APPENDIX 8

Literature Tables for Utilization and ACSC Indicators

This appendix summarizes the literature reviews for area utilization and ACSC indicators in table format.

Table 1A. Studies of appropriateness of specific procedures. This table summarizes the studies used to identify area utilization indicators.

Tables 2A-6A. These tables summarize studies of ACSC indicators. Table 2A identifies the studies and designs. Table 3A lists the ACS conditions examined in each study. Tables 4A-6A list pediatric avoidable hospitalizations, infant discretionary hospitalizations, and late hospitalization indicators examined by each study.

Table 3A focuses on conditions for which the risk of hospitalization can be reduced, either through better outpatient management of chronic diseases (e.g., asthma, CHF, diabetes) or through more timely diagnosis and effective treatment of acute conditions (e.g., pneumonia, UTI, cellulitis). This is the best validated of the 4 constructs, and is the basis for all of our selected indicators.

Table 4A includes "conditions for which evidence exists that specific ambulatory care modalities reduce hospitalization rates." This category differs from #1 in that it is more sharply focused on defects in ambulatory care, such as a lack of prior outpatient visits or antibiotic prescriptions. There is some overlap between this list and #1 (e.g., asthma, gastroenteritis, DKA, severe ENT infections, PID), although the definitions often differ slightly. Some of these indicators cannot be implemented without linked outpatient claims.

Table 5A focuses on conditions "for which the decision to admit involves a substantial amount of physician judgment...have a wide range in severity and are often managed at home." This concept seems somewhat less relevant to discussions about quality of care.

Table 6A focuses on conditions "whose advanced stages are presumed to have a greater likelihood of reflecting untimely hospital admissions" (because earlier admission would have prevented progression to the advanced stage). This concept relates to the timeliness of hospitalization and the appropriateness of inpatient care, more than to the timeliness and effectiveness of outpatient care.

Table 1A. Studies of appropriateness of specific procedures.

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
Carotid Endarterectomy[1]	18% (51/281) overall; neurosurgery 14% vs. non-neurosurgery 21%; varied from 0% to 33% among surgeons (P = 0.07)	49% (138/281) overall, decreased to 45% after adjusting for benefit of CEA for severe symptomatic disease found in NASCET; 40% neurosurgery vs. 55% non-neurosurgery; varied from 33% to 67% across surgeons (P=.26)	All in Edmonton, Alberta, Canada	291 cases of CEA performed on 265 patients between April 1994 and Sept 1995, from nine surgeons at four teaching hospitals (2 were tertiary-care centers); excluded patients without angiograms (10)
Carotid Endartectomy[24] *follow up to above study	4% (8/184)	47% (84/184)	All in Edmonton, Alberta, Canada	184 patients with CEA between 9/1/96 and 8/31/97 were evaluated after results of previous study, CEA guidelines and notification of possible surveillance were distributed to all surgeons performing CEA in Edmonton
Carotid Endarterectomy[2]	Definition A (low risk of stroke/death):~55% Definition B: ~5% Definition C:~5%	Definition A (low risk of stroke/death): ~12% Definition B: ~37% Definition C:~14%	Twelve academic medical centers	1160 randomly selected patients with CEA from 1988-1990 (with the exception of one hospital which included 1987 data), miscoded charts were excluded
Carotid Endarterectomy[3]	32% overall; varied from 29% to 40% among sites	32% overall; varied from 29% to 34% among sites	5 sites of varying utilization for the 3 procedures selected from Medicare claims submitted by physicians in Arkansas, Colorado, Iowa, Mass., Montana, Penn., S. Carolina, and N. Calif.	Random sample of Medicare beneficiaries for each procedure (claims submitted in 1981) at each site (high, average, and low use geographic areas)
Carotid Endarterectomy[4]	Varied by county from 0% - 67%	No discussion of equivocal indication	23 adjacent rural and urban, large and small, counties in one large, populous state	Sampled procedures by Medicare billing codes performed on 600 CEA patients in 1981, aged 65 years and older
Carotid Endarterectomy[22]	3.9% characterized as inappropriate; study considered CEA inappropriate if the case was “uncertain” or “proven inappropriate”.		1993 Medicare admissions in Georgia w/procedure code for CEA	1945 CEAs performed on Medicare recipients in GA in 1993

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
Cataract Surgery[5]	2% (15/723) overall; varied from 0% to 6% by institution	8% (359/723) overall; varied from 0% to 15% by institution	Ten Academic Medical Centers	1139 randomly selected until approx. 130 patients at each facility w/cataract surgery in 1990 were obtained; patients receiving other ocular surgery performed at the same time as cataract surgery or with specific ICD-9 CM or CPT-4 were excluded
Cholecystectomy[6]	12% overall; varied from 6%-14% (p=.002) among hospitals	17% overall; varied from 9%-24% (p=.002) among hospitals	Four Israeli hospitals belonging to the General Sick Fund (provides prepaid healthcare to 76% of Israeli population)	816 patients identified as having undergone cholecystectomy in 1986; 702 records were located and evaluated; complete clinical info was obtained on 657 patients
Colonoscopy[7]	27.8% (110/553) by ASGE criteria; 31.5% (170/553) by US 94 criteria; 25.6% (138/553) by Swiss 94 criteria	No rating for ASGE; 10.9% (59/553) by US 94 criteria; 11.6% (63/553) by Swiss 94 criteria	Two university-based multi-specialty outpatient clinics in Lausanne and Basel, Switzerland	553 consecutive patients referred by the outpatient clinics for colonoscopy, aged >15 from January 1995 to September 1995 (Lausanne) and January 1995 to July 1995 (Basel)
Coronary Angiography[26]	7% (1/14) of blacks; 10% (4/41) whites who underwent angiography	50% (7/14) of blacks; 46.3% (19/41) whites who underwent angiography	Department of Veterans Affairs	200 (100 white and 100 black) VA inpatients discharged between 1/193 and 12/1/93 with primary dx of cardiovascular disease or chest pain
Coronary Angiography[8]	6% overall; no difference across subgroups	16% overall; no difference across subgroups	Harvard Community Health Plan (HCHP), Brookline Mass; mixed model HMO	292 HCHP enrollees with coronary angiography in 1992; stratified into four subgroups
Coronary Angiography[9]	21% overall	30% overall	Trent region; coronary angiography is done in 3 referral centers and CABG in 2 centers.	random sample of 320 patients with coronary angiography between 2/1/87 and 5/30/88. Exclusions: incomplete records, congenital heart disease, transplant, primary valve disease.

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
Coronary Angiography[3]	17% overall; varied from 15%-18% among sites	9% overall; varied from 4%-10% among sites	5 sites of varying utilization for the 3 procedures selected from Medicare claims submitted by physicians in Arkansas, Colorado, Iowa, Mass., Montana, Penn., S. Carolina, and N. Calif.	Random sample of Medicare beneficiaries for each procedure (claims submitted in 1981) at each site (high, average, and low use geographic areas)
Coronary Angiography[4]	Varied by county from 8%-75%	no discussion of equivocal indication	23 adjacent rural and urban, large and small, counties in one large, populous state	Sampled procedures by Medicare billing codes performed on 600 CA patients in 1981, aged 65 years and older
Coronary Angiography[10]	**Canadian Criteria** Canadian sample: 9.0% (95% CI, 6.6%-11.4%) New York sample: 10.2% (95% CI, 8.5%-11.8%) **US Criteria** Canadian sample: 5.1% (95% CI, 3.2%-6.9%) New York sample: 4.2% (95% CI, 3.4%-6.9%)	**Canadian Criteria** Canadian sample: 33.2% (95% CI, 29.2%-37.2%) New York sample: 39.1 (95% CI, 35.1%-43.1%) **US Criteria** Canadian sample: 18.2% (95% CI, 14.9%-21.5%) New York sample: 20.1% (95% CI, 18.4%-21.8%)	All hospitals performing CA and CABG in Ontario and British Columbia; 15 randomly selected hospitals that provide CA in New York State; 15 randomly selected hospitals that provide CABG in New York State	553 randomly selected patients in Canada, 1333 randomly selected patients in New York. New York patients had procedures performed in 1990; Canadian patients had procedures performed between 4/89 and 3/90. Cases performed primarily for valve surgery were excluded
Coronary Angiography[11]	4% overall; varied from 0% - 9% among hospitals (NS)	20% overall; varied from 13%-31% among hospitals (NS)	15 randomly selected, non federal hospitals in New York State providing coronary angiography	Random sample of 1335 patients undergoing angiography in New York State in 1990, distributed across the 15 hospitals
CABG[12]	6% (5/85), compared to 1/85 identified by the original panel of NY cardiologists	12% (10/85), compared to 1/85 identified by the original panel of NY cardiologists	A follow-up to the above study was done using a sub-sample of the patients. A panel of Duke University cardiologists reviewed 308 records for appropriateness	
CABG[13]	1.6% (95% CI, 0.6% - 2.5%) overall; increased to 1.9% when revised by Consortium surgeons. Varied from 0% to 5% across hospitals (P=0.02) (NS)	7% (95% CI, 5%-8%) overall; did not vary significantly across hospitals	All 12 Academic Medical Center Consortium hospitals	1156 patients w/CABG surgery in 1990 w/o previous CABG or concurrent valve replacement surgery, randomly selected consecutively until 100 records were obtained from each facility

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
CABG[14]	2.4% (95% CI, 2% - 3%) overall; varied from 0% to 5% among hospitals (NS)	7% (95% CI, 5%-9%) overall; varied from 3% to 15% among hospitals (NS)	15 randomly selected, non federal hospitals in New York State providing CABG surgery	Random sample of 1338 patients undergoing isolated CABG in NY in 1990; those undergoing another major procedure in conjunction with CABG (55) were excluded; records missing critical data (13) were also excluded
CABG[9]	16% overall	26% overall	Trent region; coronary angiography is done in 3 referral centers and CABG in 2 centers.	319 randomly selected patients with CABG between 7/1/87 and 6/31/88. Exclusions: incomplete records, congenital heart disease, transplant, primary valve disease
CABG[10]	**Canadian Criteria** Canadian sample: 3.6% (95% CI, 2.0%-5.1%) New York sample: 5.5% (95% CI, 4.0%-7.1%) **US Criteria** Canadian sample: 2.5% (95% CI, 1.2%-3.8%) New York sample: 2.4% (95% CI, 1.6%-3.1%)	**Canadian Criteria** Canadian sample: 11.3% (95% CI, 8.7%-14.0%) New York sample: 9.9% (95% CI, 8.4%-11.4%) **US Criteria** Canadian sample: 9.0% (95% CI, 6.6%-11.4%) New York sample: 7.0% (95% CI, 5.1%-9.0%)	All hospitals performing CA and CABG in Ontario and British Columbia; 15 randomly selected hospitals that provide CA in New York; 15 randomly selected hospitals that provide CABG in New York	556 randomly selected CABG patients in Canada, 1336 randomly selected CABG patients in New York. New York patients had procedures performed in 1990; Canadian patients had procedures performed between 4/89 and 3/90. Cases performed primarily for valve surgery were excluded
CABG (referral after Coronary Angiography)[16]	9.7% overall	12.3% overall	Seven of eight public Swedish heart centers. (perform 92% of all bypass surgeries in Sweden)	Consecutive series of 2767 patients with coronary angiography between 5/94 and 1/95 who were considered for coronary revascularization
CABG[15]	**RAND criteria:** 42% **ACC/AHA criteria:** 17% **RAS criteria:** 46%	**RAND criteria:** 17% **ACC/AHA criteria:** no rating **RAS criteria:** no rating	An academic medical center cardiac catheterization laboratory and a VA cardiac catheterization lab in Maryland	153 catheterization patients referred to a either Univ. of Maryland Cardiac Catheterization Lab and/or Baltimore VA Medical Center Cardiac Catheterization Lab with a variety of cardiac diagnoses and treatments between 3/93 and 10/94

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
PTCA[15]	**RAND criteria:** 22% **ACC/AHA criteria:** 49% **RAS criteria:** 35%	**RAND criteria:** 29% **ACC/AHA criteria:** no rating **RAS criteria:** no rating	An academic medical center cardiac catheterization laboratory and a VA cardiac catheterization lab in Maryland	153 catheterization patients referred to a either Univ. of Maryland Cardiac Catheterization Lab and/or Baltimore VA Medical Center Cardiac Catheterization Lab with a variety of cardiac diagnoses and treatments between 3/93 and 10/94
PTCA (referral after Coronary Angiography)[16]	38.3% overall	30.0% overall	Seven of eight public Swedish heart centers. (perform 92% of all bypass surgeries in Sweden)	Consecutive series of 2767 patients with coronary angiography between 5/94 and 1/95 who were considered for coronary revascularization
PTCA[12]	12% (11/95), compared to 9/95 identified by the original panel of NY cardiologists	27% (26/95), compared to 23/95 identified by the original panel of NY cardiologists	A follow-up to reference 11 was done using a sub-sample of the patients. A panel of Duke University cardiologists reviewed 308 records for appropriateness	
Diagnostic testing for Coronary Artery Disease[17]	3% (7/215) overall	39% (42/109) overall	Five urban Los Angeles area hospital emergency departments, 2 public, 1 private NFP, 1 university med. ctr., 1 NFP HMO	356 patients with chest pain not due to myocardial infarction or history of cardiac disease between Oct 94 and Apr 96. Those not receiving ECG during initial eval were excluded
Hip Joint Replacement[25]	8.3% (86/997) overall; 6.7% - 16.3%. for osteoarthritis, 0% - 25.0% for avascular necrosis, 0% for fracture and revision	32.4% (334/997) overall; 42.3%-50.0% for osteoarthritis, 0%- 50.0% for avascular necrosis, 9.6%-40.0% for fracture, 3.4%-18.9% for revision	5 large public hospitals (4 university affiliated, 1 community-based)	997 patients with osteoarthritis, avascular necrosis, hip fracture, or revision who were undergoing HJR between 12/96 and 12/97
Hip and Knee Joint Replacement[21]	High-rate region: 6.1% Low-rate region: 6.4% Rated by subspecialists High-rate region: 11.4% Low-rate region: 11.0%	Not evaluated	7 high-rate region hospitals: 3 university affiliated, 4 community 8 low-rate region hospitals: 5 university affiliated, 3 community	371 patients in the high rate region and 565 in the low rate region with surgery performed between 4/1/92 and 3/31/93 without fracture or other indication, and < 60 years old

Procedure	% inappropriate	% uncertain	Source of population	# of patients evaluated
Hysterectomy[18]	16% overall; varied across plans from 10% to 27%	25% overall	Seven managed care organizations	Random sample of 642 hysterectomies (non-emergency and non-oncological) between 8/1/89 and 7/31/90, among women enrolled in a health plan 2 years prior to surgery
Hysterectomy[23]	70% (367/497); varied from 45% to 100% across diagnoses indicative of hysterectomy	Not evaluated	Nine capitated medical groups in Southern California	497 women receiving hysterectomy between 8/93 and 7/95 in one of nine capitated medical groups in S. California
Laminectomy[19]	23%	29%	One Swiss University hospital	196 patients with surgical treatment for herniated discs
Lumbar Discectomy and Spinal Stenosis surgery[20]	38% (126/328)	Combined with "appropriate" category	Two university neurosurgery departments	328 consecutive patients undergoing surgery for Lumbar Disc Hernia of Spinal Stenosis at hosp A from 4/92-10/92 and at hosp B from 5/93-9/93. Patients with neoplasms were excluded
Upper GI Tract endoscopy[3]	17% overall; varied from 15% to 19% among sites	11% overall; varied from 8% to 14% among sites	5 sites of varying utilization for the 3 procedures selected from Medicare claims submitted by physicians in Arkansas, Colorado, Iowa, Mass., Montana, Penn., S. Carolina, and N. Calif.	Random sample of Medicare beneficiaries for each procedure (claims submitted in 1981) at each site (high, average, and low use geographic areas)
Upper GI Tract endoscopy[4]	Varied by county from 0%-25%	Not evaluated	23 adjacent rural and urban, large and small, counties in one large, populous state	Sampled procedures by Medicare billing codes performed on 614 UGI patients in 1981, aged 65 years and older

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