

Chronic Disease and Related Conditions at Emergency Treatment Facilities in the New Orleans Area After Hurricane Katrina

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ABSTRACT

Background: Disaster preparations usually focus on preventing injury and infectious disease. However, people with chronic disease and related conditions (CDRCs), including obstetric/gynecological conditions, may be vulnerable to disruptions caused by disasters.

Methods: We used surveillance data collected after Hurricane Katrina to characterize the burden of visits for CDRCs at emergency treatment facilities (eg, hospitals, disaster medical assistance teams, military aid stations). In 6 parishes in and around New Orleans, health care providers at 29 emergency treatment facilities completed a standardized questionnaire for injury and illness surveillance from September 8 through October 22, 2005.

Results: Of 21,673 health care visits, 58.0% were for illness (24.3% CDRCs, 75.7% non-CDRCs), 29.1% for injury, 7.2% for medication refills, and 5.7% for routine or follow-up care. The proportion of visits for CDRCs increased with age. Among men presenting with CDRCs, the most common illnesses were cardiovascular disease (36.8%), chronic lower-respiratory disease (12.3%), and diabetes/glucose abnormalities (7.7%). Among women presenting with CDRCs, the most common were cardiovascular disease (29.2%), obstetric/gynecological conditions (18.2%), and chronic lower-respiratory disease (12.0%). Subsequent hospitalization occurred among 28.7% of people presenting with CDRCs versus 10.9% of those with non-CDRCs and 3.8% of those with injury.

Conclusions: Our data illustrate the importance of including CDRCs as a part of emergency response planning. (Disaster Med Public Health Preparedness. 2008;2:27–32)

Chronic Disease and Related Conditions at Emergency-Treatment Facilities after Hurricane Katrina — New Orleans Area, Louisiana

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Abstract

Disaster preparations usually focus on preventing injury and infectious disease. However, people with chronic disease and related conditions (CDRCs), including obstetric/gynecologic conditions, may be vulnerable to disruptions caused by disasters. We used surveillance data collected following Hurricane Katrina to characterize the burden of visits for CDRCs at emergency-treatment facilities (e.g., hospitals, disaster medical assistance teams, military-aid stations). In 6 Parishes in and around New Orleans, healthcare providers at 27 emergency-treatment facilities completed a standardized questionnaire for injury and illness surveillance from September 8 through October 22, 2005. Of 21,673 health-care visits, 58.0% were for illness (24.3% CDRCs, 75.7% non-CDRCs), 29.1% for injury, 7.2% for medication refills, and 5.7% for routine or follow-up care. The proportion of visits for CDRCs increased with age. Among men presenting with CDRCs, the most common were cardiovascular disease (36.8%), chronic lower-respiratory disease (12.3%), and diabetes/glucose abnormalities (7.7%). Among women presenting with CDRCs, the most common were cardiovascular disease (29.2%), obstetric/gynecologic conditions (18.2%), and chronic lower-respiratory disease (12.0%). Subsequent hospitalization occurred among 31.3% of persons presenting with CDRCs versus 10.9% of those with non-CDRCs and 3.8% of those with injury. Our data illustrate the importance of including CDRCs as part of emergency response planning.

Key words: surveillance, chronic disease, disasters, Louisiana, obstetrics

Introduction

On August 29, 2005, Hurricane Katrina made landfall along the Gulf Coast of the United States as a Category 3 storm, resulting in widespread flooding of areas in and around New Orleans. Disaster response traditionally focuses on preventing injury and infectious disease.¹ However, among populations with a large burden of chronic disease, management of chronic disease and related conditions is essential to prevent severe exacerbations or complications.^{2, 3} Following Hurricane Katrina, a limited needs assessment conducted in evacuation centers demonstrated that the majority of noninjury-related health-care visits were for medication refills, oral health problems, or chronic disease conditions.⁴ Another survey reported that 41% of evacuees had a history of at least one chronic disease.⁵ There are almost no published data on the burden of chronic conditions at emergency-treatment facilities.

In response to Hurricane Katrina, the Centers for Disease Control and Prevention (CDC) and the Louisiana Department of Health and Hospitals implemented active surveillance to monitor for injuries and illnesses at functioning emergency-treatment facilities (e.g., hospitals, disaster medical assistance teams, or military aid stations) in and around New Orleans.^{6, 7} The objectives of the current analysis were 1) to determine the prevalence of visits for chronic disease and related conditions (CDRCs) from September 8–October 22, 2005, at emergency-treatment facilities serving the area, and 2) to characterize the distribution of specific CDRCs by age and sex.

Methods

On September 8, 2005, the Louisiana Department of Health and Hospitals and CDC established an active surveillance system for injury and illness that captured information from visits to functioning emergency-treatment facilities (e.g., hospitals, disaster medical assistance teams, or military aid stations) providing acute care in six parishes (Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles and St. Tammany) in and around New Orleans.^{6, 7} Data were collected prospectively as facilities opened and joined the surveillance system. Retrospective data were collected from hospital facilities when available. This report focuses on data collected from the 8 hospital and 21 nonhospital facilities participating in the surveillance system during September 8 to October 22, 2005.

Health-care providers were instructed to complete a standardized one-page case-report form for every patient visit to an emergency-treatment facility. The form was developed by the CDC for use in clinical, post-hurricane settings. Data were collected on patient demographics and reason for visit (i.e., injury, illness, both illness and injury, medication refill, or routine care or follow-up). Among visits for injury and illness, data were also collected on symptoms, mechanism of injury, primary clinical impressions (for illness), pre-existing conditions, and disposition (i.e., hospitalized, discharged, left without treatment, left against medical advise (AMA), transferred, expired, unknown). For the purpose of this analysis, patients with both illness and injury (n=299) were combined with those who had only illness (n=15,069) into one illness category. When data collection by health-care providers was not practical, epidemiologists were assigned to abstract the medical record.

To characterize CDRCs, health-care providers were instructed to select one primary clinical impression for the most severe complaint or condition from a checklist that included the following categories: 1) cardiovascular disease; 2) cerebrovascular diseases; 3) hyperglycemia,

hypoglycemia, or diabetes mellitus; 4) renal failure; and 5) chronic lower respiratory disease. The list included 13 other conditions we considered non-CDRC (e.g., dehydration, heat-related illness, infectious diseases, or mental health related conditions) and an “other” category with space to write in a clinical impression. In order to capture CDRC data in the write-in fields, the following seven additional categories were created: 6) dental, 7) obstetric/gynecologic (women only), 8) chronic gastrointestinal, 9) chronic pain, 10) hematology/oncology, 11) arthritis, and 12) other chronic conditions. A medical epidemiologist (ECW) categorized persons as having a CDRC if they had a clinical impression consistent with symptoms, acute events or complications of a chronic condition. In cases where more than one clinical impression was noted, a person was categorized as having a CDRC if one clinical impression was consistent with a CDRC.

Of the 26,230 recorded visits during September 8–October 22, 2005, a total of 2,200 (8.4%) were excluded because of missing data on reason for visit [$n=358$ (1.4%)], or if reason for visit was known, data was missing on primary clinical impression [$n=1510$ (5.8%)] or mechanism of injury [$n=329$ (1.3%)]. An additional 2,357 (9.0%) visits were excluded because of missing data on age or sex. A total of 21,673 visits were included in the analysis.

We describe the proportion of visits to emergency-treatment facilities by reason for visit and the distribution of CDRCs by age group and sex. The distribution of CDRCs among men and women were reported separately to account for an additional primary clinical impression (i.e. obstetric/gynecologic) among women. Disposition data were collected for 17,081 of the 18,875 visits for injury or illness. In a sub-analysis, we describe the proportion of visits where the disposition was hospitalization. All data analyses were performed using SAS software (version 9.0, SAS Institute, Inc., Cary, NC).

Results

Of the 21,673 visits, 58.0% presented for illness, 29.1% for injuries, 7.2% for medication refills, and 5.7% for routine or follow-up care (Figure 1). Among visits for illness ($n=12,567$), 75.7% were for non-CDRC illnesses (e.g., dehydration, heat-related illness, infectious disease, mental health) and 24.3% were for CDRCs. The proportion of visits for illness due to CDRCs increased with age, from 12.3% among those aged 0–19 years to 40.9% among those aged ≥ 80 years (Figure 2).

Among visits for a CDRC, the distribution of specific CDRCs varied by sex and age group. Among the 1,435 men presenting with a CDRC, the most common CDRCs were cardiovascular disease (36.8%); chronic lower respiratory disease (12.3%); and hypoglycemia, hyperglycemia, or diabetes mellitus (7.7%) (Table 1). The proportion of men presenting for cardiovascular disease increased with age from 14.0% among those aged 0–19 years to 54.9% among those aged ≥ 80 years. Chronic lower respiratory disease was the most common CDRC among men aged 0–19 years (54.7%) and the second most common CDRC among men in all age groups ≥ 40 years (8.8%). Dental problems were the most common CDRC among men aged 20–39 years (20.2%).

Among the 1,619 women presenting with a CDRC, the most common CDRCs were cardiovascular disease (29.2%), obstetric/gynecologic conditions (18.2%), and chronic lower respiratory disease (12.0%) (Table 2). The proportion presenting for cardiovascular disease increased with age from 5.7% among women aged 0–19 years to 46.2% among women aged ≥ 80 years. Obstetric/gynecologic conditions were the most common CDRCs among women aged 0–19 years (33.6%) and 20–39 years (48.0%). Chronic lower respiratory conditions were the

second most common CDRC among women of all age groups (12.0%), affecting the greatest proportion among women aged 0–19 years (28.7%). Overall, hyperglycemia, hypoglycemia, or diabetes mellitus was the fourth most common CDRC among women (6.1%).

Among the 17,081 visits where data on disposition were available (Figure 1), hospitalization was the disposition for 31.3% of persons presenting with CDRCs compared to 10.9% with non-CDRC illness and 3.8% with injuries. Although the proportion of visits where the disposition was hospitalization varied by sex and increased with age across all reasons for visit (Figure 3), within each age group hospitalization was more common for visits for CDRCs than for visits for either non-CDRCs or injuries.

Discussion

Hurricane Katrina created enormous public health and medical challenges, especially in southern Louisiana where the subsequent flooding of New Orleans imposed catastrophic public health conditions. Several large hospitals were rendered inoperable. Nearly all smaller treatment facilities and pharmacies were shut down leaving people with chronic medical conditions without access to their usual sources of medical care and medications.⁸ In this paper, we have described the impact of patient visits for CDRCs at emergency-treatment facilities.

After Hurricane Katrina, CDRCs accounted for a significant proportion of visits for illness to emergency treatment facilities in and around New Orleans, particularly among those aged ≥ 60 years. The burden was magnified by the high rate of hospitalization among those presenting with CDRCs. Cardiovascular disease, chronic lower respiratory disease, obstetric/gynecologic conditions, and diabetes were the most common CDRCs. Although not as common, cerebrovascular disease and renal failure often require immediate interventions with medication or dialysis to prevent further morbidity or mortality.

Disaster preparations usually focus on preventing injury and infectious disease. However, disaster preparedness also includes planning for the needs of persons vulnerable to the stresses and disruptions caused by the disaster. Preparations for the prevention and control of chronic diseases and adverse pregnancy outcomes following a disaster can be guided by predisaster disease burden, awareness of the immediate needs of people with chronic disease for specialty care (e.g., hemodialysis) and medications, and the capacity of the health care delivery system in the area.^{3,9} Since chronic illnesses can be exacerbated by disaster conditions (e.g., lack of food or water, extreme heat or cold, physical and mental stress)¹⁰⁻¹³, active surveillance of CDRCs following a disaster can also be useful. Data can be used to direct essential resources, such as health-care providers, medications, or equipment to potential shortage areas.¹⁴ Without appropriate care following a disaster, patients with chronic stable conditions, such as cardiovascular disease, diabetes, or dialysis-dependent renal failure may suffer severe exacerbations or complications such as heart attack, diabetic ketoacidosis, or even death.

To improve surveillance for chronic disease following a disaster, a questionnaire that limits the potential for misclassification is needed. Since Hurricane Katrina, surveillance questionnaires have been updated to distinguish between exacerbations of chronic illness and presentation for stable chronic conditions, as well presentation for pregnancy complications versus non-pregnant gynecologic conditions.¹⁴ Ideally, the questionnaire would be incorporated with forms already used by disaster medical assistance teams, and could be easily integrated into the medical record.

The findings in this report are subject to several limitations. First, the surveillance system was not specifically designed to detect CDRCs. Substantial ambiguity occurred in the symptoms and diagnoses reported, resulting in probable misclassification; however, an effort was made to classify CDRCs conservatively. Second, our estimates of CDRCs may be low as we did not include mental health disorders, medication refills, or follow-up care visits. Mental health was not included as a chronic condition because the category description did not differentiate chronic mental health conditions from acute disorders related to the disaster situation. Similarly, the underlying medical condition of those requiring medication refills or follow-up care was not ascertained; therefore, the proportion of visits for CDRCs remains unknown. Third, due to the mass evacuation that occurred in the New Orleans area, the loss of health-care infrastructure, and the lack of baseline data, determining the absolute burden of CDRCs on the health-care system was not possible and generalizability to future disasters is limited. Fourth, the proportion of obstetric/gynecologic visits resulting from complications of pregnancy is not known; however, write-in data suggest that at least 25% of visits were pregnancy-related.

Despite these limitations, this report contains important information about medical needs following a disaster. Because of the substantial burden of CDRCs, these findings highlight the importance of emergency response plans and improved active surveillance to address chronic diseases, especially among older adults, and to protect the health of pregnant women. Rapid initiation of surveillance following a disaster is crucial to accurately characterize the burden of disease and direct the appropriate essential resource needs to emergency-treatment facilities in the area. The findings underscore a need for including chronic disease care and prevention of complications in pre-disaster planning, and post-disaster surveillance.

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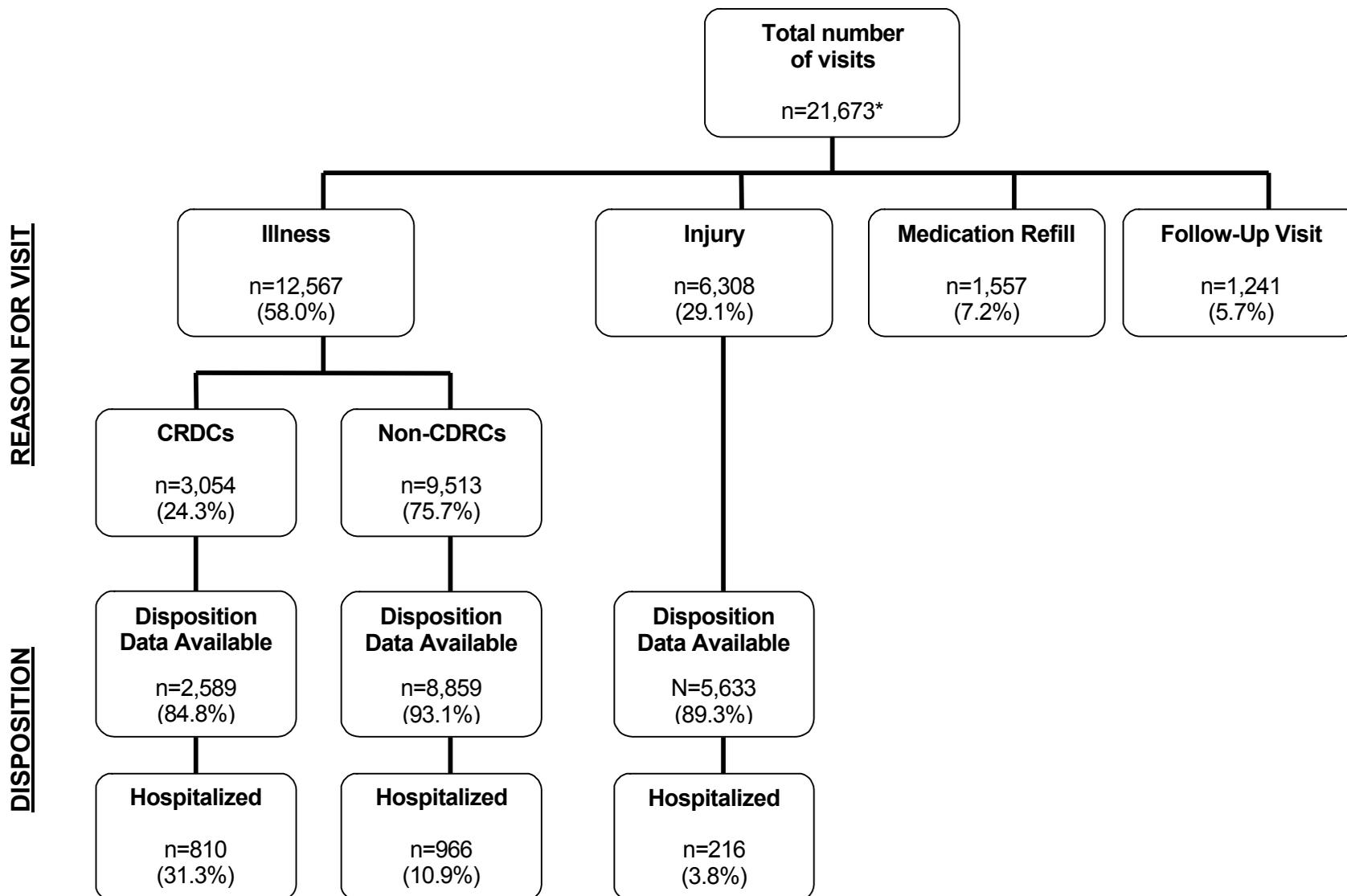
Table 1. Number (%) of men presenting at emergency-treatment facilities for chronic disease and related conditions after Hurricane Katrina, by age group — in and around New Orleans, Louisiana, September 8-October 22, 2005

| Chronic disease and related conditions | 0-19 y | | 20-39 y | | 40-59 y | | 60-79 y | | 80+ y | | Total | |
|--|-----------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|-------------|----------------|
| | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) | No. | (%) |
| Cardiovascular disease | 12 | (14.0) | 59 | (22.4) | 209 | (36.0) | 181 | (47.3) | 67 | (54.9) | 528 | (36.8) |
| Cerebrovascular disease | 0 | (0) | 7 | (2.7) | 32 | (5.5) | 28 | (7.3) | 6 | (4.9) | 73 | (5.1) |
| Hyper/hypoglycemia, diabetes | 2 | (2.3) | 18 | (6.8) | 57 | (9.8) | 25 | (6.5) | 8 | (6.6) | 110 | (7.7) |
| Renal failure | 0 | (0) | 5 | (1.9) | 23 | (4.0) | 15 | (3.9) | 8 | (6.6) | 51 | (3.6) |
| Chronic lower respiratory disease | 47 | (54.7) | 33 | (12.6) | 47 | (8.1) | 41 | (10.1) | 8 | (6.6) | 176 | (12.3) |
| Dental problems | 4 | (4.7) | 53 | (20.2) | 39 | (6.7) | 9 | (2.4) | 1 | (0.8) | 106 | (7.4) |
| Chronic gastrointestinal conditions | 11 | (12.8) | 20 | (7.6) | 43 | (7.4) | 25 | (6.5) | 8 | (6.6) | 107 | (7.5) |
| Chronic pain syndromes | 4 | (4.7) | 17 | (6.5) | 22 | (3.8) | 3 | (0.8) | 1 | (0.8) | 47 | (3.3) |
| Hematology, oncology | 2 | (2.3) | 22 | (8.4) | 25 | (4.3) | 18 | (4.7) | 7 | (5.7) | 74 | (5.2) |
| Arthritis | 0 | (0) | 7 | (2.7) | 38 | (6.5) | 17 | (4.4) | 0 | (0) | 62 | (4.3) |
| Other chronic conditions | 4 | (4.7) | 22 | (8.4) | 46 | (7.9) | 21 | (5.5) | 8 | (6.6) | 101 | (7.0) |
| Total | 86 | (100.0) | 263 | (100.0) | 581 | (100.0) | 383 | (100.0) | 122 | (100.0) | 1435 | (100.0) |

Table 2. Number (%) of women presenting at emergency-treatment facilities for chronic disease and related conditions after Hurricane Katrina, by age group — in and around New Orleans, Louisiana, September 8-October 22, 2005

| Chronic disease and related conditions | 0-19 y | | 20-39 y | | 40-59 y | | 60-79 y | | 80+ y | | Total | |
|--|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|-------------|----------------|
| | No. | (%) | No. | (%) |
| Cardiovascular disease | 7 | (5.7) | 36 | (8.8) | 160 | (30.9) | 191 | (47.8) | 79 | (46.2) | 473 | (29.2) |
| Cerebrovascular disease | 0 | (0) | 4 | (1.0) | 22 | (4.3) | 34 | (8.5) | 16 | (9.4) | 76 | (4.7) |
| Hyper/hypoglycemia, diabetes | 5 | (4.1) | 10 | (2.5) | 44 | (8.5) | 34 | (8.5) | 6 | (3.5) | 99 | (6.1) |
| Renal failure | 0 | (0) | 3 | (0.7) | 7 | (1.4) | 13 | (3.3) | 3 | (1.8) | 26 | (1.6) |
| Chronic lower respiratory disease | 35 | (28.7) | 43 | (10.5) | 64 | (12.4) | 35 | (8.8) | 18 | (10.5) | 195 | (12.0) |
| Dental problems | 5 | (4.1) | 30 | (7.4) | 26 | (5.0) | 4 | (1.0) | 1 | (0.6) | 66 | (4.1) |
| Obstetric/gynecologic conditions | 41 | (33.6) | 196 | (48.0) | 44 | (8.5) | 5 | (1.3) | 8 | (4.7) | 294 | (18.2) |
| Chronic gastrointestinal conditions | 12 | (9.8) | 17 | (4.2) | 30 | (5.8) | 22 | (5.5) | 13 | (7.6) | 94 | (5.8) |
| Chronic pain syndromes | 5 | (4.1) | 30 | (7.4) | 43 | (8.3) | 7 | (1.8) | 0 | (0) | 85 | (5.3) |
| Hematology, oncology | 5 | (4.1) | 15 | (3.7) | 14 | (2.7) | 18 | (4.5) | 5 | (2.9) | 57 | (3.5) |
| Arthritis | 0 | (0) | 2 | (0.5) | 22 | (4.3) | 12 | (3.0) | 5 | (2.9) | 41 | (2.5) |
| Other chronic conditions | 7 | (5.7) | 22 | (5.4) | 42 | (8.1) | 25 | (6.3) | 17 | (9.9) | 113 | (7.0) |
| Total | 122 | (100.0) | 408 | (100.0) | 518 | (100.0) | 400 | (100.0) | 171 | (100.0) | 1619 | (100.0) |

Figure 1. Distribution of visits to emergency-treatment facilities by reason for visit and disposition — in and around New Orleans, Louisiana, September 8-October 22, 2005



*4,557 visits excluded from the analysis due to reason for visit was immunization (n=3) or unknown (n=358), or missing data on the following: primary clinical impression (n=1510), mechanism of injury (n=329), or age and/or sex (n=2357).

Figure 2. Among visits for illness, the proportion with primary clinical impressions related to chronic disease or related conditions (CDRCs) or non-CDRCs by age group.

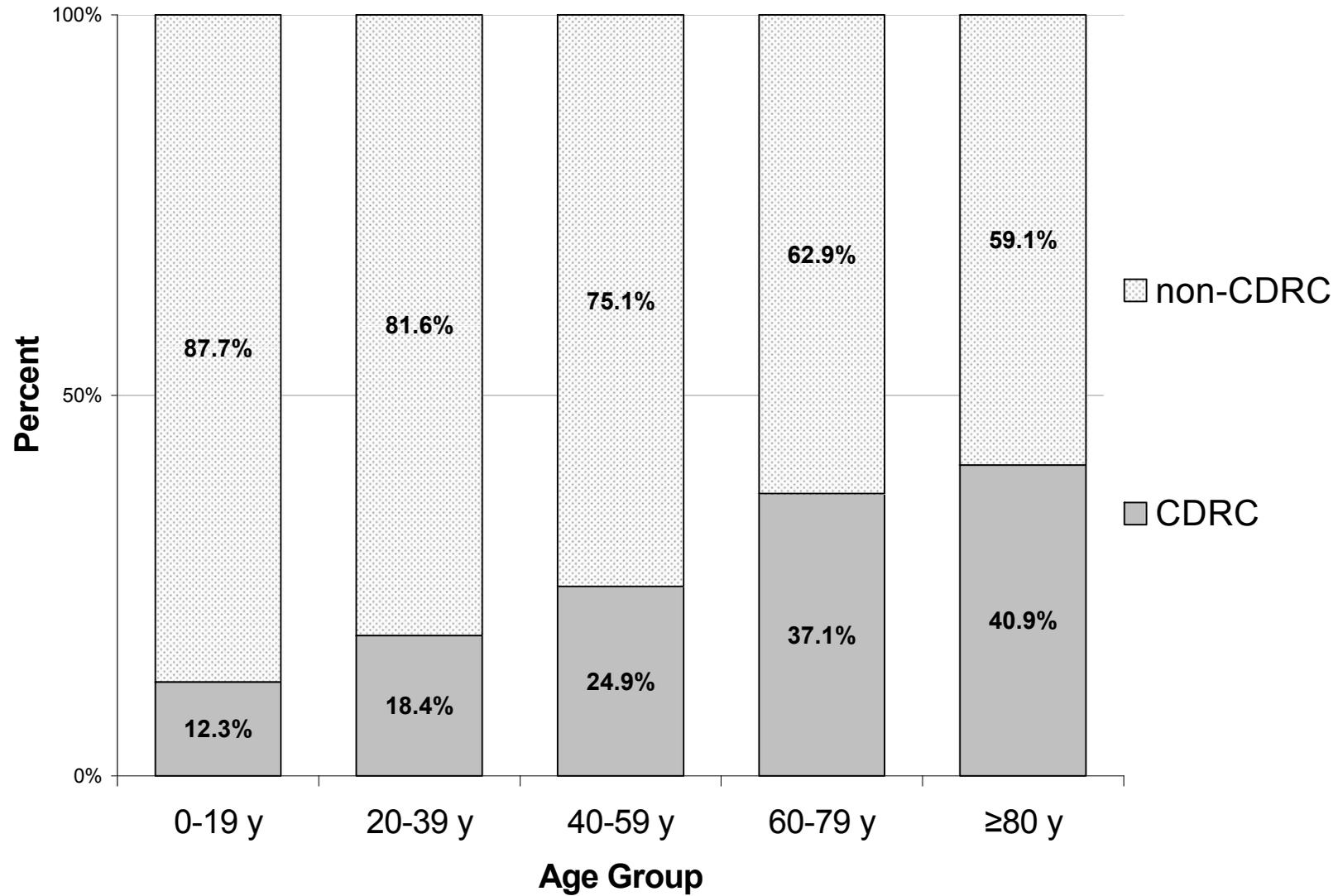
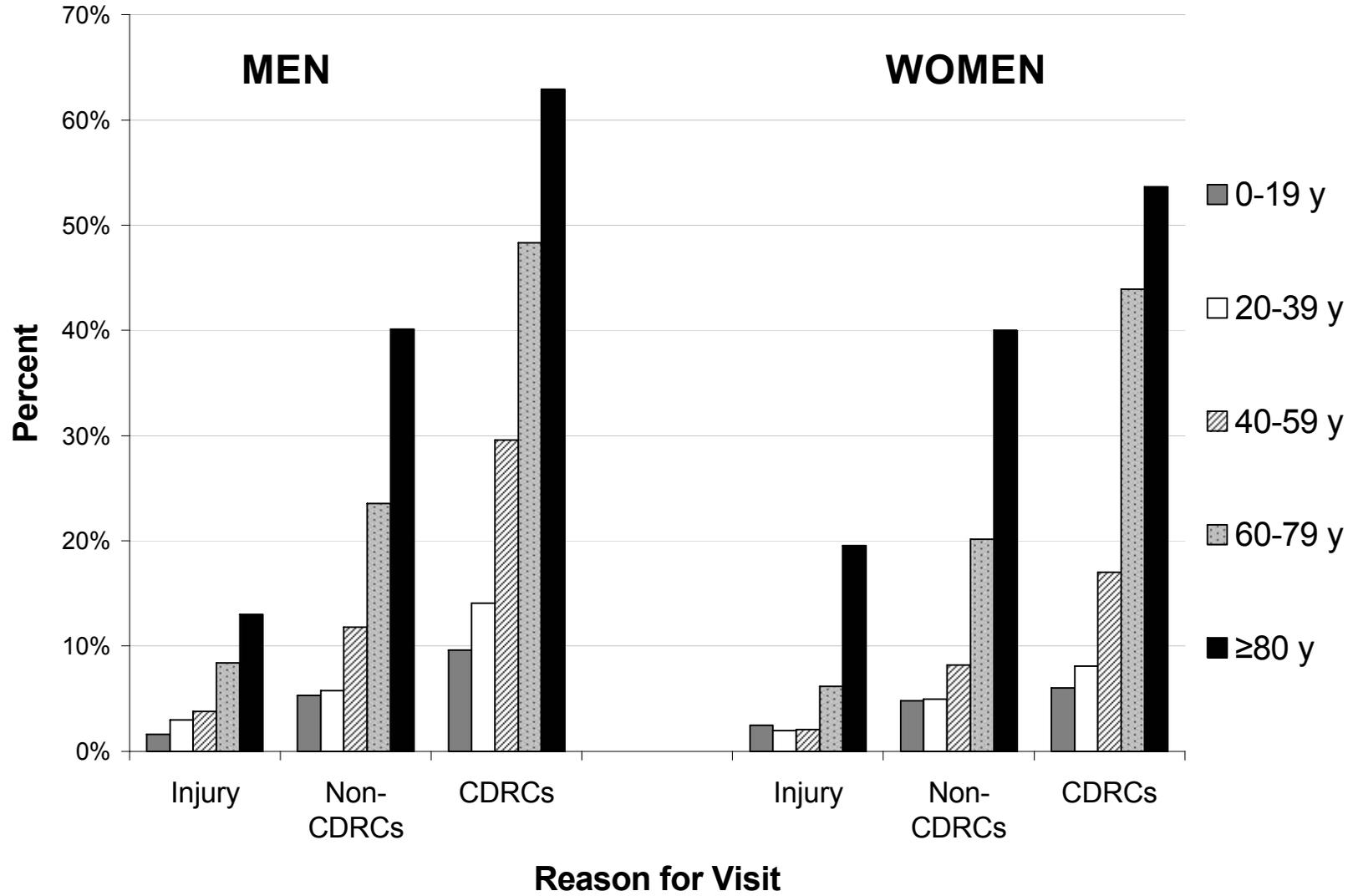


Figure 3. Proportion of visits where disposition was hospitalization by sex and reason for visit.



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