Congruence of Disposition After Emergency Department Intubation in the National Hospital Ambulatory Medical Care Survey

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Study objective: The National Hospital Ambulatory Medical Care Survey (NHAMCS) includes a large nationally representative sample of emergency department (ED) visits that is widely used for research. This study investigates the frequency of apparent NHAMCS disposition discrepancies for visits with intubation.

Methods: Using 10 years' worth of NHAMCS data composed of 348,367 ED visits, those recorded as including intubation were evaluated for congruence of disposition, which was expected to be either death or admission to a critical care unit.

Results: Of the 875 ED patients recorded as having intubation performed, 27% had incompatible dispositions: 81 (9%) were recorded as discharged and 153 (17%) as admitted to a non–critical care unit. Cross-reference with free text chief complaint descriptions and *International Classification of Diseases, Ninth Revision* diagnoses codes indicated errors in recording both intubation and admission.

Conclusion: One fourth of NHAMCS ED visits with intubation have an ED disposition incompatible with this procedure. [Ann Emerg Med. 2012;xx:xxx.]

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INTRODUCTION

Background

The National Hospital Ambulatory Medical Care Survey (NHAMCS) is a national probability sample of ambulatory visits made to nonfederal, general, and short-stay hospitals, conducted by the Centers for Disease Control and Prevention, National Center for Health Statistics. Investigators can freely download the database and test locally developed hypotheses.[1]

Between 2000 and 2011, *Annals of Emergency Medicine* has published 25 research studies using NHAMCS. Advantages of NHAMCS include its nationally representative statistical design, its broad array of variables, and its enormous sample size (348,367 ED visits from 2000 to 2009). A disadvantage of NHAMCS is that, unlike traditional chart reviews, investigators lack access to the source medical records to resolve questions or discrepancies.

During a recent separate NHAMCS analysis,[2] a visit was noted in which a child with a complaint of "scabies" was recorded as both having received intubation and being discharged from the emergency department (ED). An informal review of further visits with intubation revealed other similar anomalies.

Importance

Although it is theoretically possible that ED patients could be intubated, extubated, and then not admitted, this would appear to be a highly unusual circumstance. If such scenarios represent data discrepancies that are not infrequent, this could highlight a limitation or error within the NHAMCS data collection structure.

Goals of This Investigation

To quantify the frequency and nature of apparent chart abstraction discrepancies relating to one variable in NHAMCS, this study descriptively reviewed the congruence of disposition for ED patients recorded as having intubation.

MATERIALS AND METHODS

Study Design

This is an unadjusted, descriptive analysis of the NHAMCS database.[1] NHAMCS uses a 4-stage probability sampling design to create a database of ED visits that is nationally representative. At participating hospitals, NHAMCS field representatives or hospital personnel abstract charts for a systematic random sample of patient visits during a randomly assigned 4-week reporting period. Data include demographics, complaints,

Editor's Capsule Summary

What is already known on this topic

The National Hospital Ambulatory Medical Care Survey (NHAMCS) database is frequently analyzed to understand phenomena in emergency medicine. Although the sampling strategy for NHAMCS is quite sophisticated, chart abstraction methods may be suboptimal.

What question this study addressed

To assess the quality of the NHAMCS database, 10 years' worth of data were analyzed to determine how many patients who reportedly received intubation were recorded as being sent home from the emergency department or admitted to a non-ICU setting, findings that would suggest that at least 1 variable was inaccurately recorded.

What this study adds to our knowledge

According to NHAMCS, 1 in 4 intubated patients was sent home or admitted to a non-ICU setting.

How this is relevant to clinical practice

This study raises serious questions about the data quality of NHAMCS that may change the interpretation of published articles and future inquiries that use this database.

diagnoses, procedures, therapy, and disposition. Further information about this database can be found at http://www.cdc.gov/nchs/ahcd.htm.

The study was designated as exempt from review by the Loma Linda University Institutional Review Board.

Selection of Participants

NHAMCS annual databases for the most recent 10 years available (2000 through 2009) were downloaded and combined, with adjustment for coding differences between years. For each NHAMCS visit, intubation is one of several procedures recorded as either provided or not provided, and this study included all ED visits in which intubation was recorded as provided. No visits were otherwise excluded.

Methods of Measurement

Patient disposition was assessed by examining the binary NHAMCS variables "admit to hospital," "admit to ICU/CCU," "transfer to different hospital," and "admit to observation unit." From 2005 onward, NHAMCS also reported multiple types of hospital units for each admission, and these were also recorded. Death in the ED was recorded as present or absent, using the binary variable "dead on arrival/died in the ED" from 2000 to 2008 and by combining the separate variables "dead on arrival" and "died in ED" for 2009 data.

A patient disposition compatible with intubation was defined as death on ED arrival, death in the ED, admission to a critical care unit, transfer to another facility, or transport from the ED to either the operating room or the cardiac catheterization laboratory. A patient disposition incompatible with intubation was defined as admission to a non–critical care unit, an observation unit, or ED discharge.

For context the free text data field "cause of injury—verbatim text" and the primary *International Classification of Diseases, Ninth Revision* (*ICD-9*) diagnosis were reviewed when available.

Given that in a previous study differences were found in NHAMCS accuracy when charts were abstracted by NHAMCS's own field representatives versus hospital staff,[3] this variable was also descriptively reported. This was done with the actual reported NHAMCS results and additionally after adjusting for a recording error described in the NHAMCS documentation in which the category of "hospital staff" was reversed with one category for "census field representative" for 2001 to 2008.

Primary Data Analysis

The disposition for visits including intubation was reported descriptively. Because the study objective was to study the NHAMCS database itself rather than any population-based estimates, no adjustments were made for the weighted, multistage, stratified survey design.

Confidence intervals (CIs) were calculated with Stata (version 12; StataCorp, College Station, TX).

RESULTS

Characteristics of Study Subjects

Of the 348,367 ED visits included in NHAMCS from 2000 to 2009, 875 (0.3%) were reported as having chart documentation of intubation.

In 37 (4%) of these visits, there was conflicting information about disposition. For the 14 conflicts that included a disposition both compatible with and incompatible with intubation, the former was presumed correct for this analysis. In 9 visits, patients were described as being admitted both to a critical care unit and to an observation unit; in these circumstances, a critical care unit was recorded as the correct assignment. In 3 cases, patients were noted to have been admitted to a non–critical care unit and also transferred to another hospital; in these circumstances, transfer was recorded as the correct assignment. In 2 cases, patients were noted to have not been admitted but then also admitted to a critical care unit; in these circumstances, a critical care unit was recorded as the correct assignment.

There were 23 conflicts that did not change the assignment about compatibility with intubation. In 11 cases, patients were noted to have both died in the ED and been admitted to a critical care unit; in these circumstances, death was recorded as

Table. Disposition of intubated patients in NHAMCS 2000 to 2009 (n=875).

Item	Subtotal (%)	Total (%)
Disposition incompatible with intubation		234 (27)
Not admitted (and no death on arrival or in ED)	81 (9)	
Admission to stepdown or telemetry	13 (1)	
Admission to observation unit (<24 h)	12 (1)	
Admission to mental health or detoxification unit	1 (0.1)	
Admission to other non–critical care unit	127 (15)	
Disposition potentially compatible with intubation		641 (73)
Admission to critical care unit	340 (39)	
Dead on arrival or died in the ED	189 (22)	
Taken to operating room or catheterization laboratory	18 (2)	
Transfer to another hospital	94 (11)	

the assignment. In 11 cases, patients were noted to have been admitted to a critical care unit and transferred to another hospital; in these circumstances, a critical care unit was recorded as the assignment. In 1 case, a patient was noted to have been taken to the operating room and also transferred to another hospital; in this circumstance, the operating room was recorded as the assignment.

Main Results

As shown in the Table, 27% of patients had dispositions incompatible with intubation. More such incompatibilities were noted earlier in the 10 data file years: 24, 29, 38, 34, 27, 16, 18, 19, 15, and 14 for 2000 to 2009, respectively. Details about these incompatible patient records are detailed in Appendix E1, available online at http://www.annemergmed.com.

Free text entries about "cause of injury" (Appendix E1, available online at http://www.annemergmed.com) were available for only 97 of the 234 incompatible visits and in many cases were too brief or vague to permit meaningful context. However, for several visits the free text entries indicated a near-certain probability of critical care admission or death, eg, "gunshot wound to sternum," "dragged by car for 30 feet," "gunshot wound to head," "found down in coma near bike in street," "unconscious driver—vehicle left road," "multiple gunshot wounds—unresponsive." Similarly, *ICD-9* codes for primary diagnoses often were compatible with intubation, eg, "cardiac arrest," "instantaneous death," "acute respiratory failure." In these cases, the apparent error was due to either incorrectly identifying the disposition during chart abstraction or a later keying error. Indeed, 18 of the incompatible visits were also reported to include cardiopulmonary resuscitation.

For several other visits, the discrepancy appeared to be with intubation. Free text entries such as "leg numbness," "finger injury," "doctor at hospital pushing fluids in intravenous line had splash in eye," "motor vehicle accident no obvious signs of trauma," "g-tube dislodged," "possible kidney stone," "scabies," "low potassium × 2 weeks," and "wrist hurts" indicate a compelling probability that intubation did not actually occur. Similarly, *ICD-9* codes for primary diagnoses often were incompatible with intubation, eg, "anxiety state," "migraine," "photokeratitis," "essential hypertension," "cellulitis," "pilonidal cyst," "rash," "sprain of wrist," "internal hemorrhoids," "acute tonsillitis." In these cases, the apparent error was due to either incorrectly identifying intubation during chart abstraction or a later keying error. Free text entries or *ICD-9* primary diagnoses in 11 entries referred to tracheostomies, suggesting that chart reviewers may have considered tracheostomy tube care to represent intubation.

Descriptions of the personnel who performed the chart reviews were unavailable for 14% (120/875) of the intubation visits as follows: 85 "multiple categories checked," 31 "unknown," 2 "other," and 2 "blank." For the remaining 755 visits, using actual variables displayed in NHAMCS, the fraction of dispositions incompatible with intubation was 36% (127/357) for charts recorded by hospital staff and 15% (61/398) for charts recorded by NHAMCS field representatives (difference 21%; 95% CI 14% to 26%). After adjusting for the NHAMCS-acknowledged data reversal, the fraction of dispositions incompatible with intubation was 18% (61/346) for charts recorded by hospital staff and 31% (127/409) for charts recorded by NHAMCS field representatives (difference 13%; 95% CI 7% to 19%).

LIMITATIONS

Given that original NHAMCS medical records are not available for review, this study was unable to identify whether the identified discrepancies resulted from errors in chart abstraction, errors in keying in data, or a combination of the two.

This study is also limited in that not all dispositions can be classified as unquestionably compatible with or incompatible with intubation. Although ED discharge and admission to a non–critical care unit seem clearly incompatible with intubation, others that represent a large portion of our sample (eg, ICU admission, transfer to another hospital, operating room, cardiac catheterization laboratory) may include both intubated and nonintubated patients. Because disposition errors can thus not be identified in this subset, all were coded as compatible with intubation in this analysis. Accordingly, our results may underestimate the magnitude of the discrepancies.

DISCUSSION

In this analysis of 10 years' worth of NHAMCS ED visits by patients recorded as having received intubation, apparent disposition discrepancies were noted in more than one fourth of the 875 visits studied. Intubated patients were described as discharged from the ED (9%) or admitted to non–critical care units (17%), dispositions incompatible with this procedure. The errors included both the intubation and admission variables and were more frequent during the early portion of the 10 years studied.

In 2010, Schuur et al[3] observed a similar NHAMCS anomaly while studying pregnancy testing in ED patients with abdominal pain. They found that only 56% of patients with a diagnosis of ectopic pregnancy had a pregnancy test ordered, despite this diagnosis inherently requiring verification of pregnancy. They could not ascertain whether the recording errors were associated with the test or the diagnosis.

NHAMCS is widely used for medical research, and its studies traditionally carry unusual weight because of their enormous sample size and the nationally representative statistical design. This analysis and that of Schuur et al[3] raise important questions about the accuracy and reliability of the NHAMCS data abstraction process. How could such frequent and important errors arise in such a sophisticated database? One explanation is that, despite its chart review format, NHAMCS does not wholly comply with widely accepted methodological principles for retrospective research as outlined in 1996 by Gilbert et al.[4]

An important chart review recommendation omitted by NHAMCS is the verification of abstraction reliability. Most researchers do this by having a second reviewer independently reabstract a random sample of charts and then quantify the observed level of agreement. When abstracted variables display poor interobserver agreement, they are therefore not reliable enough to be analyzed. Unfortunately, the reliability of NHAMCS data abstraction is unknown.

The second and more fundamental area of NHAMCS noncompliance with the principles of Gilbert et al[4] would appear to be abstractor training. Most traditional retrospective research is conducted by clinically oriented personnel (eg, physicians, medical students, nurses) who possess familiarity with chart organization, terminology, and medical shorthand. For NHAMCS, however, data coding is performed by "hospital personnel" or "field representatives," and the latter may be high school graduates with no formal health training.[1] It is possible that these individuals lack sufficient medical knowledge to reliably interpret medical records. If one does not recognize that "intubated" or "rapid sequence" or "ETT" means "intubation," the abstraction of this procedure cannot be reliable. Similarly, if one does not recognize that "HCG" means a pregnancy test, this variable will be incorrectly recorded. In both this study and that of Schuur et al,[3] coding accuracy was different when hospital personnel and NHAMCS field representatives were compared, supporting the premise that differential abstractor quality is an important contributor to data accuracy.

An additional factor to be considered is that local retrospective research typically includes chart abstraction conducted by study authors, who are inherently motivated to ensure accuracy in their review. Chart reviews conducted by disinterested staff who are not vested in the outcome may not be as reliable.

The uniqueness of this study and that of Schuur et al[3] is that we studied variables that can be expected to have a clear and definite association, thus permitting us to identify inconsistencies in the underlying data. Most studies, however, include no such check and instead report results that cannot necessarily be questioned. A recent *Annals* NHAMCS study, for example, noted a surprisingly low frequency of analgesic administration to elderly ED patients.[5] Is this because emergency physicians are actually unduly stingy with these drugs or because the NHAMCS chart abstractors often overlooked analgesics on charts because of poor legibility, unfamiliar trade names, or unknown abbreviations?

During traditional chart reviews, investigators can readily resolve questions or discrepancies about their data or any given abstractor by going back to the source charts. This is impossible with NHAMCS, and investigators must assume without verification that the underlying data are valid. It can be presumed that in some circumstances these types of coding errors might diametrically alter study conclusions.

In summary, this analysis found a clinically important rate of apparent discrepancies relating to intubation in the widely studied NHAMCS database.

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Appendix E1. NHAMCS intubation entries with a noncongruent disposition (n=234).*

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Not admitted and no death on arrival or in ED	2004	16	None	0 Unknown
Not admitted and no death on arrival or in ED	2007	54	None	0389 Unspecified septicemia
Not admitted and no death on arrival or in ED	2009	23	Unconscious unknown restrained driver-vehicle left road	2859 Anemia, unspecified
Not admitted and no death on arrival or in ED	2003	54	Drinking heavily	29181 Alcohol withdrawal
Not admitted and no death on arrival or in ED	2007	24	None	30000 Anxiety state, unspecified
Not admitted and no death on arrival or in ED	2002	43	Polysubstance abuse alcoholic coma	30590 Other, mixed, or unspecified drug abuse, unspecified
Not admitted and no death on arrival or in ED	2000	27	None	34690 Migraine, unspecified, without mention of intractable migraine without mention of status migrainosus
Not admitted and no death on arrival or in ED	2004	37	None	37024 Photokeratitis
Not admitted and no death on arrival or in ED	2005	95	Weakness hypertension	4019 Unspecified essential hypertension
Not admitted and no death on arrival or in ED	2002	81	None	41091 Acute myocardial infarction of unspecified site
Not admitted and no death on arrival or in ED	2000	0	None	4275 Cardiac arrest
Not admitted and no death on arrival or in ED	2000	83	None	4275 Cardiac arrest
Not admitted and no death on arrival or in ED	2003	76	None	4275 Cardiac arrest
Not admitted and no death on arrival or in ED	2005	100	Chest pain, *ICD* discharge, hypertension	4275 Cardiac arrest
Not admitted and no death on arrival or in ED	2005	44	Bad headache for past several days	431 Intracerebral hemorrhage
Not admitted and no death on arrival or in ED	2007	41	None	4659 Acute upper respiratory infections of unspecified site
Not admitted and no death on arrival or in ED	2005	44	Cough fever	486 Pneumonia, organism unspecified
Not admitted and no death on arrival or in ED	2004	1	None	490 Bronchitis, not specified as acute or chronic
Not admitted and no death on arrival or in ED	2001	61	None	49390 Asthma, unspecified type, unspecified
Not admitted and no death on arrival or in ED	2000	51	None	51881 Acute respiratory failure
Not admitted and no death on arrival or in ED	2000	72	None	51902 Mechanical complication of tracheostomy
Not admitted and no death on arrival or in ED	2001	35	None	53550 Unspecified gastritis and gastroduodenitis
Not admitted and no death on arrival or in ED	2002	40	Used cocaine last night	53550 Unspecified gastritis and gastroduodenitis
Not admitted and no death on arrival or in ED	2003	20	None	53550 Unspecified gastritis and gastroduodenitis
Not admitted and no death on arrival or in ED	2007	18	None	53550 Unspecified gastritis and gastroduodenitis
Not admitted and no death on arrival or in ED	2005	89	Other complaints G-tube dislodged	53642 Mechanical complication of gastrostomy
Not admitted and no death on arrival or in ED	2001	56	None	5589 Other and unspecified noninfectious gastroenteritis and colitis
Not admitted and no death on arrival or in ED	2001	84	None	5997 Hematuria
Not admitted and no death on arrival or in ED	2003	14	None	6823 Cellulitis and abscess of upper arm and forearm
Not admitted and no death on arrival or in ED	2002	20	None	6851 Pilonidal cyst without mention of abscess

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Not admitted and no death on arrival or in ED	2005	22	Foreign objects in throat	7503 Tracheoesophageal fistula, esophageal atresia and stenosis
Not admitted and no death on arrival or in ED	2001	37	None	78039 Other convulsions
Not admitted and no death on arrival or in ED	2001	2	None	7806 Fever of unknown origin
Not admitted and no death on arrival or in ED	2006	85	Weakness and nausea low potassium (BP) × 2 wks	78079 Other malaise and fatigue
Not admitted and no death on arrival or in ED	2006	2	Scabies	7821 Rash and other nonspecific skin eruption
Not admitted and no death on arrival or in ED	2004	3	Post op pericardial effusion	78609 Other respiratory abnormalities
Not admitted and no death on arrival or in ED	2000	37	None	78652 Painful respiration
Not admitted and no death on arrival or in ED	2006	61	Chest pain since 8:15 had stent placed 3 wks ago	78659 Other chest pain
Not admitted and no death on arrival or in ED	2006	17	Nausea+vomiting—still can't keep anything down—seen in March	78703 Vomiting alone
Not admitted and no death on arrival or in ED	2006	29	Possible kidney stone L flank pain	78900 Abdominal pain, unspecified site
Not admitted and no death on arrival or in ED	2006	11	Stomach hurts	78905 Abdominal pain, periumbilical
Not admitted and no death on arrival or in ED	2003	42	None	78906 Abdominal pain, epigastric
Not admitted and no death on arrival or in ED	2004	20	None	78909 Abdominal pain, other specified site
Not admitted and no death on arrival or in ED	2007	60	None	7981 Instantaneous death
Not admitted and no death on arrival or in ED	2002	12	None	7999 Unspecified viral infection
Not admitted and no death on arrival or in ED	2004	39	None	7999 Unspecified viral infection
Not admitted and no death on arrival or in ED	2009	79	None	7999 Unspecified viral infection
Not admitted and no death on arrival or in ED	2009	15	Tripped and fell at school	8024 Closed fracture of malar and maxillary bones
Not admitted and no death on arrival or in ED	2001	7	None	81307 Other and unspecified closed fractures of proximal end of radius (alone)
Not admitted and no death on arrival or in ED	2004	8	Mvc	82392 Open fracture of unspecified part of fibula with tibia
Not admitted and no death on arrival or in ED	2006	23	Wrist hurts	84200 Sprain of wrist, unspecified site
Not admitted and no death on arrival or in ED	2003	14	Fracture	84210 Sprain of hand, unspecified site
Not admitted and no death on arrival or in ED	2009	34	MVA	8509 Concussion, unspecified
Not admitted and no death on arrival or in ED	2007	76	Struck by car	8690 Internal injury to unspecified or ill-defined organs without mention of open wound into cavity
Not admitted and no death on arrival or in ED	2007	9	Head hit by golf ball	87342 Open wound of forehead, without mention of complication
Not admitted and no death on arrival or in ED	2002	34	Stab wound	8798 Open wound(s) (multiple) of unspecified site(s), without mention of complication
Not admitted and no death on arrival or in ED	2005	21	Level 1 trauma, multiple GSW to abdomen and L leg while in car—intubated and unresponsive	8798 Open wound(s) (multiple) of unspecified site(s), without mention of complication
Not admitted and no death on arrival or in ED	2005	73	Fell	88100 Open wound of forearm, without mention of complication

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Not admitted and no death on arrival or in ED	2006	32	Finger injury	8830 Open wound of finger(s), without mention of complication
Not admitted and no death on arrival or in ED	2007	83	Fall—10 days ago—stood up adn fell against wheel chair	9221 Contusion of chest wall
Not admitted and no death on arrival or in ED	2001	82	Foreign body in esophagus	9351 Foreign body in esophagus
Not admitted and no death on arrival or in ED	2003	70	Amitriptyline caught in esophagus	9351 Foreign body in esophagus
Not admitted and no death on arrival or in ED	2003	70	Foreign body in esophagus	9351 Foreign body in esophagus
Not admitted and no death on arrival or in ED	2006	38	(R) Abd. pain L arm & L leg numbness	95911 Head injury, unspecified
Not admitted and no death on arrival or in ED	2006	21	MVA—L wrist back and head 0 obvious signes of trauma	9592 Shoulder and upper arm injury
Not admitted and no death on arrival or in ED	2002	34	Suicide attempt	9599 Unspecified site injury
Not admitted and no death on arrival or in ED	2002	47	Heroin overdose	96501 Head injury, unspecified
Not admitted and no death on arrival or in ED	2002	30	States she scraped off a 25 mg fentanyl patch and injected it	96509 Poisoning by other opiates and related narcotics
Not admitted and no death on arrival or in ED	2002	1	Electrical shock	9948 Electrocution and nonfatal effects of electric current
Not admitted and no death on arrival or in ED	2003	16	Hemorrhage postoperative tonsillectomy	99811 Hemorrhage complicating a procedure
Not admitted and no death on arrival or in ED	2004	39	Trach with granulation tissue	99859 Other postoperative infection
Not admitted and no death on arrival or in ED	2002	78	None	V103 Personal history of malignant neoplasm of breast
Not admitted and no death on arrival or in ED	2003	25	Doctor at hospital pushing fluids in intravenous line had splash in eye	V1585 Personal history of contact with and (suspected) exposure to potentially hazardous body fluids
Not admitted and no death on arrival or in ED	2001	52	None	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2002	36	None	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2003	37	None	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2003	63	None	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2004	83	None	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2005	74	Coughed and trache came out unable to get back in	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2005	54	Patient pulled tracheal tube out	V550 Attention to tracheostomy
Not admitted and no death on arrival or in ED	2007	45	None	V550 Attention to tracheostomy
Admission to stepdown or telemetry	2008	42	None	27800 Obesity, unspecified
Admission to stepdown or telemetry	2008	59	None	486 Pneumonia, organism unspecified
Admission to stepdown or telemetry	2008	66	None	51881 Acute respiratory failure
Admission to stepdown or telemetry	2008	87	None	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to stepdown or telemetry	2008	78	None	7280 Infective myositis
Admission to stepdown or telemetry	2008	43	None	78039 Other convulsions
Admission to stepdown or telemetry	2008	35	None	78097 Altered mental status

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Admission to stepdown or telemetry	2008	58	None	78097 Altered mental status
Admission to stepdown or telemetry	2008	55	Alcohol intoxication	78097 Altered mental status
Admission to stepdown or telemetry	2007	60	None	78609 Other respiratory abnormalities
Admission to stepdown or telemetry	2009	77	None	78820 Retention of urine, unspecified
Admission to stepdown or telemetry	2008	73	None	9222 Contusion of abdominal wall
Admission to stepdown or telemetry	2008	45	Intentional phenobarbital overdose	9670 Poisoning by barbiturates
Admission to observation unit	2005	25	Suicide attempt/poisoning drinking ink from pen nausea/dizziness/vomiting × 2	311 Depressive disorder, not elsewhere classified
Admission to observation unit	2004	68	None	4139 Other and unspecified angina pectoris
Admission to observation unit	2008	90	None	4552 Internal hemorrhoids with other complication
Admission to observation unit	2002	55	None	51881 Acute respiratory failure
Admission to observation unit	2009	49	Tracheostomy complication	51909 Other tracheostomy complications
Admission to observation unit	2003	55	None	5539 Hernia of unspecified site without mention of obstruction or gangrene
Admission to observation unit	2007	56	None	73313 Pathologic fracture of vertebrae
Admission to observation unit	2004	44	None	78652 Painful respiration
Admission to observation unit	2007	54	Assault—aggravated unarmed fight or brawl and alcohol abuse	8738 Other and unspecified open wound of head without mention of complication
Admission to observation unit	2007	30	Hit repeatedly with a steel garbage can	8738 Other and unspecified open wound of head without mention of complication
Admission to observation unit	2008	22	Took an unknown quantity of Wellbutrin about 2pm—found by mom	9690 Code out of use
Admission to observation unit	2007	24	None	9951 Angioneurotic edema, not elsewhere classified
Admission to mental health or detox unit	2009	21	Intoxicated, fell on face	78097 Altered mental status
Admission to other non–critical care unit	2009	61	None	0389 Unspecified septicemia
Admission to other non–critical care unit	2000	19	None	1363 Pneumocystosis
Admission to other non–critical care unit	2000	71	None	1509 Malignant neoplasm of esophagus, unspecified site
Admission to other non–critical care unit	2001	59	None	1509 Malignant neoplasm of esophagus, unspecified site
Admission to other non–critical care unit	2002	81	None	25000 Diabetes mellitus without mention of complication
Admission to other non–critical care unit	2001	42	None	25010 Diabetes with ketoacidosis
Admission to other non–critical care unit	2000	54	None	25080 Diabetes with other specified manifestations
Admission to other non–critical care unit	2009	83	None	2721 Pure hyperglyceridemia
Admission to other non–critical care unit	2002	90	None	2859 Anemia, unspecified
Admission to other non–critical care unit	2003	76	None	3481 Anoxic brain damage
Admission to other non–critical care unit	2000	88	None	4019 Unspecified essential hypertension
Admission to other non–critical care unit	2001	61	None	41011 Acute myocardial infarction of other anterior wall

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Admission to other non–critical care unit	2002	83	None	41071 Subendocardial infarction
Admission to other non–critical care unit	2002	77	None	41090 Acute myocardial infarction of unspecified site
Admission to other non–critical care unit	2006	80	Chest pain	4111 Intermediate coronary syndrome
Admission to other non–critical care unit	2001	71	None	41401 Coronary atherosclerosis of native coronary artery
Admission to other non–critical care unit	2000	79	None	4275 Cardiac arrest
Admission to other non–critical care unit	2001	63	None	4275 Cardiac arrest
Admission to other non–critical care unit	2001	74	None	4275 Cardiac arrest
Admission to other non–critical care unit	2003	33	None	4275 Cardiac arrest
Admission to other non–critical care unit	2003	63	None	4275 Cardiac arrest
Admission to other non–critical care unit	2003	79	None	4275 Cardiac arrest
Admission to other non–critical care unit	2004	49	None	4275 Cardiac arrest
Admission to other non–critical care unit	2004	81	None	4275 Cardiac arrest
Admission to other non–critical care unit	2000	58	None	4280 Congestive heart failure, unspecified
Admission to other non–critical care unit	2000	63	None	4280 Congestive heart failure, unspecified
Admission to other non–critical care unit	2003	67	None	430 Subarachnoid hemorrhage
Admission to other non–critical care unit	2002	77	None	431 Intracerebral hemorrhage
Admission to other non–critical care unit	2001	84	Supratherapeutic anticoagulation	4329 Unspecified intracranial hemorrhage
Admission to other non–critical care unit	2003	87	None	4371 Other generalized ischemic cerebrovascular disease
Admission to other non–critical care unit	2005	62	SOB chest pains	44101 Dissection of aorta, thoracic
Admission to other non–critical care unit	2006	26	PTA	463 Acute tonsillitis
Admission to other non–critical care unit	2003	2	None	4659 Acute upper respiratory infections of unspecified site
Admission to other non–critical care unit	2000	73	None	481 Pneumococcal pneumonia
Admission to other non–critical care unit	2000	6	None	48230 Pneumonia due to streptococcus, unspecified
Admission to other non–critical care unit	2000	30	None	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2003	18	None	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2003	66	None	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2004	79	None	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2005	45	Difficulty breathing	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2006	67	Pale, HX of lung cancer weak, not eating or drinking dry mouth-feeling lousy	486 Pneumonia, organism unspecified
Admission to other non–critical care unit	2002	65	None	49121 Obstructive chronic bronchitis with (acute) exacerbation

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Admission to other non–critical care unit	2007	71	None	49121 Obstructive chronic bronchitis with (acute) exacerbation
Admission to other non–critical care unit	2003	64	None	496 Chronic airway obstruction, not elsewhere classified
Admission to other non–critical care unit	2000	76	None	5119 Unspecified pleural effusion
Admission to other non–critical care unit	2002	68	None	515 Postinflammatory pulmonary fibrosis
Admission to other non–critical care unit	2001	82	None	5184 Acute edema of lung, unspecified
Admission to other non–critical care unit	2000	47	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2000	86	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2001	66	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2002	58	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2002	71	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2002	87	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2002	97	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2004	61	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2004	67	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2004	71	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2004	87	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2004	88	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2007	83	None	51881 Acute respiratory failure
Admission to other non–critical care unit	2001	77	None	51882 Other pulmonary insufficiency, not elsewhere classified
Admission to other non–critical care unit	2001	70	None	53390 Peptic ulcer of unspecified site
Admission to other non–critical care unit	2002	88	None	55010 Inguinal hernia, with obstruction, without mention of gangrene
Admission to other non–critical care unit	2006	79	Nausea, vomiting	5589 Other and unspecified noninfectious gastroenteritis and colitis
Admission to other non–critical care unit	2000	41	None	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2002	50	None	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2003	78	None	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2003	83	None	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2005	79	Blood with bowel movement 4 times since midnight	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2006	57	Sent to ER by PMD for a bleeding stomach ulcer	5789 Hemorrhage of gastrointestinal tract, unspecified
Admission to other non–critical care unit	2000	67	None	5849 Acute kidney failure, unspecified
Admission to other non–critical care unit	2009	64	None	5849 Acute kidney failure, unspecified

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Admission to other non–critical care unit	2004	51	None	5990 Urinary tract infection, site not specified
Admission to other non–critical care unit	2009	20	None	6823 Cellulitis and abscess of upper arm and forearm
Admission to other non–critical care unit	2003	53	Found face down in coma near bike in street	78001 Coma
Admission to other non–critical care unit	2004	80	None	78009 Other alteration of consciousness
Admission to other non–critical care unit	2001	77	None	78039 Other convulsions
Admission to other non–critical care unit	2003	37	Alcohol use	78039 Other convulsions
Admission to other non–critical care unit	2007	0	None	78039 Other convulsions
Admission to other non–critical care unit	2008	37	None	78079 Other malaise and fatigue
Admission to other non–critical care unit	2003	82	None	78099 Other general symptoms
Admission to other non–critical care unit	2004	44	Overdose	78099 Other general symptoms
Admission to other non–critical care unit	2003	76	None	7842 Swelling, mass, or lump in head and neck
Admission to other non–critical care unit	2002	77	None	7843 Aphasia
Admission to other non–critical care unit	2001	79	None	78605 Shortness of breath
Admission to other non–critical care unit	2005	60	4AM today developed abd pain, vomiting SP 02 on RA by paramedics was 88–909 w/ increased SOB after	78609 Other respiratory abnormalities
Admission to other non–critical care unit	2009	80	None	78609 Other respiratory abnormalities
Admission to other non–critical care unit	2001	70	None	78650 Chest pain, unspecified
Admission to other non–critical care unit	2005	73	Vomiting	78703 Vomiting alone
Admission to other non–critical care unit	2003	72	None	78900 Abdominal pain, unspecified site
Admission to other non–critical care unit	2009	52	None	78900 Abdominal pain, unspecified site
Admission to other non–critical care unit	2001	63	None	7991 Respiratory arrest
Admission to other non–critical care unit	2002	34	Either struck by car or dragged by car for 30 ft	80320 Other closed skull fracture with subarachnoid, subdural, and extradural hemorrhage
Admission to other non–critical care unit	2002	5	Unrestrained backseat passenger broadsided—thrown from vehicle—hit head	80350 Other open skull fracture without mention of injury
Admission to other non–critical care unit	2002	38	High speed single car rollover involving cocaine use	8052 Closed fracture of dorsal [thoracic] vertebra without mention of spinal cord injury
Admission to other non–critical care unit	2003	67	Motor vehicle accident	80700 Closed fracture of rib(s), unspecified
Admission to other non–critical care unit	2004	82	Motor vehicle accident, driver of automobile	80700 Closed fracture of rib(s), unspecified
Admission to other non–critical care unit	2001	83	Motor vehicle accident multiple fractures. Pt was in the passenger side of	8080 Closed fracture of acetabulum
Admission to other non–critical care unit	2007	85	Fell—lost balance	8208 Closed fracture of unspecified part of neck of femur

Appendix E1. Continued.

Disposition	File Year	Age	Verbatim Text	Principal *ICD-9* Diagnosis
Admission to other non–critical care unit	2003	41	Motorcycle rearended back of car	82139 Other open fracture of lower end of femur
Admission to other non–critical care unit	2002	49	None	85300 Other and unspecified intracranial hemorrhage following injury without mention of open intracranial wound
Admission to other non–critical care unit	2001	24	Kicked by horse in right flank and right upper thorax	8604 Traumatic pneumohemothorax without mention of open wound into thorax
Admission to other non–critical care unit	2006	38	MVA—labored breathing bleeding from airway unresponsive	86121 Contusion of lung without mention of open wound into thorax
Admission to other non–critical care unit	2004	38	Firearm GSW, self-inflicted GSW to head	8738 Other and unspecified open wound of head without mention of complication
Admission to other non–critical care unit	2008	18	GSW to neck, assault with handgun	8749 Open wound of other and unspecified parts of neck, complicated
Admission to other non–critical care unit	2006	45	Gun shot wound sternum	8750 Open wound of chest (wall), without mention of complication
Admission to other non–critical care unit	2004	30	Gunshot	8792 Open wound of abdominal wall, anterior, without mention of complication
Admission to other non–critical care unit	2006	44	S/P MVA abdominal contusion, nasal contusion pain knees	8910 Open wound of knee, leg [except thigh], and ankle, without mention of complication
Admission to other non–critical care unit	2002	63	Alcohol abuse and fell	920 Contusion of face, scalp, and neck except eye(s)
Admission to other non–critical care unit	2000	82	Eating dinner and noticed food not going down	9351 Foreign body in esophagus
Admission to other non–critical care unit	2002	40	Burn	9492 Blisters, epidermal loss [second degree], unspecified site
Admission to other non–critical care unit	2000	55	None	9587 Traumatic subcutaneous emphysema
Admission to other non–critical care unit	2001	27	ATV on road intubated by EMS	95901 Head injury, unspecified
Admission to other non–critical care unit	2001	24	Head on MVA	95901 Head injury, unspecified
Admission to other non–critical care unit	2002	83	Patient was a belted passenger in a MVA	95901 Head injury, unspecified
Admission to other non–critical care unit	2002	38	Pedestrian hit and run	95901 Head injury, unspecified
Admission to other non–critical care unit	2003	37	Hit head on passenger in back seat not belted hit head on roof and frt seat	95901 Head injury, unspecified
Admission to other non–critical care unit	2004	41	Unrestrained driver struck tree in auto	95901 Head injury, unspecified
Admission to other non–critical care unit	2002	0	None	9599 Unspecified site injury
Admission to other non–critical care unit	2004	46	Person drag racing on motorcycle, lost control	9599 Unspecified site injury
Admission to other non–critical care unit	2000	40	Drug intoxication	9685 Poisoning by surface (topical) and infiltration anesthetics
Admission to other non–critical care unit	2002	29	Intentional drug overdose	9779 Poisoning by unspecified drug or medicinal substance
Admission to other non–critical care unit	2003	55	May be adverse effect of MS Contin	9952 Acute allergic reaction
Admission to other non–critical care unit	2002	67	Reaction to vascular device implant	99662 Infection and inflammatory reaction due to other vascular device, implant, and graft
Admission to other non–critical care unit	2007	54	Postoperative hernia repair infection	99859 Other postoperative infection
Admission to other non–critical care unit	2001	50	Chasing a car struck by something plus LOC intubated at scene unresponsive	V508 Respiratory conditions due to other and unspecified external agents
Admission to other non–critical care unit	2009	20	Rollover car accident	V997 No disease

MVA, Motor vehicle accident; *GSW,* gunshot wound; *SOB,* shortness of breath; *PTA,* peritonsillar abscess; *PMD,* primary physician; *RA,* room air; *S/P,* status post; *LOC,* level of consciousness.

*The entries are sorted by disposition type, then by principal diagnosis *ICD-9* code, and then by file year.