

<p><i>thrombolytics</i></p> <p>Same as above.</p>	<p>68 patients with confirmed heart attack who had no contraindications to thrombolytic therapy and who had electrocardiographic indications for thrombolytic therapy from a sample of 300 Medicare patients ≥ 65 years old hospitalized with a principal diagnosis of heart attack.</p>	<p>Medicare mortality data issued by HCFA and medical records for Medicare patients from 6 hospitals in Connecticut, as part of the Medicare Hospital Information Project, 10/1/88-9/30/91.</p>	<p>43% received thrombolytics during hospitalization.</p>	<p>Meehan et al. 1995</p>
<p><i>MI: thrombolytics in 1 hour</i></p> <p>Thrombolytics are medications that break down some of the acute blockage in the blood vessels that causes a heart attack, thereby reducing infarct size and limiting left ventricular dysfunction. Thrombolytics have been shown to reduce post-MI mortality by as much as 25%, although they should not be given to patients with certain conditions (e.g., recent hemorrhagic stroke).</p>	<p>245 patients who were "ideal" candidates for thrombolytics in the first hour of arrival from a sample of 4300 patients with MI.</p>	<p>Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.</p>	<p>60% received thrombolytics within the first hour of arrival.</p>	<p>Berger et al. 1998</p>
<p><i>MI: thrombolytics</i></p>	<p>Subset of 2,938 patients with admitting diagnosis of MI.</p>	<p>Medical records from 16 Minnesota hospitals for patients admitted 8/1/95-4/30/96.</p>	<p>The median percentage of eligible patients ≥ 65 years old receiving thrombolytics in the first 48 hours of hospitalization was 55%.</p>	<p>Soumerai et al. 1998</p>

<p><i>MI: Reperfusion (Thrombolysis/PTCA)</i></p> <p>PTCA uses a miniature balloon catheter to decrease stenosis (blockage) in blood vessels supplying the heart. Thrombolysis described above.</p>	<p>398 patients who were considered "ideal" candidates for reperfusion from a sample of 4300 patients with MI.</p>	<p>Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.</p>	<p>64% received reperfusion therapy (thrombolysis/PTCA) within 12 hours of arrival to hospital.</p>	<p>Berger et al. 1998</p>
<p><i>MI: treatment with heparin</i></p> <p>Heparin is beneficial to patients with heart attack though heparin should not be given to patients with certain conditions (e.g., bleeding disorders, stroke).</p>	<p>9,857 patients who were "ideal" candidates for treatment with heparin from a sample of 16,124 Medicare patients hospitalized with a principal diagnosis of heart attack.</p>	<p>Medical records for Medicare beneficiaries who were hospitalized in 4 states (Alabama, Connecticut, Iowa, Wisconsin), as part of the Cooperative Cardiovascular Project Pilot, 6/1/92-2/28/93.</p>	<p>69% received heparin during hospitalization.</p>	<p>Ellerbeck et al. 1995</p>
<p><i>Unstable angina: treatment with intravenous heparin</i></p> <p>Same as above.</p>	<p>369 patients who were "ideal" candidates for treatment with heparin, from a sample of 450 patients \geq 65 years old hospitalized with unstable angina.</p>	<p>Medical records and administrative data for patients with Medicare from three Connecticut hospitals, 1993-1995.</p>	<p>24% received intravenous heparin (20% in 1993-94 and 32% in 1995). Of those receiving heparin, 51% had a therapeutic activated partial thromboplastin time (PTT) within 24 hours.</p>	<p>Krumholz et al. 1998</p>
<p><i>Unstable angina: Treatment with intravenous heparin</i></p> <p>Same as above.</p>	<p>91 patients who were considered "ideal" candidates for heparin intravenously administered.</p>	<p>Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina</p>	<p>63% received heparin administered intravenously.</p>	<p>Simpson et al. 1997</p>

	from a sample of 882 patients ≥ 65 years old with unstable angina.	between 10/1/93-9/30/94.		
<i>MI: treatment with intravenous nitroglycerin</i>	Intravenous nitroglycerin is beneficial to patients with heart attack who have persistent chest pain, although intravenous nitroglycerin should not be given to patients with certain conditions (e.g., shock or hypotension on admission).	Same as above.	74% received intravenous nitroglycerin during hospitalization.	Ellerbeck et al. 1995
<i>MI: smoking cessation advice for smokers</i>	Smokers with coronary artery disease who stop smoking have a better prognosis than those who keep smoking; at the time of heart attack, these smokers are most susceptible to advice about cessation of smoking.	Same as above.	28% received smoking cessation advice prior to or at time of discharge.	Ellerbeck et al. 1995
<i>Unstable angina: Smoking cessation counseling among smokers</i>	Same as above.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	23% received smoking cessation counseling.	Simpson et al. 1997

<i>MI: smoking cessation advice</i>	Smokers with coronary artery disease who stop smoking have a better prognosis than those who keep smoking; at the time of heart attack, these smokers are most susceptible to advice about cessation of smoking.		551 patients who were smokers from a sample of 4300 patients with MI.	Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.	41% received smoking cessation advice.	Berger et al. 1998
<i>MI: treatment with angiotensin-converting enzyme (ACE) inhibitors</i>	ACE inhibitors can reduce post-AMI mortality in patients with left ventricular dysfunction, although ACE inhibitors should not be given to patients with certain conditions (e.g., aortic stenosis).		1,473 patients who were "ideal" candidates for treatment with ACE inhibitors from a sample of 16,124 Medicare patients hospitalized with a principal diagnosis of heart attack.	Same as above.	59% received ACE inhibitors prior to or at time of discharge.	Ellerbeck et al. 1995
<i>MI: ACE inhibitors for low EF</i>	ACE inhibitors can reduce post-MI mortality in patients with left ventricular dysfunction, although ACE inhibitors should not be given to patients with certain conditions (e.g., aortic stenosis).		407 patients who were considered "ideal" candidates for ACE inhibitors from a sample of 4300 patients with MI.	Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.	65% received ACE inhibitors for low ejection fraction (EF).	Berger et al. 1998
<i>Unstable angina: ACE inhibitor administration</i>						

Same as above.	177 patients who were considered "ideal" candidates for an ACE inhibitor during hospitalization and 127 who were "ideal" candidates for an ACE inhibitor at discharge, from a sample of 882 patients \geq 65 years old with unstable angina.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	39% received an ACE inhibitor during hospitalization. 42% received an ACE inhibitor at discharge.	Simpson et al. 1997
<i>MI: Beta blocker therapy</i> Beta blocker therapy can reduce post-AMI mortality by as much as 25%, although beta blockers should not be given to patients with certain conditions (e.g., low left ventricular ejection fraction, pulmonary edema).	2,976 patients who were "ideal" candidates for treatment with beta blockers from a sample of 16,124 Medicare patients hospitalized with a principal diagnosis of heart attack.	Same as above.	45% received beta blockers prior to or at time of discharge.	Ellerbeck et al. 1995
<i>MI: Beta blocker therapy</i> Same as above.	3,737 Medicare patients \geq 65 years old with principal diagnosis of heart attack who were eligible for treatment with beta blockers, from a statewide cohort of 5,332 people who had survived a heart attack for at least 30 days and who had prescription drug coverage.	New Jersey Medicare hospital admissions and enrollment data, 1986-92; New Jersey Medicaid drug utilization and enrollment files, 1986-91; New Jersey Program of Pharmacy Assistance for the Aged and Disabled drug utilization data, 1986-91.	21% received beta blockers within 90 days of discharge; adjusted mortality rate for patients with treatment was 43% less than that of patients without treatment.	Soumerai et al. 1997
<i>MI: Beta blocker therapy</i> Same as above.	104 patients with confirmed heart attack who were alive	Medicare mortality data issued by HCFA and	41% received beta blockers at time of discharge.	Meehan et al. 1995

	at discharge and who had no contraindications to beta blockers from a sample of 300 Medicare patients ≥65 years old hospitalized with a principal diagnosis of heart attack.	medical records for Medicare patients from 6 hospitals in Connecticut, as part of the Medicare Hospital Information Project, 10/1/88-9/30/91.		
<i>Unstable angina: Beta blocker therapy</i>				
Same as above.	815 patients who were "ideal" candidates for beta blockers during hospitalization and 589 who were "ideal" candidates for beta-blockers at discharge, from a sample of 882 patients ≥ 65 years old with unstable angina.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	45% received beta blockers during hospitalization. 38% received β-blockers at discharge.	Simpson et al. 1997
<i>MI: Beta-blockers at discharge</i>				
Beta blocker therapy can reduce post-MI mortality by as much as 25%, although beta blockers should not be given to patients with certain conditions (e.g., low left ventricular ejection fraction, pulmonary edema).	302 patients who were considered "ideal" candidates for beta-blockers at discharge from a sample of 4300 patients with MI.	Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.	60% received β-blockers at discharge.	Berger et al. 1998
<i>MI: Beta blocker therapy</i>				
Same as above.	Subset of 2,938 patients with admitting diagnosis of MI.	Medical records from 16 Minnesota hospitals for patients admitted 8/1/95-4/30/96.	The median percentage of eligible patients receiving beta blockers in the first 48 hours of hospitalization was 78%.	Soumerai et al. 1998

<i>MI: hospital care</i>							
Care for heart attack.	1,437 patients hospitalized with acute myocardial infarction from a nationally representative sample of 7,156 patients hospitalized with any of 5 conditions (congestive heart failure, acute myocardial infarction, pneumonia, stroke, hip fracture) (Draper et al. 1990).	Medical records for Medicare patients from 297 hospitals in 5 states (California, Florida, Indiana, Pennsylvania, Texas), 7/1/85-6/30/86.	64%-68% of patients with acute myocardial infarction received appropriate components of care (e.g., documentation of examination of jugular veins and alcoholism or smoking habits).	Kahn et al. 1990			
<i>Unstable angina: Low-cholesterol diet prescribed at discharge</i>							
	637 discharged patients who were "ideal" candidates for a low-cholesterol diet, from a sample of 882 patients \geq 65 years old with unstable angina.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	38% were prescribed a low-cholesterol diet at discharge.	Simpson et al. 1997			
<i>Unstable angina: Lipid-lowering drugs prescribed at discharge</i>							
	637 patients who were "ideal" candidates for a lipid-lowering drug at discharge, from a sample of 882 patients \geq 65 years old with unstable angina.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	16% received lipid-lowering drugs at discharge.	Simpson et al. 1997			
<i>Congestive heart failure: hospital care</i>							
Care for congestive heart	1,465 patients hospitalized	Same as above.	66%-97% of patients with	Kahn et al. 1990			

failure.	with congestive heart failure from a nationally representative sample of 7,156 patients hospitalized with any of 5 conditions (congestive heart failure, acute myocardial infarction, pneumonia, stroke, hip fracture) (Draper et al. 1990).		congestive heart failure received appropriate components of care (e.g., documentation of past surgery and lung examination on day 2; blood pressure readings; electrocardiogram; serum potassium level; oxygen therapy or intubation for hypoxic patients).	
<i>Stroke: hospital care</i>				
Care for stroke.	1,442 patients hospitalized with stroke from a nationally representative sample of 7,156 patients hospitalized with any of 5 conditions (congestive heart failure, acute myocardial infarction, pneumonia, stroke, hip fracture) (Draper et al. 1990).	Same as above.	38%–94% of patients with stroke received appropriate components of care (e.g., documentation of previous stroke and gag reflex; blood pressure readings; electrocardiogram; serum potassium level).	Kahn et al. 1990

^aIf a description in the first column has no citation, it is covered by the citation in the reference column.

^bWe contacted the authors of some of the articles to clarify details related to the sample and to the data analysis.

**TABLE 2. EXAMPLES OF QUALITY OF ACUTE HEALTH CARE IN THE UNITED STATES
OVERUSE: DID PATIENTS RECEIVE INAPPROPRIATE CARE?**

Health care service ^a	Sample description	Data source	Quality of care	Reference ^b
Antibiotic Use <i>Common cold</i> Almost all colds are caused by a virus, for which antibiotics are not an effective treatment.	1,439 patients with 2,171 outpatient and emergency department visits for the common cold (acute nasopharyngitis) from a random sample of 50,000 patients with at least 1 claim for care by a physician, dentist or optometrist.	Kentucky Medicaid claims data, 7/1/93-6/30/94.	In 60% of encounters for the common cold, patients filled prescriptions for antibiotics.	Mainous et al. 1996
<i>Common cold</i> Same as above.	Patients \geq 18 years old with a diagnosis of the common cold, exclusive of adults with underlying lung disease, from a nationally representative sample of 1,529 physicians representing 28,787 adult patient ambulatory care visits.	National Ambulatory Medical Care Survey (NAMCS), 1992.	Antibiotics were prescribed at 51% of visits of patients with a common cold.	Gonzales et al. 1997
<i>Common cold</i> Same as above.	Children \leq 18 years diagnosed with common colds from a total of 531 pediatric office visits with a primary diagnosis of cold, upper respiratory infection (URI), or bronchitis, exclusive of children with	NAMCS, 1992.	Antibiotics were prescribed at 44% of visits of patients with a common cold.	Nyquist et al. 1998

	underlying lung disease, from a sample representative of the U.S. population.				
<i>Upper respiratory tract infection</i>	Antimicrobial drugs do not shorten the course of viral upper respiratory tract infection nor do they prevent secondary bacterial infections.	Physicians who participated from a nationally representative sample of 3,000 office-based physicians.	NAMCS, 1992.	16% of all antimicrobial drug prescriptions (an estimated 17,922,000 prescriptions nationally) were written for upper respiratory tract infections in 1992.	McCaig and Hughes 1995
<i>Upper respiratory tract infection</i>	Same as above.	Patients \geq 18 years old with a diagnosis of upper respiratory tract infection, exclusive of adults with underlying lung disease, from a nationally representative sample of 1,529 physicians representing 28,787 adult patient ambulatory care visits.	NAMCS, 1992.	Antibiotics were prescribed at 52% of visits of patients with a URI.	Gonzales et al. 1997
<i>Upper respiratory tract infection</i>	Same as above.	Children \leq 18 years diagnosed with URIs from a total of 531 pediatric office visits with a primary diagnosis of cold, URI, or bronchitis, exclusive of children with underlying lung disease, from a sample	NAMCS, 1992.	Antibiotics were prescribed at 46% of visits of patients with a URI.	Nyquist et al., 1998

	representative of the U.S. population.				
<i>Pharyngitis, nasal congestion, common cold, and other upper respiratory tract infection</i>	Same as above.	Same as above.	Over 70% of patients received antibiotic prescriptions for pharyngitis (excluding streptococcal), over 50% received them for rhinitis, and over 30% received them for a nonspecific upper respiratory tract infection, cough, or cold.	Dowell and Schwartz 1997	
<i>Bronchitis</i>	Patients \geq 18 years old with a diagnosis of bronchitis, exclusive of adults with underlying lung disease, from a nationally representative sample of 1,529 physicians representing 28,787 adult patient ambulatory care visits.	NAMCS, 1992.	Antibiotics were prescribed at 66% of visits of patients with bronchitis.	Gonzales et al. 1997	
<i>Bronchitis</i>	Children \leq 18 years diagnosed with bronchitis from a total of 531 pediatric office visits with a primary diagnosis of cold, URI, or bronchitis, exclusive of children with underlying lung disease, from a sample	NAMCS, 1992.	Antibiotics were prescribed at 75% of visits of patients with bronchitis.	Nyquist et al., 1998	

	representative of the U.S. population.			
Respiratory Illness				
<i>Pneumonia</i>				
Hospital admissions for pneumonia are considered appropriate when, for example, a patient fails to improve with outpatient oral medication or has a pleural effusion or an empyema.	445 hospital admissions of children <18 years old admitted with pneumonia.	Medical records for patients from 12 hospitals in 5 communities in Boston and nearby suburbs, 7/1/85-6/30/86.	9.4% of admissions were inappropriate.	Payne et al. 1995
<i>Bronchitis/asthma</i>				
Hospital admissions for bronchitis/asthma are considered appropriate when, for example, a patient has failed to improve with outpatient therapy or has a pneumothorax.	1,038 hospital admissions of children <18 years old admitted with bronchitis/asthma.	Same as above.	4.4% of admissions were inappropriate.	Payne et al. 1995
Otitis Media				
<i>Use of tympanostomy tubes</i>				
Indications for tympanostomy tube placement include refractory middle ear infection and chronic mastoiditis.	6,429 children <16 years old with recurrent acute otitis media and/or persistent otitis media with effusion who were insured in health plans requiring precertification by a utilization review firm.	Interviews with physicians' office staff at otolaryngology practices from 49 states and the District of Columbia, 1/1/90-7/30/91; additional interviews were conducted with otolaryngologists to determine the existence of extenuating clinical circumstances.	41% of tube insertions were appropriate, 32% equivocal, and 27% inappropriate. If extenuating clinical circumstances were taken into account, 42% of tube insertions were appropriate, 35% equivocal, and 23% inappropriate.	Kleinman et al. 1994

<p>Hip Fractures <i>Hip fracture: hospital care</i> Care for hip fracture.</p>	<p>1,404 patients hospitalized with hip fracture from a nationally representative sample of 7,156 patients hospitalized with any of 5 conditions (congestive heart failure, acute myocardial infarction, pneumonia, stroke, hip fracture) (Draper et al. 1990) patients hospitalized with any of 5 conditions (congestive heart failure, acute myocardial infarction, pneumonia, stroke, hip fracture) (Draper et al. 1990).</p>	<p>Medical records for Medicare patients from 297 hospitals in 5 states (California, Florida, Indiana, Pennsylvania, Texas), 7/1/85-6/30/86 (California, Florida, Indiana, Pennsylvania, Texas), 7/1/85-6/30/86.</p>	<p>67%-94% of patients with hip fracture received appropriate components of care (e.g., documentation of mental status and pedal or leg pulse; serum potassium level; electrocardiogram (e.g., documentation of mental status and pedal or leg pulse; serum potassium level; electrocardiogram).</p>	<p>Kahn et al. 1990</p>
<p>Depression <i>Depression: treatment</i> There is no evidence that minor tranquilizers are effective for depression, but there is evidence that antidepressant medications are effective for depression.</p>	<p>634 patients with current depressive disorder or depressive symptoms from a sample of 22,399 adult patients who visited 1 large HMO and several multispecialty, mixed-group practices in each city during the study period.</p>	<p>Medical Outcomes Study (MOS) in 3 cities (Boston, Chicago, Los Angeles); questionnaires completed 2/86-10/86; phone interviews completed 5/86-12/86.</p>	<p>19% of patients were treated with minor tranquilizers; 12% were treated with antidepressant medications; 11% were treated with a combination of minor tranquilizers and antidepressant medications; 59% received neither.</p>	<p>Wells et al. 1994a</p>
<p><i>Depression: treatment</i></p>	<p>650 patients with current depressive disorder from a sample of 22,462 adult patients who visited 1 large HMO, several multispecialty, mixed-group practices, single-specialist</p>	<p>MOS in 3 cities (Boston, Chicago, Los Angeles); questionnaires completed 2/86-10/86; phone interviews completed 5/86-12/86.</p>	<p>50%-58% of depressed patients who visited general medical clinicians received appropriate care (the depression was detected and they were counseled or referred to a mental health</p>	<p>Wells et al. 1989</p>

	small group and solo practice providers in each city during the study period.		specialist or another clinician was noted to be providing the majority of the patient's care). 83%-93% of depressed patients who visited mental health specialists received appropriate care.	
Depression: admission Appropriate reasons for admission include depression, medical condition meriting acute care, comorbid major psychiatric disorder, or medical reasons precluding outpatient care for depression.	1,198 patients hospitalized with depression, representative of all Medicare elderly patients hospitalized in general medical hospitals with a discharge diagnosis of depression.	Medical records for Medicare patients from 297 hospitals in 5 states (California, Florida, Indiana, Pennsylvania, Texas), 7/1/85-6/30/86.	93% were admitted for clearly or possibly appropriate reasons, and 7% were admitted for inappropriate reasons.	Wells et al. 1993
Hysterectomy <i>Hysterectomy</i> Hysterectomy is the surgical removal of the uterus.	642 women \geq 20 years old who underwent nonemergency, nononcologic hysterectomies.	Medical records for patients from 7 managed care organizations, 8/1/89-7/31/90.	16% of hysterectomies were inappropriate, 25% were equivocal, and 58% were appropriate.	Bernstein et al. 1993
Breast Cancer <i>Breast cancer: treatment</i>	199 women 50-69 years old and 175 women \geq 70 years old, with adenocarcinoma of the breast, receiving primary cancer management at a participating hospital.	Medical records from 7 hospitals in southern California, for women with breast cancer diagnosed in 1980-82.	67% of women \geq 70 years old received appropriate treatment, compared with 83% of women 50-69 years old. When controlling for comorbidity, hospital, and cancer stage, a difference in appropriateness related to age persisted.	Greenfield et al. 1987

Cardiac Disease					
<i>Coronary artery disease: coronary angiography</i>					
Same as above.	Random sample of 1,335 patients who had coronary angiography.	Medical records from 15 nonfederal hospitals providing coronary angiography in New York State, selected through a stratified random sample (for location, volume of coronary angiography, and authorization to perform coronary artery bypass graft surgery), 1990.	4% of coronary angiographies were inappropriate, 20% were equivocal, and 76% were appropriate.	Bernstein et al. 1993b	
<i>Coronary artery disease: coronary angiography</i>					
Same as above.	Random sample of 1,677 cases of coronary angiography.	Medicare physician claims data and medical records from 3 sites selected from 13 sites in 8 states (Arizona, California, Colorado, Iowa, Massachusetts, Montana, Pennsylvania, South Carolina), 1981.	17% of coronary angiographies were inappropriate, 9% were equivocal, and 74% were appropriate.	Chassin et al. 1987	
<i>Coronary artery disease: coronary artery bypass graft (CABG)</i>					
In CABG surgery, damaged blood vessels supplying the heart are replaced with vessels from elsewhere in the body.	Stratified, random sample of 386 patients who underwent CABG surgery in the 3 hospitals.	Medical records from 3 hospitals (excluding Veterans Administration or governmental hospitals and specialty hospitals) selected through a stratified random sample (for size and teaching status) in a western	14% of CABG surgeries were inappropriate, 30% were equivocal, and 56% were appropriate.	Winslow et al. 1988	

			state as part of the National Institutes of Health Consensus Development Program, 1979, 1980, and 1982.		
<i>Coronary artery disease: CABG</i>					
Same as above.	Random sample of 1,156 patients who had isolated CABG surgery.		Medical records for patients from 12 Academic Medical Center Consortium hospitals in 10 states (California, Iowa, Louisiana, Maryland, Massachusetts, Minnesota, New Hampshire, New York, North Carolina, Pennsylvania), 1990.	1.6% of CABG surgeries were inappropriate, 7% were equivocal, and 92% were appropriate.	Leape et al. 1996
<i>Coronary artery disease: CABG</i>					
Same as above.	Random sample of 1,338 patients who had isolated CABG surgery.		Medical records from 15 nonfederal hospitals providing CABG procedure in New York State, selected through a stratified random sample (for location and volume of CABG operations), 1990.	2.4% of CABG surgeries were inappropriate, 7% were equivocal, and 91% were appropriate.	Leape et al. 1993
<i>Coronary artery disease: percutaneous transluminal coronary angioplasty (PTCA)</i>					
PTCA uses a miniature balloon catheter to decrease stenosis (blockage) in blood vessels supplying the heart.	Random sample of 1,306 patients who had PTCA.		Medical records from 15 nonfederal hospitals providing PTCA in New York State, selected through a stratified random	4% of PTCAs were inappropriate, 38% were equivocal, and 58% were appropriate.	Hilborne et al. 1993

			sample (for location and volume of PTCA), 1990.		
<i>MI: permanent cardiac pacemaker</i> Pacemakers help regularize abnormal heart rates and rhythms.	Medicare patients who underwent a total of 382 pacemaker implantations.	Medical records from 6 university teaching hospitals, 11 university-affiliated hospitals, and 13 community hospitals in Philadelphia County, 1/1/83-6/30/83.		20% of pacemaker implantations were inappropriate, 36% were equivocal, and 44% were appropriate.	Greenspan et al. 1988
<i>MI: Lidocaine Therapy</i> Lidocaine prophylaxis should not be used to prevent ventricular fibrillation in patients treated for probable MI because it has been shown to increase mortality.	Subset of 2,938 patients with admitting diagnosis of MI.	Medical records from 16 Minnesota hospitals for patients admitted 8/1/95-4/30/96.		The median percentage of patients ineligible for lidocaine who received it in the first 48 hours of hospitalization was 12%.	Soumerai et al. 1998
<i>MI: avoidance of calcium channel blockers for patients with a contraindication</i> Calcium channel blockers should not be given to patients with certain conditions (e.g., low left ventricular ejection fraction, evidence of shock or pulmonary edema during hospitalization).	785 patients with clear contraindication to calcium channel blockers from a sample of 16,124 Medicare patients hospitalized with a principal diagnosis of heart attack.	Same as above.		21% who were ineligible for calcium channel blockers received them.	Ellerbeck et al. 1995
<i>MI: Avoidance of calcium channel blockers for patients with a contraindication</i>					

Calcium channel blockers should not be given to patients with certain conditions (e.g., low left ventricular ejection fraction, evidence of shock or pulmonary edema during hospitalization).	220 patients with contraindications for calcium channel blockers (i.e. a left ventricular ejection fraction <40%) from a sample of 4300 patients with MI.	Medical records from acute care hospitals in Maryland and the District of Columbia in Medicare's National Claims History File sampled during 1/94-7/95.	82% for whom calcium blockers were contraindicated did not receive them.	Berger et al. 1998
<i>Unstable angina: Avoidance of calcium channel blockers for patients with a contraindication.</i>				
Same as above.	218 patients with contraindications for calcium-channel blocking drugs, from a sample of 882 patients ≥ 65 years old with unstable angina.	Medical records of Medicare beneficiaries discharged from 16 hospitals in North Carolina between 10/1/93-9/30/94.	38% for whom calcium blockers were contraindicated did not receive them.	Simpson et al. 1997
Carotid Arteries				
<i>Carotid endarterectomy</i>				
Carotid endarterectomy is a procedure that opens up stenotic (blocked) carotid arteries (which supply blood to the brain).	Random sample of 1,302 cases of carotid endarterectomy.	Medicare physician claims data and medical records from 3 sites selected from 13 sites in 8 states (Arizona, California, Colorado, Iowa, Massachusetts, Montana, Pennsylvania, South Carolina), 1981.	32% of carotid endarterectomies were inappropriate, 32% were equivocal, and 35% were appropriate.	Chassin et al. 1987
Gastrointestinal Disease				
<i>Upper gastrointestinal tract endoscopy</i>				
Endoscopy enables	Random sample of 1,585	Same as above.	17% of upper	Chassin et al. 1987

visualization of the gastrointestinal tract, and permits biopsy and brush cytologic examination.	cases of upper gastrointestinal tract endoscopy.		gastrointestinal tract endoscopies were inappropriate, 11% were equivocal, and 72% were appropriate.	
Cataracts				
<i>Cataract surgery</i> Cataract surgery is a commonly performed surgery in adults ≥ 65 years old. Cataract surgery should not be performed in people with certain conditions (e.g., macular degeneration or diabetic retinopathy).	1,020 patients who underwent a total of 1,139 cataract surgeries.	Medical records for patients from 10 academic medical centers, 1990.	2% of cataract surgeries were inappropriate, 7% were equivocal, and 91% were appropriate.	Tobacman et al. 1996
Low Back Pain				
<i>Chiropractic Spinal Manipulation</i> AHCPR has concluded that spinal manipulation hastens recovery from acute low back pain not caused by such conditions as fracture, tumor, infection, and cauda equina syndrome (AHCPR, 1994).	A random sample of 10 patients per office (920 patients) who sought chiropractic care for low back pain for the first time during the study period.	Medical records of patients from 92 chiropractic offices in or near Miami, FL; Minneapolis-St. Paul, MN; Portland, OR; and San Diego, CA; who sought care for the first time between 1/1/85-12/31/91.	Initiation of spinal manipulation was inappropriate in 20%-40% of cases, uncertain in 20%-30% of cases, and appropriate in 40%-54% of cases (depending on city).	Shekelle et al. 1998

^aIf a description in the first column has no citation, it is covered by the citation in the reference column.

^bWe contacted the authors of some of the articles to clarify details related to the sample and to the data analysis.

**TABLE 3. EXAMPLES OF QUALITY OF HEALTH CARE IN THE UNITED STATES
MISUSE: DID PATIENTS RECEIVE APPROPRIATE CARE IN A MANNER THAT COULD HAVE CAUSED HARM?**

Health care service^a	Sample description	Data source	Quality of care	Reference^b
Preventable Deaths <i>Evaluation of preventable deaths</i>				
	182 patients who died in hospitals from stroke, pneumonia, or heart attack.	Medical records for patients from 12 hospitals, 1985.	14% of deaths resulted from inadequate diagnosis or treatment and could have been prevented.	Dubois and Brook, 1988
Adverse Events <i>Adverse events</i>				
An adverse event is an injury that is caused by medical management rather than the underlying disease and that prolongs hospitalization, produces a disability at discharge, or both.	30,121 medical records from a weighted sample of 31,429 records of hospitalized patients from a population of 2,671,863 nonpsychiatric discharged patients.	51 randomly selected acute care, nonpsychiatric hospitals in New York State, 1984.	There were 1,133 adverse events and 280 negligent events during 1984 admissions, representing a 3.7% statewide incidence rate of adverse events, and a 1.0% statewide incidence rate of adverse events due to negligence.	Brennan et al. 1991
Adverse events				
	30,121 medical records from a weighted sample of 31,429 records of hospitalized patients from a population of 2,671,863 nonpsychiatric discharged patients.	51 randomly selected acute care, nonpsychiatric hospitals in New York State, 1984.	17% of adverse events resulting from operations and 37% of other adverse events were due to negligence. 47% of physician errors leading to adverse events were negligent.	Leape et al. 1991
Adverse drug events Same as above.	4,031 adult non-obstetric	Medical records and reports	There were 1.8 preventable	Bates et al. 1995