulatory-care/safetransitions.html

Patient safety measures that could be directly affected by implementation of this toolkit by ambulatory care providers include:

- 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.
- Adults age 65 and over who received in the calendar year at least 1 of 33 potentially inappropriate prescription medications for older adults.
- Short-stay home health patients who had drug education on all medications.

Patient safety measures that could be indirectly affected by implementation of this toolkit by ambulatory care providers who share information with home health providers include:

- 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.
- 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.
- Adults who reported that home health providers talked with them in the last 2 months of care about the purpose of taking their new or changed prescription medicines.

Ambulatory Safety Resources

AHRQ offers several other resources to improve the quality and safety of ambulatory care in nursing homes. These include:

- Medical Office Survey on Patient Safety Culture and
- TeamSTEPPS for Office-Based Care.

Visit AHRQ.gov for more tools and resources for ambulatory care.

Patient Safety in the Nursing Home Setting

Nursing homes, or skilled nursing facilities, provide a wide range of health and personal care services.

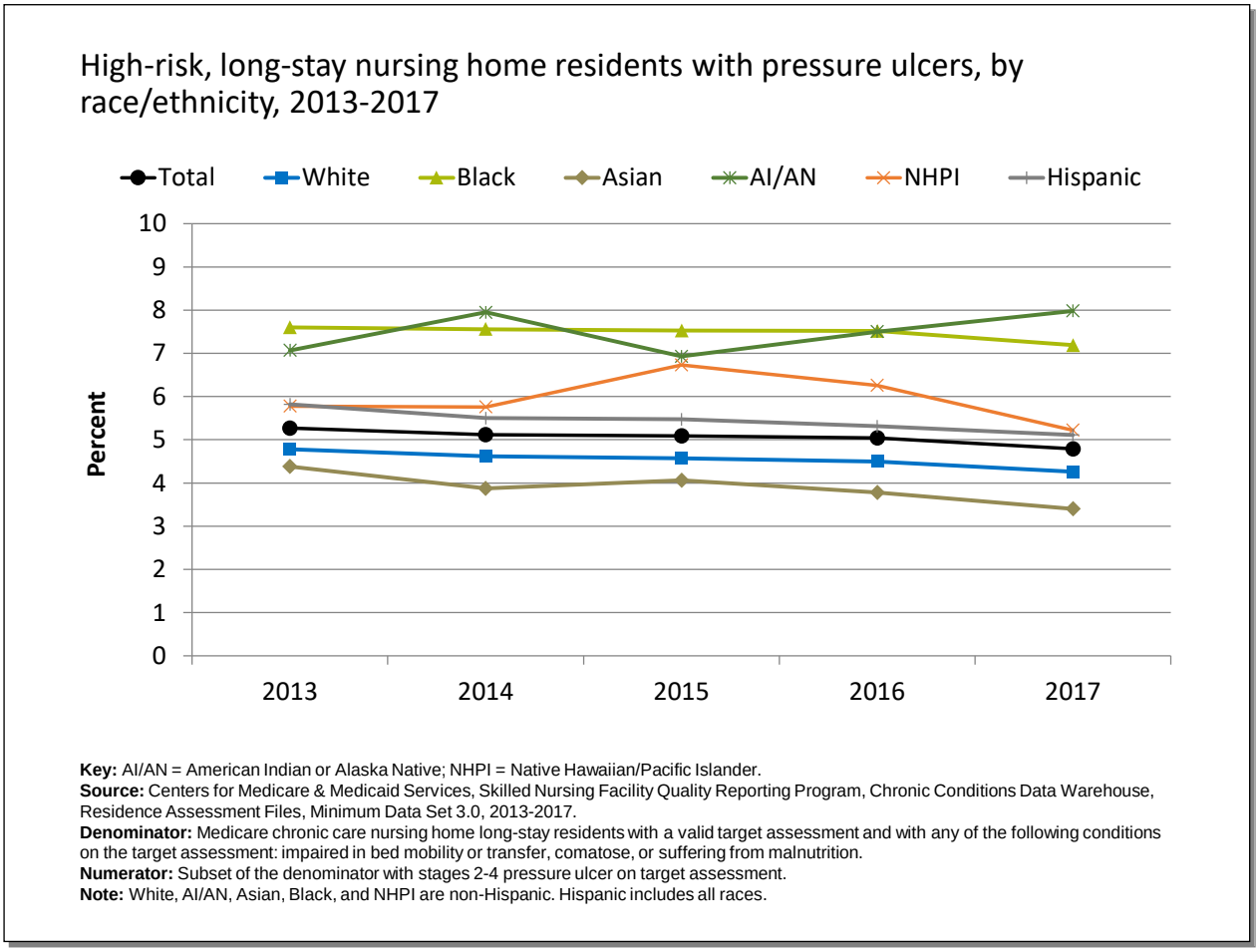
- More than 1 million people receive care in U.S. nursing homes annually (KFF, 2019).
- The United States has an estimated 15,000+ nursing homes (Harris-Kojetin, et al., 2019).
- Nursing home residents may stay for a short period of time, where they may receive rehabilitation after inpatient care or in a long-term care facility where residents receive extended health and personal care.

For nursing home residents, optimal care seeks to maximize quality of life and minimize unintended complications.

In this section, measures address:

- High-risk, long-stay nursing home residents with pressure ulcers.
- Short-stay nursing home residents with pressure ulcers that are new or worsened.
- Long-stay nursing home residents with a urinary tract infection.
- Low-risk, long-stay nursing home residents with a catheter inserted and left in bladder.
- Long-stay nursing home residents experiencing one or more falls with major injury.

Nursing Home Residents With Pressure Ulcers, by Race/Ethnicity



Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Chronic Conditions Data Warehouse, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment and with any of the following conditions on the target assessment: impaired in bed mobility or transfer, comatose, or suffering from malnutrition.
Numerator: Subset of the denominator with stages 2-4 pressure ulcer on target assessment.
Note: White, AI/AN, Asian, Black, and NHPI are non-Hispanic. Hispanic includes all races.

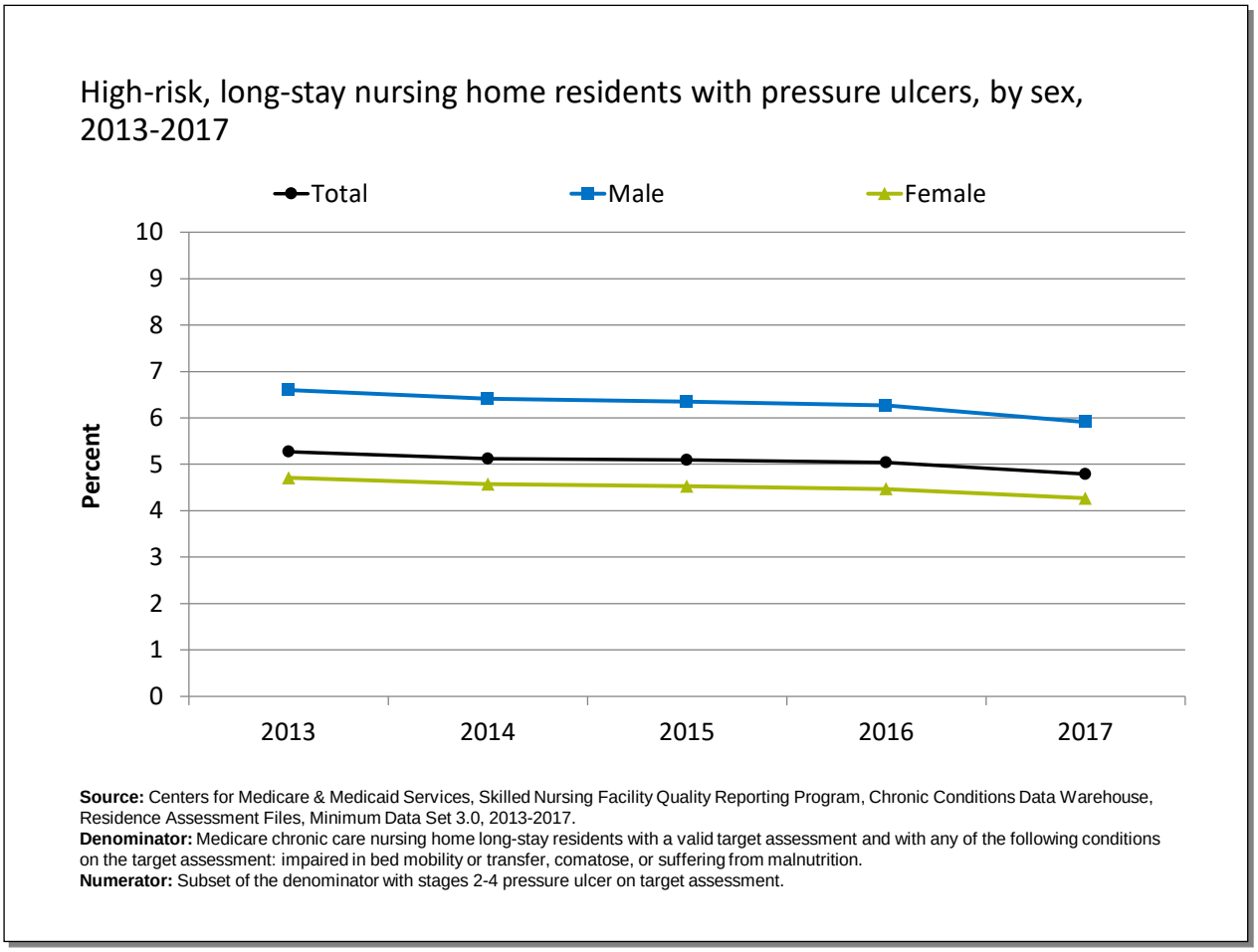
- **Importance:** Research by Kennedy (2004), shows "66% greater likelihood that black residents would develop a stage 2 (or worse) pressure ulcer." After controlling for eight patient characteristics including age and sex, Black residents were 35% more likely than White residents to develop a pressure ulcer. Further research by Oozageer Gunowa, et.al. (2018), shows that patients with darker complexions are more likely to experience higher stage pressure ulcers and injuries.
- **Overall Percentage:** In 2017, 4.8% of long-stay nursing home patients who were impaired in bed mobility or transfer, comatose, or suffering from malnutrition at the time of an assessment were experiencing a pressure ulcer.
- **Trends:** From 2013 to 2017, the number of denominator-eligible nursing home patients who experienced a pressure ulcer declined (improved) overall and for all race/ethnicity groups except AI/AN and NHPI.
- **Groups With Disparities:**
  - In 2017, Black patients were more likely than White patients to have a pressure ulcer (7.2% vs. 4.3%).
  - Black patients were also more likely than White patients to have a pressure ulcer in 2013, and the disparity did not improve over time.

- In 2017, Asian patients were less likely than White patients to have a pressure ulcer (3.4% vs. 4.3%).
- In 2017, AI/AN patients were more likely than White patients to have a pressure ulcer (8.0% vs. 4.3%).
- AI/AN patients were also more likely than White patients to have a pressure ulcer in 2013, and the disparity did not improve over time.
- In 2017, Hispanic patients were more likely than White patients to have a pressure ulcer (5.1% vs. 4.3%).
- Hispanic patients were also more likely than White patients to have a pressure ulcer in 2013, and the disparity did not improve over time.

- **Trends in Disparities:**

  - Disparities existed between Blacks and Whites, AI/ANs and Whites, and Hispanics and Whites in 2013 and remained the same through 2017.

Nursing Home Residents With Pressure Ulcers, by Sex

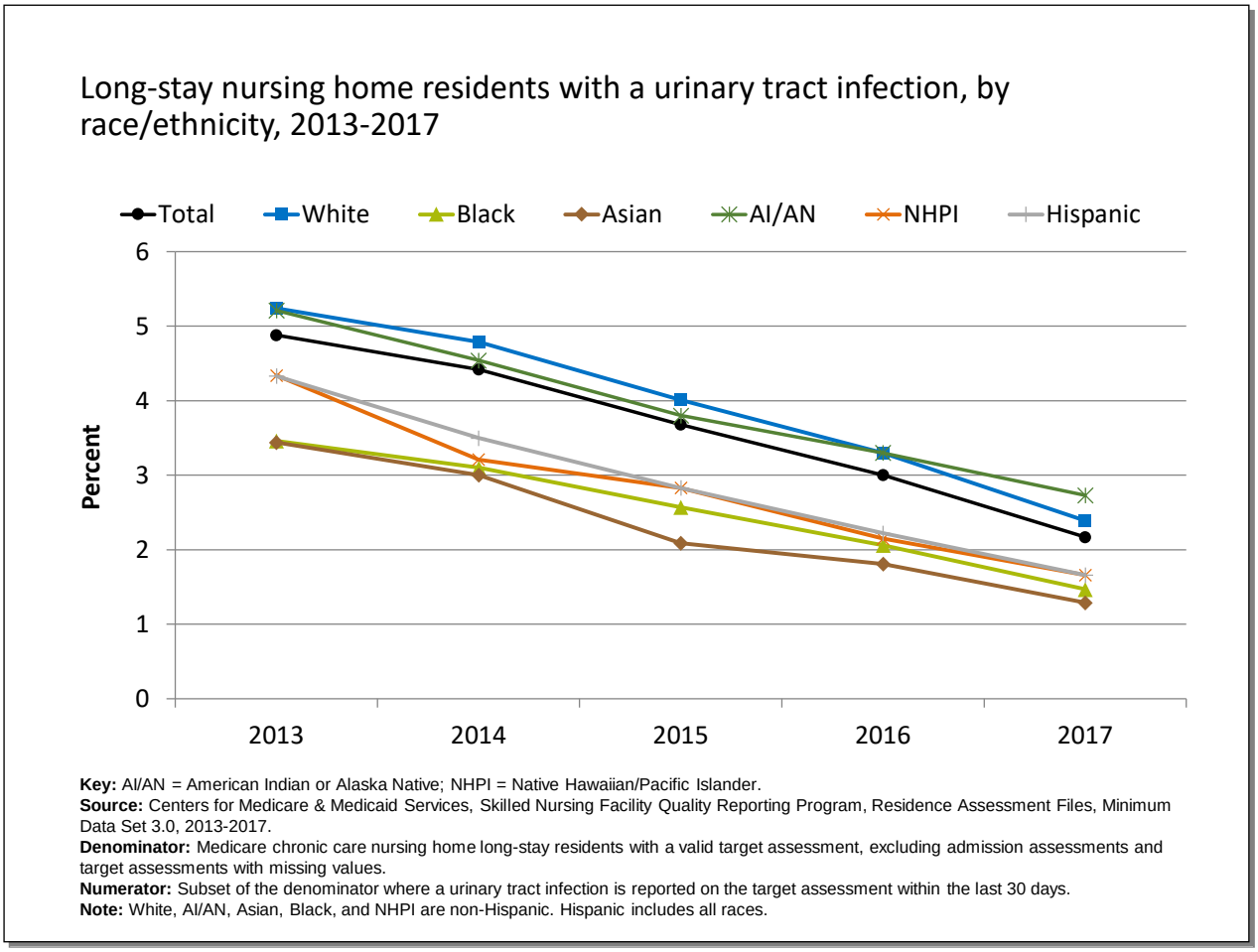


Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Chronic Conditions Data Warehouse, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment and with any of the following conditions on the target assessment: impaired in bed mobility or transfer, comatose, or suffering from malnutrition.
Numerator: Subset of the denominator with stages 2-4 pressure ulcer on target assessment.

- **Overall Percentage:** In 2017, 4.8% of long-stay nursing home patients who were impaired in bed mobility or transfer, comatose, or suffering from malnutrition at the time of an assessment were experiencing a pressure ulcer.

- **Trends:** From 2013 to 2017, the number of denominator-eligible nursing home patients who experienced a pressure ulcer declined (improved) overall and for both sexes.
- **Groups With Disparities:**
  - In 2017, female nursing home patients were less likely than male patients to have a pressure ulcer (4.3% vs. 5.9).

Nursing Home Residents With a Urinary Tract Infection, by Race/Ethnicity

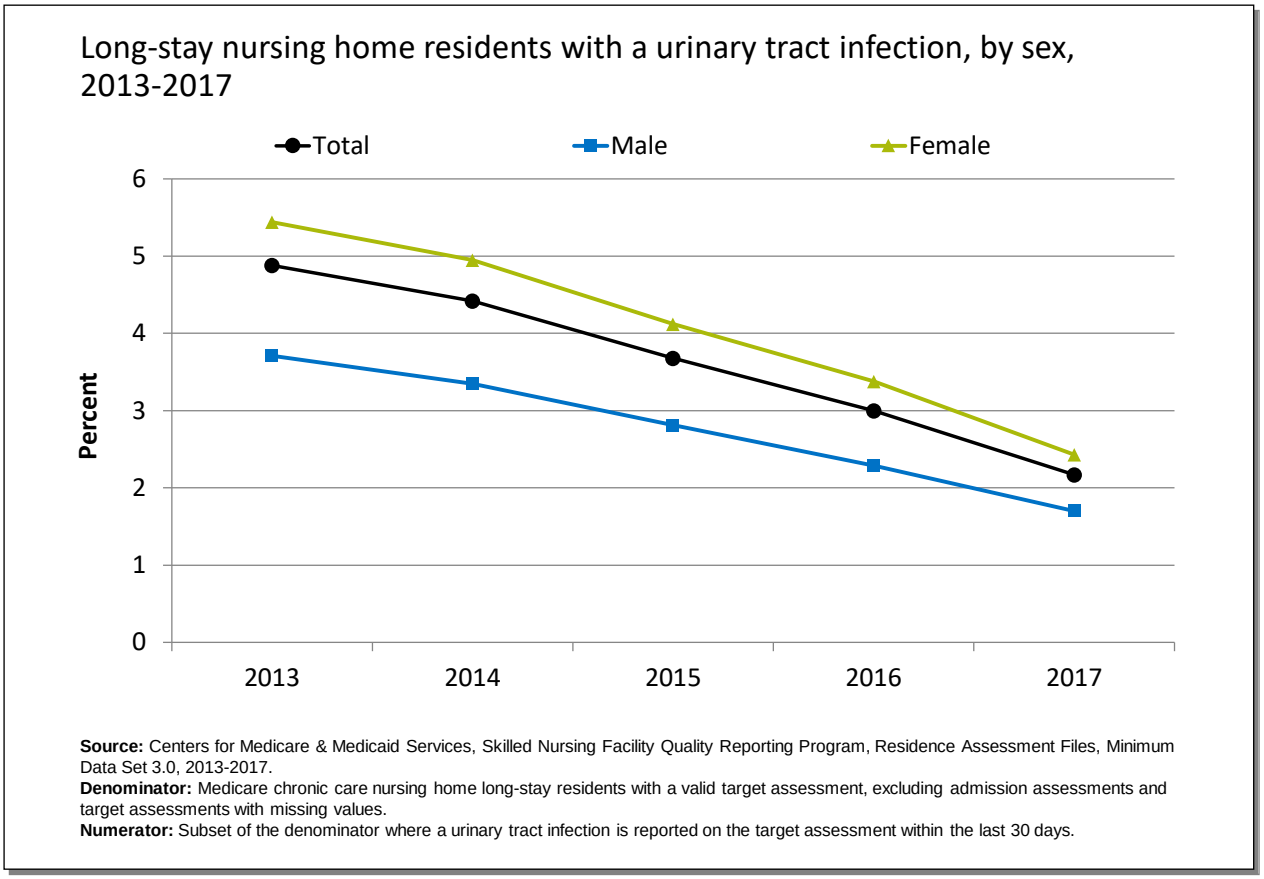


Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment, excluding admission assessments and target assessments with missing values.
Numerator: Subset of the denominator where a urinary tract infection is reported on the target assessment within the last 30 days.
Note: White, AI/AN, Asian, Black, and NHPI are non-Hispanic. Hispanic includes all races.

- **Importance:** A urinary tract infection and particularly a catheter-associated urinary tract infection is an example of a preventable infection that occurs in many long-term care facilities. Several national, State, and local programs, including AHRQ Safety Program for Long-Term Care: HAIs/CAUTI, have worked to bring quality and safety tools to nursing homes in an effort to reduce these infections. While infection rates for most populations have declined, racial, ethnic, and sex disparities still persist.
- **Overall Percentage:** In 2017, 2.2% of long-stay nursing home patients had a urinary tract infection within the 30 days prior to assessment.
- **Trends:** From 2013 to 2017, the number of long-stay nursing home patients with a urinary tract infection declined (improved) overall and for all race/ethnicity groups.

- **Groups With Disparities:**
  - In 2017, Black patients were less likely than White patients to have a urinary tract infection (1.5% vs. 2.4%).
  - In 2017, Asian patients were less likely than White patients to have a urinary tract infection (1.3% vs. 2.4%).
  - In 2017, Native Hawaiian/Pacific Islander patients were less likely than White patients to have a urinary tract infection (1.7% vs. 2.4%).
  - In 2017, Hispanic patients were less likely than White patients to have a urinary tract infection (1.7% vs. 2.4%).

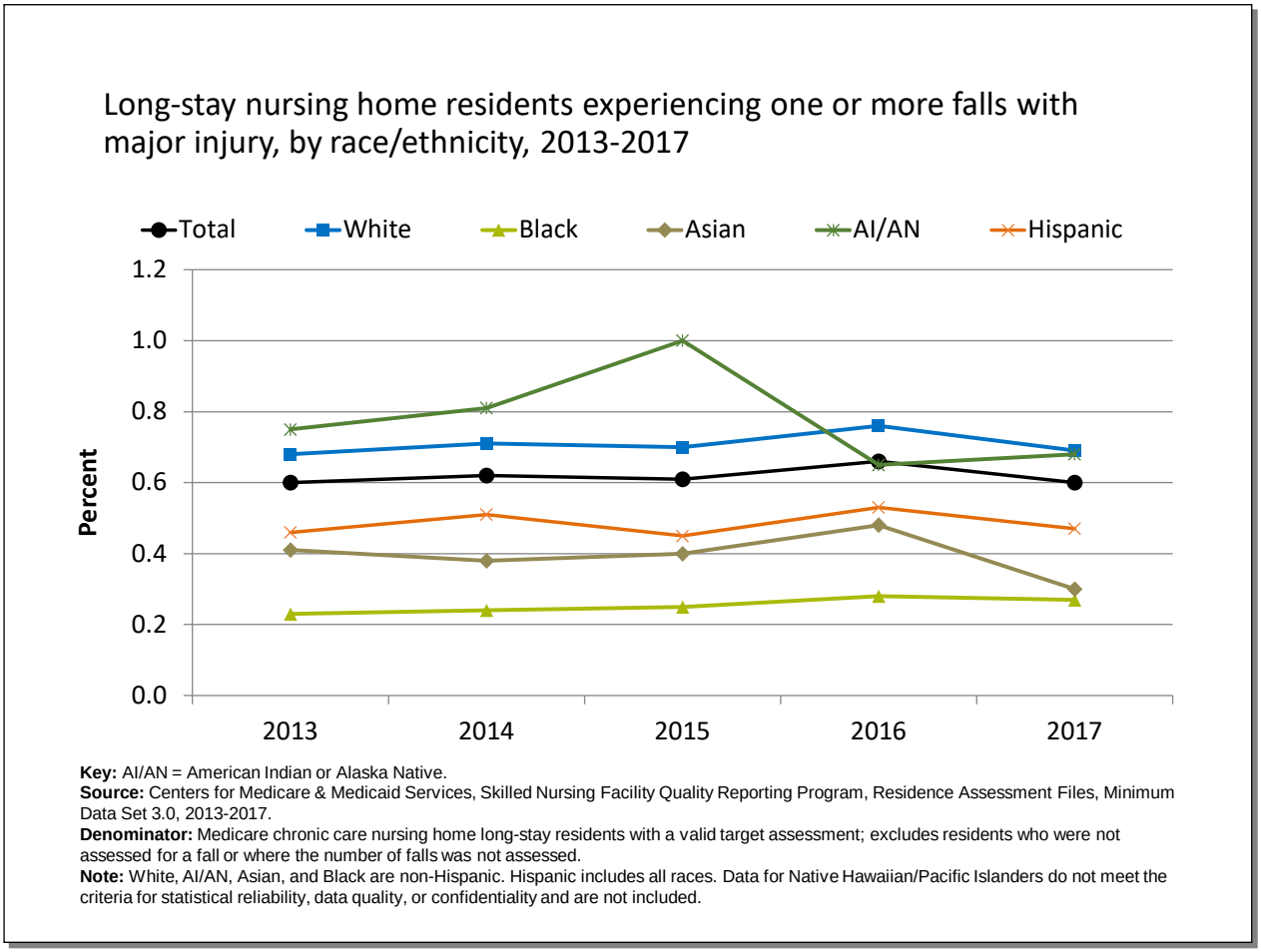
Nursing Home Residents With a Urinary Tract Infection, by Sex



Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment, excluding admission assessments and target assessments with missing values.
Numerator: Subset of the denominator where a urinary tract infection is reported on the target assessment within the last 30 days.

- **Overall Percentage:** In 2017, 2.2% of long-stay nursing home patients had a urinary tract infection within the 30 days prior to assessment.
- **Trends:** From 2013 to 2017, the number of long-stay nursing home patients with a urinary tract infection declined (improved) overall and for both sexes.
- **Groups With Disparities:**
  - In 2017, female nursing home patients were more likely than male patients to have a urinary tract infection (2.4% vs. 1.7%).
  - Female patients were also more likely than male patients to have a urinary tract infection in 2013, and the disparity did not improve over time.

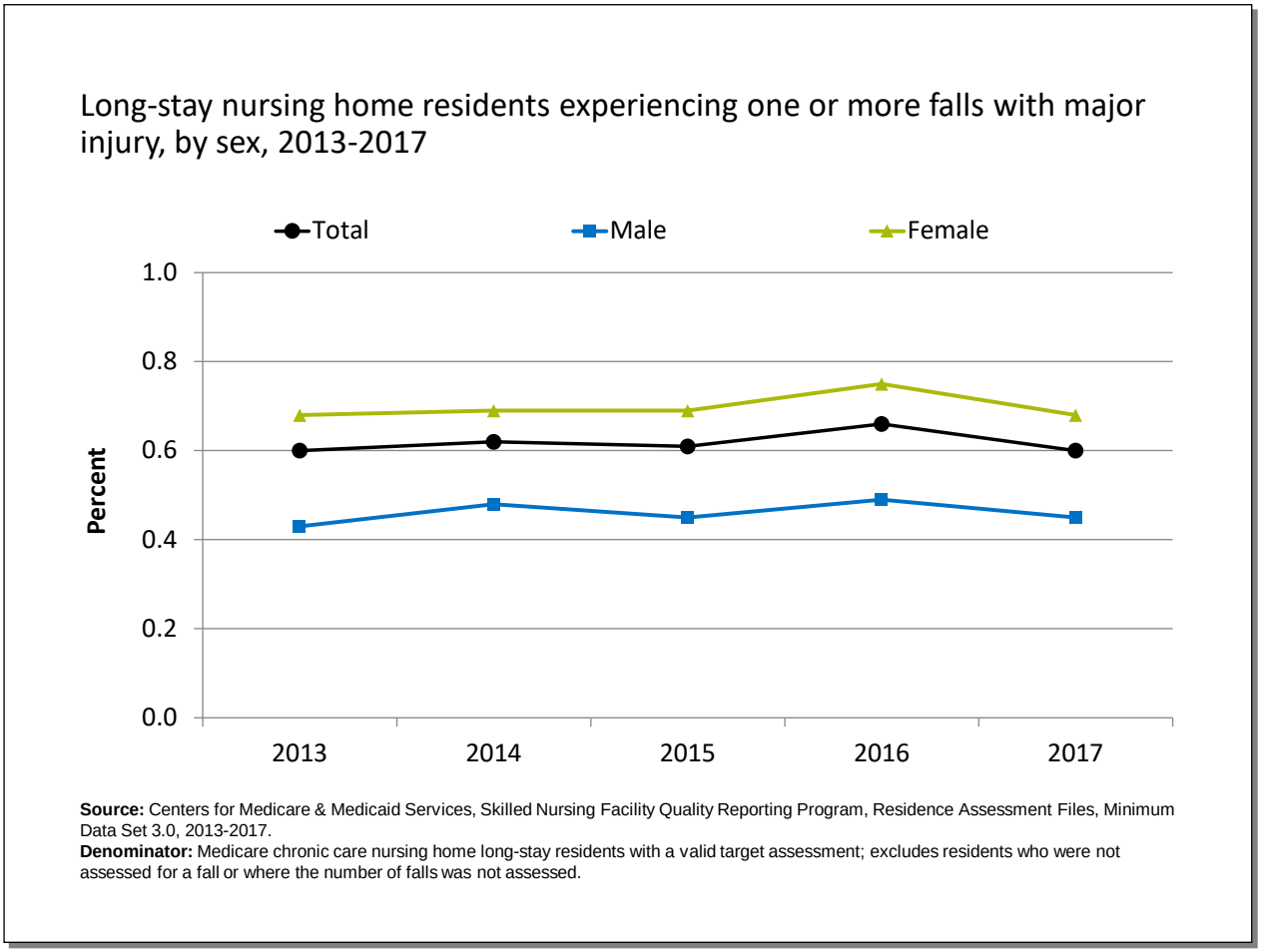
Falls Among Nursing Home Residents, by Race/Ethnicity



Key: AI/AN = American Indian or Alaska Native.
Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment; excludes residents who were not assessed for a fall or where the number of falls was not assessed.
Note: White, AI/AN, Asian, and Black are non-Hispanic. Hispanic includes all races. Data for Native Hawaiian/Pacific Islanders do not meet the criteria for statistical reliability, data quality, or confidentiality and are not included.

- **Importance:** In 2012, it was estimated that almost 530,000 nursing home residents in U.S. nursing facilities, fell every year. Moreover, one-third, experienced more than two falls, annually (AHRQ, 2017). Research by Sanghavi, et. al. (2020), showed that reporting for falls in White adults was higher than non-White adults when not controlling for facility-level and race characteristics.
- **Overall Percentage:** In 2017, 0.6% of long-stay nursing home patients with a valid target assessment experienced one or more falls with major injury.
- **Trends:** From 2013 to 2017, there was no change in the proportion of long-stay nursing home patients with a valid target assessment who experienced one or more falls with major injury overall. However, the proportion of Blacks that experienced one ore more falls with major injury increased (worsened).
- **Groups With Disparities:**
  - In 2017, Black patients were less likely than White patients to have experienced a fall with major injury (0.3% vs. 0.7%).
  - In 2017, Asian patients were less likely than White patients to have experienced a fall with major injury (0.3% vs. 0.7%).
  - In 2017, Hispanic patients were less likely than White patients to have experienced a fall with major injury (0.5% vs. 0.7%).

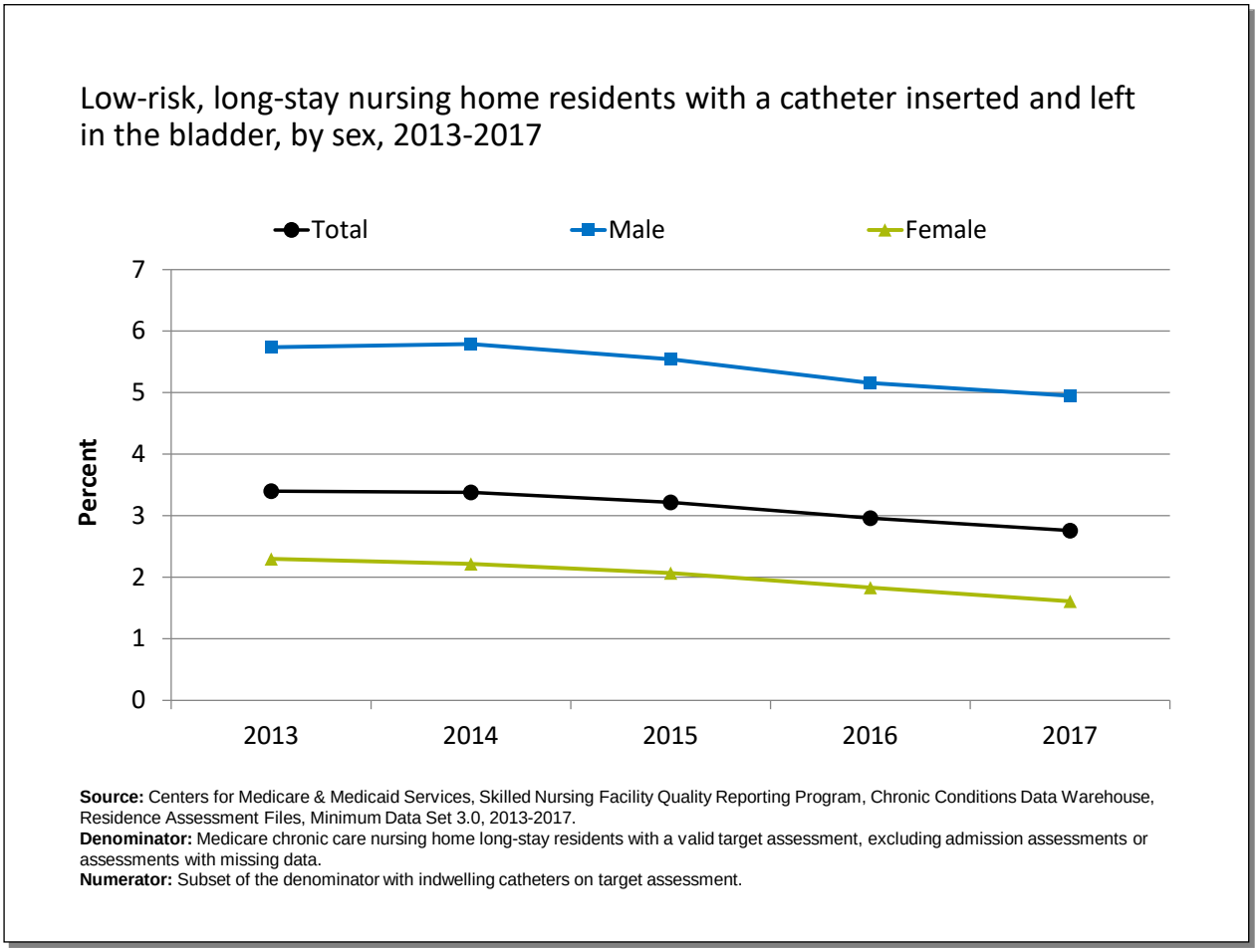
Falls Among Nursing Home Residents, by Sex



Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment; excludes residents who were not assessed for a fall or where the number of falls was not assessed.

- **Overall Percentage:** In 2017, 0.6% of long-stay nursing home patients with a valid target assessment experienced one or more falls with major injury.
- **Trends:** From 2013 to 2017, there was no change in the proportion of long-stay nursing home patients with a valid target assessment who experienced one or more falls with major injury overall and for both sexes.
- **Groups With Disparities:**
  - In 2017, female nursing home patients were more likely than male patients to have experienced a fall with major injury (0.7% vs. 0.5%).
  - Female patients were also more likely than male patients to have experienced a fall with major injury in 2013, and the disparity did not improve over time.

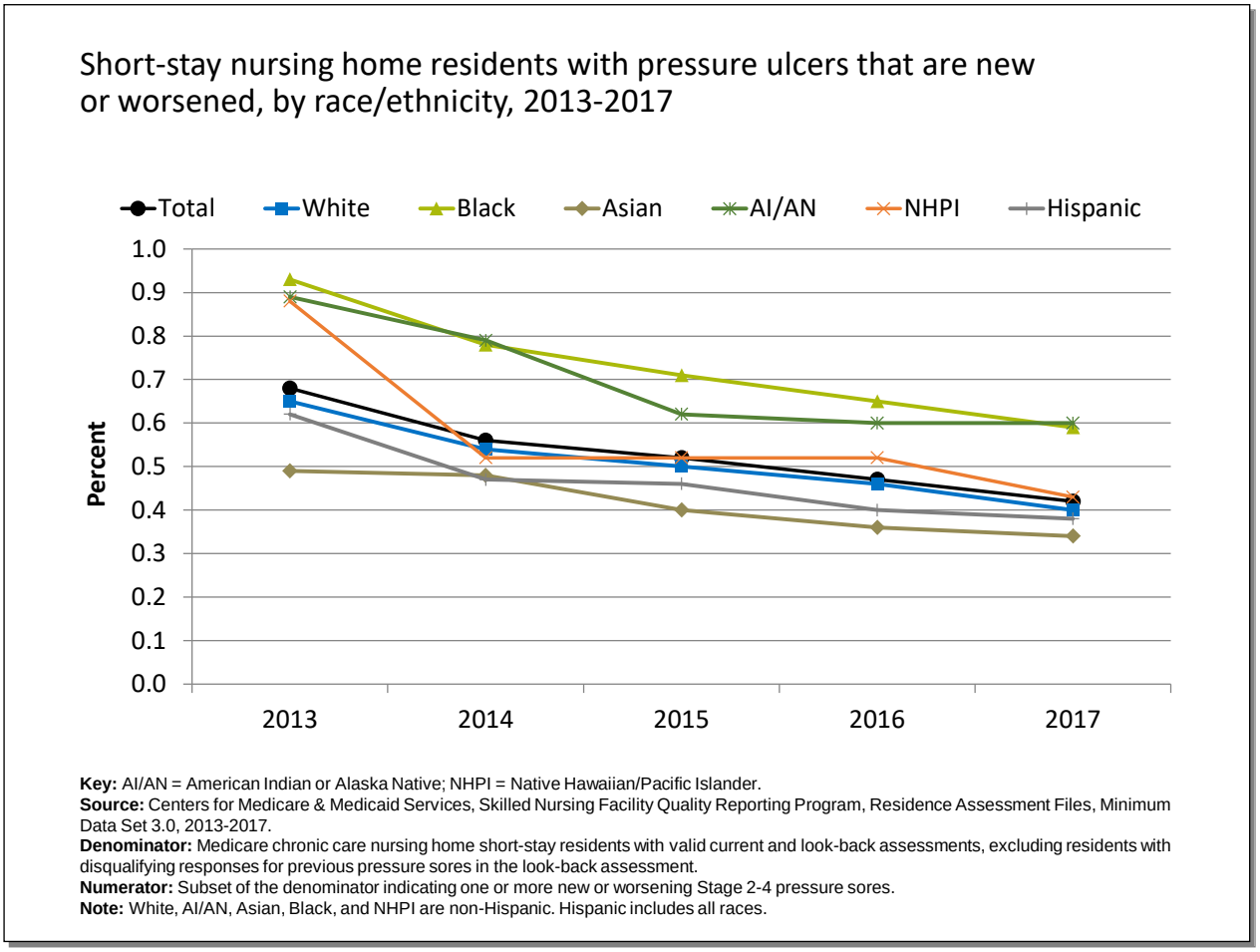
Nursing Home Residents With a Catheter Inserted and Left in the Bladder



Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Chronic Conditions Data Warehouse, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home long-stay residents with a valid target assessment, excluding admission assessments or assessments with missing data.
Numerator: Subset of the denominator with indwelling catheters on target assessment.

- **Importance:** Long-term catheter use can lead to urinary tract infections. This safety issue provides the rationale for the quality indicator "catheter left in bladder" publicly reported by nursing homes via the CMS website (Simmons, et al., 2016). Infection prevention strategies include minimizing catheter use in general and avoiding catheter use for incontinent patients; training staff in proper techniques for urinary catheter insertion; using a closed urinary drainage system; using external catheters instead of indwelling catheters when possible; documenting key information related to urinary catheter use; and providing stop orders or reminders to remove such catheters.
- **Overall Percentage:** In 2017, 2.8% of low-risk, long-stay nursing home residents had a catheter inserted and left in the bladder at the time of assessment.
- **Trends:** Between 2013 and 2017, the percentage of low-risk, long-stay nursing home residents with a catheter inserted and left in the bladder declined (improved) from 3.4% to 2.8%. The percentage also declined for both sexes.
- **Groups With Disparities:**
  - In 2017, female patients were less likely than male patients to have had a catheter inserted and left in the bladder (1.6% vs. 5.0%).

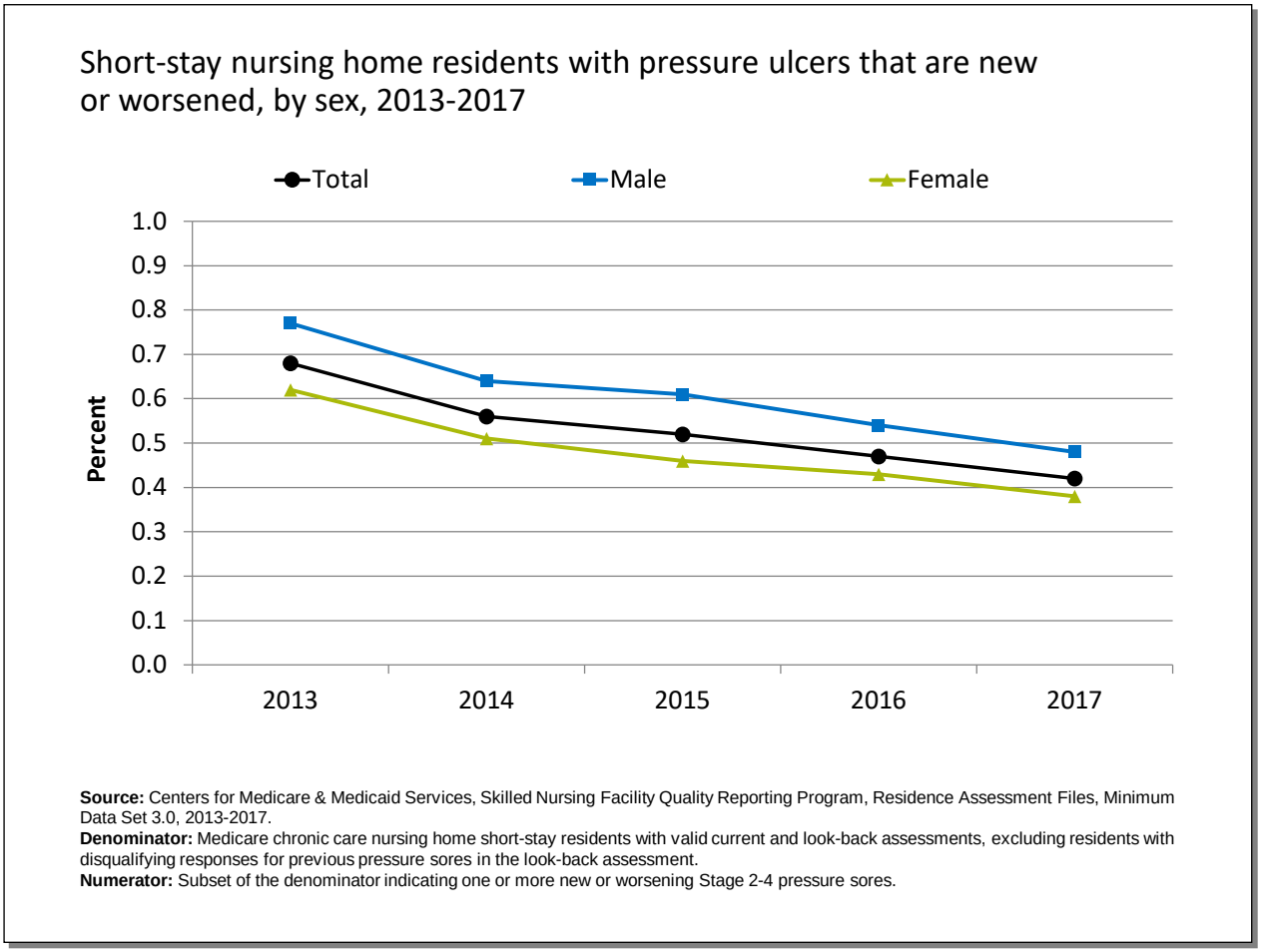
Nursing Home Residents With New or Worsened Pressure Ulcers, by Race/Ethnicity



Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home short-stay residents with valid current and look-back assessments, excluding residents with disqualifying responses for previous pressure sores in the look-back assessment.
Numerator: Subset of the denominator indicating one or more new or worsening Stage 2-4 pressure sores.
Note: White, AI/AN, Asian, Black, and NHPI are non-Hispanic. Hispanic includes all races.

- **Importance:** Pressure ulcers are a serious healthcare problem for nursing home residents. A recent study showed that effective management combined with real-time data analytics, as enabled by digital wound care management, can help prevent increases in pressure ulcers among short-stay nursing home residents (Au, et al., 2019).
- **Overall Percentage:** In 2017, 0.42% of short-stay nursing home patients had pressure ulcers that were new or had worsened.
- **Trends:** There was improvement in the percentage of short-stay nursing home patients with pressure ulcers that are new or worsened between 2013 and 2017. The overall percentage declined from 0.68% in 2013 to 0.42% in 2017. The percentage also declined for all race/ethnicity groups.
- **Groups With Disparities:**
  - In 2013, there were disparities between Black and White patients and between AI/AN and White patients, and these did not improve over time.
  - In 2017, Black patients were more likely than White patients to have pressure ulcers that were new or worsened (0.59% vs. 0.40%).
  - In 2017, AI/AN patients were more likely than White patients to have pressure ulcers that were new or worsened (0.60% vs. 0.40%).

Nursing Home Residents With New or Worsened Pressure Ulcers, by Sex



Source: Centers for Medicare & Medicaid Services, Skilled Nursing Facility Quality Reporting Program, Residence Assessment Files, Minimum Data Set 3.0, 2013-2017.
Denominator: Medicare chronic care nursing home short-stay residents with valid current and look-back assessments, excluding residents with disqualifying responses for previous pressure sores in the look-back assessment.
Numerator: Subset of the denominator indicating one or more new or worsening Stage 2-4 pressure sores.

- **Overall Percentage:** In 2017, 0.42% of short-stay nursing home patients had pressure ulcers that were new or had worsened.
- **Trends:** There was improvement in the percentage of short-stay nursing home patients with pressure ulcers that are new or worsened between 2013 and 2017. The overall percentage declined from 0.68% in 2013 to 0.42% in 2017. The percentage also declined for both sexes.
- **Groups With Disparities:**
  - In 2017, female patients were less likely than male patients to have pressure ulcers that were new or worsened (0.38% vs. 0.48%).

Nursing Home Safety Resources

AHRQ offers several resources to improve the quality and safety of care in nursing homes. These include:

- On-Time Pressure Ulcer Prevention,
- CUSP Toolkit To Reduce CAUTI and Other HAIs In Long-Term Care Facilities, and
- Falls Management Program.

AHRQ is also funding the AHRQ ECHO National Nursing Home COVID-19 Action Network. This Network is working with nursing homes nationally to implement quality and safety interventions to reduce the spread of COVID-19. Visit AHRQ.gov for more tools and resources for long-term and nursing home care.

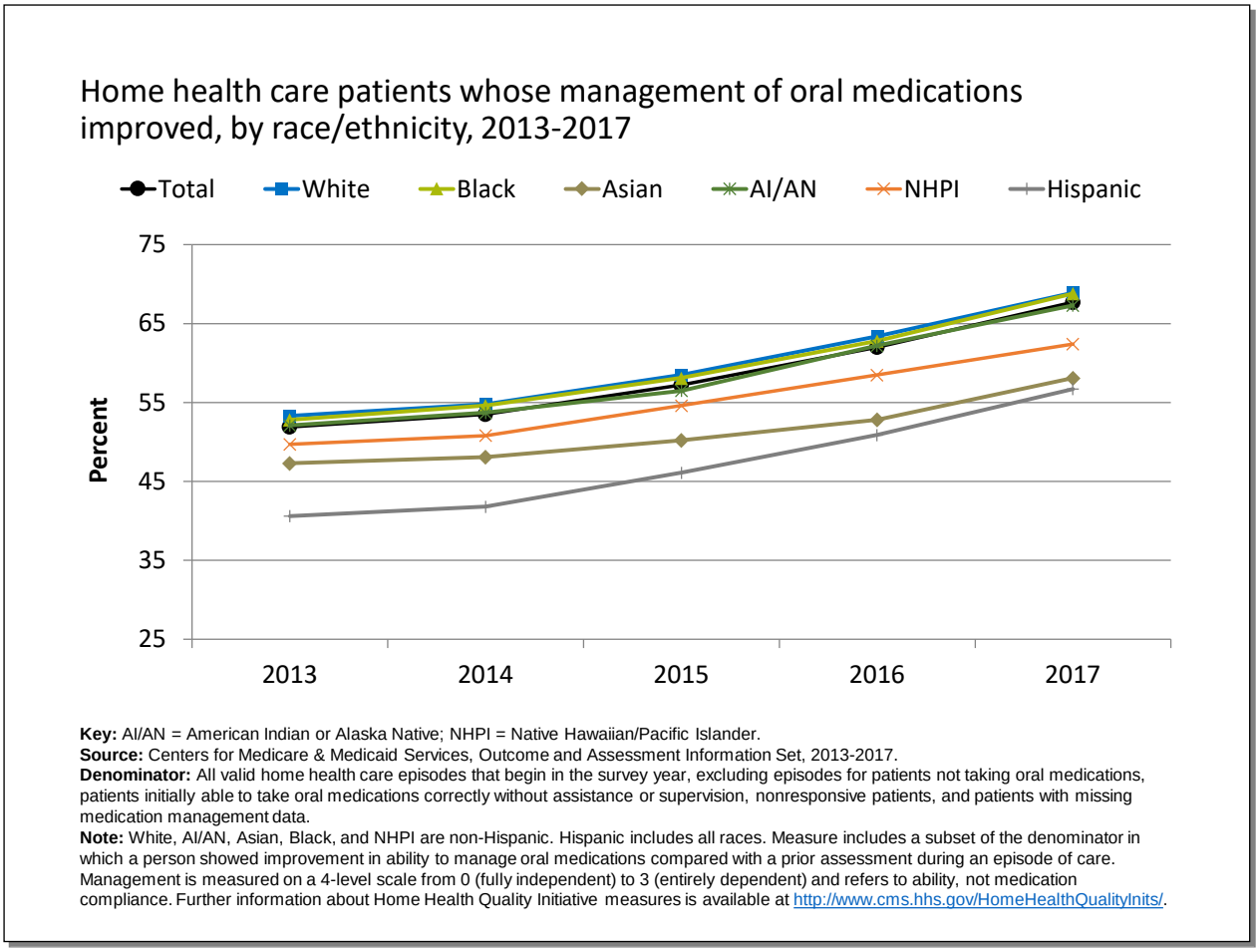
Patient Safety in the Home Health Setting

Home health agencies provide services to patients 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, and terminal illness (NAHCH, 2010). Improvements among home health patients can reflect the quality of care from home health agencies.

In this section, measures address:

- Home health care patients whose management of oral medications improved, by race/ethnicity.
- 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, by race/ethnicity and age.

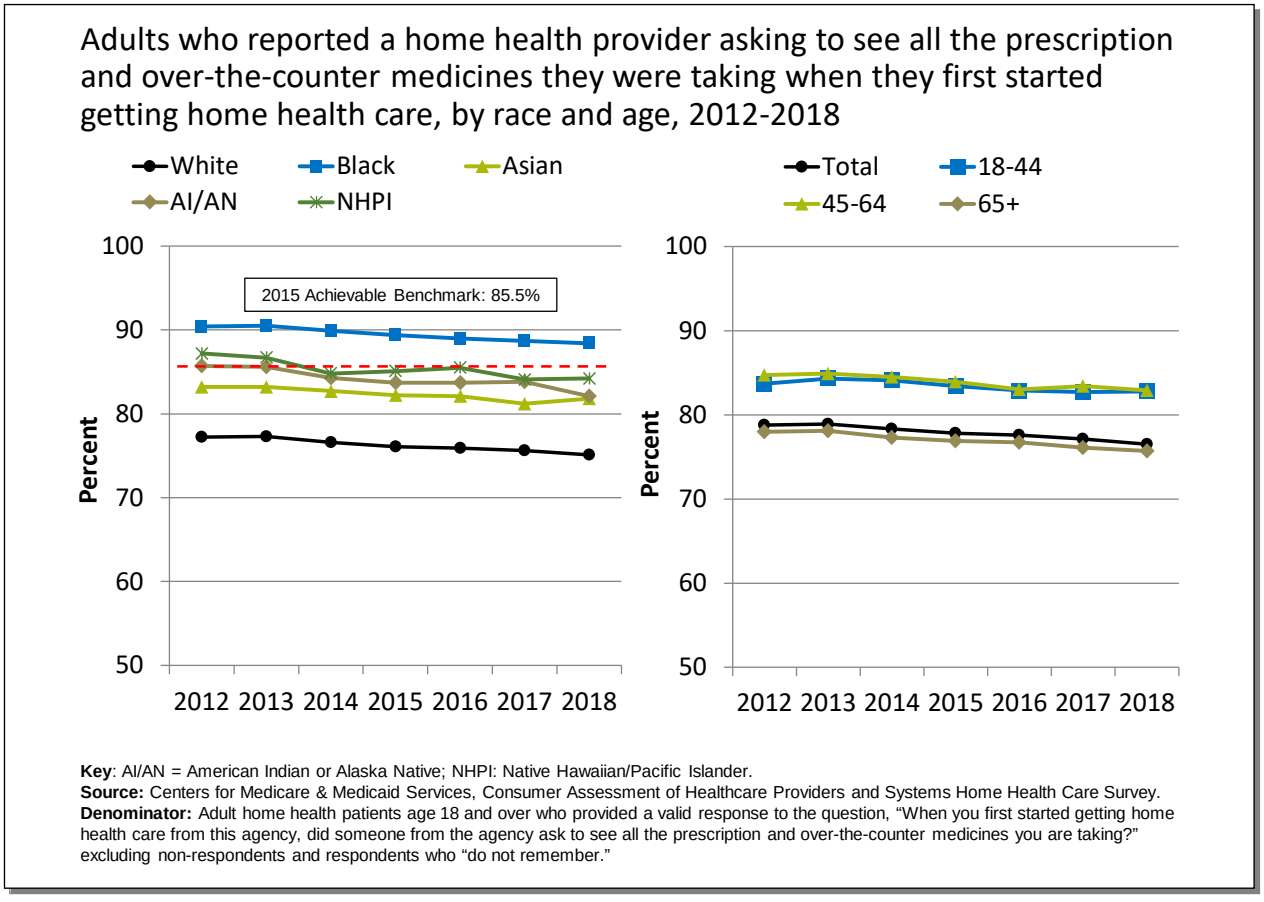
Home Health Care Patients With Improved Management of Oral Medications



Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Outcome and Assessment Information Set, 2013-2017.
Denominator: All valid home health care episodes that begin in the survey year, excluding episodes for patients not taking oral medications, patients initially able to take oral medications correctly without assistance or supervision, nonresponsive patients, and patients with missing medication management data.
Note: White, AI/AN, Asian, Black, and NHPI are non-Hispanic. Hispanic includes all races. Measure includes a subset of the denominator in which a person showed improvement in ability to manage oral medications compared with a prior assessment during an episode of care. Management is measured on a 4-level scale from 0 (fully independent) to 3 (entirely dependent) and refers to ability, not medication compliance. Further information about Home Health Quality Initiative measures is available at http://www.cms.hhs.gov/HomeHealthQualityInits/.

- **Importance:** Poor medication management may lead to incorrect, missed, and mistimed doses, reducing the effectiveness of medical treatment plans, making adverse events more likely, and potentially leading to hospitalization, injury, or death.
- **Overall Percentage:** In 2017, 67.7% of home health patients taking oral medications had improved their medication management during an episode of care.
- **Trends:** From 2013 to 2017, medication management improved for patients overall, for men and women (data not shown), and for all racial/ethnic groups.
- **Groups With Disparities:**
  - In 2017, Hispanic adults receiving home healthcare experienced worse outcomes than White home healthcare patients who saw a greater improvement in the management of their oral medications (56.7% vs. 68.9%). Hispanics also fared worse than Whites in 2013, and the disparity did not improve significantly over time.
  - In 2017, Asian adults receiving home healthcare experienced worse outcomes than White home healthcare patients who saw a greater improvement in the management of their oral medications (58.1% vs. 68.9%). Asians also fared worse than Whites in 2013, and the disparity between Asians and Whites worsened over time from 2013 to 2017.
  - In 2017, NHPIs adults receiving home healthcare experienced worse outcomes than White home healthcare patients who saw a greater improvement in the management of their oral medications (62.4% vs. 68.9%).

Home Health Providers Asking To See All Medications



Key: AI/AN = American Indian or Alaska Native; NHPI: Native Hawaiian/Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Consumer Assessment of Healthcare Providers and Systems Home Health Care Survey.
Denominator: Adult home health patients age 18 and over who provided a valid response to the question, "When you first started getting home health care from this agency, did someone from the agency ask to see all the prescription and over-the-counter medicines you are taking?" excluding non-respondents and respondents who "do not remember."

- **Importance:**
  - Home health providers' asking to see all medications is a preliminary step in ensuring that patients take only medications appropriate to their condition and understand why, when, and how much of each medication to take. This step may be especially important in protecting against medication errors and adverse events after transitions from facility-based care to home care.
  - This measure focuses on patients' recollection of their experience with the home health agency. It is important to note that the skill sets and required background training of home health care workers varies substantially across States. While home health care workers in some States may be trained to assist providers in medication reconciliation, workers in other States may not. Medication reconciliation is a key part of ambulatory care. For more information, refer to Patient Safety Primer: Ambulatory Care Safety at https://psnet.ahrq.gov/primers/primer/16.

- **Overall Percentage:** In 2018, 76.5% of adult home health patients reported that they had been asked to show a home health provider all the prescription and over-the-counter medicines they were taking, when they first started getting home health care.
- **Trends:**
  - From 2012 to 2018, the percentage of home health patients reporting that they had been asked to show their medications to a home health provider decreased from 78.8% to 76.5%.
  - Similar decreases were observed for all racial and age groups.
  - Trend analysis was not performed for Hispanics but their rate in 2018 was above the 2015 benchmark of 85.5% (86.5%, data not shown on slide). Black patients in 2018 also remained above the 2015 benchmark (88.4%). The States contributing to the benchmark are Alabama, Arkansas, Louisiana, Mississippi, Texas, and West Virginia.

- **Groups With Disparities in 2018:**
  - **By Race:**
    - Black, Asian, AI/AN, and NHPI home health patients were all more likely than White patients to have been asked to show their medications to a home health provider (88.4%, 81.8%, 82.1%, and 84.2%, respectively, vs. 75.1%).
    - Hispanic home health patients were more likely than non-Hispanic White patients to have been asked to show their medications to a home health provider (86.5% vs. 74.4%; data not shown).
  - **By Age:**
    - Adults age 65 and over were less likely than adults ages 18-44 to have been asked to show their medications to a home health provider (75.7% vs 82.8%). This disparity existed in 2012 and has not narrowed over time.

Home Health Care Quality and Safety Resources

Home health care quality and safety resources continue to evolve.

- AHRQ currently offers the CAHPS Home Health Care Survey that asks patients to assess the quality of their home health care experience.
- In 2011, AHRQ and the National Academies of Sciences co-published Bringing Human Factors Into Home Health Care, a report examining the impact of health information technology on home health care delivery.

Patient Safety and Communication

Patient safety and person-centered care are directly related quality domains. Poor communication is a leading cause of patient safety events and poor patient experiences of care (Kohn, et al., 2000; Divi, et al., 2007; Khan, et al., 2020).

- Poor communication can occur between patients and providers as well as among providers.
- Poor communication can continue to harm patients and families after an adverse event has occurred (Etchegaray, et al., 2014).

Studies show that some adult hospital patients experience poorer communication with their providers based on their race, ethnicity, or educational status (Elliott, et al., 2016; Zhu, et al., 2015; Karter, et al, 2007). Communication gaps occur in all settings of care and are barriers to health equity.

Health Literacy

Healthy People 2030 has two complementary definitions (ODPHP, 2020b) that together constitute health literacy:

- Personal Health Literacy: The degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.
- Organizational Health Literacy: The degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.
- Health literate communication is improving but is far from universal (Liang & Brach, 2017).
    - Many evidence-based health literacy strategies, such as the teach-back method (Schillinger, et al., 2003), can help healthcare organizations be health literate (Koh, et al., 2013).

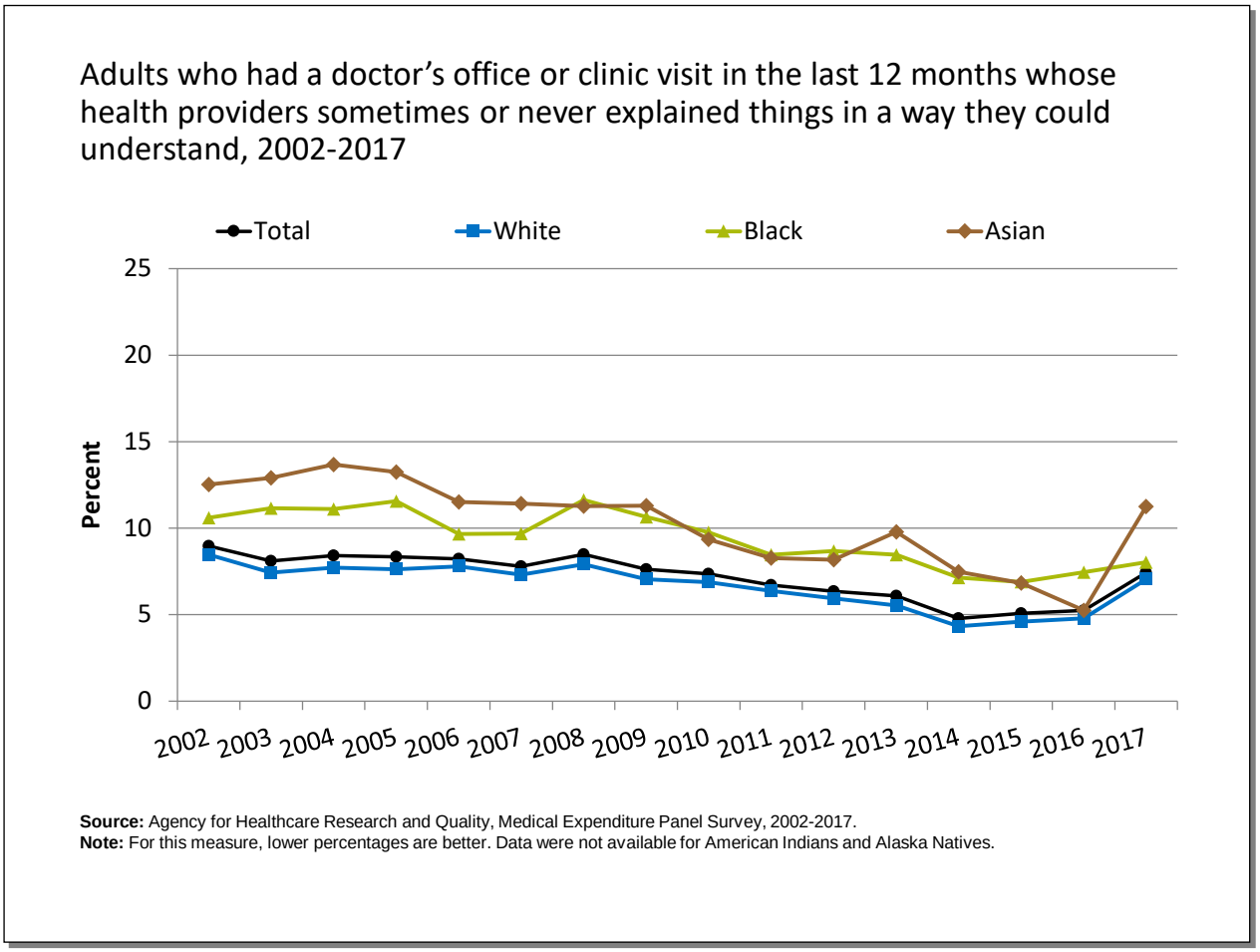
Even people with adequate personal health literacy have difficulty understanding what to do to attain and maintain good health. Many patients leave their healthcare visit unsure of what their provider asked them to do or what was discussed.

Measures of Communication

- Adults who had a doctor's office or clinic visit in the last 12 months whose health providers sometimes or never explained things in a way they could understand
- Adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions
- Adults who reported that home health providers always explained things in a way that was easy to understand in the last 2 months of care

These measures fall under the person-centered care quality domain within the NHQDR database. They are not included in the summary bar charts shown earlier. These measures are represented in the person-centered care bar shown earlier.

Poor Communication Between Doctors and Patients



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2017.
Note: For this measure, lower percentages are better. Data were not available for American Indians and Alaska Natives.

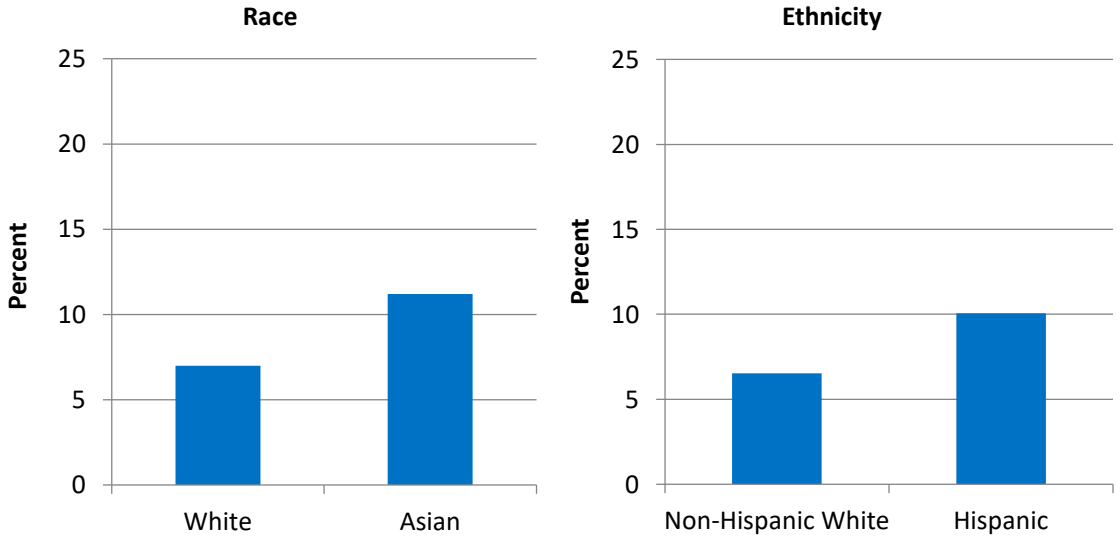
- **Importance:** When healthcare providers use teach-back with their patients, they ask them to describe in their own words what they have heard. If patients cannot teach the information back correctly, providers have to instruct them again using a different way of explaining, until patients are able to teach back what they have learned correctly (AHRQ, 2019b). The use of strategies such as teach-back and shared decision making are contributing to improvements in patient-provider communication. Breakdowns in communication still exist

and require close examination of modes of communication, implicit bias, and trust building (Boulware, et al., 2003).

- **Overall Percentage:** In 2017, 7.4% of adults who had a doctor's office or clinic visit in the last 12 months had health providers who sometimes or never explained things in a way they could understand.
- **Trends:** The percentage of adults who had a doctor's office or clinic visit in the last 12 months whose health providers sometimes or never explained things in a way they could understand improved from 2002 to 2017 for all races.

Poor Communication Between Doctors and Patients, by Race and Ethnicity

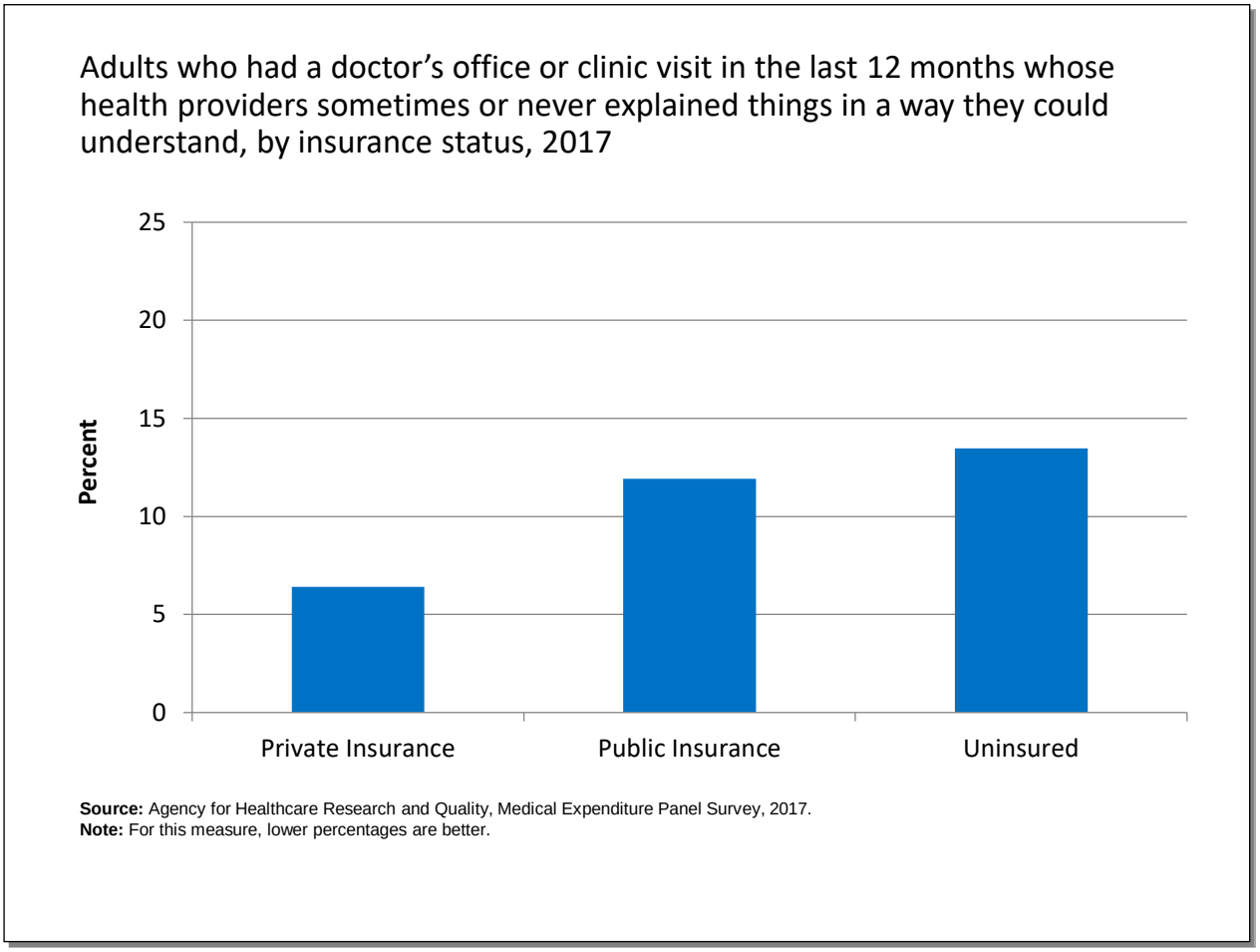
Adults who had a doctor's office or clinic visit in the last 12 months whose health providers sometimes or never explained things in a way they could understand, by race and ethnicity, 2017



Key: AI/AN = American Indian and Alaska Native.
Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2017.
Note: For this measure, lower percentages are better. Data for AI/AN populations in 2017 were not available.

- **Groups With Disparities:**
  - In 2017, the percentage of adults whose health providers sometimes or never explained things in a way they could understand was higher for Asians than for Whites (11.2% vs. 7.0%).
  - In 2017, the percentage of adults whose health providers sometimes or never explained things in a way they could understand was higher for Hispanics than for Whites (10.1% vs. 6.5%).

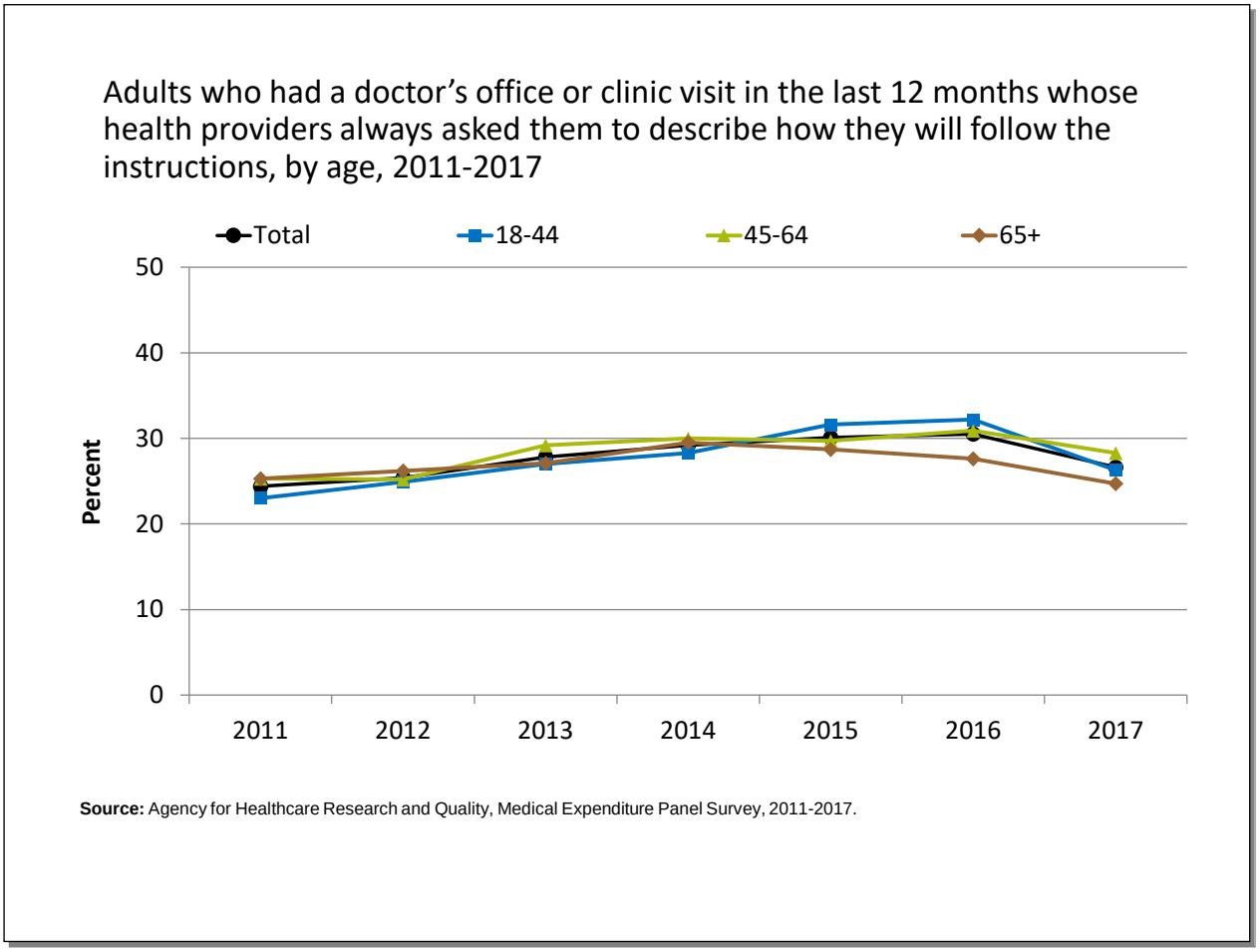
Poor Communication Between Doctors and Patients, by Insurance Status



Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2017.
Note: For this measure, lower percentages are better.

- **Groups With Disparities:**
  - In 2017, the percentage of adults whose health providers sometimes or never explained things in a way they could understand was higher for people with public insurance than for people with private insurance (11.9% vs. 6.4%).
  - In 2017, the percentage of adults whose health providers sometimes or never explained things in a way they could understand was higher for uninsured people than for people with private insurance (13.5% vs. 6.4%).

Use of Teach-Back, by Age

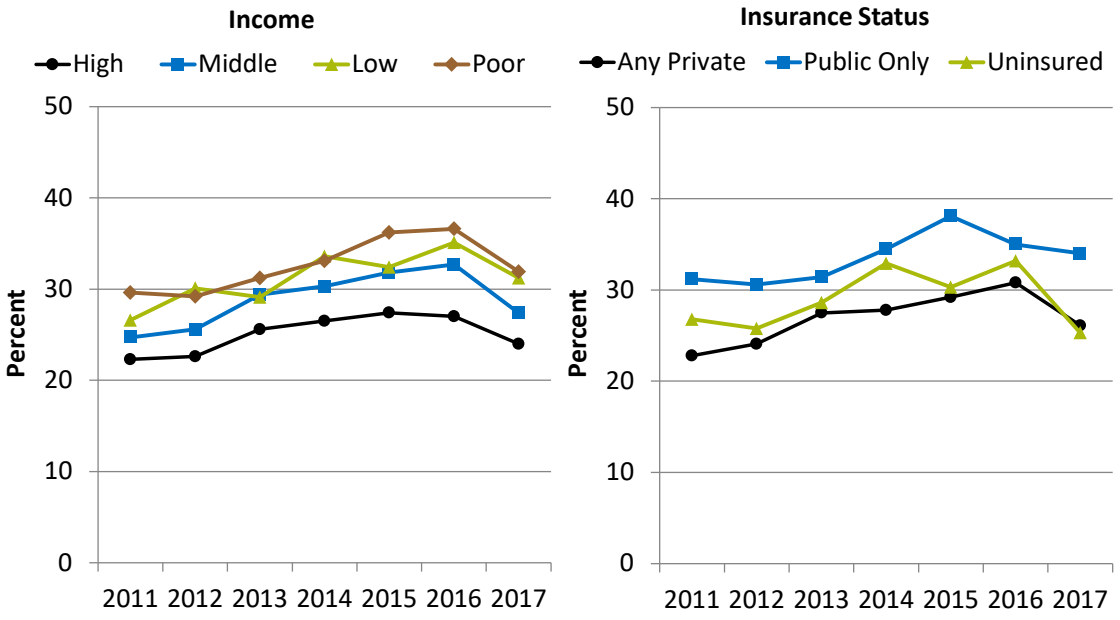


Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2011-2017.

- **Importance:** Many patients leave their healthcare visit unsure of what their provider asked them to do or what was discussed. Nationwide, only 12% of adults have proficient health literacy (Kutner, et al., 2006).[7] That means almost 9 out of 10 Americans find it challenging "to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (IOM, 2004). The use of strategies such as teach-back and shared decision making are contributing to improvements in patient-provider communication. Breakdowns in communication still exist and require close examination of modes of communication, implicit bias, and trust building (Boulware, et al., 2003).
- **Overall Percentage:** From 2011 to 2017, the percentage of adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions improved from 24.4% to 26.6%.
- **Trends:** The percentage of adults ages 45-64 years who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions improved from 2011 (25.3%) to 2017 (28.3%). All other age groups had no statistically significant changes over time.

Use of Teach-Back, by Income and Insurance Status

Adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions, by income and insurance status, 2011-2017

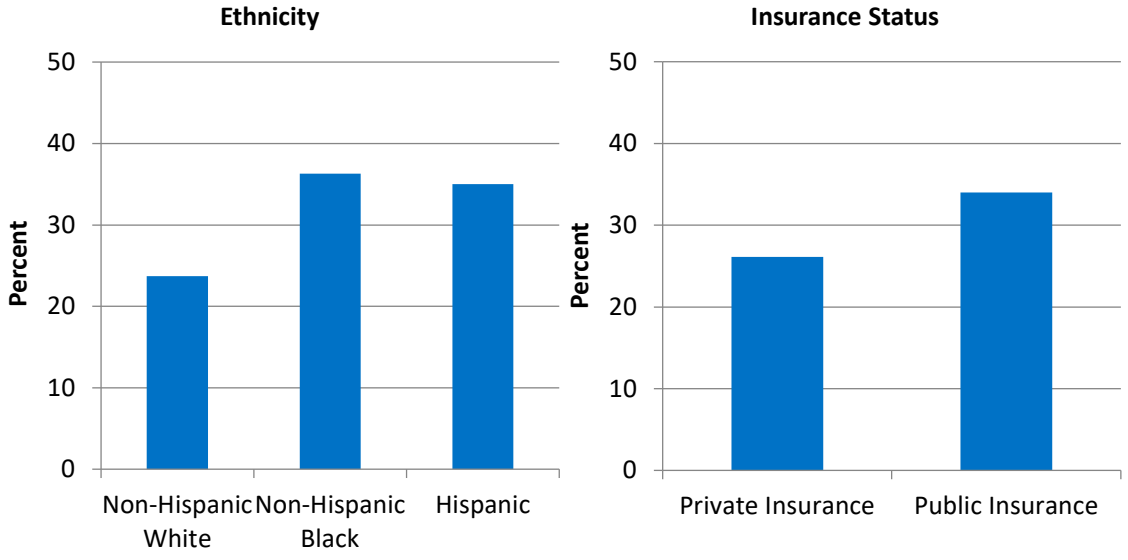


Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2002-2017.

- **Trends:**
  - **Income:** The percentage of adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions improved from 2011 to 2017 for poor and low-income people. Adults with high income and middle income had no statistically significant changes over time.
    - High Income: 22.3% to 24.0%.
    - Middle Income: 24.7% to 27.4%.
    - Low Income: 26.6% to 31.2%.
    - Poor: 29.6% to 31.9%.
  - **Health Insurance:** The percentage of adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions improved from 2011 to 2017 for people with any private insurance and with public insurance. Uninsured adults had no statistically significant changes over time.
    - Any private: 22.8% to 26.1%.
    - Public only: 31.2% to 34.0%.
    - Uninsured: 26.8% to 25.3%.

Use of Teach-Back, by Ethnicity and Insurance Status

Adults who had a doctor's office or clinic visit in the last 12 months whose health providers always asked them to describe how they will follow the instructions, by ethnicity and insurance status, 2017

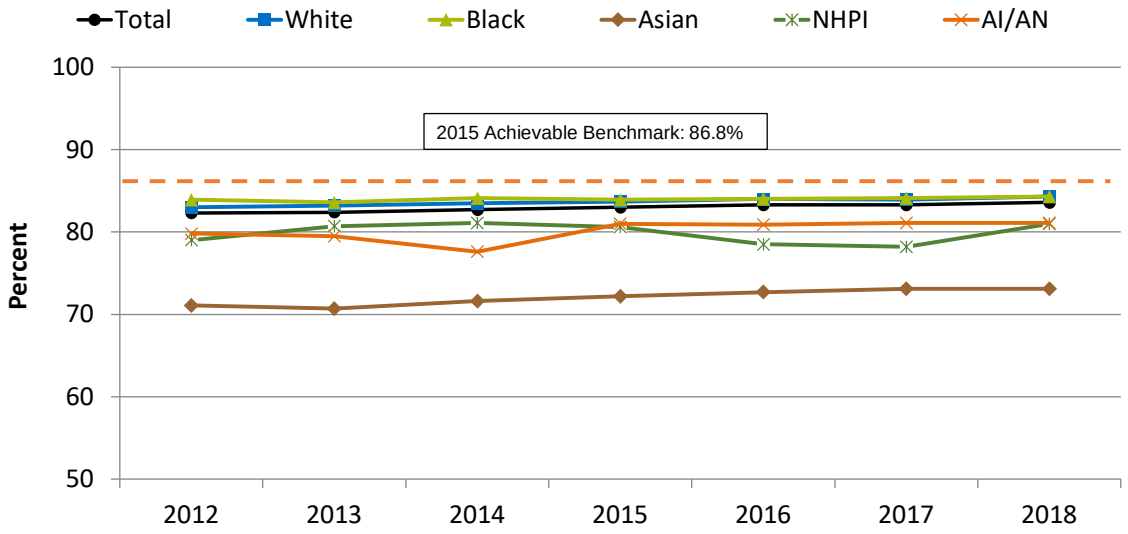


Source: Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 2017.

- **Groups With Disparities:**
  - **Ethnicity:**
    - In 2017, the percentage of adults whose health providers always asked them to describe how they will follow the instructions was higher for non-Hispanic Black adults (36.3%) and Hispanic adults (35%) than for non-Hispanic White adults (23.7%).
  - **Insurance Status:**
    - In 2017, the percentage of adults whose health providers always asked them to describe how they will follow the instructions was higher for adults with public insurance (34.0%) than for adults with private insurance (26.1%).

Adults Whose Home Health Providers Always Explained Things Well

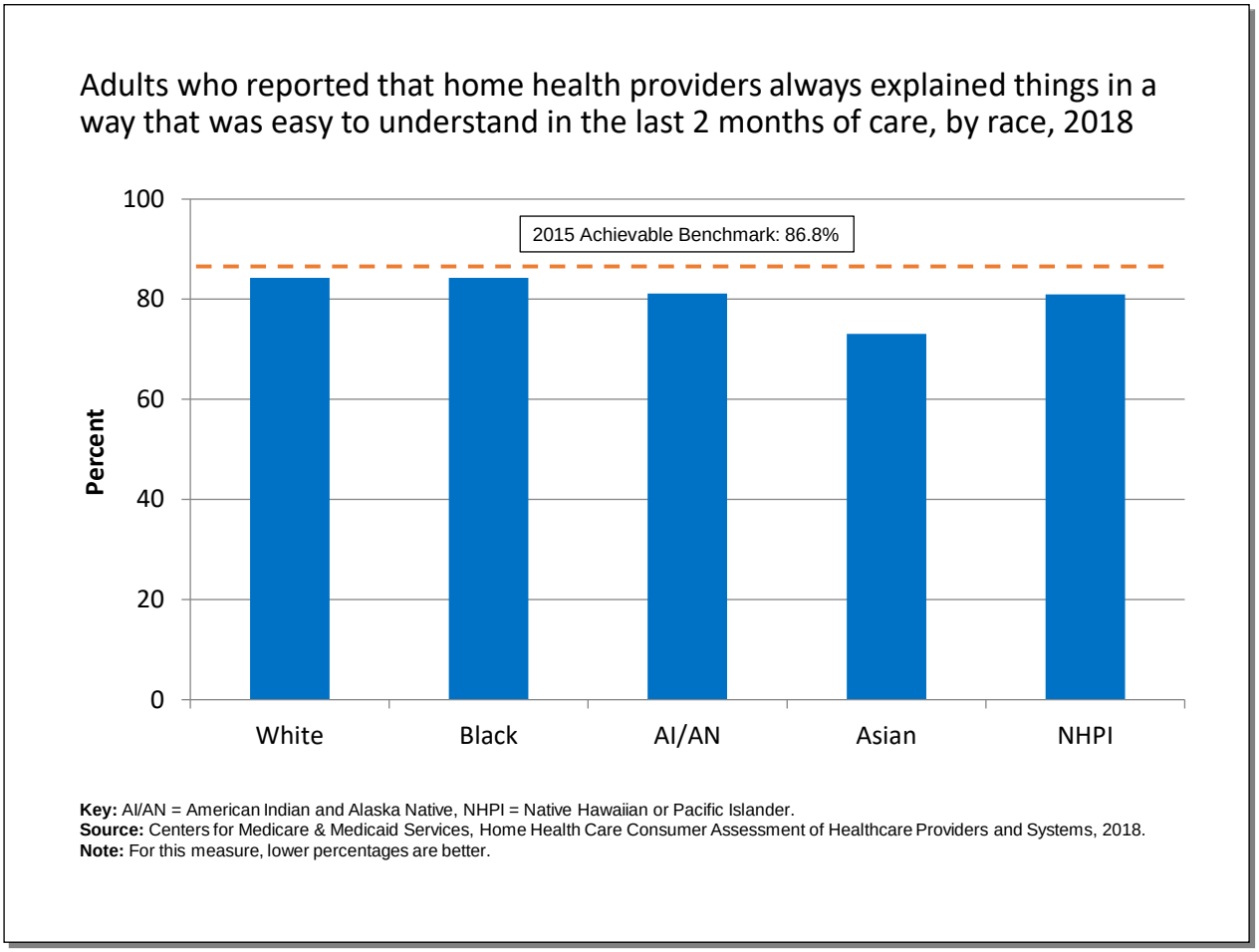
Adults who reported that home health providers always explained things in a way that was easy to understand in the last 2 months of care, total and by race, 2012-2018



Key: AI/AN = American Indian and Alaska Native, NHPI = Native Hawaiian or Pacific Islander.
Source: Centers for Medicare & Medicaid Services, Home Health Care Consumer Assessment of Healthcare Providers and Systems, 2012-2018.

- **Importance:** Overall, effective communication leads to increased patient and clinician satisfaction, increased trust with the clinician, and functional and psychological well-being. Effective communication also leads to improved outcomes in specific diseases, including heart disease, diabetes, and hypertension (Chou, 2018).
- **Overall Percentage:** In 2018, 83.6% of adults reported that home health providers always explained things in a way that was easy to understand in the last 2 months of care.
- **Trends:**
  - The percentage of adults who had a home healthcare visit in the last 12 months that had health providers who always explained things in a way they could understand improved from 2012 to 2018 for White (83% to 84.3%) and Asian populations (71.1% to 73.1%).
    - White adults are an estimated 12 years from reaching the 2015 benchmark of 86.8%.
    - Asian adults are an estimated 32 years from reaching the 2015 benchmark of 86.8%.
  - Black, Native Hawaiian/Pacific Islander (NHPI), and AI/AN populations had no statistically significant changes over time from 2012-2018.

Adults Whose Home Health Providers Always Explained Things Well, by Race, 2018



- **Groups With Disparities:**
  - In 2018, there were no statistically significant differences between Blacks and Whites in the percentage of adults who reported that home health providers always explained things in a way that was easy to understand in the last 2 months of care (84.3% vs. 84.3%)
  - In 2018, AI/AN adults (81.1%), Asian adults (73.1%), and NHPI adults (81.0%) each had a lower percentage than White adults (84.3%) who reported that home health providers always explained things in a way that was easy to understand in the last 2 months of care.

Tools for Improving Patient Safety and Communication With Patients and Families

AHRQ patient engagement and health literacy tools support improved communication with patients and families. They include:

- Tools for Engaging Patients and Families in Their Health Care, which includes the Guide to Improving Patient Safety in Primary Care Settings by Engaging Patients and Families, featuring a teach-back intervention.

- AHRQ's health literacy microsite, which includes improvement tools such as the AHRQ Health Literacy Universal Precautions Toolkit, designed to promote better understanding by all patients.

Patient Safety Tools, Resources, and Programs Across Multiple Settings

Patient safety infrastructure varies by State and healthcare facility. Patient safety and quality issues in ambulatory care settings and medical offices relative to safety culture are described in data from the:

- AHRQ Ambulatory Surgery Center (ASC) Survey on Patient Safety Culture.
- AHRQ Medical Office Survey on Patient Safety.

AHRQ implements the Patient Safety and Quality Improvement Act of 2005 except for the confidentiality and related enforcement provisions delegated to the Office for Civil Rights. Patient safety infrastructure varies by State and healthcare facility.

Patient safety and quality issues in ambulatory care settings and medical offices relative to safety culture are described in data from the:

- AHRQ Ambulatory Surgery Center (ASC) Survey on Patient Safety Culture.
- AHRQ Medical Office Survey on Patient Safety.

AHRQ implements the Patient Safety and Quality Improvement Act of 2005 except for the confidentiality and related enforcement provisions delegated to the Office for Civil Rights.

The AHRQ Ambulatory Surgery Center Survey on Patient Safety Culture enables ASCs to assess how their staff perceive various aspects of patient safety culture in their ASC. See: https://www.ahrq.gov/sops/surveys/asc/index.html.

The AHRQ Medical Office Survey on Patient Safety Culture enables medical offices to assess how their staff perceive various aspects of patient safety culture in their medical office. See: https://www.ahrq.gov/sops/surveys/medical-office/index.html.

Surveys on Patient Safety Culture™ (SOPS®) Ambulatory Surgery Center Survey

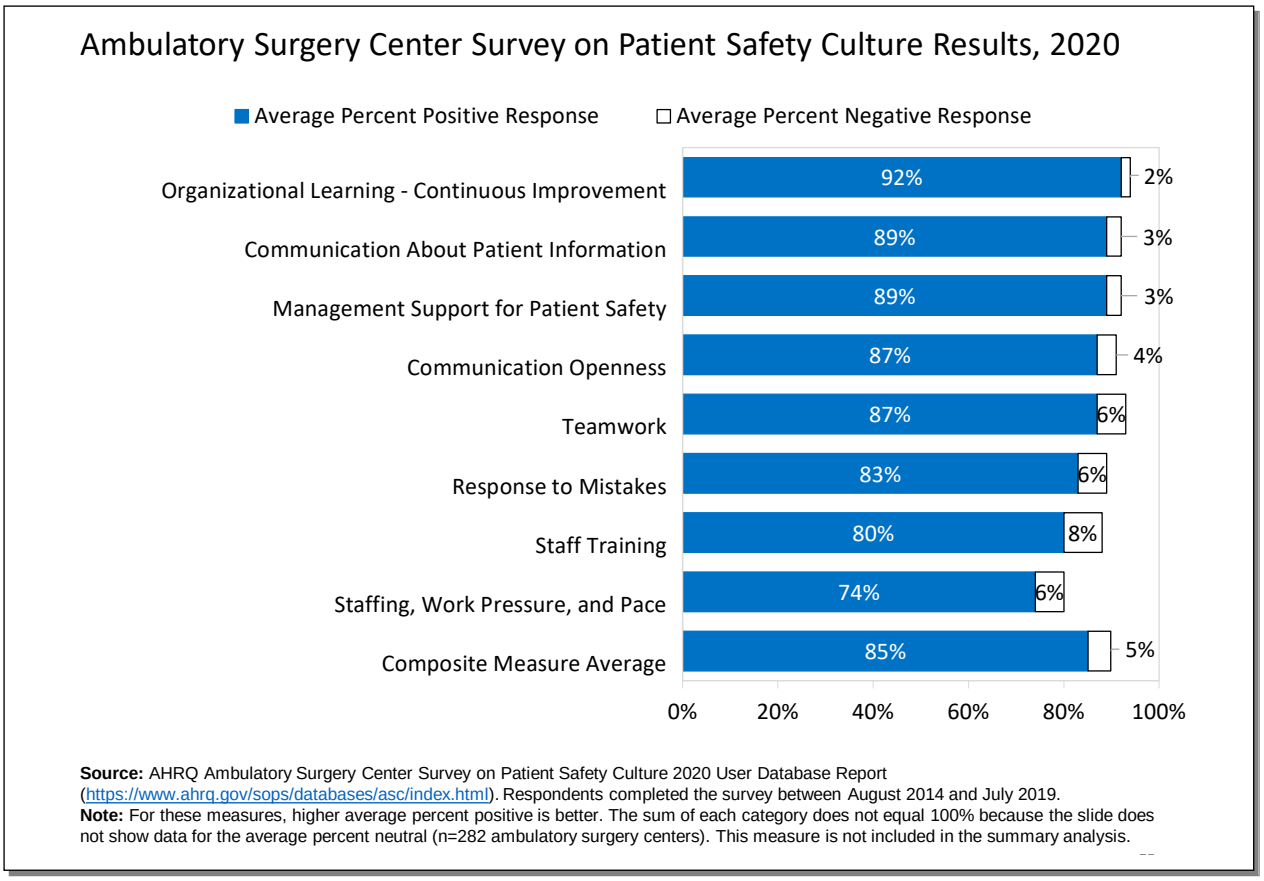
- Data source: AHRQ 2020 SOPS Ambulatory Surgery Center (ASC) Database
  - Includes responses from 10,527 respondents representing 282 ACSs.
  - Self-selected and self-reporting sample of U.S. ASCs, representing less than 5% of all ASCs in the United States.
- Results provided for:
  - Patient safety culture composite measures, composite measure average.
  - Overall rating on patient safety by composite measure average quartile.

An ambulatory surgery center is defined as an approved ambulatory surgery center in a specific location with a valid CMS Certification Number (CCN). Each ambulatory surgery center operates exclusively to provide surgical/procedural services to patients that do not require hospitalization (except in unusual circumstances), and the ambulatory surgery centers do not share space with a hospital or hospital outpatient surgery department.

To be included, ambulatory surgery centers must be located in the United States or in a U.S. territory. Each ambulatory surgery center must have at least five completed surveys. Only current ambulatory surgery center providers and staff are eligible to contribute data.

Ambulatory surgery centers, health systems, management companies, or survey vendors that have administered the AHRQ Ambulatory Surgery Center Survey on Patient Safety Culture indicate their interest in participating in the database by registering with AHRQ; interested submitters are notified regarding their eligibility for participation. See https://www.ahrq.gov/sops/surveys/asc/index.html for further information on the survey.

Ambulatory Surgery Center Survey Results

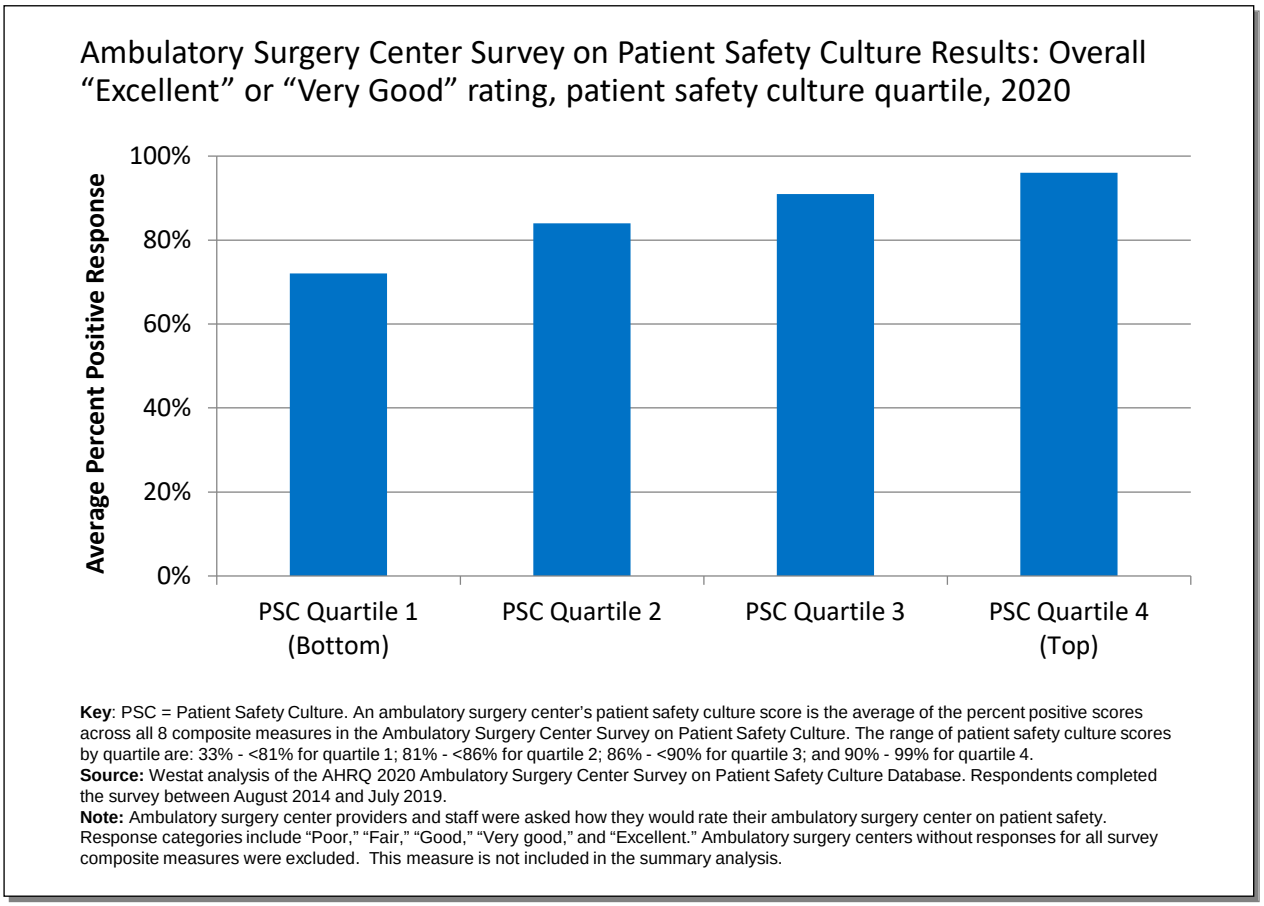


Source: AHRQ Ambulatory Surgery Center Survey on Patient Safety Culture 2020 User Database Report (https://www.ahrq.gov/sops/databases/asc/index.html). Respondents completed the survey between August 2014 and July 2019.
Note: For these measures, higher average percent positive is better. The sum of each category does not equal 100% because the slide does not show data for the average percent neutral (n=282 ambulatory surgery centers). This measure is not included in the summary analysis.

- **Importance**: As ambulatory surgery centers aim to improve their performance, there is growing recognition of the importance of establishing a culture of patient safety by looking at patient safety culture areas where they are most positive and where they are perceived most negative by ambulatory surgery center staff.

- **Areas of Strength and Weakness:**
  - Organizational Learning – Continuous Improvement (92 percent positive) had the highest average percent positive response and lowest percent negative response (2% negative).
  - Staffing, Work Pressure, and Pace (74% positive) had the lowest average percent positive response. Staff Training (8% negative) had the highest average percent negative responses.

Ambulatory Surgery Center Survey Results, Overall Rating



Key: PSC = Patient Safety Culture. An ambulatory surgery center's patient safety culture score is the average of the percent positive scores across all 8 composite measures in the Ambulatory Surgery Center Survey on Patient Safety Culture. The range of patient safety culture scores by quartile are: 33% - <81% for quartile 1; 81% - <86% for quartile 2; 86% - <90% for quartile 3; and 90% - 99% for quartile 4.
Source: Westat analysis of the AHRQ 2020 Ambulatory Surgery Center Survey on Patient Safety Culture Database. Respondents completed the survey between August 2014 and July 2019.
Note: Ambulatory surgery center providers and staff were asked how they would rate their ambulatory surgery center on patient safety. Response categories include "Poor," "Fair," "Good," "Very good," and "Excellent." Ambulatory surgery centers without responses for all survey composite measures were excluded. This measure is not included in the summary analysis.

- **Importance:** Ambulatory surgery centers with an overall rating of "Excellent" or "Very good" on patient safety also have more positive perceptions of how well they are doing in general. This sample represents 282 ambulatory surgery centers. There are well over 5,500 Medicare-certified ASCs in the United States (Ambulatory Surgery Center Association, no date).
- **Results:**
  - An overall rating on patient safety of "Excellent" or "Very good" was higher among respondents in ambulatory surgery centers with higher patient safety culture scores (PSC quartile 4) compared to ambulatory surgery centers with lower patient safety culture scores (PSC quartile 1).
  - The difference in the average percent positive score on the overall patient safety rating in ambulatory surgery centers with the lowest patient safety culture scores compared to ambulatory surgery centers with the highest patient safety culture scores was 24 percentage points (72% vs. 96%).

Surveys on Patient Safety Culture™ (SOPS®) Medical Office Survey

- Data source: AHRQ 2020 SOPS Medical Office Database
  - Includes responses from 18,396 respondents representing 1,475 medical offices.
  - Self-selected sample of US medical offices, representing less than 1% of all medical offices in the United States.
- Results provided for:
  - Patient safety culture composite measures, composite measure average.
  - Overall rating on patient safety by composite measure average quartile.

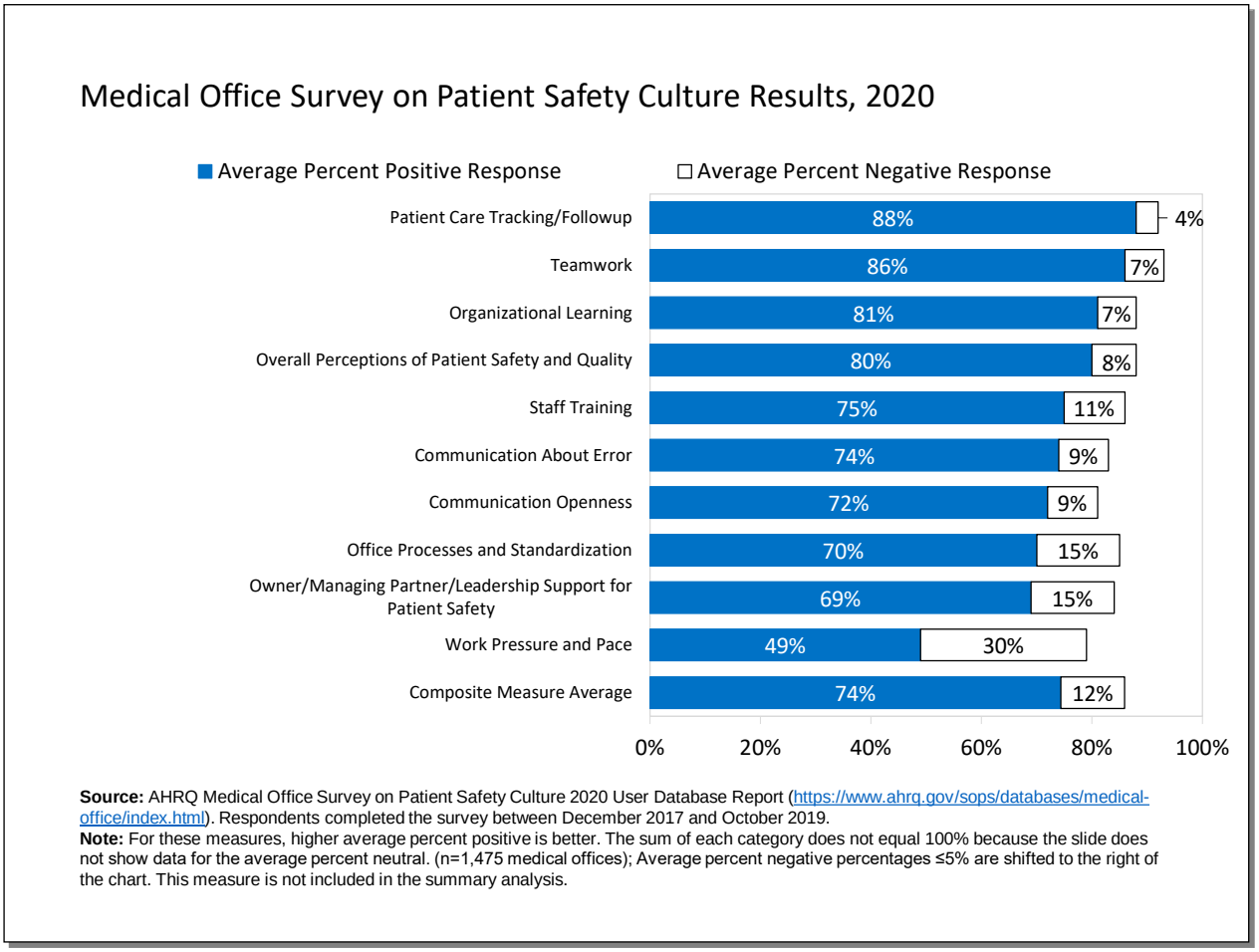
The results presented include the average percent positive and average percent negative for each of the ten medical office composite measures, the composite measure average, and results for the average percent positive of the overall rating on patient safety in medical offices by the medical office composite measure average quartile.

Medical Offices in the SOPS Medical Office Database

- A medical office is an outpatient facility in a specific location.
- If there are multiple providers in a single medical office, providers share administrative and clinical support staff.
- Each medical office located in a building containing multiple medical offices is considered a separate medical office.

To be included, medical offices must be located in the United States or in a U.S. territory. Each medical office must have at least 5 completed surveys. Only current medical office providers and staff are eligible to contribute data. Medical offices, health systems, or survey vendors that have administered the AHRQ Medical Office Survey on Patient Safety Culture indicate their interest in participating in the database by registering with AHRQ; interested submitters are notified regarding their eligibility for participation. See https://www.ahrq.gov/sops/databases/medical-office/submission.html for further information on the survey.

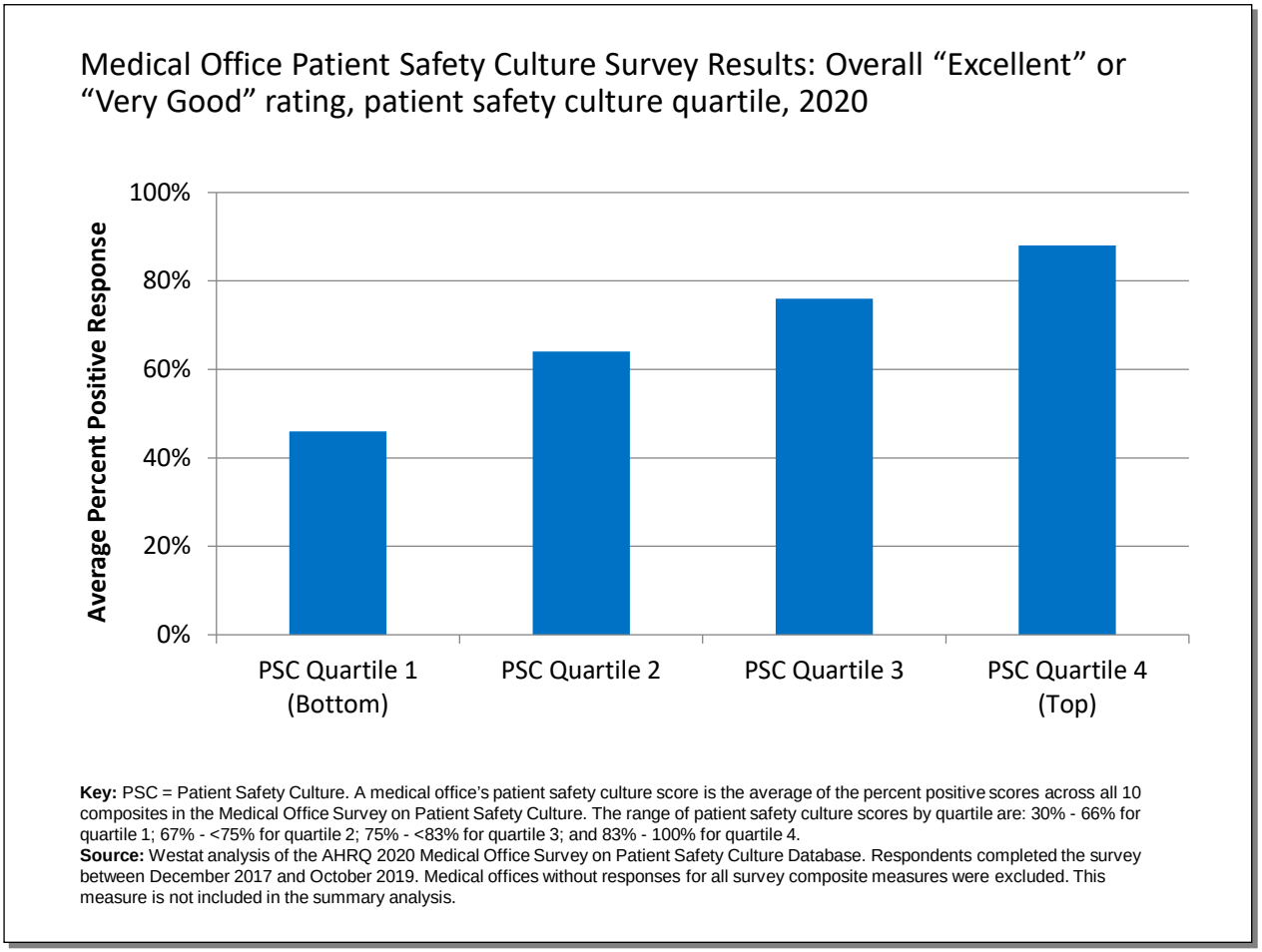
Medical Office Survey Results



Source: AHRQ Medical Office Survey on Patient Safety Culture 2020 User Database Report (https://www.ahrq.gov/sops/databases/medical-office/index.html). Respondents completed the survey between December 2017 and October 2019.
Note: For these measures, higher average percent positive is better. The sum of each category does not equal 100% because the slide does not show data for the average percent neutral. (n=1,475 medical offices); Average percent negative percentages ≤5% are shifted to the right of the chart. This measure is not included in the summary analysis.

- **Importance:** As medical offices aim to improve their performance, there is growing recognition of the importance of establishing a culture of patient safety by looking at patient safety culture areas where they are perceived most positive and most negative by medical office providers and staff.
- **Areas of Strength and Weakness:**
  - Patient Care Tracking/Followup (88% positive) had the highest average percent positive response and lowest percent negative response (4% negative).
  - Work Pressure and Pace (49% positive) had the lowest average percent positive response and had the highest percent negative response (30% negative).

Medical Office Survey Results, Overall Rating



Key: PSC = Patient Safety Culture. A medical 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. The range of patient safety culture scores by quartile are: 30% - 66% for quartile 1; 67% - <75% for quartile 2; 75% - <83% for quartile 3; and 83% - 100% for quartile 4.
Source: Westat analysis of the AHRQ 2020 Medical Office Survey on Patient Safety Culture Database. Respondents completed the survey between December 2017 and October 2019. Medical offices without responses for all survey composite measures were excluded. This measure is not included in the summary analysis.

- **Importance**: The medical office overall rating on patient safety reflects medical office respondent perceptions of how well they are doing in general.
- **Results:**
  - Medical offices in the highest patient safety culture quartile (PSC quartile 4) had a higher average percent positive overall rating of "Excellent" or "Very good" for their medical office, compared with medical offices in the lowest quartile (PSC quartile 1).
  - The difference in the average percent positive overall rating on patient safety between PSC quartile 4 and PSC quartile 1 was 42 percentage points (46% vs. 88%).

Patient Safety Organization Program

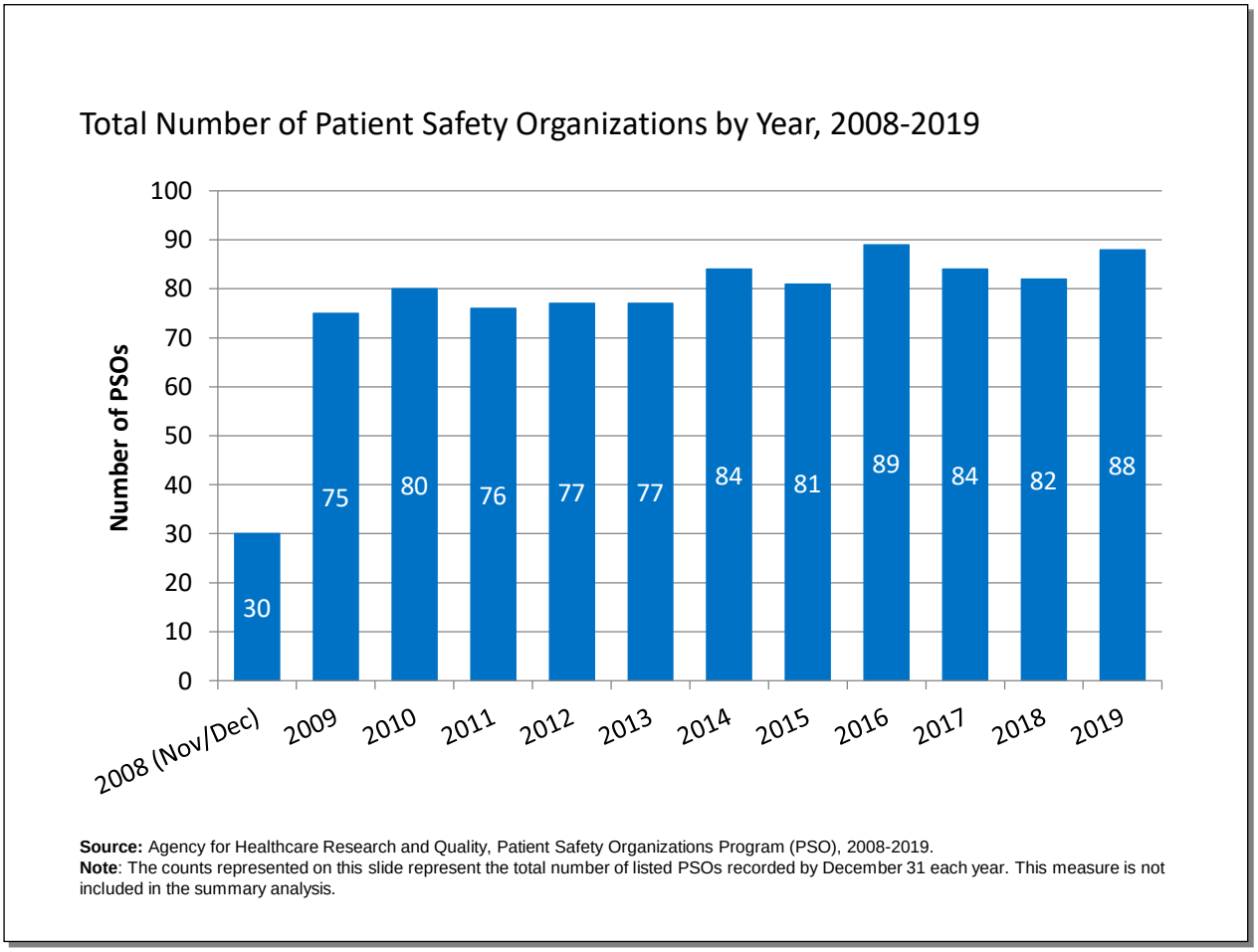
Infrastructure for patient safety improvement varies by State and healthcare facility. The AHRQ Patient Safety Organization (PSO) Program was created as a result of the Patient Safety and Quality Improvement Act of 2005 (PSQIA). AHRQ supports implementation of the PSQIA except for the confidentiality and related enforcement provisions delegated to the Office for Civil Rights.

PSOs engage with healthcare providers in patient safety and healthcare quality improvement activities. 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 it can obtain from a PSO that aggregates large volumes of event data from multiple providers. Moreover, their data remain protected even when the PSO aggregates them 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 is available at https://pso.ahrq.gov/legislation. More information on how to become a Patient Safety Organization is available at https://pso.ahrq.gov/become_PSO.

Number of Patient Safety Organizations



Source: Agency for Healthcare Research and Quality, Patient Safety Organizations Program (PSO), 2008-2019.
Note: The counts represented on this slide represent the total number of listed PSOs recorded by December 31 each year. This measure is not included in the summary analysis.

- **Importance:** The PSO program has grown over time, and most participating PSOs have remained continuously listed since their initial listing dates. This continuity allows the PSOs to work closely with contracted providers to support quality and safety activities to fulfill eight required patient safety activities:
  - Efforts to improve patient safety and the quality of healthcare delivery
  - Collection and analysis of patient safety work product
  - Development and dissemination of information with respect to improving patient safety, such as recommendations, protocols, and information regarding best practices
  - Utilization of patient safety work product for the purposes of encouraging a culture of safety and providing feedback and assistance to effectively minimize patient risk
  - Maintenance of procedures to preserve confidentiality with respect to patient safety work product
  - Provision of appropriate security measures with respect to patient safety work product
  - Use of qualified staff
  - Activities related to the operation of a patient safety evaluation system and provision of feedback to participants in a patient safety evaluation system

- **Past Data on the Number of New PSOs Listed, Annually:** While the chart features the total number of PSOs at the end of the year (as of December 31), the number of new PSOs that have joined the program have differed, annually. Over the past 11 years, these were the total number of new PSOs each year:

  - 2008: 30 PSOs
  - 2009: 45 PSOs
  - 2010: 19 PSOs
  - 2011: 13 PSOs
  - 2012: 13 PSOs
  - 2013: 8 PSOs
  - 2014: 12 PSOs
  - 2015: 6 PSOs
  - 2016: 12 PSOs
  - 2017: 5 PSOs
  - 2018: 4 PSOs
  - 2019: 9 PSOs

Most Frequent PSO Specialties Reported on the 2019 PSO Profile

PSO Specialty	Frequency	Percentage
All Medical Specialties	33	49%
Anesthesiology	9	13%
Pharmacy	9	13%
Pediatrics	8	12%
Emergency Medicine/EMS	6	9%
Radiology	6	9%
Family Medicine, General Surgery, Internal Medicine, Neurology, Obstetrics/Gynecology, Orthopedic Surgery, Physical Medicine and Rehabilitation[a]	5	7%
Other	14	21%

[a] Each of the PSO specialties included in this list was identified by a total of five PSOs, representing 7% of the PSOs reporting. This PSO Profile question is a check all that apply question; therefore, the sum of percentages may exceed 100%.
Source: PSO Privacy Protection Center analysis of 2019 AHRQ PSO Profile data.
Note: Sixty-eight PSOs reported specialty focus in the 2019 PSO Profile. A PSO can report more than one specialty focus. This measure is not included in the summary analysis.

PSO specialties cover the full spectrum of medical specialties, with more than half (33/68) of PSOs providing data reporting that they work with all medical specialties. PSOs may report more than one specialty. The following PSO specialties are available in the 2019 PSO Profile: All Medical Specialties, Anesthesiology, Cardiology, Colorectal Surgery, Dentistry, Dermatology, Emergency Medicine/EMS, Family Medicine, Gastroenterology, General Surgery, Internal Medicine, Neurology, Neurological Surgery, Nuclear Medicine, Nursing, Obstetrics/ Gynecology, Oncology, Ophthalmology, Orthopedic Surgery, Otolaryngology, Pathology, Pediatrics, Pediatric Surgery, Pharmacy, Physical Medicine and Rehabilitation, Plastic Surgery, Podiatry, Psychiatry, Pulmonology, Radiology, Thoracic Surgery, Urology, Vascular Surgery, Allied Health Professionals.

Types of Providers Contracted With PSOs, by Provider Type, 2016-2019

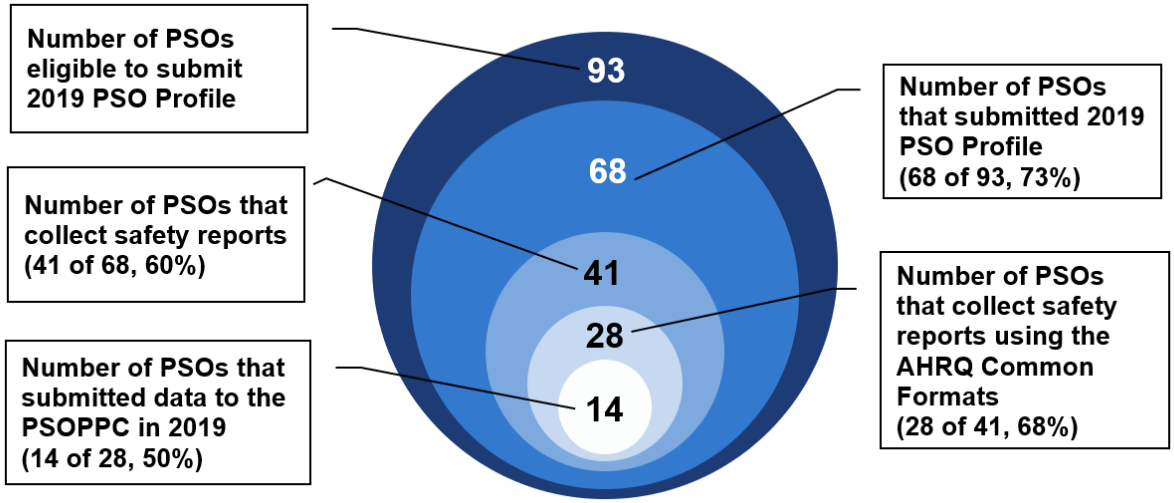
Provider Type	2016 (N = 3,911)	2017 (N = 4,678)	2018 (N = 5,088)	2019 (N = 8,330)
General Hospitals	2,011 (51.4%)	2,349 (50.2%)	2,001 (39.3%)	2,158 (25.9%)
Specialty Hospitals	386 (9.9%)	413 (8.8%)	520 (10.2%)	523 (6.3%)
Critical Access Hospitals	100 (2.6%)	183 (3.9%)	157 (3.1%)	176 (2.1%)
Licensed Practitioner Groups	493 (12.6%)	540 (11.5%)	1,610 (31.6%)	3,765 (45.2%)
Specialized Treatment Facilities (e.g., Behavioral, Chemotherapy, Dialysis, Psychiatric)	31 (0.8%)	69 (1.5%)	69 (1.4%)	58 (0.7%)
Long-Term Care (includes Skilled Nursing Facilities or Intermediate/Long-Term Care Facilities and Assisted Living Facilities)	166 (4.2%)	136 (2.9%)	77 (1.5%)	43 (0.5%)
Retail Pharmacy	2 (0.1%)	5 (0.1%)	15 (0.3%)	2 (0.0%)
Other*	722 (18.5%)	983 (21%)	639 (12.6%)	1,605 (19.3%)

* Other includes all categories not specifically identified above (e.g., Urgent care/emergency medicine).
Source: PSOPPC analysis of 2019 AHRQ PSO Profile data.
Note: Forty-four PSOs reported provider type details in the 2019 PSO Profile. Percentages may not add to 100 due to rounding. This measure is not included in the summary analysis.

While the PSO program continues to have a strong presence working with hospital providers, the providers contracted with PSOs span a large portion of the continuum of care. The trend presents the diversity of the types of providers that are contracted with the PSOs and shows that the patient safety events reported are not limited t those that occur in a hospital setting. Changes in the number of providers within each type occur for several reasons, including listing of new PSOs, delisting of PSOs no longer participating in the program, and changes in the composition of provider types among contracted providers.

Although PSOs are collecting data, only 14 submitted data to the PSOPPC in 2019.

PSO Data Submission



Source: PSOPPC analysis of 2019 AHRQ PSO Profile data.
Note: As of calendar year 2019, the PSOPPC dataset includes data submitted by 17 PSOs across Common Formats for Event Reporting-Hospital V1.1, V1.2, and V2.0.

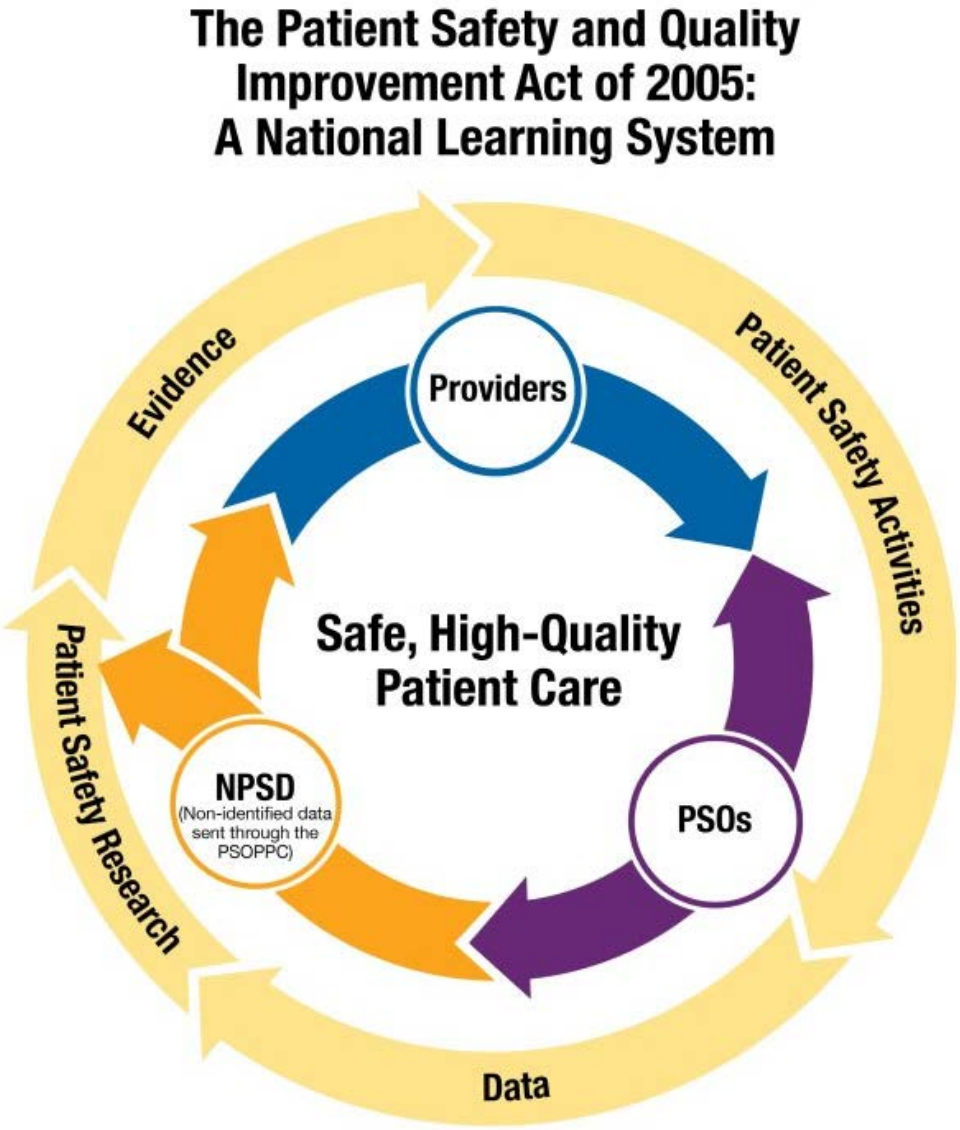
Seventeen PSOs have submitted data at any time across the Common Formats for Event Reporting-Hospital (CFER-H) V1.1, V1.2, and V2.0. Fourteen PSOs submitted data to the PSOPPC during calendar year 2019.

For data to be accepted by the PSOPPC, the data must comply with CFER-H. Although only a small percentage of PSOs submit the data to the PSOPPC using the CFER-H specifications, more than 65% of PSOs collect patient safety reports. These data indicate that opportunities remain to improve the collection and reporting of patient safety data.

Network of Patient Safety Databases and the National Learning System

- The Network of Patient Safety Databases (NPSD) is part of the national learning system of providers, the Agency for Healthcare Research and Quality (AHRQ), and AHRQ-listed Patient Safety Organizations (PSOs) (see figure below).
- The data collected by the Patient Safety Organization Privacy Protection Center (PSOPPC) are designed to support measurement and improvement of patient safety in hospitals.
- Once data are collected, aggregated, deidentified, and submitted to the NPSD, they will provide insights about improvements in patient care, which in turn will advance patient safety. More information is available on AHRQ's website at https://www.ahrq.gov/npsd/quality-patient-safety/index.html.

NPSD and the National Learning System



References

Abe K, Kuklina EV, Hooper WC, Callaghan WM. Venous thromboembolism as a cause of severe maternal morbidity and mortality in the United States. Semin Perinatol. 2019 Jun;43(4):200-204. Epub 2019 Mar 9. https://pubmed.ncbi.nlm.nih.gov/30935751/. Accessed January 14, 2021.

Adams MM, Alexander GR, Kirby RS, Wingate MS. Perinatal Epidemiology for Public Health Practice. New York, NY: Springer US; 2009.

Agency for Healthcare Research and Quality. AHRQ National Scorecard on Hospital-Acquired Conditions: Updated Baseline Rates and Preliminary Results 2014-2017. 2019a. https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/pfp/hacreport-2019.pdf . Accessed January 15, 2021.

Agency for Healthcare Research and Quality. The Falls Management Program: A Quality Improvement Initiative for Nursing Facilities. Chapter 1. Introduction and Program Overview. Content last reviewed December 2017. https://www.ahrq.gov/patient-safety/settings/long-term-care/resource/injuries/fallspx/man1.html. Accessed January 14, 2021.

Agency for Healthcare Research and Quality. Making Health Care Safer II: An Updated Critical Analysis of the Evidence for Patient Safety Practices. Evidence Reports/Technology Assessments, No. 211. March 2013. AHRQ Publication No. 13-E001-EF. https://www.ncbi.nlm.nih.gov/books/ NBK133363/. Accessed February 3, 2021.

Agency for Healthcare Research and Quality. More Effort Is Needed To Ensure Patients Understand Doctors' Instructions. 2019b. AHRQ Publication No. 18(19)-0033-8-EF. https://www.ahrq.gov/sites/default/files/wysiwyg/research/findings/nhqrdr/dataspotlight-health-literacy.pdf. Accessed January 6, 2021.

Agency for Healthcare Research and Quality. Patient Safety Primer: Health Care-Associated Infections. https://psnet.ahrq.gov/primers/primer/7. 2019c. Accessed January 14, 2021.

Agency for Healthcare Research and Quality. Patient Safety Primer: Maternal Safety. https://psnet.ahrq.gov/primers/primer/50/Maternal-Safety. 2019d. Accessed January 14, 2021.

Ambulatory Surgery Center Association. Number of ASCs per State. https://www.ascassociation.org/advancingsurgicalcare/asc/numberofascsperstate. Accessed January 14, 2021.

American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine, Kilpatrick SK, Ecker JL. Severe maternal morbidity: screening and review. Am J Obstet Gynecol. 2016 Sep;215(3):B17-B22. https://pubmed.ncbi.nlm.nih.gov/27560600/. Accessed January 14, 2021.

Au Y, Holbrook M, Skeens A, Painter J, McBurney J, Cassata A, Wang SC. Improving the quality of pressure ulcer management in a skilled nursing facility. Int Wound J. 2019 Apr;16(2):550-555. doi: 10.1111/iwj.13112. Epub 2019 Mar 12. https://pubmed.ncbi.nlm.nih.gov/30864302/. Accessed January 14, 2021.

Bateman BT, Shaw KM, Kuklina EV, Callaghan WM, Seely EW, Hernandez-Diaz S. Hypertension in women of reproductive age in the United States: NHANES 1999-2008. PLoS ONE. 2012;7(4):36171. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3340351/. Accessed January 14, 2021.

Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. Public Health Rep. 2003 Jul-Aug;118(4):358-365. https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC1497554/. Accessed January 14, 2021.

Carpenter CVE, Wylde V, Moore AJ, Sayers A, Blom AW, Whitehouse MR. Perceived occurrence of an adverse event affects patient-reported outcomes after total hip replacement. BMC Musculoskelet Disord. 2020 Feb 21;21(1):118. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC7035750. Accessed January 14, 2021.

Centers for Disease Control and Prevention. Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-Central Line-Associated Bloodstream Infection. Device-Associated Module. January 2021a. https://www.cdc.gov/nhsn/pdfs/pscmanual/ 4psc_clabscurrent.pdf. Accessed January 14, 2021.

Centers for Disease Control and Prevention. Frequently Asked Questions. 2020a. https://www.cdc.gov/nchs/maternal-mortality/faq.htm. Accessed January 14, 2021.

Centers for Disease Control and Prevention. Pregnancy Mortality Surveillance System. 2020b. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm. Accessed January 14, 2021.

Centers for Disease Control and Prevention. Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) Events. Device-Associated Module. 2021b. http://www.cdc.gov/nhsn/pdfs/pscmanual/ 7psccauticurrent.pdf. Accessed January 14, 2021.

Centers for Disease Control and Prevention. Vital Signs. Pregnancy-Related Deaths. Last reviewed May 2019. https://www.cdc.gov/vitalsigns/maternal-deaths/index.html. Accessed January 14, 2021.

Chou C. Time to start using evidence-based approaches to patient engagement. NEJM Catalyst 2018 Mar 28. https://catalyst.nejm.org/evidence-based-patient-provider-communication/. Accessed January 14, 2021.

Chughtai M, Gwam CU, Mohamed N, Khlopas A, Newman JM, Khan R, Nadhim A, Shaffiy S, Mont MA. The epidemiology and risk factors for postoperative pneumonia. J Clin Med Res. 2017 Jun;9(6):466-475. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5412519/. Accessed January 14, 2021.

Divi C, Koss RG, Schmaltz SP, Loeb JM. Language proficiency and adverse events in U.S. hospitals: a pilot study. Int J Qual Health Care. 2007 Apr;19(2):60-67. https://pubmed.ncbi.nlm.nih.gov/17277013/. Accessed January 14, 2021.

Dudeck MA, Edwards JR, Allen-Bridson K, Gross C, Malpiedi PJ, Peterson KD, Pollock DA, Weiner LM, Sievert DM. National Healthcare Safety Network report, data summary for 2013, Device-associated Module. Am J Infect Control. 2015 Mar 1;43(3):206-221. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4653815/. Accessed January 14, 2021.

Elliott AM, Alexander SC, Mescher CA, Mohan D, Barnato AE. Differences in physicians' verbal and nonverbal communication with Black and White patients at the end of life. J Pain Symptom Manage. 2016;51(1):1-8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4698224/. Accessed January 14, 2021.

Etchegaray JM, Ottosen MJ, Burress L, Sage WM, Bell SK, Gallagher TH, Thomas EJ. Structuring patient and family involvement in medical error event disclosure and analysis. Health Aff (Millwood). 2014 Jan;33(1):46-52. http://content.healthaffairs.org/content/33/1/46.long. Accessed January 14, 2021.

Fasano HT, McCarter MSJ, Simonis JM, Hoelscher GL, Bullard MJ. Influence of socioeconomic bias on emergency medicine resident decision making and patient care. Simul Healthc. 2020 Jul 2. https://pubmed.ncbi.nlm.nih.gov/32649585/. Accessed January 14, 2021.

Gyamfi-Bannerman C, Srinivas SK, Wright JD, Goffman D, Siddiq Z, D'Alton ME, Friedman AM. Postpartum hemorrhage outcomes and race. Am J Obstet Gynecol. 2018 Aug;219(2):185.e1-185.e10. https://pubmed.ncbi.nlm.nih.gov/29752934/. Accessed January 14, 2021.

Harris-Kojetin L, Sengupta M, Lendon JP, Rome V, Valverde R, Caffrey C. Long-term care providers and services users in the United States, 2015-2016. National Center for Health Statistics. Vital Health Stat 3(43). 2019. https://www.cdc.gov/nchs/data/series/sr_03/sr03_43-508.pdf. Accessed January 14, 2021.

Institute of Medicine. Health Literacy: A Prescription To End Confusion. Washington, DC: National Academies Press; 2004. https://www.nap.edu/catalog/10883/health-literacy-a-prescriptiontoend-confusion. Accessed January 14, 2021.

Kaiser Family Foundation. State Health Facts. Total Number of Residents in Certified Nursing Facilities. Timeframe: 2019. https://www.kff.org/other/state-indicator/number-of-nursing-facility-residents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed January 14, 2021.

Karter AJ, Stevens MR, Brown AF, Duru OK, Gregg EW, Gary TL, Beckles GL, Tseng CW, Marrero DG, Waitzfelder B, Herman WH, Piette JD, Safford MM, Ettner SL. Educational disparities in health behaviors among patients with diabetes: the Translating Research Into Action for Diabetes (TRIAD) Study. BMC Public Health. 2007 Oct 29;7:308. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC2238766/. Accessed January 14, 2021.

Kennedy MS. Pressure ulcers and race in nursing homes: a study finds high rates of pressure ulcers in Black residents. Am J Nurs 2004 Dec;104(12):20.

Khan A, Yin HS, Brach C, Graham DA, Ramotar MW, Williams DN, Spector N, Landrigan CP, Dreyer BP; Patient and Family Centered I-PASS Health Literacy Subcommittee. Association between parent comfort with English and adverse events among hospitalized children. JAMA Pediatr. 2020 Dec 1;174(12):e203215. https://pubmed.ncbi.nlm.nih.gov/33074313/. Accessed February 3, 2021.

Koh HK, Brach C, Harris LM, Parchman ML. A proposed 'health literate care model' would constitute a systems approach to improving patients' engagement in care. Health Aff. 2013;32(2):357-367. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5102011/. Accessed January 14, 2021.

Kohn LT, Corrigan JM, Donaldson MS, eds.; Committee on Quality of Health Care in America, Institute of Medicine. To Err Is Human: Building a Safer Health System. Washington, DC: National Academy Press; 2000. http://www.nap.edu/catalog/9728.html. Accessed January 15, 2021.

Kutner M, Greenberg E, Jin Y, Paulsen C. The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy. Washington, DC: National Center for Education Statistics; 2006. Publication No. NCES 2006-483. https://nces.ed.gov/pubs2006/2006483_1.pdf. Accessed January 14, 2021.

Liang L, Brach C. Health literacy universal precautions are still a distant dream: analysis of U.S. data on health literate practices. Health Lit Res Pract. 2017 Oct;1(4):e216-e230. Epub 2017 Nov 9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5706771/. Accessed January 14, 2021.

Lim W. Using low molecular weight heparin in special patient populations. J Thromb Thrombolysis 2010 Feb;29(2):233-40. https://www.ncbi.nlm.nih.gov/pubmed/19902146. Accessed January 14, 2021.

Lobo BL. Use of newer anticoagulants in patients with chronic kidney disease. Am J Health Syst Pharm 2007;64(19):2017-26. https://www.ncbi.nlm.nih.gov/pubmed/17893411. Accessed January 14, 2021.

Magill SS, Edwards JR, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections. N Engl J Med 2014;370:1198-1208. https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC4648343/. Accessed January 14, 2021.

Medline Plus. Eclampsia. National Library of Medicine; 2021a. https://medlineplus.gov/ency/article/000899.htm. Accessed January 14, 2021.

Medline Plus. Preeclampsia. National Library of Medicine; 2021b. https://medlineplus.gov/ency/article/000898.htm. Accessed January 14, 2021.

Metersky ML, Hunt DR, Kliman R, Wang Y, Curry M, Verzier N, Lyder CH, Moy E. Racial disparities in the frequency of patient safety events: results from the National Medicare Patient Safety Monitoring System. Med Care. 2011 May;49(5):504-510. https://pubmed.ncbi.nlm.nih.gov/21494115/. Accessed January 14, 2021.

National Association for Home Care & Hospice. Basic Statistics About Home Care. Updated 2010. http://www.nahc.org/wp-content/uploads/2017/10/10hc_stats.pdf. Accessed January 14, 2021.

Ngwenya S. Postpartum hemorrhage: incidence, risk factors, and outcomes in a low-resource setting. Int J Womens Health. 2016;8:647-650. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC5098756/. Accessed January 14, 2021.

Noursi S, Saluja B, Richey L. Using the ecological systems theory to understand Black/White disparities in maternal morbidity and mortality in the United States. J Racial Ethn Health Disparities. 2020 Jul 27. https://pubmed.ncbi.nlm.nih.gov/32720294/. Accessed January 14, 2021.

Office of Disease Prevention and Health Promotion. Adverse Drug Events. U.S. Department of Health and Human Services. 2020a. https://health.gov/our-work/health-care-quality/adverse-drug-events. Accessed January 14, 2021.

Office of Disease Prevention and Health Promotion. Health Literacy in Healthy People 2030. 2020b. https://health.gov/our-work/healthy-people-2030/about-healthy-people-2030/health-literacy-healthy-people. Accessed January 14, 2021.

Oozageer Gunowa N, Hutchinson M, Brooke J, Jackson D. Pressure injuries in people with darker skin tones: a literature review. J Clin Nurs. 2018 Sep;27(17-18):3266-3275. https://pubmed.ncbi.nlm.nih.gov/28887872/. Accessed January 14, 2021.

Petersen EE, Davis NL, Goodman D, Cox S, Mayes N, Johnston E, Syverson C, Seed K, Shapiro-Mendoza CK, Callaghan WM, Barfield W. Vital Signs: Pregnancy-related deaths, United States, 2011-2015, and strategies for prevention, 13 states, 2013-2017. MMWR Morb Mortal Wkly Rep 2019;68:423-429. http://dx.doi.org/10.15585/mmwr.mm6818e1. Accessed January 14, 2021.

Piccardi C, Detollenaere J, Vanden Bussche P, Willems S. Social disparities in patient safety in primary care: a systematic review. Int J Equity Health. 2018 Aug 7;17(1):114. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC6081855/. Accessed January 14, 2021.

Pisoni RL, Zepel L, Port FK, Robinson BM. Trends in U.S. vascular access use, patient preferences, and related practices: an update from the U.S. DOPPS practice monitor with international comparisons. Am J Kidney Dis. 2015;65(6):905-915. https://www.ncbi.nlm.nih.gov/ pubmed/25662834. Accessed January 14, 2021.

Sanghavi P, Pan S, Caudry D. Assessment of nursing home reporting of major injury falls for quality measurement on nursing home compare. Health Serv Res. 2020 Apr;55(2):201-210. https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC7080404/. Accessed January 14, 2021.

Schillinger D, Piette J, Grumbach K, Wang F, Wilson C, Daher C, Leong-Grotz K, Castro C, Bindman AB. Closing the loop: physician communication with diabetic patients who have low health literacy. Arch Intern Med. 2003 Jan 13;163(1):83-90. https://pubmed.ncbi.nlm.nih.gov/12523921/. Accessed January 14, 2021.

Simmons S, Schnelle J, Slagle J, Sathe NA, Stevenson D, Carlo M, McPheeters ML. Resident Safety Practices in Nursing Home Settings. Technical Briefs, No. 24. Rockville, MD: Agency for Healthcare Research and Quality; May 2016. AHRQ Publication No. 16-EHC022-EF. https://www.ncbi.nlm.nih.gov/books/NBK384624/. Accessed January 14, 2021.

Sobieraj DM, Coleman CI, Tongbram V, Chen W, Colby J, Lee S, Kluger J, Makanji S, Ashaye A, White CM. Comparative effectiveness of low-molecular-weight heparins versus other anticoagulants in major orthopedic surgery: a systematic review and meta-analysis. Pharmacotherapy. 2012 Sep;32(9):799-808. https://www.ncbi.nlm.nih.gov/pubmed/22744711. Accessed January 14, 2021.

Steiner CA, Karaca Z, Moore BJ, Imshaug MC, Pickens G. Surgeries in Hospital-Based Ambulatory Surgery and Hospital Inpatient Settings, 2014. HCUP Statistical Brief Number 223. Rockville, MD: Agency for Healthcare Research and Quality; May 2017. www.hcup-us.ahrq.gov/reports/ statbriefs/sb223-Ambulatory-Inpatient-Surgeries-2014.pdf. Accessed January 14, 2021.

Sunshine JE, Meo N, Kassebaum NJ, Collison ML, Mokdad AH, Naghavi M. Association of adverse effects of medical treatment with mortality in the United States: a secondary analysis of the Global Burden of Diseases, Injuries, and Risk Factors Study. JAMA Netw Open. 2019 Jan 4;2(1):e187041. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6484545/. Accessed January 15, 2021.

Thomas AD, Pandit C, Krevat SA. Race differences in reported harmful patient safety events in healthcare system high reliability organizations. J Patient Saf. 2020 Dec;16(4):e235-e239. https://pubmed.ncbi.nlm.nih.gov/30585888/. Accessed January 14, 2021.

Zhu J, Weingart SN, Ritter GA, Tompkins CP, Garnick DW. Racial/ethnic disparities in patient experience with communication in hospitals: real differences or measurement errors? Med Care. 2015 May;53(5):446-454. https://pubmed.ncbi.nlm.nih.gov/25856567/. Accessed January 14, 2021.

Appendix A: Data Methods and Analysis

Methods: Trends

Comparisons were made between priority and reference groups with estimates for at least four time points. Meaningful differences between two groups were determined based on two criteria:

- Absolute difference was statistically significant with $p < 0.05$ on a two-tailed test.
- The relative difference was at least 10%, where relative difference is defined as the difference between priority group and reference group, divided by reference group value.

Interpretation of Trends

Measures are interpreted in three categories:

- **Improving** = Average annual percentage change >1% per year in a favorable direction and $p < 0.10$.
- **Not Changing** = Average annual percentage change ≤1% per year or $p \geq 0.10$.
- **Worsening** = Average annual percentage change >1% per year in an unfavorable direction and $p < 0.10$.

Measures that are not changing over time are not necessarily performing well. Each measure's performance requires further exploration of the data.

Methods: Size of Disparities

The NHQDR also assesses whether access or quality differs between two subpopulations for the most recent data year. Comparisons are typically made between a priority population group and a reference group within a population characteristic (e.g., Blacks vs. Whites within the race characteristic). The best performing subgroup is typically used as the reference group.

Two criteria are applied to determine whether the difference between two groups is meaningful:

- The absolute difference between the priority population group and the reference group must be statistically significant with $p < 0.05$ on a two-tailed test.
- The relative difference between the priority population group and the reference group must be at least 10% when framed positively or negatively ($[p1 - p2]/p2 > 0.1$), where p1 is priority group's aligned rate and p2 is reference group's aligned rate.

Interpretation of Size of Disparities

Measures are interpreted in three categories:

- **Better** = Priority population estimate more favorable than reference group estimate by at least 10% and with $p < 0.05$.
- **Same** = Priority population and reference group estimates differ by less than 10% or $p \geq 0.05$.
- **Worse** = Priority population estimate less favorable than reference group estimate by at least 10% and with $p < 0.05$.

Measures that are performing the same do not necessarily indicate that those measures are performing well. Each measure's performance requires further exploration of the data.

Methods: Trends in Disparities Between Two Subpopulations

The NHQDR also observes whether the difference in access or quality between two subpopulations has changed over time. Meaningful differences between two groups are determined based on two criteria:

- Estimates for at least four time points between 2000 and the most recent data year for both the priority population and reference group are used to calculate the trend.
- **Model:** $M = \beta_0 + \beta_1 Y_1$ where M is the aligned rate of a subgroup, β_0 is the intercept or constant, and β_1 is the coefficient corresponding to year Y. The coefficient is the average annual change (AAC). We calculate the difference in the AAC and in the standard error values between the priority population group and reference group.
- We use standard errors from the regression coefficients to calculate the standard error of the absolute difference.

Interpretation of Trends in Disparities Between Two Subpopulations

Measures are interpreted in three categories:

- **Improving** = The difference in the AAC of the priority population and reference group is <-1 (in a favorable direction) and $p < 0.10$ for testing that regression coefficients are the same.
- **Not Changing** = Absolute value of the difference in the AAC of the priority population and reference group is <1 or the absolute value of the difference in the AAC of the priority population and reference group is >1 and $p \geq 0.10$ for testing that regression coefficients are the same.
- **Worsening** = The difference in the AAC of the priority population and reference group is >1 (in an unfavorable direction) and $p < 0.10$ for testing that regression coefficients are the same.

Measures that are not changing are not necessarily performing well. Each measure's performance requires further exploration of the data.

Methods and Interpretation: Calculating Benchmarks

The 2015 benchmark is calculated based on the average performance of the top 10% of States to encourage achievable goals. These standards are considered achievable because they have already been attained by the best performing States.

Five categories tell us about the direction of the measure compared with the benchmark:

- Achieved the benchmark or better: The rate in the most recent year is better than the benchmark value and changing in the desirable direction.
- Approaching the benchmark: The trend shows improvement toward the benchmark.
- Insignificant change: The average annual change is not statistically significant ($p \geq 0.05$) or the average annual change is zero.
- No progress toward the benchmark: Rate in the most recent year is worse than the benchmark and is changing in the undesirable direction.
- Better than the benchmark and going away from the benchmark: Rate in the most recent year is better than the benchmark, but the trend is showing worsening performance.