

# Black Patients Are Administered Opioid Pain Medications Less Often Than Hispanic and White Patients in the ED

Team A: Karen Wong, MD; Aaron Jensen; Alex Piff

Team B: Matthew Gracianette, MD; Brendan Joyce

Last updated 1 July 2024 • Check for updates at [EpicResearch.org](https://EpicResearch.org)

## Key Findings:

- Black patients receive opioids at a lower rate than Hispanic and White patients during pain-related visits in the emergency department (ED), regardless of vital sign readings.
- Black and Hispanic patients receive non-opioid pain medications at a higher rate than White patients for similar ED encounters.

Opioids are commonly administered or prescribed in the emergency department (ED) for pain management. The decision to administer or prescribe opioids typically depends on clinician assessment of the patient's pain, which can be determined through verbal reports from the patient or clinical findings. In some patients, acute pain can cause temporary physiologic responses, such as increased pulse rate or systolic blood pressure, although vital signs have not been shown to reliably correlate with reported pain levels.<sup>1</sup>

We analyzed 2.4 million ED encounters with pain-related chief complaints involving patients aged 30 to 39 from January 1, 2022, to February 29, 2024. We studied this age group as they are more likely than older patients to experience an acute pain event rather than a complex history of pain that might bring them to the ED. Our findings revealed that higher peak pulse rates and systolic blood pressure readings were generally associated with increased rates of opioid pain medication administrations during pain-related ED visits, regardless of the patient's sex, race, or ethnicity. Despite this trend, Black patients consistently received opioids at lower rates compared to their Hispanic and White counterparts across most vital sign measurements, as seen in Figures 1 and 2. This pattern persisted among male and female patients and aligns with previous studies highlighting racial disparities in pain management in ED settings.<sup>2</sup>

## Pulse Rate and ED Opioid Administrations

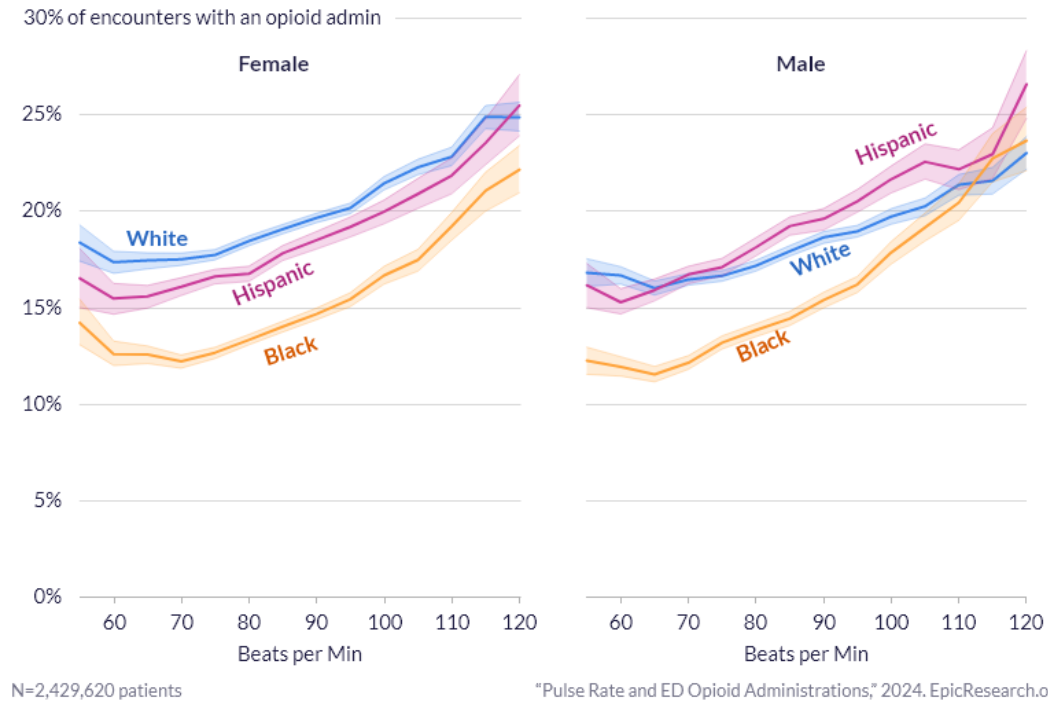


Figure 1. The rate of opioid administrations in pain-related ED encounters by patient race, ethnicity, and peak pulse rate.

## Systolic Blood Pressure and ED Opioid Administrations

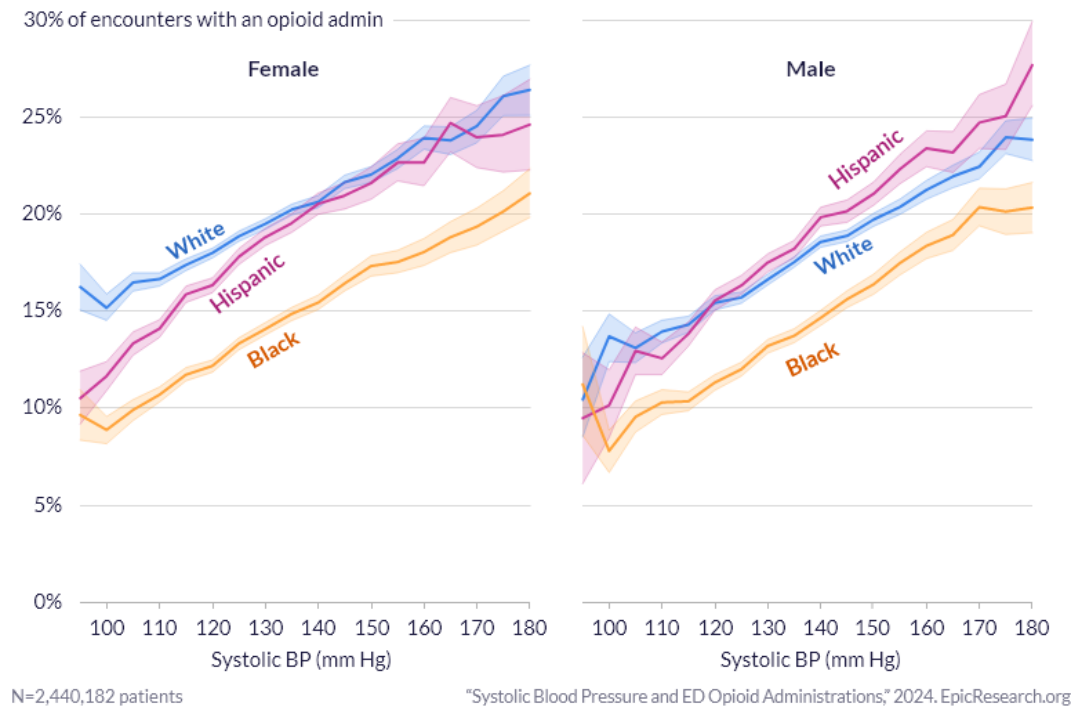


Figure 2. The rate of opioid administrations in pain-related ED encounters by patient race, ethnicity, and peak systolic blood pressure.

We also evaluated administration rates of non-opioid pain medications, such as acetaminophen, ibuprofen, ketorolac, and naproxen, in pain-related ED encounters. We found that Hispanic patients were administered non-opioid pain medications at a higher rate than Black and White patients. White patients were administered non-opioid pain medications least frequently across the range of peak pulse rates and systolic blood pressures, as seen in Figures 3 and 4. Of note, some of these medications may be administered for other purposes such as treating a fever, and indication for administration was not studied.

### Pulse Rate and ED Non-Opioid Pain Medication Administrations

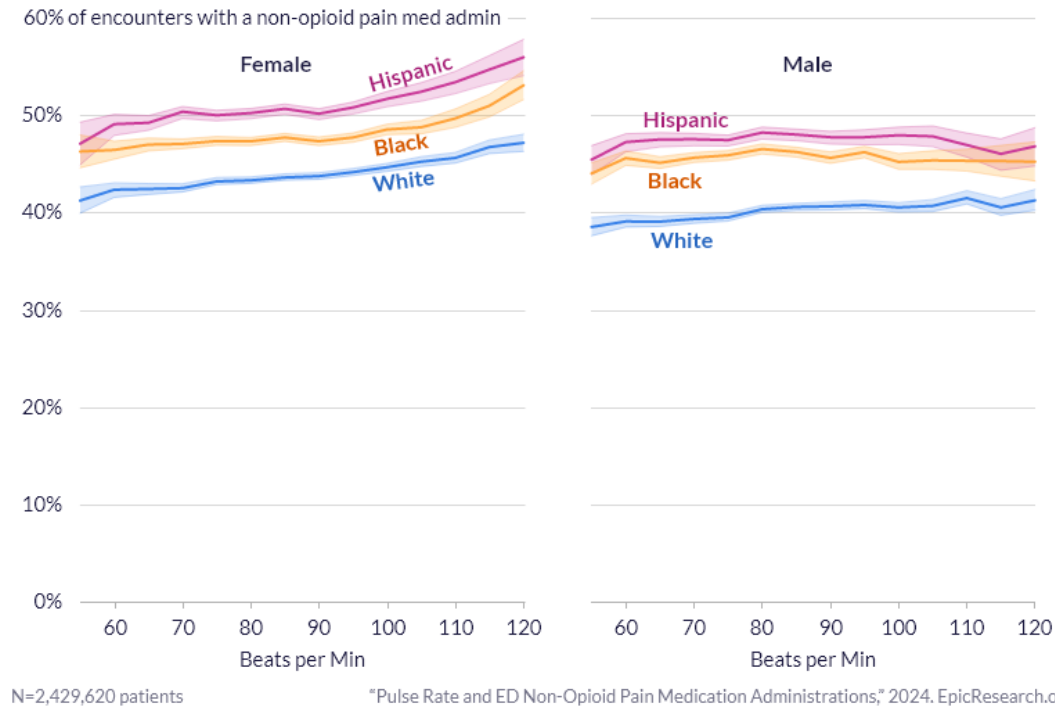


Figure 3. The rate of non-opioid pain medication administrations in pain-related ED encounters by patient race, ethnicity, and peak pulse rate.

## Systolic Blood Pressure and ED Non-Opioid Pain Medication Administrations

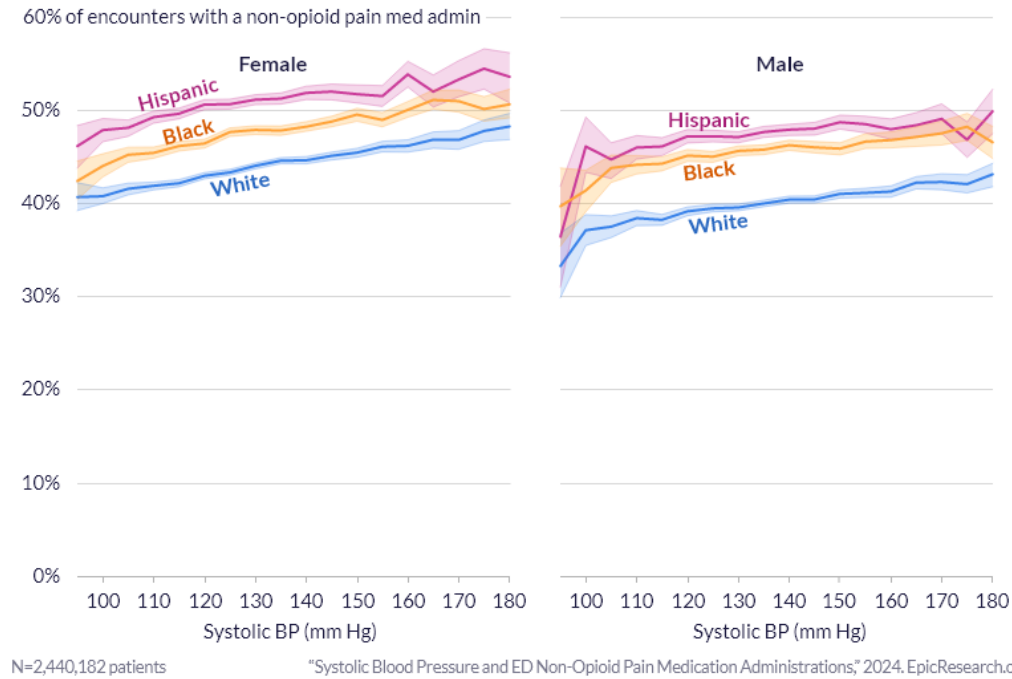


Figure 4. The rate of non-opioid pain medication administrations in pain-related ED encounters by patient race, ethnicity, and peak systolic blood pressure.

Additionally, we wanted to understand whether these differences persisted for opioid prescriptions placed upon discharge from pain-related ED visits. While we found smaller differences in prescription rates among racial and ethnic groups, White patients, both male and female, had the highest discharge prescription rates for opioids across the range of peak pulse rates and systolic blood pressures, as seen in Figures 5 and 6.

## Pulse Rate and ED Opioid Prescriptions

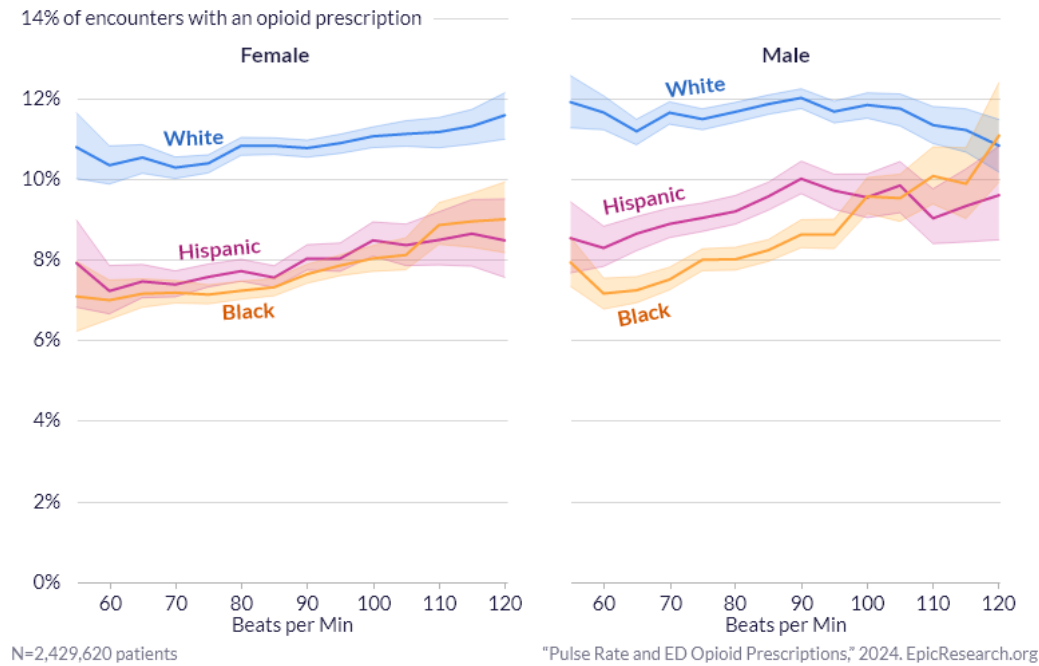


Figure 5. The rate of opioid prescriptions at discharge in pain-related ED encounters by patient race, ethnicity, and peak pulse rate.

## Systolic Blood Pressure and ED Opioid Prescriptions

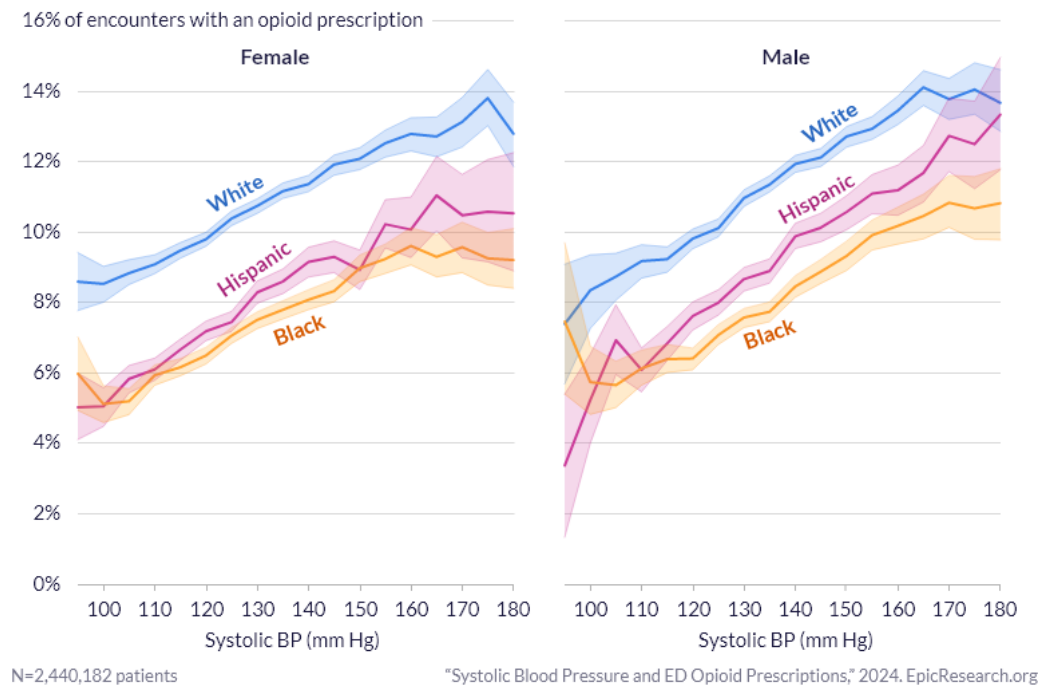


Figure 6. The rate of opioid prescriptions at discharge in pain-related ED encounters by patient race, ethnicity, and peak systolic blood pressure.

These findings underscore the need for better understanding of the factors contributing to racial disparities in opioid administration and discharge prescribing rates in emergency departments, with the goal of ensuring equitable pain management for all patients.

*These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 256 million patient records from 1,500 hospitals and more than 34,100 clinics from all 50 states and Lebanon. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Aishwarya Shettigar and Brian Olson.*

## References

1. Shahiri T. S, Gélinas C. The validity of vital signs for pain assessment in critically ill adults: A narrative review. *Pain Manag Nurs.* 2023;24(3):318-328. doi:10.1016/j.pmn.2023.01.004
2. Lee P, Le Saux M, Siegel R, et al. Racial and ethnic disparities in the management of acute pain in US emergency departments: Meta-analysis and systematic review. *The American Journal of Emergency Medicine.* 9/2019;37(9):1770-1777.

## Data Definitions

| Term                    | Definition   |
|-------------------------|--|
| <b>Study period</b>     | January 1, 2022, to February 29, 2024  |
| <b>Study population</b> | <p>Patients aged 30 to 39 with ED encounters during the <b>study period</b> with a <b>pain complaint</b> in a department in the United States. Patients aged 30 to 39 were selected to reduce variability of including patients of all ages, such as chronic pain and medical complexity.</p> <p>Patients with multiple ED encounters for pain in the study period had one selected at random.</p> <p>The encounter must come from an organization which has been contributing data for the entirety of the focused population’s study period.</p> <p>We excluded encounters for the following reasons:</p> <ul style="list-style-type: none"> <li>• Encounters for patients with a pre-existing opioid prescription active 60 to 30 days prior to their ED visit</li> <li>• Encounters where the patient was admitted from their ED visit</li> <li>• Encounters in which the patient had any temperature reading <math>\geq</math> 100.4 on the start date of the encounter, or on the next calendar day</li> </ul> |
| <b>Pain complaint</b>   | An encounter with one of the following chief complaints: abdominal pain, chest pain, back pain, flank pain, leg pain, knee pain, dental pain, neck pain, shoulder pain, ankle pain, arm pain, hip pain, hand pain, foot pain, eye pain, wrist pain, rib pain, groin pain, pelvic pain, toe pain, facial pain, sickle cell pain crisis, extremity pain, testicle pain, pain, jaw pain, elbow pain, finger pain, pain with breathing, rectal pain, vaginal pain, breast pain, muscle pain, joint pain, penis pain, tailbone pain, oral pain, musculoskeletal pain, side pain, mouth pain, buttocks pain, scrotal pain, incisional pain, nasal pain, suprapubic pain, heel pain, Achilles pain, temporomandibular joint pain, sternum pain, pain management, cancer pain, eyelid pain, fall, headache, sore throat, motor vehicle crash, head injury, abscess, constipation, hand   |

injury, arm injury, ankle injury, assault victim, foot injury, lower extremity issue, insect bite, facial swelling, finger injury, shoulder injury, animal bite, urinary retention, knee injury, trauma, migraine, head laceration, wrist injury, wound infection, leg injury, finger laceration, facial laceration, facial injury, burn, extremity laceration, abdominal cramping, toe injury, oral swelling, ear problem, rib injury, foot swelling, eye trauma, dental problem, motorcycle crash, injury, cyst, foreign body, lip laceration, foreign body in ear, joint swelling, mouth lesions, mass, alleged sexual assault, arm swelling, sinus problem, bleeding/bruising, dog bite, throat problem, hemorrhoids, gun shot wound, sinusitis, abrasion, hernia, mouth injury, elbow injury, shaking, hip injury, nose problem, hand laceration, foreign body in skin, neck injury, back injury, puncture wound, hand swelling, foreign body in nose, leg problem, eye swelling, upper extremity issue, recurrent skin infections, arm problem, bicycle crash, wound care, hand problem, foot problem, hand burn, alleged domestic violence, nephrolithiasis, ankle swelling, gout, chest injury, chemical exposure, stab wound, threatened miscarriage, rectal problems, blister, dental injury, fecal impaction, automobile versus pedestrian, heat exposure, or knee problem

#### Opioids

Any medications with one of the following simple generic names: oxycodone HCl/naltrexone HCl, fentanyl citrat/dextrose 5%/PF, fentanyl/bupivacaine/0.9% NaCl, oxycodone myristate, oxymorphone HCl, oliceridine fumarate, oxycodone HCl, cod/ASA/salicylmd/acetamin/caf, methadone in sod chlor,iso-osm, buprenorphine HCl, oxycodone pectinate, levomethadyl acetate HCl, fentanyl citrate, buprenorphine, codeine/chlorzoxazone/acetamin, hydromorphone/bupiv/0.9NaCl/PF, morphine sulfate/D5W/PF, fentanyl citrate-0.9 % NaCl/PF, hydromorphone HCl/0.9% NaCl/PF, morphine sulfate/naltrexone, levorphanol tartrate, meperidine HCl in 0.9% NaCl/PF, fentanyl/ropivacaine/sod Cl/PF, morphine sulfate/D5W, dezocine, acetaminophen/codeine/caffeine, morphine sulfate in 0.9 % NaCl, morphine HCl/PF, morphine sulfate/PF, hydromorphone/bupivac/0.9%NaCl, codeine phosphate, tramadol HCl, codeine/methocarbamol/aspirin, propoxyphene HCl, pentazocine HCl/naloxone HCl, meperidine HCl, nalbuphine HCl, propoxyphene nap/acetaminophen, methadone in 0.9 % sod.chlorid, morphine tartrate, hydromorphone HCl in D5W/PF, propoxyphene napsylate, propoxyphene HCl/acetaminophen, opium/belladonna alkaloids, fentanyl/bupivacaine/NS/PF, fentanyl/ropivacaine/NS/PF, propoxyphene/aspirin/caffeine, hydromorphone HCl in water/PF, hydromorphone/sod chlor,iso/PF, sufentanil citrate, hydrocodone bitartrate, pentazocine HCl/acetaminophen, pentazocine HCl, morphine HCl, meperidine HCl in 0.9 % NaCl, codeine/ASA/caffe/meprobamate, codeine phosphate/ASA/buffers, remifentanil in 0.9 % NaCl/PF, meperidine HCl/PF, fentanyl citrate/PF, morphine sulfate liposomal/PF, tapentadol HCl, oxycodone HCl/naloxone HCl, codeine/aspirin/phenobarbital, meperidine HCl/atropine, codeine/codeine sulfate, hydromorphone HCl/PF, fentanyl HCl, butorphanol tartrate, dihydrocodeine bitartrate, fentanyl, morphine in iso sod chlorid/PF, morphine sulfate, meperidine HCl/prometh HCl, codeine sulfate,

|   |  |
|---|--|
|   | hydromorphone/ropiv/sod chl/PF, codeine phos/aspirin/caffeine, hydromorphone HCl, hydromorphone HCl in 0.9% NaCl, sufentanil/bupivacaine/NS/PF, pentazocine HCl/aspirin, morphine sulfate/0.9% NaCl/PF, pentazocine lactate, hydrocodone/acetaminophen, methadone HCl, or codeine/methocarbamol/acetamin   |
| <b>Non-opioid pain medications</b>            | <p>One of the following medications identified by RxNorm code:</p> <ul style="list-style-type: none"> <li>• Ibuprofen: 5640</li> <li>• Acetaminophen: 161</li> <li>• Ketorolac: 35827</li> <li>• Naproxen: 7258</li> <li>• Diclofenac: 3355</li> <li>• Ketoprofen: 6142</li> </ul> <p>Medications were excluded if they were included as an <b>opioid</b>.</p>   |
| <b>Race and ethnicity</b>                     | <p>Patients were classified using self-reported race and ethnicity as non-Hispanic Black only (Black), Hispanic (any race), or non-Hispanic White only (White).</p> <p>To ensure statistical reliability and to protect privacy, we excluded stratifications with small sample sizes. This includes individuals who self-reported being Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and individuals of another race or ethnicity or with multiple races.</p> |
| <b>Peak pulse and systolic blood pressure</b> | For each vital, the maximum value recorded in the ED visit on the start date of the encounter, or the calendar day following the start of the encounter, was used.   |
| <b>Confidence Intervals</b>                   | Bootstrapped confidence intervals of 1,000 samples were used for each plotted data point.  |

**Table 1: Pulse Rate and ED Opioid Administrations**

|        |            | Opioid Admin Rate |        |         |            |        |         |            |        |         |
|--------|------------|-------------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |            | White             |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | Pulse Rate | Admin Rate        | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 55         | 18%               | 17%    | 19%     | 17%        | 15%    | 18%     | 14%        | 13%    | 15%     |
|        | 60         | 17%               | 17%    | 18%     | 15%        | 15%    | 16%     | 13%        | 12%    | 13%     |
|        | 65         | 17%               | 17%    | 18%     | 16%        | 15%    | 16%     | 13%        | 12%    | 13%     |
|        | 70         | 18%               | 17%    | 18%     | 16%        | 16%    | 17%     | 12%        | 12%    | 13%     |
|        | 75         | 18%               | 17%    | 18%     | 17%        | 16%    | 17%     | 13%        | 12%    | 13%     |
|        | 80         | 18%               | 18%    | 19%     | 17%        | 16%    | 17%     | 13%        | 13%    | 14%     |
|        | 85         | 19%               | 19%    | 19%     | 18%        | 17%    | 18%     | 14%        | 14%    | 14%     |
|        | 90         | 20%               | 19%    | 20%     | 18%        | 18%    | 19%     | 15%        | 14%    | 15%     |
|        | 95         | 20%               | 20%    | 20%     | 19%        | 19%    | 20%     | 15%        | 15%    | 16%     |
|        | 100        | 21%               | 21%    | 22%     | 20%        | 19%    | 21%     | 17%        | 16%    | 17%     |
|        | 105        | 22%               | 22%    | 23%     | 21%        | 20%    | 22%     | 17%        | 17%    | 18%     |
| 110    | 23%        | 22%               | 23%    | 22%     | 21%        | 23%    | 19%     | 18%        | 20%    |         |

|      |     |     |     |     |     |     |     |     |     |     |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|      | 115 | 25% | 24% | 25% | 24% | 22% | 25% | 21% | 20% | 22% |
|      | 120 | 25% | 24% | 26% | 25% | 24% | 27% | 22% | 21% | 23% |
|      |     |     |     |     |     |     |     |     |     |     |
| Male | 55  | 17% | 16% | 18% | 16% | 15% | 17% | 12% | 12% | 13% |
|      | 60  | 17% | 16% | 17% | 15% | 15% | 16% | 12% | 11% | 12% |
|      | 65  | 16% | 16% | 16% | 16% | 15% | 16% | 12% | 11% | 12% |
|      | 70  | 16% | 16% | 17% | 17% | 16% | 17% | 12% | 12% | 13% |
|      | 75  | 17% | 16% | 17% | 17% | 17% | 18% | 13% | 13% | 14% |
|      | 80  | 17% | 17% | 17% | 18% | 18% | 19% | 14% | 13% | 14% |
|      | 85  | 18% | 18% | 18% | 19% | 19% | 20% | 14% | 14% | 15% |
|      | 90  | 19% | 18% | 19% | 20% | 19% | 20% | 15% | 15% | 16% |
|      | 95  | 19% | 19% | 19% | 21% | 20% | 21% | 16% | 16% | 17% |
|      | 100 | 20% | 19% | 20% | 22% | 21% | 22% | 18% | 17% | 18% |
|      | 105 | 20% | 20% | 21% | 23% | 22% | 23% | 19% | 18% | 20% |
|      | 110 | 21% | 21% | 22% | 22% | 21% | 23% | 20% | 20% | 21% |
|      | 115 | 22% | 21% | 22% | 23% | 22% | 24% | 23% | 22% | 24% |
|      | 120 | 23% | 22% | 24% | 27% | 25% | 28% | 24% | 22% | 25% |

**Table 2: Systolic Blood Pressure and ED Opioid Administrations**

|        |             | Opioid Admin Rate |        |         |            |        |         |            |        |         |
|--------|-------------|-------------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |             | White             |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | Systolic BP | Admin Rate        | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 95          | 16%               | 15%    | 17%     | 10%        | 9%     | 12%     | 10%        | 8%     | 11%     |
|        | 100         | 15%               | 14%    | 16%     | 12%        | 11%    | 12%     | 9%         | 8%     | 10%     |
|        | 105         | 16%               | 16%    | 17%     | 13%        | 13%    | 14%     | 10%        | 9%     | 10%     |
|        | 110         | 17%               | 16%    | 17%     | 14%        | 14%    | 15%     | 11%        | 10%    | 11%     |
|        | 115         | 17%               | 17%    | 18%     | 16%        | 15%    | 16%     | 12%        | 11%    | 12%     |
|        | 120         | 18%               | 18%    | 18%     | 16%        | 16%    | 17%     | 12%        | 12%    | 12%     |
|        | 125         | 19%               | 19%    | 19%     | 18%        | 17%    | 18%     | 13%        | 13%    | 14%     |
|        | 130         | 19%               | 19%    | 20%     | 19%        | 18%    | 19%     | 14%        | 14%    | 14%     |
|        | 135         | 20%               | 20%    | 20%     | 20%        | 19%    | 20%     | 15%        | 14%    | 15%     |
|        | 140         | 21%               | 20%    | 21%     | 21%        | 20%    | 21%     | 15%        | 15%    | 16%     |
|        | 145         | 22%               | 21%    | 22%     | 21%        | 20%    | 22%     | 16%        | 16%    | 17%     |
|        | 150         | 22%               | 22%    | 22%     | 22%        | 21%    | 22%     | 17%        | 17%    | 18%     |
|        | 155         | 23%               | 22%    | 23%     | 23%        | 22%    | 24%     | 18%        | 17%    | 18%     |
|        | 160         | 24%               | 23%    | 25%     | 23%        | 21%    | 24%     | 18%        | 17%    | 19%     |
|        | 165         | 24%               | 23%    | 24%     | 25%        | 23%    | 26%     | 19%        | 18%    | 20%     |
|        | 170         | 25%               | 24%    | 25%     | 24%        | 22%    | 26%     | 19%        | 18%    | 20%     |
| 175    | 26%         | 25%               | 27%    | 24%     | 22%        | 26%    | 20%     | 19%        | 21%    |         |
| 180    | 26%         | 25%               | 28%    | 25%     | 22%        | 27%    | 21%     | 20%        | 22%    |         |

|      |     |     |     |     |     |     |     |     |     |     |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|      |     |     |     |     |     |     |     |     |     |     |
| Male | 95  | 10% | 8%  | 13% | 9%  | 6%  | 13% | 11% | 9%  | 14% |
|      | 100 | 14% | 12% | 15% | 10% | 8%  | 12% | 8%  | 7%  | 9%  |
|      | 105 | 13% | 12% | 14% | 13% | 12% | 14% | 10% | 9%  | 10% |
|      | 110 | 14% | 13% | 15% | 13% | 12% | 13% | 10% | 10% | 11% |
|      | 115 | 14% | 14% | 15% | 14% | 13% | 14% | 10% | 10% | 11% |
|      | 120 | 15% | 15% | 16% | 16% | 15% | 16% | 11% | 11% | 12% |
|      | 125 | 16% | 15% | 16% | 16% | 16% | 17% | 12% | 12% | 12% |
|      | 130 | 17% | 16% | 17% | 17% | 17% | 18% | 13% | 13% | 14% |
|      | 135 | 18% | 17% | 18% | 18% | 18% | 19% | 14% | 13% | 14% |
|      | 140 | 19% | 18% | 19% | 20% | 19% | 20% | 15% | 14% | 15% |
|      | 145 | 19% | 19% | 19% | 20% | 20% | 21% | 16% | 15% | 16% |
|      | 150 | 20% | 19% | 20% | 21% | 20% | 22% | 16% | 16% | 17% |
|      | 155 | 20% | 20% | 21% | 22% | 22% | 23% | 17% | 17% | 18% |
|      | 160 | 21% | 21% | 22% | 23% | 22% | 24% | 18% | 18% | 19% |
|      | 165 | 22% | 21% | 22% | 23% | 22% | 24% | 19% | 18% | 20% |
| 170  | 22% | 22% | 23% | 25% | 23% | 26% | 20% | 19% | 21% |     |
| 175  | 24% | 23% | 25% | 25% | 23% | 27% | 20% | 19% | 21% |     |
| 180  | 24% | 23% | 25% | 28% | 26% | 30% | 20% | 19% | 22% |     |

**Table 3: Pulse Rate and ED Non-Opioid Pain Medication Administrations**

|        |            | Opioid Admin Rate |        |         |            |        |         |            |        |         |
|--------|------------|-------------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |            | White             |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | Pulse Rate | Admin Rate        | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 55         | 41%               | 40%    | 43%     | 47%        | 45%    | 49%     | 46%        | 45%    | 48%     |
|        | 60         | 42%               | 42%    | 43%     | 49%        | 48%    | 50%     | 47%        | 46%    | 47%     |
|        | 65         | 43%               | 42%    | 43%     | 49%        | 49%    | 50%     | 47%        | 46%    | 48%     |
|        | 70         | 43%               | 42%    | 43%     | 50%        | 50%    | 51%     | 47%        | 47%    | 48%     |
|        | 75         | 43%               | 43%    | 44%     | 50%        | 50%    | 51%     | 47%        | 47%    | 48%     |
|        | 80         | 43%               | 43%    | 44%     | 50%        | 50%    | 51%     | 47%        | 47%    | 48%     |
|        | 85         | 44%               | 43%    | 44%     | 51%        | 50%    | 51%     | 48%        | 47%    | 48%     |
|        | 90         | 44%               | 44%    | 44%     | 50%        | 50%    | 51%     | 47%        | 47%    | 48%     |
|        | 95         | 44%               | 44%    | 45%     | 51%        | 50%    | 51%     | 48%        | 47%    | 48%     |
|        | 100        | 45%               | 44%    | 45%     | 52%        | 51%    | 53%     | 49%        | 48%    | 49%     |
|        | 105        | 45%               | 45%    | 46%     | 52%        | 52%    | 53%     | 49%        | 48%    | 50%     |
|        | 110        | 46%               | 45%    | 46%     | 53%        | 52%    | 55%     | 50%        | 49%    | 51%     |
| 115    | 47%        | 46%               | 48%    | 55%     | 53%        | 56%    | 51%     | 50%        | 52%    |         |
| 120    | 47%        | 46%               | 48%    | 56%     | 54%        | 58%    | 53%     | 52%        | 55%    |         |
| Male   | 55         | 39%               | 38%    | 40%     | 46%        | 44%    | 47%     | 44%        | 43%    | 45%     |

|  |     |     |     |     |     |     |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|  | 60  | 39% | 39% | 40% | 47% | 46% | 48% | 46% | 45% | 46% |
|  | 65  | 39% | 39% | 40% | 48% | 47% | 48% | 45% | 45% | 46% |
|  | 70  | 39% | 39% | 40% | 48% | 47% | 48% | 46% | 45% | 46% |
|  | 75  | 40% | 39% | 40% | 48% | 47% | 48% | 46% | 46% | 47% |
|  | 80  | 40% | 40% | 41% | 48% | 48% | 49% | 47% | 46% | 47% |
|  | 85  | 41% | 40% | 41% | 48% | 47% | 49% | 46% | 46% | 47% |
|  | 90  | 41% | 40% | 41% | 48% | 47% | 48% | 46% | 45% | 46% |
|  | 95  | 41% | 41% | 41% | 48% | 47% | 49% | 46% | 46% | 47% |
|  | 100 | 41% | 40% | 41% | 48% | 47% | 49% | 45% | 45% | 46% |
|  | 105 | 41% | 40% | 41% | 48% | 47% | 49% | 45% | 45% | 46% |
|  | 110 | 42% | 41% | 42% | 47% | 46% | 48% | 45% | 44% | 47% |
|  | 115 | 41% | 40% | 42% | 46% | 44% | 48% | 45% | 44% | 47% |
|  | 120 | 41% | 40% | 42% | 47% | 45% | 49% | 45% | 43% | 47% |

**Table 4: Systolic Blood Pressure and ED Non-Opioid Pain Medication Administrations**

|        |            | Opioid Admin Rate |        |         |            |        |         |            |        |         |
|--------|------------|-------------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |            | White             |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | SystolicBP | Admin Rate        | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 95         | 41%               | 39%    | 42%     | 46%        | 44%    | 48%     | 42%        | 40%    | 45%     |
|        | 100        | 41%               | 40%    | 42%     | 48%        | 47%    | 49%     | 44%        | 43%    | 45%     |
|        | 105        | 42%               | 41%    | 42%     | 48%        | 47%    | 49%     | 45%        | 44%    | 46%     |
|        | 110        | 42%               | 41%    | 42%     | 49%        | 49%    | 50%     | 45%        | 45%    | 46%     |
|        | 115        | 42%               | 42%    | 43%     | 50%        | 49%    | 50%     | 46%        | 46%    | 47%     |
|        | 120        | 43%               | 43%    | 43%     | 51%        | 50%    | 51%     | 46%        | 46%    | 47%     |
|        | 125        | 43%               | 43%    | 44%     | 51%        | 50%    | 51%     | 48%        | 47%    | 48%     |
|        | 130        | 44%               | 44%    | 44%     | 51%        | 51%    | 52%     | 48%        | 47%    | 48%     |
|        | 135        | 45%               | 44%    | 45%     | 51%        | 51%    | 52%     | 48%        | 47%    | 48%     |
|        | 140        | 45%               | 44%    | 45%     | 52%        | 51%    | 53%     | 48%        | 48%    | 49%     |
|        | 145        | 45%               | 45%    | 46%     | 52%        | 51%    | 53%     | 49%        | 48%    | 49%     |
|        | 150        | 45%               | 45%    | 46%     | 52%        | 51%    | 53%     | 50%        | 49%    | 50%     |
|        | 155        | 46%               | 46%    | 47%     | 52%        | 50%    | 53%     | 49%        | 48%    | 50%     |
|        | 160        | 46%               | 46%    | 47%     | 54%        | 53%    | 55%     | 50%        | 49%    | 51%     |
|        | 165        | 47%               | 46%    | 48%     | 52%        | 50%    | 54%     | 51%        | 50%    | 52%     |
| 170    | 47%        | 46%               | 48%    | 53%     | 51%        | 55%    | 51%     | 50%        | 52%    |         |
| 175    | 48%        | 47%               | 49%    | 54%     | 52%        | 57%    | 50%     | 49%        | 51%    |         |
| 180    | 48%        | 47%               | 50%    | 54%     | 51%        | 56%    | 51%     | 49%        | 52%    |         |
| Male   | 95         | 33%               | 30%    | 37%     | 36%        | 31%    | 42%     | 40%        | 35%    | 44%     |
|        | 100        | 37%               | 36%    | 39%     | 46%        | 43%    | 49%     | 41%        | 39%    | 44%     |
|        | 105        | 38%               | 36%    | 39%     | 45%        | 43%    | 47%     | 44%        | 42%    | 45%     |

|  |     |     |     |     |     |     |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|  | 110 | 38% | 38% | 39% | 46% | 45% | 47% | 44% | 43% | 45% |
|  | 115 | 38% | 38% | 39% | 46% | 45% | 47% | 44% | 44% | 45% |
|  | 120 | 39% | 39% | 40% | 47% | 47% | 48% | 45% | 45% | 46% |
|  | 125 | 40% | 39% | 40% | 47% | 47% | 48% | 45% | 44% | 46% |
|  | 130 | 40% | 39% | 40% | 47% | 47% | 48% | 46% | 45% | 46% |
|  | 135 | 40% | 40% | 40% | 48% | 47% | 48% | 46% | 45% | 46% |
|  | 140 | 40% | 40% | 41% | 48% | 47% | 49% | 46% | 46% | 47% |
|  | 145 | 40% | 40% | 41% | 48% | 47% | 49% | 46% | 45% | 47% |
|  | 150 | 41% | 41% | 42% | 49% | 48% | 50% | 46% | 45% | 47% |
|  | 155 | 41% | 41% | 42% | 49% | 48% | 49% | 47% | 46% | 48% |
|  | 160 | 41% | 41% | 42% | 48% | 47% | 49% | 47% | 46% | 48% |
|  | 165 | 42% | 42% | 43% | 48% | 47% | 50% | 47% | 46% | 48% |
|  | 170 | 42% | 42% | 43% | 49% | 48% | 51% | 48% | 46% | 49% |
|  | 175 | 42% | 41% | 43% | 47% | 45% | 49% | 48% | 47% | 50% |
|  | 180 | 43% | 42% | 44% | 50% | 48% | 52% | 47% | 45% | 48% |

**Table 5: Pulse Rate and ED Opioid Prescriptions**

|        |            | Opioid Rx Rate |        |         |            |        |         |            |        |         |
|--------|------------|----------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |            | White          |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | Pulse Rate | Admin Rate     | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 55         | 11%            | 10%    | 12%     | 8%         | 7%     | 9%      | 7%         | 6%     | 8%      |
|        | 60         | 10%            | 10%    | 11%     | 7%         | 7%     | 8%      | 7%         | 7%     | 7%      |
|        | 65         | 11%            | 10%    | 11%     | 7%         | 7%     | 8%      | 7%         | 7%     | 8%      |
|        | 70         | 10%            | 10%    | 11%     | 7%         | 7%     | 8%      | 7%         | 7%     | 7%      |
|        | 75         | 10%            | 10%    | 11%     | 8%         | 7%     | 8%      | 7%         | 7%     | 7%      |
|        | 80         | 11%            | 11%    | 11%     | 8%         | 7%     | 8%      | 7%         | 7%     | 7%      |
|        | 85         | 11%            | 11%    | 11%     | 8%         | 7%     | 8%      | 7%         | 7%     | 8%      |
|        | 90         | 11%            | 11%    | 11%     | 8%         | 8%     | 8%      | 8%         | 7%     | 8%      |
|        | 95         | 11%            | 11%    | 11%     | 8%         | 8%     | 8%      | 8%         | 8%     | 8%      |
|        | 100        | 11%            | 11%    | 11%     | 9%         | 8%     | 9%      | 8%         | 8%     | 8%      |
|        | 105        | 11%            | 11%    | 11%     | 8%         | 8%     | 9%      | 8%         | 8%     | 9%      |
|        | 110        | 11%            | 11%    | 12%     | 9%         | 8%     | 9%      | 9%         | 8%     | 9%      |
|        | 115        | 11%            | 11%    | 12%     | 9%         | 8%     | 9%      | 9%         | 8%     | 10%     |
|        | 120        | 12%            | 11%    | 12%     | 9%         | 8%     | 10%     | 9%         | 8%     | 10%     |
| Male   | 55         | 12%            | 11%    | 13%     | 9%         | 8%     | 9%      | 8%         | 7%     | 9%      |
|        | 60         | 12%            | 11%    | 12%     | 8%         | 8%     | 9%      | 7%         | 7%     | 8%      |
|        | 65         | 11%            | 11%    | 11%     | 9%         | 8%     | 9%      | 7%         | 7%     | 8%      |
|        | 70         | 12%            | 11%    | 12%     | 9%         | 9%     | 9%      | 8%         | 7%     | 8%      |
|        | 75         | 11%            | 11%    | 12%     | 9%         | 9%     | 9%      | 8%         | 8%     | 8%      |

|  |     |     |     |     |     |     |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|  | 80  | 12% | 11% | 12% | 9%  | 9%  | 10% | 8%  | 8%  | 8%  |
|  | 85  | 12% | 12% | 12% | 10% | 9%  | 10% | 8%  | 8%  | 9%  |
|  | 90  | 12% | 12% | 12% | 10% | 10% | 10% | 9%  | 8%  | 9%  |
|  | 95  | 12% | 11% | 12% | 10% | 9%  | 10% | 9%  | 8%  | 9%  |
|  | 100 | 12% | 12% | 12% | 10% | 9%  | 10% | 10% | 9%  | 10% |
|  | 105 | 12% | 11% | 12% | 10% | 9%  | 10% | 10% | 9%  | 10% |
|  | 110 | 11% | 11% | 12% | 9%  | 8%  | 10% | 10% | 9%  | 11% |
|  | 115 | 11% | 11% | 12% | 9%  | 8%  | 10% | 10% | 9%  | 11% |
|  | 120 | 11% | 10% | 11% | 10% | 9%  | 11% | 11% | 10% | 12% |

**Table 6: Systolic Blood Pressure and ED Opioid Prescriptions**

|        |            | Opioid Rx Rate |        |         |            |        |         |            |        |         |
|--------|------------|----------------|--------|---------|------------|--------|---------|------------|--------|---------|
|        |            | White          |        |         | Hispanic   |        |         | Black      |        |         |
| Sex    | SystolicBP | Admin Rate     | CI Low | CI High | Admin Rate | CI Low | CI High | Admin Rate | CI Low | CI High |
| Female | 95         | 9%             | 8%     | 9%      | 5%         | 4%     | 6%      | 6%         | 5%     | 7%      |
|        | 100        | 9%             | 8%     | 9%      | 5%         | 4%     | 6%      | 5%         | 5%     | 6%      |
|        | 105        | 9%             | 9%     | 9%      | 6%         | 5%     | 6%      | 5%         | 5%     | 6%      |
|        | 110        | 9%             | 9%     | 9%      | 6%         | 6%     | 6%      | 6%         | 6%     | 6%      |
|        | 115        | 9%             | 9%     | 10%     | 7%         | 6%     | 7%      | 6%         | 6%     | 6%      |
|        | 120        | 10%            | 10%    | 10%     | 7%         | 7%     | 7%      | 7%         | 6%     | 7%      |
|        | 125        | 10%            | 10%    | 11%     | 7%         | 7%     | 8%      | 7%         | 7%     | 7%      |
|        | 130        | 11%            | 11%    | 11%     | 8%         | 8%     | 9%      | 8%         | 7%     | 8%      |
|        | 135        | 11%            | 11%    | 11%     | 9%         | 8%     | 9%      | 8%         | 8%     | 8%      |
|        | 140        | 11%            | 11%    | 12%     | 9%         | 9%     | 10%     | 8%         | 8%     | 8%      |
|        | 145        | 12%            | 12%    | 12%     | 9%         | 9%     | 10%     | 8%         | 8%     | 9%      |
|        | 150        | 12%            | 12%    | 12%     | 9%         | 8%     | 9%      | 9%         | 9%     | 9%      |
|        | 155        | 13%            | 12%    | 13%     | 10%        | 10%    | 11%     | 9%         | 9%     | 10%     |
|        | 160        | 13%            | 12%    | 13%     | 10%        | 9%     | 11%     | 10%        | 9%     | 10%     |
|        | 165        | 13%            | 12%    | 13%     | 11%        | 10%    | 12%     | 9%         | 9%     | 10%     |
| 170    | 13%        | 12%            | 14%    | 10%     | 9%         | 12%    | 10%     | 9%         | 10%    |         |
| 175    | 14%        | 13%            | 15%    | 11%     | 9%         | 12%    | 9%      | 9%         | 10%    |         |
| 180    | 13%        | 12%            | 14%    | 11%     | 9%         | 12%    | 9%      | 8%         | 10%    |         |
|        |            |                |        |         |            |        |         |            |        |         |
| Male   | 95         | 7%             | 6%     | 9%      | 3%         | 1%     | 5%      | 7%         | 5%     | 10%     |
|        | 100        | 8%             | 7%     | 9%      | 5%         | 4%     | 7%      | 6%         | 5%     | 7%      |
|        | 105        | 9%             | 8%     | 9%      | 7%         | 6%     | 8%      | 6%         | 5%     | 6%      |
|        | 110        | 9%             | 9%     | 10%     | 6%         | 5%     | 7%      | 6%         | 6%     | 7%      |
|        | 115        | 9%             | 9%     | 10%     | 7%         | 6%     | 7%      | 6%         | 6%     | 7%      |
|        | 120        | 10%            | 10%    | 10%     | 8%         | 7%     | 8%      | 6%         | 6%     | 7%      |
|        | 125        | 10%            | 10%    | 10%     | 8%         | 8%     | 8%      | 7%         | 7%     | 7%      |

|  |     |     |     |     |     |     |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|  | 130 | 11% | 11% | 11% | 9%  | 8%  | 9%  | 8%  | 7%  | 8%  |
|  | 135 | 11% | 11% | 12% | 9%  | 9%  | 9%  | 8%  | 7%  | 8%  |
|  | 140 | 12% | 12% | 12% | 10% | 10% | 10% | 8%  | 8%  | 9%  |
|  | 145 | 12% | 12% | 12% | 10% | 10% | 11% | 9%  | 9%  | 9%  |
|  | 150 | 13% | 12% | 13% | 11% | 10% | 11% | 9%  | 9%  | 10% |
|  | 155 | 13% | 13% | 13% | 11% | 11% | 12% | 10% | 9%  | 10% |
|  | 160 | 13% | 13% | 14% | 11% | 10% | 12% | 10% | 10% | 11% |
|  | 165 | 14% | 14% | 15% | 12% | 11% | 12% | 10% | 10% | 11% |
|  | 170 | 14% | 13% | 14% | 13% | 12% | 14% | 11% | 10% | 12% |
|  | 175 | 14% | 13% | 15% | 12% | 11% | 14% | 11% | 10% | 12% |
|  | 180 | 14% | 13% | 15% | 13% | 12% | 15% | 11% | 10% | 12% |