

# Running the Numbers

*A Periodic Feature to Inform North Carolina Health Care Professionals  
About Current Topics in Health Statistics*

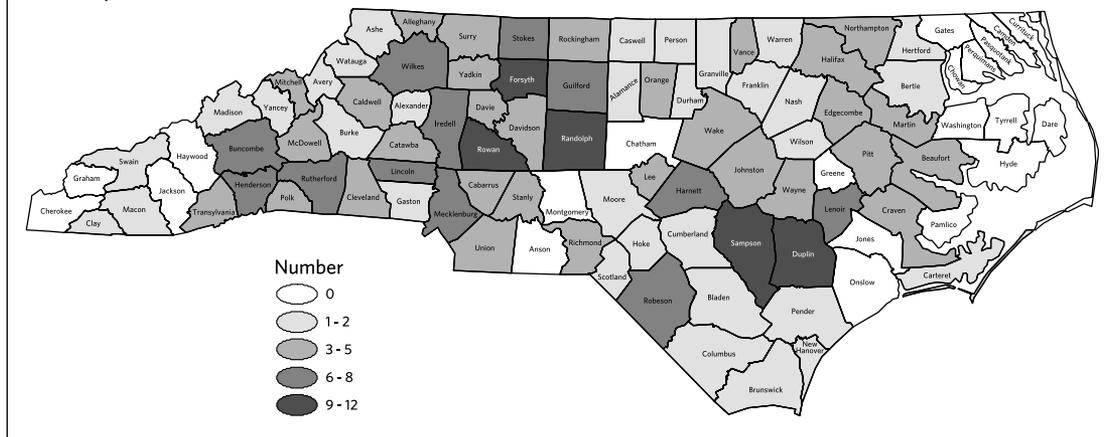
## Inpatient Hospitalizations Related to Agricultural Machine Injuries in North Carolina, 2006-2010

Incidents involving agricultural machinery are a frequent cause of injuries related to farming activities, although the availability of data with which to track such injuries on a population-based level is limited. Multisource surveillance methods—employing data collected through sources such as death certificates, emergency department records, migrant and community health providers, and hospital discharge data—provide a more complete tracking system than does single-source reporting; however, such systems can be costly to set up and maintain [1, 2]. In the absence of a comprehensive agricultural injury surveillance system, individual data sources can still provide a useful snapshot of the epidemiology of farm injuries in a population. The following is a description of inpatient hospitalizations related to agricultural machine injuries, obtained from the North Carolina Hospital Discharge Database.

The North Carolina Hospital Discharge Database captures information on all inpatient hospitalizations in nonfederal hospitals in North Carolina. North Carolina residents who are admitted to hospitals outside the state are not included in the database. This may bias data for certain border counties, particularly those in the northeastern part of the state, so county-level data should be interpreted with caution. The database contains 1 field for reporting an E code diagnosis, which was added to the database in 1997. The E code is used to denote an external cause of injury code and is used as a supplemental code, with the International Classification of Diseases, 9th Revision, Clinical Modification diagnosis code. We searched the database for the code E919.0 (“accidents caused by agricultural machines”) for the 5-year period 2006-2010. For this analysis, the data for calendar year 2010 were provisional.

There were a total of 294 inpatient hospital discharges for injuries related to agricultural machines in North Carolina during 2006-2010. Patients were cared for at 61 different facilities throughout the state, with the largest numbers of patients being admitted to Pitt County Memorial Hospital, in Greenville ( $n = 37$ ), and North Carolina Baptist Hospital, in Winston-Salem ( $n = 34$ ). Fractures, including skull, neck/

**FIGURE 1.**  
Number of Hospitalizations Due to Injuries from Agriculture Machines, by County of Residence, North Carolina, 2006-2010



**TABLE 1.**  
**Characteristics of Patients (N = 294) Admitted to the Hospital for**  
**Agricultural Machine Injuries, North Carolina, 2006-2010**

Patient characteristic	No. (%)
<b>Discharge status</b>	
Discharged to home	191 (65.0)
Discharged to home under care of home health services	44 (15.0)
Discharge to skilled nursing facility	19 (6.5)
Discharged to another rehab facility	18 (6.1)
Died	15 (5.1)
Discharged to another, short-term general hospital	2 (0.7)
Discharged to a federal hospital	1 (0.3)
Left against medical advice/discontinued care	1 (0.3)
Discharged to intermediate care facility	1 (0.3)
Discharged to this institution to Medicare approved swing bed	1 (0.3)
Discharged to long-term care	1 (0.3)
<b>Admission type</b>	
Emergency	201 (68.4)
Urgent	46 (15.6)
Elective	26 (8.8)
Trauma center	21 (7.1)
<b>Admission source</b>	
Emergency department	198 (67.3)
Referral from physician/clinic	68 (23.1)
Transfer from hospital or other facility	27 (9.2)
Not stated	1 (0.3)

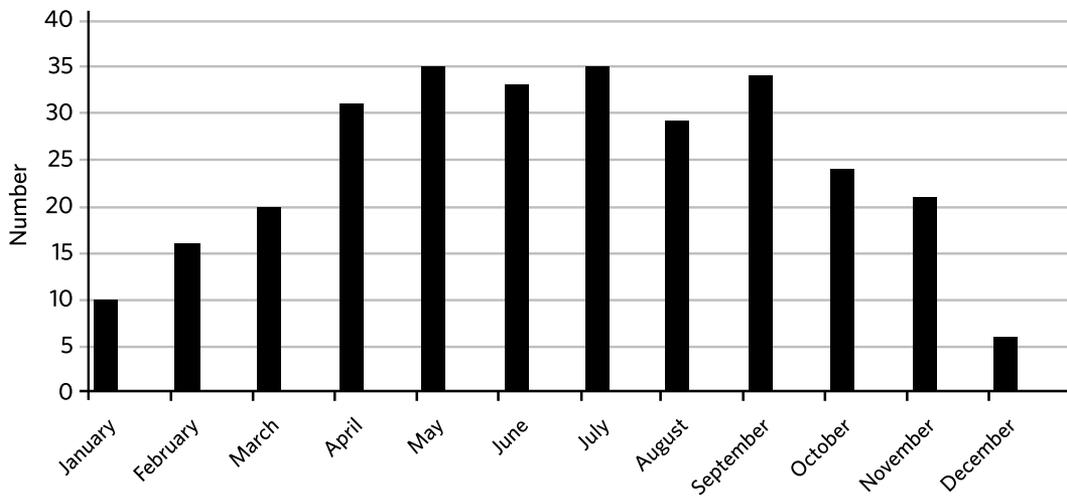
trunk, and limb, accounted for 46.6% of the hospitalizations, on the basis of principal diagnosis, followed by open wounds (13.3%). All but 21 counties had at least 1 such discharge, although, as noted above, the data are probably incomplete for the counties in the northeastern part of the state (Figure 1). Total inpatient hospital charges related to agricultural machine injuries were \$10,823,698, the average charge per admission was just under \$37,000, and the average length of hospital stay was 6.4 days. (Hospital charges reflect the amount the hospital charged for each admission, not the amount paid. Physician charges are not included.)

The admission type and discharge status of individuals admitted to the hospital for agricultural machine injuries are presented in Table 1. Eighty percent (191) of the patients were discharged to home, either under their own care or with assistance from home health services. Fifteen individuals (5.1%) died as inpatients, and 43 (14.6%) were discharged to other short-term or long-term care facilities. The most common type of admission was as an emergency (68.4%). Urgent admissions accounted for 15.6%, and trauma center admissions accounted for 7.1%. Just under 9% of admissions were elective. The main source of admission was via the emergency department (67.3%), followed by physician/clinic referral (23.1%) and transfers from other facilities (9.2%).

As seen in Figure 2, the majority (more than two-thirds) of admissions occurred during April-September—the main growing season in North Carolina. December and January had the fewest admissions. Individuals admitted for agricultural machine injuries covered all age groups (Figure 3). Seventy-six percent of the individuals were aged 40 years and older. Males accounted for 264 (89.8%) of the discharges.

These data provide some insight into one aspect of agricultural injuries in North Carolina. Injuries involving farm machines account for approximately 60 inpatient hospitalizations each year in the state,

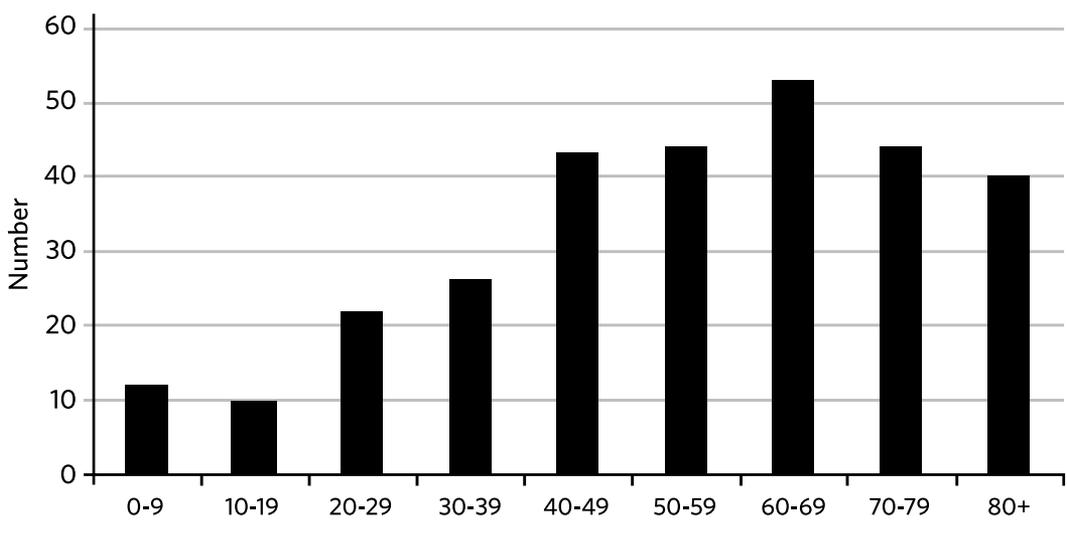
**FIGURE 2.**  
**In-Patient Discharges Due to Agricultural Machine Injuries by Month, North Carolina, 2006-2010**



they occur in both rural and urban areas, and they affect all age groups. A large percentage of the injuries occurred among older individuals. While this may suggest that age is associated with an increased likelihood of such injuries, we did not examine this issue in further detail, because of the lack of a clearly definable population at risk for this analysis. A study of agricultural machine injuries from the Canadian province of Saskatchewan found a significant linear trend in the risk of injury with advancing age, so it is possible that a similar pattern exists in other regions, including in North Carolina [3].

There are some limitations to the data that must be acknowledged. First, the North Carolina Hospital Discharge Database captures only inpatient admissions, so individuals who were seen on an outpatient basis or who were treated in and released from the emergency department are not included. Second, the database captures only 1 E code diagnosis, so it is not possible to determine the specific location where

**FIGURE 3.**  
**In-Patient Discharges Due to Agricultural Machine Injuries by Age of Patient, North Carolina, 2006-2010**



the injury occurred, such as a farm or a highway. As previously indicated, North Carolina residents who are admitted to hospitals out of state are not captured in the database, which may produce a somewhat skewed picture of the geographic distribution of such injuries in the state.

As discussed in the article by Higgins and colleagues [2] in this issue of the Journal, public health surveillance of agricultural injuries presents many challenges, and even obtaining a complete and accurate count of the number of injuries and fatalities is problematic. When used in conjunction with other databases and reporting systems—including emergency department records, trauma registries, death certificates, and physician reporting—hospital discharge data can be an informative source of information in a population-based farm injury surveillance system. **NCMJ**

#### **References**

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*Contributed by Robert E. Meyer, PhD, MPH, and Allison M. Hayes, State Center for Health Statistics, North Carolina Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina.*