

LIST OF APPENDICES

Appendix A:

- Table A-1. Standardized Evidence and Recommendation Scale
- Table A-2. Reclassification of Existing Evidence and Recommendation Scales
- Table A-3. Broad and Sub-Topic Areas for Process of Care Measures
- Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke
- Table A-5. Functional Outcome Measures

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Appendix D:

- Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions
- Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Appendix E: Hospital Sample

Appendix F:

- Table F-1. Reliability of Overall Diagnosis (All Conditions)
- Table F-2. Reliability of Condition Present on Admission (All Conditions)
- Table F-3: Reliability of Procedures

Appendix G: Validation of PDD- Derived Measures versus Clinical Chart Abstraction

Appendix H:

- Table H-1. Comparison of Measures by DNR (as reported in PDD)
- Table H-2. Comparison of Measures by no CPR (as abstracted)
- Table H-3. Comparison of Measures by no Mechanical Ventilation (as abstracted)
- Table H-4. Comparison of Measures by Hospital Death

Appendix I:

- Geo-coding Results: Comparison of Measures across Records with Replacement of Missing Data (tract-level) With Zip Code Level Data

Appendix J:

- Table J-1: Regression Validation: Inpatient Death
- Table J-2: Regression Validation: Inpatient Death (Restricted to Labs)
- Table J-3: Regression Validation: 30-Day Death
- Table J-4: Regression Validation: 30-Day Death (Restricted to Labs)
- Table J-5: Regression Validation: 30-Day Readmission
- Table J-6: Stepwise Regression Inpatient Death (all)
- Table J-7: Stepwise Regression Inpatient Death--Labs Only
- Table J-8: Regression Validation: 30-Day Mortality--Limited Variables
- Table J-9: 30-Day Mortality (Limited Variables, Labs Only)
- Table J-10: Regression Validation: 30-Day Readmission (Limited Variables)

Appendix K: C-Statistics for Validation Regression Models**Appendix L:**

- Table L-1: Regression Validation Quality -30 Day Death
- Table L-2: Regression Validation Quality -30 Day Death (excluding hospital deaths)
- Table L-3: Regression Validation Quality- All Indicator Variables
- Table L-4: Examine Full Models for the Other Outcomes Using Logistic Regression
- Table L-5: Regression Validation Quality-30 day Readmission

Appendix M: Regression Validation ROC**Appendix N: Models/Outcome Analysis**

- N-1: Logistic Model Predict: Hospital Death
- N-2: Logistic Model Predict: 30-Day Death
- N-3: Logistic Model Predict: 30-Day Readmission
- N-4: Logistic Model Predict: 30-Day No Hospital Death
- N-5: PHCOX Model Predict: 30 Day Survival
- N-6: PHCOX Model Predict: Time to 30 Day Readmission

Appendix O: Stepwise Regression

- O-1:30-Day Death, Stepwise Regression, Model Results
- O-2: 30-Day Readmission, Stepwise Regression, Model Results

Appendix P: Pearson Correlation Procedure**Appendix Q: Hospital Rankings and Sensitivity Analysis**

- Table Q-1: 30-Day Death Hospital Rankings
- Table Q-2: 30-Day Readmission Hospital Rankings

Appendix R:

- Table R-1: Comparison of Death by Inpatient Death Readmission
- Table R-2: Comparison of Death by Readmission
- Table R-3: Comparison of Death by Death and Readmission
- Table R-4: Comparison of Death by Cox Death
- Table R-5: Comparison of Death by Cox Readmission

Appendix A:

Table A-1. Standardized Evidence and Recommendation Scale

Table A-2. Reclassification of Existing Evidence and Recommendation Scales

Table A-3. Broad and Sub-Topic Areas for Process of Care Measures

Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Table A-5. Functional Outcome Measures

Appendix Table A-1. Standardized Evidence and Recommendation Scale

Standardized Classification		Definition
Level	A	> 1 RCT or meta analysis of RCTs
	B	≥ 1 observational studies
	C	Expert opinion, case studies, or recommended good practice based on clinical experience
Grade	1	<ul style="list-style-type: none"> • Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective • Body of evidence can be trusted to guide practice in most situations • Diagnostic test: Established as useful/predictive (or probably useful/predictive) for condition in specific population
	2	<ul style="list-style-type: none"> • Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment: <ul style="list-style-type: none"> - Weight of evidence or opinion is in favor of the procedure or treatment - Usefulness/efficacy is less well established by evidence or opinion • Body of evidence provides some support for recommendation(s), but care should be taken in its application • Diagnostic test: Possible useful/predictive for condition in specific population
	3	<ul style="list-style-type: none"> • Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful • Body of evidence is weak and recommendation must be applied with caution • Diagnostic test: Data inadequate or conflicting; value of test unclear or controversial

Appendix Table A-2. **Reclassification of Existing Evidence and Recommendation Scales**

Classification	Definition	Source	Year	Standardized Classification Level & Grade
Class I	Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective	AHA/ASA	2006	1
Class IIa	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment: <i>Weight of evidence or opinion is in favor of the procedure or treatment</i>	AHA/ASA	2006	2
Class IIb	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment: <i>Usefulness/efficacy is less well established by evidence or opinion</i>	AHA/ASA	2006	2
Class III	Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful	AHA/ASA	2006	3
Level of Evidence A	Data derived from multiple randomized clinical trials	AHA/ASA	2006	A
Level of Evidence B	Data derived from a single randomized trial or nonrandomized studies	AHA/ASA	2006	B
Level of Evidence C	Expert opinion or case studies	AHA/ASA	2006	C
Grade A	Body of evidence can be trusted to guide practice	Australian	2007	1
Grade B	Body of evidence can be trusted to guide practice in most situations	Australian	2007	1
Grade C	Body of evidence provides some support for recommendation(s), but care should be taken in its application	Australian	2007	2
Grade D	Body of evidence is weak and recommendation must be applied with caution	Australian	2007	3
Level I	A systematic review of level II studies	Australian	2007	B
Level II	A randomized controlled trial	Australian	2007	A
Level III-1	A pseudo randomized controlled trial (i.e. alternate allocation or some other method)	Australian	2007	B
Level III-2	A comparative study with concurrent controls: • Nonrandomized, experimental trial • Cohort study • Case-control study • Interrupted time series with a control group	Australian	2007	B
Level III-3	A comparative study without concurrent controls: • Historical control study • Two or more single arm study • Interrupted time series without a parallel control group	Australian	2007	B
Level IV	Case series with either posttest or pretest/posttest outcomes	Australian	2007	C
Grade A	Methods strong, results consistent—RCTs, no heterogeneity	Holloway	2001	A
Grade B	Methods strong, results inconsistent—RCTs, heterogeneity present	Holloway	2001	A
Grade C	Methods weak—observational studies	Holloway	2001	B
Sub-grade 1	Effect clear—clear that benefits do (or do not) outweigh risks	Holloway	2001	1
Sub-grade 2	Effect equivocal—uncertainty whether benefits outweigh risks	Holloway	2001	2
Level of Evidence A	At least one RCT; or, meta-analysis of randomized controlled trials (RCTs)	Canadian	2006	A
Level of Evidence B	Well designed controlled trial without randomization; or, well designed cohort or case-control analytic study; or, multiple time series, dramatic results of uncontrolled experiment	Canadian	2006	B
Level of Evidence C	At least one well designed, non-experimental descriptive study (e.g. comparative studies, correlation studies, cast studies); or, expert committee reports, opinions and/or experience of respected authorities	Canadian	2006	B/C
Level of Evidence D	Expert committee reports, opinions and/or experience of respected authorities. This grading indicates that directly applicable clinical studies of good quality are absent	Canadian	2006	C
Level of Evidence R	Recommended good practice based on the clinical experience of the Guideline Development Group	Canadian	2006	C

Appendix Table A-2. **Reclassification of Existing Evidence and Recommendation Scales**

Classification	Definition	Source	Year	Standardized Classification Level & Grade
A1	Clear risk/benefit; Randomized trials without important limitations: Strong recommendation; can apply to most patients in most circumstances without reservation	Lindsay	2005	A1
B1	Clear risk/benefit; Randomized trials with important limitations (inconsistent results, methodologic flaws): Strong recommendations, likely to apply to most patients	Lindsay	2005	A1
B2	Unclear risk/benefit; Randomized trials with important limitations (inconsistent results, methodologic flaws): Weak recommendation; alternative approaches likely to be better for some patients under some circumstances	Lindsay	2005	A2
C1	Clear risk/benefit; Observation studies: Intermediate-strength recommendation; may change when stronger evidence available	Lindsay	2005	B1
C2	Unclear risk/benefit; Observation studies: Very weak recommendations; other alternatives may be equally reasonable	Lindsay	2005	B2
Level of Evidence I	<u>Therapy/Treatment</u> : Data from RCT with sufficient statistical power to make false positive/negative findings unlikely; treatment may be FDA-approved <u>Diagnostic test</u> : Evidence from prospective study(s) in a broad spectrum of patients; gold standard comparisons when appropriate; high accuracy rate	Alberts	2005	A
Level of Evidence II	<u>Therapy/Treatment</u> : Data from RCT, but may have false positives or negatives; may not be FDA-approved, but Rx is widely or commonly used in many medical centers <u>Diagnostic test</u> : Evidence from prospective study of a narrow patient population or well-designed retrospective studies of a broad population; comparison with gold standard or other reasonable validated alternative test	Alberts	2005	A
Level of Evidence III	<u>Therapy/Treatment</u> : Data from nonrandomized cohort studies; Rx is used in some settings but not widely adopted <u>Diagnostic test</u> : Evidence from retrospective studies in a narrow patient population	Alberts	2005	B
Level of Evidence IV	<u>Treatment/Therapy</u> : Data from nonrandomized studies using historical controls <u>Diagnostic test</u> : Most evidence from case series or expert opinion panels	Alberts	2005	B
Level of Evidence V	<u>Treatment/Therapy</u> : Data from anecdotal case series or several case reports <u>Diagnostic test</u> : N/A	Alberts	2005	C
Grade A	<u>Therapy/Treatment</u> : Supported by level I evidence <u>Diagnostic test</u> : Established as useful/predictive for condition in specific population	Alberts	2005	1
Grade B	<u>Therapy/Treatment</u> : Supported by level II evidence <u>Diagnostic test</u> : Probably useful/predictive for condition in specific population	Alberts	2005	1
Grade C	<u>Therapy/Treatment</u> : Supported by level III, IV, or V evidence <u>Diagnostic test</u> : Possible useful/predictive for condition in specific population	Alberts	2005	2
Grade D	<u>Therapy/Treatment</u> : N/A; <u>Diagnostic test</u> : Data inadequate or conflicting; value of test unclear or controversial	Alberts	2005	3

Appendix Table A-2. **Reclassification of Existing Evidence and Recommendation Scales**

Classification	Definition	Source	Year	Standardized Classification Level & Grade
Class I	<p><u>Evidence classification scheme for a diagnostic measure:</u> A prospective study in a broad spectrum of persons with the suspected condition, using a 'gold standard' for case definition, where the test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy</p> <p><u>Evidence classification scheme for a therapeutic intervention:</u> An adequately powered, prospective, randomized, controlled clinical trial with masked outcome assessment in a representative population or an adequately powered systematic review of prospective randomized controlled clinical trials with masked outcome assessment in representative populations. The following are required:</p> <ul style="list-style-type: none"> a randomization concealment b primary outcome(s) is/are clearly defined c exclusion/inclusion criteria are clearly defined d adequate accounting for dropouts and crossovers with numbers sufficiently low to have a minimal potential for bias e relevant baseline characteristics are presented and substantially equivalent among treatment groups or there is appropriate statistical adjustment for differences 	European	2008	A
Class II	<p><u>Evidence classification scheme for a diagnostic measure:</u> A prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by 'gold standard') compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy</p> <p><u>Evidence classification scheme for a therapeutic intervention:</u> Prospective matched-group cohort study in a representative population with masked outcome assessment that meets a–e above or a randomized, controlled trial in a representative population that lacks one criterion a–e</p>	European	2008	A/B
Class III	<p><u>Evidence classification scheme for a diagnostic measure:</u> Evidence provided by a retrospective study where either persons with the established condition or controls are of a narrow spectrum, and where test is applied in a blinded evaluation</p> <p><u>Evidence classification scheme for a therapeutic intervention:</u> All other controlled trials (including well-defined natural history controls or patients serving as own controls) in a representative population, where outcome assessment is independent of patient treatment</p>	European	2008	B
Class IV	<p><u>Evidence classification scheme for a diagnostic measure:</u> Evidence from uncontrolled studies, case series, case reports, or expert opinion</p> <p><u>Evidence classification scheme for a therapeutic intervention:</u> Evidence from uncontrolled studies, case series, case reports, or expert opinion</p>	European	2008	C
Level A	Established as useful/predictive or not useful/predictive for a diagnostic measure or established as effective, ineffective or harmful for a therapeutic intervention; requires at least one convincing Class I study or at least two consistent, convincing Class II studies	European	2008	1-3
Level B	Established as useful/predictive or not useful/predictive for a diagnostic measure or established as effective, ineffective or harmful for a therapeutic intervention; requires at least one convincing Class II study or overwhelming Class III evidence	European	2008	1-3
Level C	Established as useful/predictive or not useful/predictive for a diagnostic measure or established as effective, ineffective or harmful for a therapeutic intervention; requires at least two Class III studies	European	2008	1-3
GCP points	Recommended best practice based on the experience of the guideline development group. Usually based on Class IV evidence indicating large clinical uncertainty, such GCP points can be useful for health workers	European	2008	2-3

Appendix Table A-3. Broad and Sub-Topic Areas for Process of Care Measures

<ol style="list-style-type: none">1. Early Assessment and Diagnosis<ol style="list-style-type: none">a. Assessment of TIAb. Triage in emergency departmentc. Imagingd. Investigations 2. Acute Stroke Management<ol style="list-style-type: none">a. Stroke care unitb. Early management of TIAc. Thrombolysisd. Antithrombotic therapye. Blood pressure therapyf. Surgical and interventional therapyg. Physiological monitoringh. Oxygen therapyi. Glycemic controlj. Other general acute stroke carek. Neuroprotective agents 3. Assessment and Management of the Consequences of Stroke<ol style="list-style-type: none">a. Dysphagiab. Nutritionc. Early mobilizationd. Early rehabilitation assessment/therapye. Cognition and perceptionf. Communicationg. Incontinenceh. Mood (e.g., depression)i. Cerebral hemorrhage 4. Prevention and Management of Complications<ol style="list-style-type: none">a. Neurological complications (e.g., brain edema, hydrocephalus, elevated intracranial pressure, seizures, hemorrhagic transformation, etc.)b. Deep venous thrombosis (DVT) or pulmonary embolism (PE)c. Pyrexiad. Pressure caree. Painf. Fallsg. Infections (e.g., pneumonia, urinary tract infections)h. Other (e.g., Angioedema) 5. Secondary Prevention<ol style="list-style-type: none">a. Behavior change (e.g., smoking, alcohol, physical activity, diet, weight management, stress management)b. Blood pressure therapyc. Antithrombotic therapyd. Antiplatelet therapye. Anticoagulation therapyf. Lipid managementg. Diabetes managementh. Carotid assessment and intervention (e.g., imaging, angioplasty, surgery)i. Other (e.g., evaluation for PFO)j. Concordance with medicationk. Complementary and alternative therapy 6. Discharge Planning, Transfer of Care and Integrated Community Care<ol style="list-style-type: none">a. Ongoing inpatient careb. Pre-discharge needs assessmentc. Stroke education & care giver trainingd. Care planse. Discharge plannerf. Rehabilitation plang. Community rehabilitationh. Post discharge support 7. Miscellaneous

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Atrial Fibrillation	1	A patient has an ischemic stroke and has atrial fibrillation	He should receive long-term anticoagulation (warfarin with an INR of 2 to 3)			O	X			X	X		X	O	X	O	O	X
Atrial Fibrillation	2	A patient has a stroke or a TIA and has atrial fibrillation, cardioembolic stroke from valvular heart disease, or recent myocardial infarction	Anticoagulation therapy should be used unless a contraindication exists							X								
Atrial Fibrillation	3	A patient has stroke and has atrial fibrillation and is unable to take anticoagulation	Aspirin 325 mg/d is recommended.				X											
Anticoagulation	1	A patient has a stroke or TIA and has a PFO	Anticoagulation may also be considered taking into account other risk factors and the increased risk of harm.															
Anticoagulation	2	A patient has a stroke or TIA	The routine use of anticoagulation is NOT recommended	X					O	X			X					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Anticoagulation	3	A patient has a stroke	The intravenous administration of streptokinase for treatment of stroke is NOT recommended.	X														
Anticoagulation	4	A patient has a stroke	Increasing age alone is NOT a contraindication to oral anticoagulation										X					
Anticoagulation	5	A patient has a stroke	The administration of glycoprotein-IIb-IIIa inhibitors is not recommended										X					
Antiplatelet	1	A patient has an acute stroke	The oral administration of aspirin (initial dose is 325mg) within 24 to 48 hours after stroke onset is recommended	X		O				X	X	O	X	O	X	O	O	X
Antiplatelet	2	A patient has ischemic CAD patient during oral anticoagulant therapy for ischemic stroke	Aspirin should be used concurrently in doses up to 162 mg/d, preferably in the enteric-coated form.				X				X							
Antiplatelet	3	A patient has an ischemic stroke or TIA and is not on anticoagulation therapy	Long term antiplatelet should be prescribed		X	O	X			X	X	O	X	O		O		X

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Antiplatelet	4	A patient presents with an acute ischemic stroke	Aspirin (50 to 325 mg/d) monotherapy, the combination of aspirin and extended-release dipyridamole, and clopidogrel monotherapy are all acceptable options		X		X				X		X					
Antiplatelet	5	A patient with ischemic stroke has thrombolytic therapy	Aspirin should NOT be used as an adjunctive therapy within 24 hours	X														
Antiplatelet	6	A patient presents with an acute ischemic stroke and does not have acute CAD or a recent coronary stent	The combination of aspirin plus clopidogrel is not recommended in the secondary prevention of cerebrovascular disease		X		X						X					
Antiplatelet	7	A patient has ischemic stroke and specific indications (e.g. unstable angina or non-Q-wave MI, or recent stenting)	The combination of aspirin and clopidogrel is recommended and treatment should be given for up to 9 months after the event										X					
Assessment	1	A patient presents with an acute ischemic stroke	Standardized assessment tools should be used to assess the functional status of stroke patients								X							

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Assessment	2	A patient presents with an acute ischemic stroke	Clinicians should use standardized, valid assessments to evaluate the patient's stroke-related impairments and functional status, and encourage patient's participation in community and social activities								X							
Behavior	1	A patient has had a stroke/TIA or is an inpatient in an acute care hospital for his stroke/TIA	Individualized cognitive behavior interventions are more likely to be effective when relaxation techniques are employed								X							
Behavior	2	A patient has an acute ischemic stroke and is diagnosed with a depressive disorder	The patient should be given a trial of antidepressant medication, if no contraindication exists							X	X		X					
Behavior	3	A patient has had an acute ischemic stroke	The routine use of prophylactic antidepressants is NOT recommended							X	X							
Behavior	4	A patient has an acute ischemic stroke and has severe, persistent, or troublesome tearfulness	SSRIs are recommended as the antidepressant of choice							X	X							

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Behavior	5	A patient has an acute ischemic stroke and is diagnosed with a depressive disorder	Interventions should be individualized and may be delivered using behavioral techniques (such as educational or motivational counseling).							X	X							
Behavior	6	A patient has had an acute ischemic stroke and is managed using a case management model after discharge	Services should incorporate education of the recognition and management of depression, screening and assistance to coordinate appropriate interventions via a medical practitioner.							X								
Behavior	7	A patient has had an acute ischemic stroke	Patients and their care givers should have their individual psychosocial and support needs reviewed on a regular basis as part of the longer-term management of stroke								X							
Behavior	8	A patient has had an acute ischemic stroke and has suspected altered mood (e.g. depression, anxiety, emotional lability)	The patient should be assessed by trained personnel using a standardized scale							X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Carotid Disease	1	A patient has an acute ischemic stroke with carotid territory symptoms who would potentially be candidates for carotid revascularization	The patient should have an urgent carotid duplex ultrasound.					X		X		O					O	
Carotid Disease	2	A patient has asymptomatic carotid stenosis (60-99%) and is otherwise eligible for surgery (considering age, gender, and comorbidities)	Carotid endarterectomy may be undertaken if it can be performed by a specialist surgeon with very low rates of perioperative mortality/morbidity.				X	X		X	X	O	X					
Carotid Disease	3	A patient has asymptomatic carotid stenosis (60-99%) and is otherwise eligible for surgery (considering age, gender, and comorbidities)	Carotid endarterectomy should be undertaken if surgery can be performed by a specialist surgeon with very low rates of perioperative mortality/morbidity.				X			X	X							
Carotid Disease	4	A patient has <50% symptomatic carotid stenosis or <60% asymptomatic carotid stenosis	Carotid endarterectomy is not recommended				X			X	X		X					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Carotid Disease	5	A patient has an acute ischemic stroke or TIA and has symptomatic carotid stenosis	The patient should undergo carotid endarterectomy as soon as possible after the event (ideally within 2 weeks).							X								
Carotid Disease	6	A patient undergoes CEA	Carotid endarterectomy should only be performed by a specialist surgeon at centers where outcomes of carotid surgery are routinely audited.							X								
Carotid Disease	7	A patient meets criteria for carotid endarterectomy but is deemed unfit due to medical comorbidities (e.g. significant heart/lung disease, age >80yrs), or conditions that make them unfit for open surgery (e.g. high	Carotid angioplasty may be considered as an alternative							X								
Carotid Disease	8	A patient has symptomatic stenosis	Carotid angioplasty and stenting should not routinely be considered							X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Carotid Disease	9	A patient has symptomatic stenosis	External carotid - internal carotid bypass surgery is not routinely recommended.				X											
Carotid Disease	10	A patient undergoes CEA	The patient should remain on antiplatelet therapy										X					
Carotid Disease	11		Consider CT Angiogram					X										
Cholesterol	1	A patient has high cholesterol levels	The patient should receive dietary review and counseling by a specialist, trained clinician.							X	X							
Cholesterol	2	A patient is at high risk for a vascular event	The patient should be treated with a statin to achieve an LDL-C =2.0 mmol/L							X	X		X					X
Cholesterol	3	A patient has CHD or symptomatic atherosclerotic disease	Statin agents are recommended, and the target goal for cholesterol lowering for those with CHD or symptomatic atherosclerotic disease is an LDL-C level of <100 mg/dL.		X	O	X				X					O		
Cholesterol	4	A patient is very high risk with multiple risk factors	Statin agents are recommended, and the target goal for cholesterol		X		X											

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
			lowering is an LDL-C <70 mg/dL															
Cholesterol	5	A patient has an ischemic stroke or TIA and has elevated cholesterol, comorbid CAD, or evidence of an atherosclerotic origin	The patient should be managed according to NCEP III guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations		X		X											
DVT	1	A stroke patient is immobilized	Subcutaneous administration of anticoagulants is recommended.	X						X			X		X			
DVT	2	An acute ischemic stroke patient has not received rtPA and is nonambulatory	The patient should start receiving the following within the first 24 h of admission unless being treated concurrently with intravenous heparin or therapeutic warfarin: Intermittent pneumatic compression stockings			O			O	X					X	O		
DVT	3	An acute ischemic stroke patient is not receiving	Aspirin can be used as a potential intervention to	A2														

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
		anticoagulations	prevent deep vein thrombosis															
DVT	4	A patient has an ischemic stroke or TIA and has established inherited thrombophilia	The patient should be evaluated for deep venous thrombosis				X											
Diabetes	1	A patient has an acute ischemic stroke	Blood glucose level should be checked on arrival at the ED and regularly for first 24 h															X
Diabetes	2	A patient has had an acute ischemic stroke and has elevated plasma glucose levels	Lowering PG targets toward the normal range should be considered: A1C =6.0%; FPG/preprandial PG: 4.0 to 6.0 mmol/L; and 2-hour postprandial PG: 5.0 to 8.0 mmol/L				X			X	X							X
Diabetes	3	A patient with acute stroke has diabetes or is on diabetes medications	The patient should be discharged on diabetes medications			O												
EKG	1	A patient has had an acute ischemic stroke or TIA	The patient 'should have a 12-lead electrocardiography (ECG) and continuous ECG recording										X					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
EKG	2	A stroke or TIA patient is seen after the acute phase when arrhythmias are suspected and no other causes of stroke are found	24-hour Holter ECG monitoring should be performed										X					
Education	1	A stroke patient is going to be discharged to home	Relevant members of the interdisciplinary team should provide specific training for care givers before discharge.			O				X	X	O		O	X	O		X
Education	2	A stroke patient is discharged	Contact with and education by trained staff should be offered to the patient and care givers							X								
Education	3	A stroke patient is discharged to home	Interventions to promote adherence to medication regimes should include one or more of the following: 1.) information, reminders, self-monitoring, reinforcement, counseling, family therapy 2.) reduction in the number of daily doses 3.) multi-compartment							X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
			medication compliance device															
Education	4	A stroke patient is discharged	The patient and care giver 'should be provided with a contact person (in the hospital or community)							X								
Education	5	A person is at risk for stroke or who has had a stroke	The person should be assessed for and given information about risk factors, lifestyle management issues (exercise, smoking, diet, weight, alcohol, stress management), and be counseled about possible strategies to modify their lifestyle and risk factors								X	O						

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Evaluation	1	A patient has had a stroke	Specific treatments for cognitive deficits are NOT recommended										X					
Exercise	1	A patient has had a stroke or TIA or are in the hospital for a stroke or TIA	The patient should engage in either a moderate exercise regimen (an accumulation of 30 to 60 min) of brisk walking, jogging, cycling or other dynamic exercise 4 to 7 days each week or a medically supervised exercise programs (if a high risk patient, e.g. those with cardiac disease)								X	O						
Fever	1	A patient has an acute ischemic stroke and has a fever	The fever should be treated with antipyretics							X								X
Hormone Replacement	1	a woman has an acute ischemic stroke or TIA	Postmenopausal hormone replacement therapy is NOT recommended.				X					O	X					
Hypertension	1	A patient has had an acute ischemic stroke or TIA and is normotensive or hypertensive (? And has a history of hypertension)	The patient should receive blood pressure lowering therapy, unless contraindicated by symptomatic hypotension.				X			X	X		X					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Hypertension	2	A patient is hospitalized for an acute ischemic stroke stroke or TIA and is normotensive or hypertensive (? And has a history of hypertension)	The patient should be discharged with antihypertensive agents if appropriate															X
Hypertension	3	A patient has an acute ischemic stroke and also has diabetes and hypertension	ACEIs and ARBs are recommended as first-choice medications				X											
Hypertension	4	A patient hospitalized for an acute ischemic stroke stroke is hypertensive	Orders for new antihypertensive agents should not be added within 24 hours of symptom onset unless any of the following is present: administration of thrombolytic therapy, SBP >220 mm Hg, DBP >120 mm Hg, MAP >130 mm Hg, worsening renal function, aortic dissection, myocardial infarction, congestive heart failure, or hypertensive encephalopathy												X			

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Hypertension	5	A patient is hospitalized for an acute ischemic stroke	Blood pressure should be checked regularly										X					
Imaging	1	A patient presents to the hospital with signs and symptoms of an acute stroke ischemic stroke	Imaging of the brain is recommended before initiating any specific therapy to treat acute ischemic stroke	X					O	X			X	O				
Imaging	2	If a patient presents with an acute ischemic stroke	Then perform TCD					X	O				X	O			O	
Imaging	3	If a patient presents with an acute ischemic stroke	Then consider transesophageal echo										X					
Imaging	4	If a patient presents with an acute ischemic stroke	Then consider MRA/MRV										X					
Imaging	5	If a patient presents with an acute ischemic stroke	Then consider MRI with diffusion										X					
Imaging	6	If a patient presents with an acute ischemic stroke	Then consider MR perfusion										X					
Imaging	7	If a patient presents with an acute ischemic stroke	Then consider PET										X					
Imaging	8	A patient with an ischemic stroke or TIA has an initial assessment that has not confirmed likely source of ischemic event, OR a patient has a history of more than	Further brain, cardiac or carotid imaging should be undertaken							X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
		one TIA, OR a patient is likely to undergo carotid surgery																
Incontinence	1	A patient with acute ischemic stroke has possible urinary incontinence	A portable bladder ultrasound scan can be used							X								
Incontinence	2	A patient with acute ischemic stroke has suspected urinary incontinence difficulties	Trained personnel using a structured functional assessment should assess the patient							X								
Incontinence	3	A patient with acute ischemic stroke has confirmed urinary incontinence difficulties	A continence management plan should be formulated and documented.							X								
Life Style	1	A patient has had a stroke or TIA or are in the hospital for a stroke or TIA	The patient should have no to moderate alcohol consumption (less than two standard drinks per day); Men: less than 14 drinks per week/Women: less than 9 drinks per week				X				X	O	C3					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Life Style	2	A patient has had a stroke or TIA or are in the hospital for a stroke or TIA	The patient should have a diet that is low in fat (especially saturated fat) and sodium, and high in fruit and vegetables							X	X							
Life Style	3	A patient has an acute ischemic stroke or TIA	Smoking history should be assessed and documented									O						X
Life Style	4	A patient has had a stroke or TIA or are in the hospital for a stroke or TIA and is a smoker	Smoking cessation should be attempted - pharmacologic therapy , nicotine replacement therapy and behavioral therapy			O				X	X	O	B1			O		
Life Style	5	A patient has had a stroke or TIA or are in the hospital for a stroke or TIA and is a smoker and is overweight	The patient maintain goal of a BMI of 18.5 to 24.9 kg/m ² and a waist circumference of <88cm for women and <102 cm for men			O					X							
Nutrition	1	A patient has an acute ischemic stroke or TIA	Close monitoring of hydration status and appropriate fluid supplementation should be used							X								
Nutrition	2	A patient is hospitalized for acute stroke	The patient should be screened for malnutrition							X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Nutrition	3	A patient has had a stroke and has poor or worsening nutritional status	Nutritional supplementation should be offered							X								
Nutrition	4	A patient has had a stroke and has not recovered the ability to swallow	Nasogastric feeding is the preferred method during the first month post stroke							X								
Other	1	A patient has a stroke	Acupuncture should NOT be used.							X								
Other	2	A patient has had a stroke	Antioxidant vitamin supplements are NOT recommended										X					
Other	3	A patient has had a stroke	The routine use Ginkgo biloba extract or Dan shen agents is NOT recommended							X								
Other	4	A patient has had a stroke	The routine use of Reiki therapy is NOT recommended							X								
Other	5	A patient has an ischemic stroke or TIA and hyperhomocysteinemia (levels >10 mol/L)	Daily standard multivitamin preparations are reasonable				X											

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Other	6	A patient has had an acute stroke	The use of putative neuroprotectors should only be used if part of a randomized controlled trial (e.g. Routine use is NOT recommended)	X						X			X					
Other	7	A patient has had an acute ischemic stroke	The administration of medications such as pentoxifylline is NOT recommended	X														
Other	8	A patient has had an acute ischemic stroke	Hemodilution with or without venesection and volume expansion is NOT recommended	X														
Rehabilitation	1	A patient has had an acute stroke	The patient should be assessed for rehab services													O		
Rehabilitation	2	A patient has had a stroke and is assessed as high risk for bed sores	The patient should be provided with a pressure relieving mattress							X								
Rehabilitation	3	A patient has had an acute stroke	The patient should begin rehabilitation therapy as early as possible once medical stability is reached			O					X			O				

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Rehabilitation	4	A patient has had an acute stroke has mild or moderate impairment is medically stable	Early discharge from stroke unit care is possible providing that rehabilitation is delivered in the community by a multidisciplinary team with stroke expertise								X		X					
Rehabilitation	5	A patient has had an acute stroke and has difficulty in ADLs	The patient should receive Occupational Therapy or multi-disciplinary interventions targeting ADL							X			X					
Rehabilitation	6	A patient has had an acute stroke and has been evaluated as requiring rehab services	The patient should be offered rehab in the hospital via outpatients, or day hospital, or in the community							X	X	O						
Rehabilitation	7	A patient has had an acute stroke, is living in the community, and has difficulty in ADLs	The patient should have access, as appropriate, to therapy services to improve, or prevent deterioration in ADL							X	X							
Rehabilitation	8	A patient has had an acute stroke and is receiving post-acute stroke care	Care should be delivered in a setting in which rehabilitation care is formally coordinated and								X							

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
			organized															
Rehabilitation	9	A patient has had an acute stroke is at risk for falling and is discharged to home	Multifactorial interventions should be provided in the community including an individually prescribed exercise program in order to prevent or reduce the number and severity of falls								X							
Rehabilitation	10	A patient has had an acute stroke, is living at home and has difficulty in ADLs	A home assessment should be carried out to ensure safety and community access.							X								
Rehabilitation	11	A patient has had an acute stroke and has a physical disability	Physiotherapy is recommended, but the optimal mode of delivery is unclear										X					
Rehabilitation	12	A patient has had an acute stroke and is receiving post-acute stroke care	The team should promote the practice of skills gained in therapy into the patient's daily routine in a consistent manner															

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Rehabilitation	13	A patient has had an acute stroke and is receiving post-acute stroke care	Therapy should include repetitive and intense use of novel tasks that challenge the patient to acquire necessary motor skills to use the involved limb during functional tasks and activities								X							
Rehabilitation	14	A patient has had an acute stroke and is receiving post-acute stroke care	The patient should undergo as much therapy appropriate to his needs as his is willing and able to tolerate								X							
Rehabilitation	15	A patient has had an acute stroke, is receiving post-acute stroke care, and has upper extremity weakness	Use of supports for the arm should be considered								X							
Rehabilitation	16	A patient has had an acute stroke, is receiving post-acute stroke care, and has upper extremity weakness	Overhead pulleys should not be used								X							
Rehabilitation	17	A patient has had an acute stroke and is receiving post-acute stroke care	The patient should have his individual psychosocial and support needs reviewed on a regular basis								X							

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Seizure	1	A patient had had an acute stroke and suffers post-stroke seizures	Administration of anticonvulsants is recommended to prevent recurrent post-stroke seizures										X					
Speech	1	A patient has had an acute stroke	The patient should be screened for communication deficits using a validated screening tool							X								
Speech	2	A patient has had an acute stroke	The speech pathologist should advise staff and family/care givers of appropriate communication techniques.							X								
Speech	3	A patient has had an acute stroke	Before being given food, drink or oral medications, the patient should be screened for swallowing deficits by personnel specifically trained in swallowing screening			O				X	X	O			O	O		
Steroids	1	A patient is hospitalized for an acute stroke and has brain edema with raised intracranial pressure	Corticosteroids are NOT recommended for management	X						X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Stroke Unit	1	A hospitalized acute stroke patient requires rehabilitation	The patient should be treated in a comprehensive or rehabilitation stroke unit by an interdisciplinary team					X			X		X		X		O	X
Stroke Unit	2	A patient with acute stroke is hospitalized	The patient should be treated by an interdisciplinary team, which may consist of a physician, nurse, physical therapist, occupational therapist, speech and language pathologist, psychologist, social worker, dietitian, recreation therapist, patient and family/caregivers								X						O	
Surgery	1	If an acute stroke patient has significant middle cerebral artery infarction and satisfies specific criteria (e.g. age and symptom onset)	The patient should be urgently referred to a neurosurgeon for consideration of hemicraniectomy	B1						X								
Surgery	2	If an acute stroke patient has an IA or AVM	Endovascular ablation of the IA or AVM should be considered					X		X								

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
Surgery	3	If an acute stroke patient has an IA	Surgical clipping of the IA should be considered					X										
Surgery	4							X					X					
Surgery	5	If an acute stroke patient has an IA	Intracranial reperfusion therapy of the IA should be considered					X										
TIA Evaluation	1	If a patient has a suspected TIA whether first seen in primary or secondary care	The patient should have a full assessment that includes assessment of stroke risk using the ABCD ² tool at the initial point of health care contact							X								
TIA Evaluation	2	If a patient has a suspected TIA	The following investigations should be undertaken routinely: full blood count, electrolytes, renal function, cholesterol level, glucose level, and electrocardiogram.							X			X					
Triage	1	If a patient has an acute stroke	Emergency department staff should use a validated stroke screening tool							X								
tPA	1	If a patient presents with signs and symptoms of acute stroke	The patient should be evaluated for tPA eligibility									O						X

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Category	#	IF	THEN	AHA-Adams	AHA-Adams2	AHA-GWTG	AHA-Sacco	Alberts	AMA-PCPI	Australian	Canadian	Cheng	European	Heuschmann	Holloway	JCAHO/CDC	Kapral	Lindsay
tPA	2	If a patient is eligible for thrombolytic therapy	Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is recommended	X		O				X		O	X		X	O		X
tPA	3	If a patient has an acute stroke and presents to the emergency room and has an ischemic stroke	The patient should receive IV t-PA within 60 minutes after triage (ED arrival)			O												
tPA	4	If a patient presents with signs and symptoms of acute stroke and does not have evidence of intracranial hemorrhage	Treatment with tPA within three hours of onset of stroke should NOT be precluded	A2														
tPA	5	If a patient presents with signs and symptoms of acute stroke and has specific CT findings (hemorrhage, ischemia affecting more than 1/3 of a cerebral hemisphere)	Treatment with tPA within three hours of onset of stroke should be precluded	A2														
tPA	6	If a patient presents with signs and symptoms of acute stroke beyond three hours after onset	Intravenous tPA may be of benefit (but is not recommended for routine clinical practice)										X					

Appendix Table A-4. Summary Literature Review of Processes of Care for Ischemic Stroke

Key:

O = no evidence or strength of recommendation specified.

X = highest level of evidence (Level A in Table A-1) and expert consensus was that either the intervention was useful, effective, and otherwise should be done (Grade 1 in Table A-1) or that the intervention was not useful, ineffective, potentially dangerous and should otherwise be avoided (Grade 3 in Table A-1).

A2 = highest level of evidence (Level A in Table A-1) and there is conflicting opinion about the usefulness/efficacy of a procedure or treatment.

B1 = moderate level of evidence (Level B in Table A-1) and expert consensus was that the intervention was useful, effective, and otherwise should be done (Grade 1 in Table A-1).

C3 = low level of evidence (Level C in Table A-1) and expert consensus was that that the intervention was not useful, ineffective, potentially dangerous and should otherwise be avoided (Grade 3 in Table A-1).

Acronyms:

ACEI	Angiotensin Converting Enzyme Inhibitor	INR	International Normalized Ratio
ADL	Activity of Daily Living	LDL	Low Density Lipoprotein
ARB	Angiotensin Receptor Blocker	MAP	Mean Arterial Pressure
AVM	Arteriovenous Malformation	MI	Myocardial Infarction
BMI	Body Mass Index	MR perfusion	Magnetic Resonance Perfusion imaging (of brain)
CAD	Coronary Artery Disease	MRA/MRV	Magnetic Resonance Angiogram / Venogram
CEA	Carotid Endarterectomy	MRI with diffusion	Magnetic Resonance Imaging (of brain) with diffusion
CHD	Chronic Heart Disease	PE	Pulmonary Embolism
CTA	Computerized Tomography Angiogram	PET	Magnetic Resonance Perfusion imaging (of brain)
CVA	Cerebral Vascular Accident	PFO	Patent Foramen Ovale
DBP	Diastolic Blood Pressure	SBP	Systolic Blood Pressure
DVT	Deep Venous Thrombosis	SSRI	Selective Serotonin Reuptake Inhibitor
ECG	Electrocardiogram (also EKG)	TCD	Transcarotid Doppler
ED	Emergency Department	TIA	Temporary Ischemic Attack
IA	Intracerebral Aneurism	tPA	Tissue Plasminogen Activator

Appendix Table A-5. Functional Outcome Measures

REFERENCES

1. Adams HP, Jr., del Zoppo G, Alberts MJ, et al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. *Stroke*. May 2007;38:1655-1711.
2. Adams RJ, Albers G, Alberts MJ, et al. Update to the AHA/ASA recommendations for the prevention of stroke in patients with stroke and transient ischemic attack. *Stroke*. May 2008;39(5):1647-1652.
3. American Heart Association: Get With The Guidelines Stroke Fact Sheet 2008. Available at: http://www.americanheart.org/downloadable/heart/1222293163737sfactsheet1_S_web.pdf. Accessed December 2008.
4. Sacco RL, Adams R, Albers G, et al. Guidelines for prevention of stroke in patients with ischemic stroke or transient ischemic attack: a statement for healthcare professionals from the American Heart Association/American Stroke Association Council on Stroke: co-sponsored by the Council on Cardiovascular Radiology and Intervention: the American Academy of Neurology affirms the value of this guideline. *Stroke*. Feb 2006;37(2):577-617.
5. Alberts MJ, Latchaw RE, Selman WR, et al. Recommendations for comprehensive stroke centers: a consensus statement from the Brain Attack Coalition. *Stroke*. Jul 2005;36(7):1597-1616.
6. American Medical Association: Physician Consortium for Performance Improvement® (PCPI) Performance Measure Status Report 2008. <http://www.ama-assn.org/ama1/pub/upload/mm/370/measures111408.pdf>. Accessed December 2008.
7. National Stroke Foundation of Australia: *Clinical Guidelines for Acute Stroke Management 2007*. Available at: http://www.strokefoundation.com.au/component/option,com_docman/Itemid,0/task,doc_view/gid,122/. Accessed November 2008.
8. Canadian Stroke Network and the Heart and Stroke Foundation of Canada: *Canadian Stroke Strategy. Canadian Best Practice Recommendations for Stroke Care: 2006*. Ottawa, 2006. Available at: http://www.strokecenter.org/prof/CSSManualENG_WEB_Sept07.pdf. Accessed November 2008.

Appendix Table A-5. Functional Outcome Measures

9. Cheng EM, Fung CH. Quality indicators for the care of stroke and atrial fibrillation in vulnerable elders. *J Am Geriatr Soc*. Oct 2007;55 Suppl 2:S431-437.
10. The European Stroke Organisation (ESO) Executive Committee and the ESO Writing Committee: *Guidelines for Management of Ischaemic Stroke and Transient Ischaemic Attack 2008*. *Cerebrovasc Dis* 2008; 25:457-507.
11. Heuschmann PU, Biegler MK, Busse O, et al. Development and implementation of evidence-based indicators for measuring quality of acute stroke care: the Quality Indicator Board of the German Stroke Registers Study Group (ADSR). *Stroke*. Oct 2006;37(10):2573-2578.
12. Holloway RG, Vickrey BG, Benesch C, Hinchey JA, Bieber J. Development of performance measures for acute ischemic stroke. *Stroke*. Sep 2001;32(9):2058-2074.
13. The Joint Commission: Stroke Performance Measures 2008. Available at: http://www.jointcommission.org/NR/rdonlyres/9BB8B4D9-D558-40A1-84E1-D0A56478062D/0/F_Section4_Sep08.pdf. Accessed December 2008.
14. Kapral MK, Laupacis A, Phillips SJ, et al. Stroke care delivery in institutions participating in the Registry of the Canadian Stroke Network. *Stroke*. Jul 2004;35(7):1756-1762.
15. Lindsay MP, Kapral MK, Gladstone D, et al. The Canadian Stroke Quality of Care Study: establishing indicators for optimal acute stroke care. *Cmaj*. Feb 1 2005;172(3):363-365.

Appendix Table A-5. Functional Outcome Measures

Scale	Description	Scale Range	Worst Outcome	Favorable Outcome	Best Outcome
Barthel Index (BI)	Measure of the ability to perform ADL	0-100	0	BI \geq 95	100=complete independence
Modified Rankin Scale (mRS)	Simplified overall assessment of function	0-5	5=severe disability	mRS \leq 1	0=absence of symptoms
Glasgow Outcome Scale (GOS)	Global assessment of function: 1=good recovery; 2=moderate disability; 3=severe disability; 4= survival but in a vegetative state; 5=death	1-5	5=death	GOS=1	1=good recovery

Source: The National Institute of Neurological Disorder and Stroke rt-PA Stroke Study Group. Tissue Plasminogen Activator for acute ischemic stroke. 333:24; 1581-158

Appendix B:

Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Outcomes Category	Outcomes	Outcomes Rate (%)			References
		1 month	3 month	12 month	
Altered level of consciousness	Confusion	5.0			71
Altered level of consciousness	Consciousness disturbances	15.8			67
Altered level of consciousness	Delirium	2.0			69
Altered level of consciousness	Diminished level of consciousness		1.0		70
Altered level of consciousness	Hallucination		<1.0		70
Cardiac	Acute coronary syndrome without MI	11.7			64
Cardiac	AF	0.5			26
Cardiac	AMI	1.0-4.5	7.0		18,26,64,65,68,71
Cardiac	Angina/MI/cardiac ischemia		1.0		70
Cardiac	Cardiac arrhythmias	0.3-3.0			62,71
Cardiac	Cardiac complications	0.7-17.2			26,67
Cardiac	Congestive heart failure	0.2-2.0	2.0-3.0		26,71,62,70
Cardiac	Hypertension	0.5-14.8			26,67
Cardiac	Pulmonary edema		1.0		70
Dermatologic	Rashes (other than infective)	2.0			71
Endocrine	Hyperglycemia	6.0-16.5	1.0		67,69,70
Fluid and Electrolytes	Dehydration/renal failure	7.0			69
Functional	Disability		19.5		25
GI	Constipation	7.9			62
GI	Gastritis or gastric/duodenal ulcer	2.6			68
GI	Gastrointestinal bleeding	1.6-3.0	3.0		62,69,70,71
GI	Aspiration	2.5			62
Hemorrhage	Other bleeding	1.1			62
Hemorrhage	Peripheral bleeding	0.1			26
Infection, chest	Aspiration pneumonia	1.6-11.0	1.5-3.0		18,29,70
Infection, chest	Bronchitis or upper respiratory infection	2.5			13
Infection, chest	Chest infection	3.0-12.0	17.2-22.0	13-23.0	60,62,64,68,69,71

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Outcomes Category	Outcomes	Outcomes Rate (%)			References
		1 month	3 month	12 month	
Infection, chest	Pneumonia	1.8-12.0	5.0		2,26,63,65,66,70
Infection, chest	Pneumonia/aspiration pneumonitis	8.4			13
Infection, chest	Pulmonary infection	10.7			67
Infection, other	Cellulitis	1.0	1.0		66,70
Infection, other	Fever/Pyrexial illness	1.2-23.7			13,26,64,65,68,71
Infection, other	Infective (fungal infections and septicemia)	7.0			71
Infection, other	Other infection	2.5-8.0	12.7-19.0	8.0-25.0	60,64,69
Infection, other	Sepsis		1.0		70
Infection, other	UTI	1.7-16.2	1.0-27.9	16-23.0	13,26,29,60,62,63,64,65,66,67,68,70,71
Infection, other	Viral infection	1.7			13
Mental status	Depression	2.0-5.0	<1.0-26.0	17.0-50.0	54,60,62,69,70,71
Mobility & gait	Decubitus ulcer	0.2			63
Mobility & gait	DVT	0.4-3.0	1.0-2.5	1	26,60,62,64,69,70,71
Mobility & gait	Fall	1.0-22.0	3.3-25.0	8.0-49.0	60,62,64,65,71
Mobility & gait	Fracture	0.9-3.0			68,71
Mobility & gait	Pressure sore	0.6-18.0	2.9-21.0	8	18,60,62,64,65,68,71
Mortality	Fatality	5-15.6	12.9-20.5		25,63,69
Neurologic	Extracranial bleeding	2.0-6.6			18,65,68
Neurologic	Unexplained blackout			9.0-19.0	60
Neurologic	Acute toxic encephalopathy		<1.0		70
Neurologic	Brain edema		4.0		70
Neurologic	Brain herniation		2.0		70
Neurologic	Dizziness		<1.0		70
Neurologic	Epileptic seizure	0.5-4.0	3.0	1.0-5.0	2,26,60,62,71
Neurologic	Hemorrhagic transformation	3.0			65
Neurologic	Hydrocephalus		<1.0		70
Neurologic	Increased intracranial pressure	0.2-2.8			2,26
Neurologic	Intracerebral hemorrhage	0.2-0.4			26,63

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Outcomes Category	Outcomes	Outcomes Rate (%)			References
		1 month	3 month	12 month	
Neurologic	Intracranial hypertension		<1.0		70
Neurologic	Intraparenchymal hemorrhage		2.0		70
Neurologic	Neuroradiologic damage progression	7.9			67
Neurologic	Recurrent cerebral ischemia	1.6			26
Neurologic	Seizure	1.0-4.0	1.0-2.5		64,65,67,70,69
Neurologic	Stroke progression	13-18.4			64,65,69
Neurologic	Stroke recurrence	1.0-4.9	5.1-9.0	6.0-9.0	2,25,60,62,64,65,71
Neurologic	TIA		<1.0		70
Other	Arthritis	0.7-2.0			62,71
Other	Hyperthermia	19.9			67
Other	New infarct/extension		5.0		70
Other	Other (requiring medical intervention)	2.6			65
Pain	Diffuse pain	23.9			64
Pain	Other pain	34.0-53.3		35.0-41.0	60,64
Pain	Pain requiring analgesia	6.0			71
Pain	Shoulder pain	2.0-4.0	9.0-10.7	11.0-15	60,64,71
Psychiatric	Anxiety, clinical		14.0		60
Psychiatric	Anxiety, drug therapy			4.0-5.0	60
Psychiatric	Anxiety, symptoms			34.0-44.0	60
Pulmonary	Dyspnea		1.0		70
Pulmonary	Hypoxia		1.0		70
Pulmonary	Oxygen saturation <92%	15.1			67
Pulmonary	Pulmonary embolism	0.1-1.0	1.0-1.2		2,26,60,62,63,64,70,71
Readmission	Readmission	24.3	2.0	15.0-31.0	44,60
Urologic/bladder	Retention of urine	5.0			62
Urologic/bladder	Urinary incontinence	27.7			53
Vascular	Acute limb/bowel ischemia	1.0			71
Vascular	Carotid stenosis		2.0		70
Vascular	Peripheral vascular disorder		1.0		70

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

Key:

ADL	Activities of Daily Living	mg/dl	milligrams per deciliter
AF	Atrial Fibrillation	MI	Myocardial Infarction
AMI	Acute Myocardial Infarction	mmol/L	millimoles per Liter
AMT	Abbreviated Mental Test	mOsm/kg	milliOsmoles per kilogram
BI	Barthel Index	mRS	Modified Rankin Scale
C	Celsius	OR	Odds Ratio
CHD	Coronary Heart Disease	NIHSS	NIH Stroke Scale
CHF	Coronary Heart Failure	PAD	Peripheral Artery Disease
CNS	Canadian Neurological Scale	RH	Relative Hazard
CT	Computerized Tomography	rtPA	Recombinant tissue plasminogen activator
CVA	Cerebrovascular Attack	SAI	Stroke-associated infection
DVT	Deep Vein Thrombosis	SD	Standard Deviation
GCS	Glasgow Coma Scale	SSS	Scandinavian Stroke Scale
GI	Gastrointestinal	TACI	Total Anterior Circulation Infarction
GOS	Glasgow Outcome Scale	TIA	Transient Ischemic Attack
HR	Hazard Ratio	UTI	Urinary Tract Infection
IHD	Ischemic Heart Disease	WST	Water Swallow Test
IQCODE	Informant Questionnaire on Cognitive Decline in the Elderly		
LACI	Lacunar Infarct		
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders III - Revision		

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

REFERENCES

References for Risk Factors: [1-49][50-59]

References for Outcomes: [2, 12, 13, 18, 26, 29, 31, 38, 44, 49, 60-71]

1. Wong, K.S., *Risk factors for early death in acute ischemic stroke and intracerebral hemorrhage: A prospective hospital-based study in Asia. Asian Acute Stroke Advisory Panel.* Stroke, 1999. 30(11): p. 2326-30.
2. Heuschmann, P.U., et al., *Predictors of in-hospital mortality and attributable risks of death after ischemic stroke: the German Stroke Registers Study Group.* Arch Intern Med, 2004. 164(16): p. 1761-8.
3. Basile, A.M., et al., *Selective risk factors profiles and outcomes among patients with stroke and history of prior myocardial infarction. The European Community Stroke Project.* J Neurol Sci, 2008. 264(1-2): p. 87-92.
4. Collins, T.C., et al., *Short-term, intermediate-term, and long-term mortality in patients hospitalized for stroke.* J Clin Epidemiol, 2003. 56(1): p. 81-7.
5. Roquer, J., et al., *Clustering of vascular risk factors and in-hospital death after acute ischemic stroke.* J Neurol, 2007. 254(12): p. 1636-41.
6. Jeng, J.S., et al., *Predictors of survival and functional outcome in acute stroke patients admitted to the stroke intensive care unit.* J Neurol Sci, 2008. 270(1-2): p. 60-6.
7. Tang, W.K., et al., *Frequency and clinical determinants of poststroke cognitive impairment in nondemented stroke patients.* J Geriatr Psychiatry Neurol, 2006. 19(2): p. 65-71.
8. Kwon, H.M., et al., *The pneumonia score: a simple grading scale for prediction of pneumonia after acute stroke.* Am J Infect Control, 2006. 34(2): p. 64-8.
9. Ois, A., et al., *Heart failure in acute ischemic stroke.* J Neurol, 2008. 255(3): p. 385-9.
10. Lau, K.K., et al., *Hypertension after acute stroke and clinical outcome.* Cerebrovasc Dis, 2005. 20(3): p. 201-4.
11. Fischer, U., et al., *Impact of comorbidity on ischemic stroke outcome.* Acta Neurol Scand, 2006. 113(2): p. 108-13.
12. Pinto, A.N., et al., *Can a clinical classification of stroke predict complications and treatments during hospitalization?* Cerebrovasc Dis, 1998. 8(4): p. 204-9.
13. Grau, A.J., et al., *Fever and infection early after ischemic stroke.* J Neurol Sci, 1999. 171(2): p. 115-20.
14. Candelise, L., G. Pinardi, and A. Morabito, *Mortality in acute stroke with atrial fibrillation. The Italian Acute Stroke Study Group.* Stroke, 1991. 22(2): p. 169-74.
15. Macciocchi, S.N., et al., *Ischemic stroke: relation of age, lesion location, and initial neurologic deficit to functional outcome.* Arch Phys Med Rehabil, 1998. 79(10): p. 1255-7.
16. Demchuk, A.M., et al., *Serum glucose level and diabetes predict tissue plasminogen activator-related intracerebral hemorrhage in acute ischemic stroke.* Stroke, 1999. 30(1): p. 34-9.
17. Corsori, B., et al., *Prognostic factors in first-ever stroke in the carotid artery territory seen within 6 hours after onset.* Stroke, 1993. 24(4): p. 532-5.

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

18. Yoo, S.H., et al., *Undernutrition as a predictor of poor clinical outcomes in acute ischemic stroke patients*. Arch Neurol, 2008. 65(1): p. 39-43.
19. Ovbiagele, B., et al., *Frequency and determinants of pneumonia and urinary tract infection during stroke hospitalization*. J Stroke Cerebrovasc Dis, 2006. 15(5): p. 209-13.
20. Weir, C.J., et al., *Low triglyceride, not low cholesterol concentration, independently predicts poor outcome following acute stroke*. Cerebrovasc Dis, 2003. 16(1): p. 76-82.
21. De Silva, D.A., et al., *Concomitant coronary artery disease among Asian ischaemic stroke patients*. Ann Acad Med Singapore, 2008. 37(7): p. 573-5.
22. Sumer, M.M., I. Ozdemir, and N. Tascilar, *Predictors of outcome after acute ischemic stroke*. Acta Neurol Scand, 2003. 107(4): p. 276-80.
23. Kammersgaard, L.P., et al., *Short- and long-term prognosis for very old stroke patients. The Copenhagen Stroke Study*. Age Ageing, 2004. 33(2): p. 149-54.
24. Sheikh, K., et al., *Predictors of mortality and disability in stroke*. J Epidemiol Community Health, 1983. 37(1): p. 70-4.
25. Acciarresi, M., et al., *First-ever stroke and outcome in patients admitted to Perugia Stroke Unit: predictors for death, dependency, and recurrence of stroke within the first three months*. Clin Exp Hypertens, 2006. 28(3-4): p. 287-94.
26. Weimar, C., et al., *Complications following acute ischemic stroke*. Eur Neurol, 2002. 48(3): p. 133-40.
27. Weimar, C., et al., *Age and National Institutes of Health Stroke Scale Score within 6 hours after onset are accurate predictors of outcome after cerebral ischemia: development and external validation of prognostic models*. Stroke, 2004. 35(1): p. 158-62.
28. Sellars, C., et al., *Risk factors for chest infection in acute stroke: a prospective cohort study*. Stroke, 2007. 38(8): p. 2284-91.
29. Aslanyan, S., et al., *Pneumonia and urinary tract infection after acute ischaemic stroke: a tertiary analysis of the GAIN International trial*. Eur J Neurol, 2004. 11(1): p. 49-53.
30. Johnston, K.C., et al., *A predictive risk model for outcomes of ischemic stroke*. Stroke, 2000. 31(2): p. 448-55.
31. Silva, Y., et al., *Semi-intensive monitoring in acute stroke and long-term outcome*. Cerebrovasc Dis, 2005. 19(1): p. 23-30.
32. Aslanyan, S., et al., *Poststroke neurological improvement within 7 days is associated with subsequent deterioration*. Stroke, 2004. 35(9): p. 2165-70.
33. Kelly, J., et al., *Dehydration and venous thromboembolism after acute stroke*. QJM, 2004. 97(5): p. 293-6.
34. Liu, X., et al., *Subtypes and one-year survival of first-ever stroke in Chinese patients: The Nanjing Stroke Registry*. Cerebrovasc Dis, 2006. 22(2-3): p. 130-6.
35. Ois, A., et al., *Early arterial study in the prediction of mortality after acute ischemic stroke*. Stroke, 2007. 38(7): p. 2085-9.
36. Alevizaki, M., et al., *Low triiodothyronine: a strong predictor of outcome in acute stroke patients*. Eur J Clin Invest, 2007. 37(8): p. 651-7.
37. Paciaroni, M., et al., *Dysphagia following Stroke*. Eur Neurol, 2004. 51(3): p. 162-7.
38. Vargas, M., et al., *Clinical consequences of infection in patients with acute stroke: is it prime time for further antibiotic trials?* Stroke, 2006. 37(2): p. 461-5.

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

39. Petty, G.W., et al., *Ischemic stroke subtypes : a population-based study of functional outcome, survival, and recurrence*. Stroke, 2000. 31(5): p. 1062-8.
40. Roquer, J., et al., *Comparison of the impact of atrial fibrillation on the risk of early death after stroke in women versus men*. J Neurol, 2006. 253(11): p. 1484-9.
41. Paciaroni, M., et al., *Early hemorrhagic transformation of brain infarction: rate, predictive factors, and influence on clinical outcome: results of a prospective multicenter study*. Stroke, 2008. 39(8): p. 2249-56.
42. Bohannon, R.W. and N. Lee, *Association of physical functioning with same-hospital readmission after stroke*. Am J Phys Med Rehabil, 2004. 83(6): p. 434-8.
43. Solberg, O.G., et al., *Derivation and validation of a simple risk score for predicting 1-year mortality in stroke*. J Neurol, 2007. 254(10): p. 1376-83.
44. Chuang, K.Y., et al., *Identifying factors associated with hospital readmissions among stroke patients in Taipei*. J Nurs Res, 2005. 13(2): p. 117-28.
45. Mann, G., G.J. Hankey, and D. Cameron, *Swallowing function after stroke: prognosis and prognostic factors at 6 months*. Stroke, 1999. 30(4): p. 744-8.
46. Lee, A.H., P.J. Somerford, and K.K. Yau, *Risk factors for ischaemic stroke recurrence after hospitalisation*. Med J Aust, 2004. 181(5): p. 244-6.
47. Sumer, M., I. Ozdemir, and O. Erturk, *Progression in acute ischemic stroke: frequency, risk factors and prognosis*. J Clin Neurosci, 2003. 10(2): p. 177-80.
48. Dziewas, R., et al., *Pneumonia in acute stroke patients fed by nasogastric tube*. J Neurol Neurosurg Psychiatry, 2004. 75(6): p. 852-6.
49. Jorgensen, H.S., et al., *Stroke recurrence: predictors, severity, and prognosis. The Copenhagen Stroke Study*. Neurology, 1997. 48(4): p. 891-5.
50. Tutuarima, J.A., et al., *Risk factors for falls of hospitalized stroke patients*. Stroke, 1997. 28(2): p. 297-301.
51. Ashburn, A., et al., *Predicting people with stroke at risk of falls*. Age Ageing, 2008. 37(3): p. 270-6.
52. Arboix, A., et al., *Predictive clinical factors of in-hospital mortality in 231 consecutive patients with cardioembolic cerebral infarction*. Cerebrovasc Dis, 1998. 8(1): p. 8-13.
53. Pettersen, R., B.K. Saxby, and T.B. Wyller, *Poststroke urinary incontinence: one-year outcome and relationships with measures of attentiveness*. J Am Geriatr Soc, 2007. 55(10): p. 1571-7.
54. Pohjasvaara, T., et al., *Frequency and clinical determinants of poststroke depression*. Stroke, 1998. 29(11): p. 2311-7.
55. Eriksson, M., et al., *Self-reported depression and use of antidepressants after stroke: a national survey*. Stroke, 2004. 35(4): p. 936-41.
56. Sacco, R.L., et al., *Predictors of mortality and recurrence after hospitalized cerebral infarction in an urban community: the Northern Manhattan Stroke Study*. Neurology, 1994. 44(4): p. 626-34.
57. O'Donnell, M.J., et al., *Gastrointestinal bleeding after acute ischemic stroke*. Neurology, 2008. 71(9): p. 650-5.
58. Larrue, V., et al., *Risk factors for severe hemorrhagic transformation in ischemic stroke patients treated with recombinant tissue plasminogen activator: a secondary analysis of*

Appendix B: Summary Literature Review of Rates of Stroke-related Outcomes and Post-Stroke Complications

- the European-Australasian Acute Stroke Study (ECASS II)*. Stroke, 2001. 32(2): p. 438-41.
59. Sharma, J.C., et al., *What influences outcome of stroke--pyrexia or dysphagia?* Int J Clin Pract, 2001. 55(1): p. 17-20.
 60. Langhorne, P., et al., *Medical complications after stroke: a multicenter study*. Stroke, 2000. 31(6): p. 1223-9.
 61. McLean, R., *Incidence of complications in stroke patients in an acute rehabilitation unit in Singapore*. Cerebrovasc Dis, 2007. 24(1): p. 129-32.
 62. Navarro, J.C., E. Bitanga, and N. Suwanwela, *Complication of acute stroke: A study in ten Asian countries*. Neurology Asia, 2008. 13: p. 33-39.
 63. Saposnik, G., et al., *Stroke outcome in those over 80: a multicenter cohort study across Canada*. Stroke, 2008. 39(8): p. 2310-7.
 64. Indredavik, B., et al., *Medical complications in a comprehensive stroke unit and an early supported discharge service*. Stroke, 2008. 39(2): p. 414-20.
 65. Hong, K.S., D.W. Kang, and J.S. Koo, *Impact of neurological and medical complications on 3-month outcomes in acute ischaemic stroke*. European Journal of Neurology, 2008. 15: p. 1324-1331.
 66. Kwan, J. and P. Hand, *Infection after acute stroke is associated with poor short-term outcome*. Acta Neurol Scand, 2007. 115(5): p. 331-8.
 67. Rocco, A., et al., *Monitoring after the acute stage of stroke: a prospective study*. Stroke, 2007. 38(4): p. 1225-8.
 68. Bae, H.J., et al., *In-hospital medical complications and long-term mortality after ischemic stroke*. Stroke, 2005. 36(11): p. 2441-5.
 69. Cavallini, A., et al., *Role of monitoring in management of acute ischemic stroke patients*. Stroke, 2003. 34(11): p. 2599-603.
 70. Johnston, K.C., et al., *Medical and neurological complications of ischemic stroke: experience from the RANTTAS trial*. RANTTAS Investigators. Stroke, 1998. 29(2): p. 447-53.
 71. Davenport, R.J., et al., *Complications after acute stroke*. Stroke, 1996. 27(3): p. 415-20.

Appendix C:

Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Aspiration										
Disabling stroke (BI<60)								11.0		45
Recurrent stroke								36.0		45
Chest infection										
Delayed/absent swallowing reflex								11.8		45
Dysphagia										
Age				1.1						37
NIHSS >=15				1.9						37
Somnolence				1.6						37
Any clinical swallowing impairment							4.0			45
Cord penetration							17.0			45
Delayed oral transit							6.0			45
Dysphagia, chest infection or aspiration										
Age >70							5.0			45
Gender, male							5.0			45
Cord penetration							14.0			45
Delayed oral transit							14.0			45
Pneumonia										
Atrial fibrillation, current	2.0									19
Age	8.0									8
Age (per decade)	1.2									19

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Age >= 65	3.3									28
AMT < 8	4.2									28
Decreased consciousness				7.4						48
Diabetes							1.6			32
Dysarthria/ no speech	3.7									28
Dysphagia	15.6									8
Facial palsy				3.1						48
Failed WST	3.6									28
Gender, male	3.7						1.7			8,32
History of CHF	2.0									19
History of dementia	0.2									19
Mechanical ventilation	9.8									8
NIHSS at admission	3.4									8
OCSP classification, TACI (total anterior circulation infarction)							1.9			32
Rankin scale (mRS >= 4)	2.9									28
Different diet										
Delayed oral transit				32.0						45
Dehydration										
Age >70	4.0									33
Barthel Index <=9	8.1									33
Osmolality >297 mOsm/kg	4.7									33
Urea:creatinine ratio >80	3.4									54
Depression										
Dependence				1.8-2.9						54

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
ADL-dependent at follow-up				2.3						55
Age (65-74)(vs. <=64)				0.7						55
Age (75-84)(vs. <=64)				0.6						55
Age (>=85)(vs. <=64)				0.6						55
Female				1.3						55
Living situation at follow-up: at home, alone (vs. at home, not alone)				1.6						55
Recurrent strokes				1.1						55
History of prestroke depression				2.3 - 3.4						54
Stroke severity measure on SSS				1.1						54
Falls										
Major psychotropic drug	0.5									50
Urinary incontinence	2.3									50
History of near-falling in hospital							4.1			51
All hemorrhage (including hemorrhage transformations)										
NIHSS (5-pt intervals)	1.6-12.4									16
Smoker, current	0.4									16
Diabetes mellitus	3.6									16
Hemorrhagic Transformation										
Cardioembolism				2.4						41
Large lesion				4.6						41
Low platelet count				1.0						41

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Parenchymal hematoma										
Cardioembolism				5.3						41
Large lesion				12.2						41
Other cause				6.8						41
Treatment with thrombolysis				3.5						41
Parenchymal hemorrhage (hemorrhagic transformation)										
Age				1.0						58
Attenuation of density on baseline CT				2.6						58
Baseline systolic blood pressure				1.0						58
Prior congestive heart failure				2.6						58
rtPA				3.6						58
Symptomatic intracranial hemorrhage (hemorrhagic transformation)										
Age				1.0						58
Attenuation of density on baseline CT				2.0						58
Prior congestive heart failure				3.7						58
rtPA				3.2						58
Urinary tract infection										
Gender, male	0.5						0.4			19, 32
History of stroke/TIA	1.5									19
Cognitive impairment										
Gender, female							8.9			7
Education							0.8			7

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
NIHSS dysarthria score							4.1			7
Urinary incontinence							4.4			7
Atrial fibrillation							9.4			7
Neurological deterioration										
Age, per additional 10%				1.0						32
Recovery, per additional 10% (NIHSS % change from baseline to day 7)				1.2						32
7-day NIHSS, per additional point				1.1						32
Stroke progression										
Lesions in the posterior circulation							3.2			47
Noncardioembolic subtypes of stroke							4.5			47
Stroke recurrence										
Age at index admission, in years			1.0							46
Gender, male	1.7									49
Aboriginal		1.5								46
Atrial fibrillation	1.8									49
Former TIA	2.0									49
Hypertension	1.4									49
Diabetes		1.3								46
Other cardiac conditions		1.2								46
Transferred to another hospital at index admission		1.3								46
Treated in stroke unit at index admission		0.8								46
Urinary incontinence		1.3								46

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Diabetes mellitus				1.1						25
Readmission										
ADL limitations, 3-4 (vs. 0-2)	6.6									44
ADL limitations, 5-6 (vs. 0-2)	8.6									44
Adopted a care plan	3.4									44
Care arrangements, family care and others (vs. institution)	4.5									44
Care arrangements, full-time helper (vs. institution)	10.2									44
First incidence of stroke	2.4									44
Other invasive nursing care	2.6									44
Wound Nursing care	3.3									44
History of diabetes, -/+							1.9			42
Length of stay (days)							1.1			42
Length of stay in days, <=4/>4							2.2			42
Postadmission Barthel							0.9			42
Postadmission Barthel, <=10/>10							0.3			42
Prestroke Barthel							0.9			42
Prestroke Barthel, <20/20							0.5			42
Poor Functional Outcome (BI<70)										
Age				2.3						30
Aspiration pneumonia				3.8						32
Infarct volume				2.7						30
Initial NIHSS score				2.3						30
NIHSS>6 (initial severity)				11.8						13
Prior disability				4.4						30

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Urinary tract infection				1.9						32
Fever (48 h)				3.9						13
Poor Functional Outcome (GOS>2)										
Age				2.7						30
Infarct volume				3.7						30
Initial NIHSS score				2.4						30
Poor Functional Outcome (mRS>=2)										
Atrial fibrillation	3.2-4.9	1.2		1.2						11,17,40,37
Age (per year)	1.1		1.0	1.2						6,37,40
All gastrointestinal bleeds	3.3									57
Aspiration pneumonia				3.4						32
Dysphagia				1.6						37
CNS score on admission <6.5 (vs. CNS >=6.5)	22.0-39.5			12.0			14.0			17,22
Coronary artery disease	3.8									11
Diabetes	4.0									11
Heart failure with preserved left ventricular function				2.5						9
Gastrointestinal bleed without transfusion	3.6									57
Ischemic heart disease		1.2								40
NIHSS (per unit)	1.2	1.1								6,40
NIHSS (initial severity)	1.2			3.9						11,9
NIHSS >= 15				1.4						37
NIHSS score (1-wk)				1.8						18
Posterior localization of the infarct	4.2									22

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Previous stroke	2.4									6
Requiring Ventilator aid	7.0									6
Smoking		1.3								40
Stroke Subtype (TACI)(vs. PACI and LACI)	2.3									6
Systolic heart failure				3.0						9
Tube feeding	16.6									38
Under nutrition at 1 wk				4.5						18
UTI				3.1						32
Pre-treatment with statins				0.3						9
Thrombolytic treatment				0.5						9
Incomplete Functional Recovery (BI<95)										
Age (difference of 1 year)				1.1-1.5						26,27
Gender, female				1.5						26
Diabetes mellitus				1.9						26
Fever >38 degrees Celsius				3.0						26
Left arm weakness (difference of 1 scale score)				1.6						26
Right arm weakness (difference of 1 scale score)				1.5						26
Lenticulostriate arteries infarction				2.1						26
Neurological complications				3.6						26
NIHSS total score at admission (difference of 1 scale score)				1.1-1.3						26,27
Prior stroke				1.7						26
Rankin scale (difference of 1 scale score)				1.7						26

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Disability on Discharge (BI=3-5)										
Gender, female	1.1									24
Disability from previous stroke	1.3									24
Extensive motor deficit	1.1									24
Impaired consciousness	1.1									24
Incontinence	2.1									24
Combined neurological deficits	1.2									24
Handicap (BI=2-5)										
Aphasia				1.5						3
Diabetes				1.4						3
Hypertension				0.7						3
Myocardial infarction				1.5						3
Paralysis				2.3						3
Pre-stroke institutionalization				2.2						3
Swallowing problems				1.8						3
Urinary incontinence				2.6						3
Death or Disability (mRS=3-5)										
Age				1.1-1.2						25,41
Gender, male				0.9						25
Atherosclerosis				1.8						41
First-ever stroke				0.5						41
History of diabetes				2.1						41
Impaired consciousness				0.9						25
NIHSS >= 15				1.4						25,41
Parenchymal hematoma				15.3						41

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Superficial Middle cerebral artery				1.1						25
Independently Ambulatory										
Pneumonia	0.2									19
Good Functional Outcome (BI>60)										
Age 70 yrs (vs. 60yrs)				0.2						15
Age 80 (vs. 60 yrs)							0.4			15
Cortical lesion (vs. other)							3.2			15
Left cerebral hemisphere lesion (vs. right hemisphere)							5.5			15
Stroke experience (vs. none)							0.3			15
Excellent Functional Outcome (BI>=95)										
Age				0.4						30
Infarct volume				0.3						30
Initial NIHSS				0.5						30
Prior diabetes				0.4						30
Prior disability				0.2						30
Excellent Functional Outcome (GOS=1)										
Age				0.5						30
Initial NIHSS				0.5						30
Prior diabetes				0.4						30
Prior disability				0.2						30

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Excellent neurological outcome (NIHSS score <= 1)										
Initial NIHSS				0.2						30
Small vessel				0.4						30
Prior stroke				0.3						30
Prior diabetes				0.3						30
Prior disability				0.2						30
Infarct volume				0.1						30
Survival										
Age (10 y)		1.3								39
Rankin 4 or 5 (vs. 1 or 2)		11.6								39
Atherosclerosis with stenosis (vs. cardioembolic)		3.3								39
Survival free of subsequent stroke (recurrence)										
Atherosclerosis with stenosis (vs. cardioembolic)		3.3								39
Mortality or institutional care										
NIHSS (per unit)				1.1						6
Requiring ventilator aid				9.2						6
TACI Stroke Subtype (vs. PACI and LACI)				2.9						6
POCI Stroke Subtype (vs. PACI and LACI)				2.7						6
Mortality or nursing home residence										

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Age >= 80							2.3			53
BI score <9 on admission							4.8-5.1			53
Continence (vs. incontinence)							3.0			53
Continuity of attention							3.3			53
Poor prestroke instrumental ADL function (NEADL score <52)							2.6-4.1			53
Stroke-related neurocognitive impairment (Screening Instrument for Neurocognitive Impairments in Stroke score <54)							4.7-6.9			53
1-month mortality										
Atrial fibrillation	2.2	1.6	1.3-1.8							1,2,5,14,40
Age	1.1		1.0-1.1							10,40,52
Age (for 10-year increment in age)		1.4								56
Age 55-64 (vs. <45)			1.6							4
Age 65-74 (vs. <45)			2.6							4
Age >=75 (vs. <45)			4.5							4
Age 65-74 (vs. <65)			1.2							2
Age 75-84 (vs. <65)			1.8							2
Age >=85 (vs. <65)			3.1							2
Age 56-75 (vs. >=76)	0.7									1
Age (>75)		2.1								14
Age, very old (>=85 years)	2.5-2.7									23
Age, very old (>=85 years)	2.7									
Gender, male	2.4		1.4-1.9							5,40,52
Black race (vs. non-Hispanic white)			0.8							4

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Anti-hypertensive treatment			0.2							10
Average pulse			0.9							10
Chronic heart failure			1.1							4
Diabetes	1.5		1.3							1,2
Glasgow Coma Scale			0.9							10
Hemorrhagic stroke			8.3							10
History of CVA/TIA			3.5							10
History of hypertension			4.1							10
History of ischemic heart disease			3.9							10
Hyperlipidemia			0.5-0.6							5
In-hospital medical complications			2.4							5
Ischemic heart disease	2.0		1.5-2.0							1,5,40
Massive lesion			8.4							10
NIHSS at admission			1.1-1.2							5,40
Other cardiac arrhythmias			1.1							4
Peripheral arterial disease			2.1							5
Previous stroke			1.4							2
Stroke severity 2 (vs. 0-1)			1.9-2.5							2
Stroke severity 3 (vs. 0-1)			6.1-6.7							2
Stroke severity 4 (vs. 0-1)			11.1-11.8							2
Stroke severity at admission, per 10 point decrease in SSS score	2.3-2.7									23
Altered consciousness	13.2									52
Congestive heart failure	3.7	2.6-2.7								52,56
Conjugate deviation of eyes	1.2									24
Early recurrent embolism	33.6									52
Extensive motor deficit	1.1									24

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
History of unconsciousness at onset	1.1									24
Impaired consciousness	1.1									24
Limb weakness	8.0									52
Pneumonia	6.0									19
Pre-existing disability	2.1									23
Previous antiplatelet treatment	0.5									1
Smoker, ex- (vs. current smoker)	2.2									1
Admission glucose (for a 100mg/dI increment in glucose)		1.4								56
Admission glucose >140mg/dI		1.8-2.8								56
Depressed consciousness		3.2								56
Heavy ethanol use		3.5								56
Hypertension at discharge		1.9								56
Lacunar syndrome		0.6								56
Major hemispheric or basilar syndrome		1.6-5.9								56
Severe neurologic deficit (score of <=3, unknown scale)		6.0								14
3-month mortality										
Age (difference of 1 year)				1.1-1.3	1.8					25,27,35,37,59
Age, increasing (per decade)						(1.6)				20
Age 45-54 (vs. <45)						0.6				4
Age 65-74 (vs. <45)						2.1				4
Age >=75 (vs. <45)						3.5				4
Married, currently						0.8				4
No reported income (vs. >=\$20000)						1.4				4
Aspiration pneumonia						2.2				32

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Requiring Ventilator aid						3.5				6
Hematocrit <30%						2.3				6
Initial stroke severity (NIHSS) per unit				1.2		1.1				6,27,35
Atrial fibrillation				1.1-1.5		(1.4)				3,20,25
Alcohol consumption				1.3						3
Arterial stenosis/occlusion				3.4						35
Dysphagia				1.4	2.6					37,59
Heart failure				2.1						35
Hypertension				0.9						3
Impaired consciousness				1.5						25
Ischemic heart disease				1.6	2.1					35,59
Lacunar syndrome				0.7						25
Myocardial infarction				1.3						3
NIHSS >= 15				1.5						25,37
Previous disability				1.9						35
Small vessel disease				0.7						25
Somnolence				1.2						37
Thrombolytic treatment				0.3						35
Undetermined causes				0.7						25
Hyperglycemia						(1.5)				20
Increasing triglyceride level (per quartile)						(0.8)				20
Symptoms resolved within 72 h						(0.6)				20
Diabetes mellitus					2.4					59
TACS (total anterior circulation syndrome)					2.8					59
12-month mortality										

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Age (per 10-year increase)							1.9		1.3	36,43
Age (46-60 vs. <=45)									1.4	34
Age (61-75 vs. <=45)									3.1	34
Age (>75 vs. <=45)									5.7	34
Age 55-64 (vs. <45)									1.9	4
Age 65-74 (vs. <45)									3.2	4
Age >=75 (vs. <45)									5.4	4
Age (>75)								3.4		14
Race, Hispanic (vs. non-Hispanic white race)									0.7	4
Atrial fibrillation								1.7	1.8	14,34
Chronic heart failure									1.1	4
Diabetes mellitus									1.9	34
Glucose on admission (per 10-mg increase)									1.0	36
Hemorrhagic stroke									1.9	36
History of Transient ischemic attack									2.7	34
Hypercholesterolaemia									1.9	36
Hyperlipidemia									1.7	34
Hypertension									2.5	34
Mental illness									1.2	4
Smoking									1.6	34
SSS: Scandinavian Stroke Scale (per 10 point increase)									0.6	36
T3									0.7	36
Charlson comorbidity index, increase of 1							1.3			43
CNS (<=3.5 vs. >3.5)							5.1			43

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

Complications and Risk Factors	1 Month			3 Month			12 Month			References
	OR	RR	HR	OR	RR	HR/(RH)	OR	RR	HR	
Combined neurological deficits							1.1			24
Conjugate deviation of eyes							1.1			24
Impaired consciousness							1.1			24
Sensory deficit							1.2			24
Severe disability (Rankin 4-5)							1.1			24
Stroke type, hemorrhagic (vs. ischemic or unknown)							3.2			43
Infarct on computed tomogram								2.0		14
Severe neurologic deficit (score of <=3)								2.9		14

Key:

- | | | | |
|-----|-----------------------------|---------|--|
| ADL | Activities of Daily Living | mg/dl | milligrams per deciliter |
| AF | Atrial Fibrillation | MI | Myocardial Infarction |
| AMI | Acute Myocardial Infarction | mmol/L | millimoles per Liter |
| AMT | Abbreviated Mental Test | mOsm/kg | milliOsmoles per kilogram |
| BI | Barthel Index | mRS | Modified Rankin Scale |
| C | Celsius | OR | Odds Ratio |
| CHD | Coronary Heart Disease | NIHSS | NIH Stroke Scale |
| CHF | Coronary Heart Failure | PAD | Peripheral Artery Disease |
| CNS | Canadian Neurological Scale | RH | Relative Hazard |
| CT | Computerized Tomography | rtPA | Recombinant tissue plasminogen activator |
| CVA | Cerebrovascular Attack | SAI | Stroke-associated infection |
| DVT | Deep Vein Thrombosis | SD | Standard Deviation |
| GCS | Glasgow Coma Scale | SSS | Scandinavian Stroke Scale |
| GI | Gastrointestinal | TACI | Total Anterior Circulation Infarction |
| GOS | Glasgow Outcome Scale | TIA | Transient Ischemic Attack |

OR—Odds Ratio; RR—Relative Risk; HR—Hazard Ratio

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

HR	Hazard Ratio	UTI	Urinary Tract Infection
IHD	Ischemic Heart Disease	WST	Water Swallow Test
IQCODE	Informant Questionnaire on Cognitive Decline in the Elderly		
LACI	Lacunar Infarct		
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders III - Revision		

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

REFERENCES

References for Risk Factors: [1-49][50-59]

References for Outcomes: [2, 12, 13, 18, 26, 29, 31, 38, 44, 49, 60-71]

1. Wong, K.S., *Risk factors for early death in acute ischemic stroke and intracerebral hemorrhage: A prospective hospital-based study in Asia*. Asian Acute Stroke Advisory Panel. Stroke, 1999. 30(11): p. 2326-30.
2. Heuschmann, P.U., et al., *Predictors of in-hospital mortality and attributable risks of death after ischemic stroke: the German Stroke Registers Study Group*. Arch Intern Med, 2004. 164(16): p. 1761-8.
3. Basile, A.M., et al., *Selective risk factors profiles and outcomes among patients with stroke and history of prior myocardial infarction. The European Community Stroke Project*. J Neurol Sci, 2008. 264(1-2): p. 87-92.
4. Collins, T.C., et al., *Short-term, intermediate-term, and long-term mortality in patients hospitalized for stroke*. J Clin Epidemiol, 2003. 56(1): p. 81-7.
5. Roquer, J., et al., *Clustering of vascular risk factors and in-hospital death after acute ischemic stroke*. J Neurol, 2007. 254(12): p. 1636-41.
6. Jeng, J.S., et al., *Predictors of survival and functional outcome in acute stroke patients admitted to the stroke intensive care unit*. J Neurol Sci, 2008. 270(1-2): p. 60-6.
7. Tang, W.K., et al., *Frequency and clinical determinants of poststroke cognitive impairment in nondemented stroke patients*. J Geriatr Psychiatry Neurol, 2006. 19(2): p. 65-71.
8. Kwon, H.M., et al., *The pneumonia score: a simple grading scale for prediction of pneumonia after acute stroke*. Am J Infect Control, 2006. 34(2): p. 64-8.
9. Ois, A., et al., *Heart failure in acute ischemic stroke*. J Neurol, 2008. 255(3): p. 385-9.
10. Lau, K.K., et al., *Hypertension after acute stroke and clinical outcome*. Cerebrovasc Dis, 2005. 20(3): p. 201-4.
11. Fischer, U., et al., *Impact of comorbidity on ischemic stroke outcome*. Acta Neurol Scand, 2006. 113(2): p. 108-13.
12. Pinto, A.N., et al., *Can a clinical classification of stroke predict complications and treatments during hospitalization?* Cerebrovasc Dis, 1998. 8(4): p. 204-9.
13. Grau, A.J., et al., *Fever and infection early after ischemic stroke*. J Neurol Sci, 1999. 171(2): p. 115-20.
14. Candelise, L., G. Pinardi, and A. Morabito, *Mortality in acute stroke with atrial fibrillation. The Italian Acute Stroke Study Group*. Stroke, 1991. 22(2): p. 169-74.
15. Macciocchi, S.N., et al., *Ischemic stroke: relation of age, lesion location, and initial neurologic deficit to functional outcome*. Arch Phys Med Rehabil, 1998. 79(10): p. 1255-7.
16. Demchuk, A.M., et al., *Serum glucose level and diabetes predict tissue plasminogen activator-related intracerebral hemorrhage in acute ischemic stroke*. Stroke, 1999. 30(1): p. 34-9.
17. Censori, B., et al., *Prognostic factors in first-ever stroke in the carotid artery territory seen within 6 hours after onset*. Stroke, 1993. 24(4): p. 532-5.

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

18. Yoo, S.H., et al., *Undernutrition as a predictor of poor clinical outcomes in acute ischemic stroke patients*. Arch Neurol, 2008. 65(1): p. 39-43.
19. Ovbiagele, B., et al., *Frequency and determinants of pneumonia and urinary tract infection during stroke hospitalization*. J Stroke Cerebrovasc Dis, 2006. 15(5): p. 209-13.
20. Weir, C.J., et al., *Low triglyceride, not low cholesterol concentration, independently predicts poor outcome following acute stroke*. Cerebrovasc Dis, 2003. 16(1): p. 76-82.
21. De Silva, D.A., et al., *Concomitant coronary artery disease among Asian ischaemic stroke patients*. Ann Acad Med Singapore, 2008. 37(7): p. 573-5.
22. Sumer, M.M., I. Ozdemir, and N. Tascilar, *Predictors of outcome after acute ischemic stroke*. Acta Neurol Scand, 2003. 107(4): p. 276-80.
23. Kammersgaard, L.P., et al., *Short- and long-term prognosis for very old stroke patients. The Copenhagen Stroke Study*. Age Ageing, 2004. 33(2): p. 149-54.
24. Sheikh, K., et al., *Predictors of mortality and disability in stroke*. J Epidemiol Community Health, 1983. 37(1): p. 70-4.
25. Acciarresi, M., et al., *First-ever stroke and outcome in patients admitted to Perugia Stroke Unit: predictors for death, dependency, and recurrence of stroke within the first three months*. Clin Exp Hypertens, 2006. 28(3-4): p. 287-94.
26. Weimar, C., et al., *Complications following acute ischemic stroke*. Eur Neurol, 2002. 48(3): p. 133-40.
27. Weimar, C., et al., *Age and National Institutes of Health Stroke Scale Score within 6 hours after onset are accurate predictors of outcome after cerebral ischemia: development and external validation of prognostic models*. Stroke, 2004. 35(1): p. 158-62.
28. Sellars, C., et al., *Risk factors for chest infection in acute stroke: a prospective cohort study*. Stroke, 2007. 38(8): p. 2284-91.
29. Aslanyan, S., et al., *Pneumonia and urinary tract infection after acute ischaemic stroke: a tertiary analysis of the GAIN International trial*. Eur J Neurol, 2004. 11(1): p. 49-53.
30. Johnston, K.C., et al., *A predictive risk model for outcomes of ischemic stroke*. Stroke, 2000. 31(2): p. 448-55.
31. Silva, Y., et al., *Semi-intensive monitoring in acute stroke and long-term outcome*. Cerebrovasc Dis, 2005. 19(1): p. 23-30.
32. Aslanyan, S., et al., *Poststroke neurological improvement within 7 days is associated with subsequent deterioration*. Stroke, 2004. 35(9): p. 2165-70.
33. Kelly, J., et al., *Dehydration and venous thromboembolism after acute stroke*. QJM, 2004. 97(5): p. 293-6.
34. Liu, X., et al., *Subtypes and one-year survival of first-ever stroke in Chinese patients: The Nanjing Stroke Registry*. Cerebrovasc Dis, 2006. 22(2-3): p. 130-6.
35. Ois, A., et al., *Early arterial study in the prediction of mortality after acute ischemic stroke*. Stroke, 2007. 38(7): p. 2085-9.
36. Alevizaki, M., et al., *Low triiodothyronine: a strong predictor of outcome in acute stroke patients*. Eur J Clin Invest, 2007. 37(8): p. 651-7.
37. Paciaroni, M., et al., *Dysphagia following Stroke*. Eur Neurol, 2004. 51(3): p. 162-7.
38. Vargas, M., et al., *Clinical consequences of infection in patients with acute stroke: is it prime time for further antibiotic trials?* Stroke, 2006. 37(2): p. 461-5.

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

39. Petty, G.W., et al., *Ischemic stroke subtypes : a population-based study of functional outcome, survival, and recurrence*. Stroke, 2000. 31(5): p. 1062-8.
40. Roquer, J., et al., *Comparison of the impact of atrial fibrillation on the risk of early death after stroke in women versus men*. J Neurol, 2006. 253(11): p. 1484-9.
41. Paciaroni, M., et al., *Early hemorrhagic transformation of brain infarction: rate, predictive factors, and influence on clinical outcome: results of a prospective multicenter study*. Stroke, 2008. 39(8): p. 2249-56.
42. Bohannon, R.W. and N. Lee, *Association of physical functioning with same-hospital readmission after stroke*. Am J Phys Med Rehabil, 2004. 83(6): p. 434-8.
43. Solberg, O.G., et al., *Derivation and validation of a simple risk score for predicting 1-year mortality in stroke*. J Neurol, 2007. 254(10): p. 1376-83.
44. Chuang, K.Y., et al., *Identifying factors associated with hospital readmissions among stroke patients in Taipei*. J Nurs Res, 2005. 13(2): p. 117-28.
45. Mann, G., G.J. Hankey, and D. Cameron, *Swallowing function after stroke: prognosis and prognostic factors at 6 months*. Stroke, 1999. 30(4): p. 744-8.
46. Lee, A.H., P.J. Somerford, and K.K. Yau, *Risk factors for ischaemic stroke recurrence after hospitalisation*. Med J Aust, 2004. 181(5): p. 244-6.
47. Sumer, M., I. Ozdemir, and O. Erturk, *Progression in acute ischemic stroke: frequency, risk factors and prognosis*. J Clin Neurosci, 2003. 10(2): p. 177-80.
48. Dziewas, R., et al., *Pneumonia in acute stroke patients fed by nasogastric tube*. J Neurol Neurosurg Psychiatry, 2004. 75(6): p. 852-6.
49. Jorgensen, H.S., et al., *Stroke recurrence: predictors, severity, and prognosis. The Copenhagen Stroke Study*. Neurology, 1997. 48(4): p. 891-5.
50. Tutuarima, J.A., et al., *Risk factors for falls of hospitalized stroke patients*. Stroke, 1997. 28(2): p. 297-301.
51. Ashburn, A., et al., *Predicting people with stroke at risk of falls*. Age Ageing, 2008. 37(3): p. 270-6.
52. Arboix, A., et al., *Predictive clinical factors of in-hospital mortality in 231 consecutive patients with cardioembolic cerebral infarction*. Cerebrovasc Dis, 1998. 8(1): p. 8-13.
53. Pettersen, R., B.K. Saxby, and T.B. Wyller, *Poststroke urinary incontinence: one-year outcome and relationships with measures of attentiveness*. J Am Geriatr Soc, 2007. 55(10): p. 1571-7.
54. Pohjasvaara, T., et al., *Frequency and clinical determinants of poststroke depression*. Stroke, 1998. 29(11): p. 2311-7.
55. Eriksson, M., et al., *Self-reported depression and use of antidepressants after stroke: a national survey*. Stroke, 2004. 35(4): p. 936-41.
56. Sacco, R.L., et al., *Predictors of mortality and recurrence after hospitalized cerebral infarction in an urban community: the Northern Manhattan Stroke Study*. Neurology, 1994. 44(4): p. 626-34.
57. O'Donnell, M.J., et al., *Gastrointestinal bleeding after acute ischemic stroke*. Neurology, 2008. 71(9): p. 650-5.
58. Larrue, V., et al., *Risk factors for severe hemorrhagic transformation in ischemic stroke patients treated with recombinant tissue plasminogen activator: a secondary analysis of*

Appendix C: Summary Literature Review of Risk Estimates of Factors that Influence Outcomes for Ischemic Stroke

- the European-Australasian Acute Stroke Study (ECASS II)*. Stroke, 2001. 32(2): p. 438-41.
59. Sharma, J.C., et al., *What influences outcome of stroke--pyrexia or dysphagia?* Int J Clin Pract, 2001. 55(1): p. 17-20.
 60. Langhorne, P., et al., *Medical complications after stroke: a multicenter study*. Stroke, 2000. 31(6): p. 1223-9.
 61. McLean, R., *Incidence of complications in stroke patients in an acute rehabilitation unit in Singapore*. Cerebrovasc Dis, 2007. 24(1): p. 129-32.
 62. Navarro, J.C., E. Bitanga, and N. Suwanwela, *Complication of acute stroke: A study in ten Asian countries*. Neurology Asia, 2008. 13: p. 33-39.
 63. Saposnik, G., et al., *Stroke outcome in those over 80: a multicenter cohort study across Canada*. Stroke, 2008. 39(8): p. 2310-7.
 64. Indredavik, B., et al., *Medical complications in a comprehensive stroke unit and an early supported discharge service*. Stroke, 2008. 39(2): p. 414-20.
 65. Hong, K.S., D.W. Kang, and J.S. Koo, *Impact of neurological and medical complications on 3-month outcomes in acute ischaemic stroke*. European Journal of Neurology, 2008. 15: p. 1324-1331.
 66. Kwan, J. and P. Hand, *Infection after acute stroke is associated with poor short-term outcome*. Acta Neurol Scand, 2007. 115(5): p. 331-8.
 67. Rocco, A., et al., *Monitoring after the acute stage of stroke: a prospective study*. Stroke, 2007. 38(4): p. 1225-8.
 68. Bae, H.J., et al., *In-hospital medical complications and long-term mortality after ischemic stroke*. Stroke, 2005. 36(11): p. 2441-5.
 69. Cavallini, A., et al., *Role of monitoring in management of acute ischemic stroke patients*. Stroke, 2003. 34(11): p. 2599-603.
 70. Johnston, K.C., et al., *Medical and neurological complications of ischemic stroke: experience from the RANTTAS trial*. RANTTAS Investigators. Stroke, 1998. 29(2): p. 447-53.
 71. Davenport, R.J., et al., *Complications after acute stroke*. Stroke, 1996. 27(3): p. 415-20.

Appendix D:

Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
	Dysphasia (difficulty with language)	Dysphasia	784.5	Other speech disturbance	
			438.12	Stroke late effects - dysphasia	
	Aphasia	Aphasia	438.10	Speech and language deficit, unspecified (late effects of cerebrovascular disease)	
			438.11	Aphasia (late effects of cerebrovascular disease)	
			438.19	Other speech and language deficits (late effects of cerebrovascular disease)	
			784.3	Aphasia (excludes late effects of cerebrovascular disease)	
	Dysarthria (inability to articulate)	Dysarthria	438.13	Late effects of cerebrovascular disease-dysarthria	
			438.14	Late effects of cerebrovascular disease-fluency disorder (stuttering)	
			784.5	Other speech disturbance	
	Dysphagia	Dysphagia	438.82	Other late effects of cerebrovascular accident-dysphagia	
			787.2x	Dysphagia	
	Facial palsy	FacialPalsy	438.83	Other late effects of cerebrovascular disease-Facial weakness, facial droop	
			781.94	Facial weakness-facial droop (excludes weakness due to late effect of cerebrovascular accident)	
			351.0	Bell's palsy (Facial palsy)	
	Hemiplegia/Hemiparesis	Hemiplegia_Hemiparesis	438.2x	stroke late effect - hemiplegia	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			342.xx	Hemiplegia/hemiparesis	
	Other paralysis	OtherParalysis	438.3x	stroke late effect - monoplegia upper limb	
			438.4x	stroke late effect - monoplegia lower limb	
			438.5x	Other paralytic syndrome	
			344.3x	Monoplegia lower limb	
			344.4x	Monoplegia upper limb	
			344.5x	Monoplegia unspecified limb	
			344.8x	Other specified paralytic states (including locked in syndrome)	
			344.9	Paralysis, unspecified	
		Hemineglect	Hemineglect	781.8	neurologic neglect syndrome
	Vision loss	VisionLoss	438.7x	stroke - loss of vision	
			368.46	Homonymous bilateral field defects	
	Facial weakness	FcialWeakness	438.83	stroke late effect - facial weakness	
			781.94	facial weakness	
	Apraxia	Apraxia	438.81	stroke late effect - apraxia	
			784.69	other symptolic dysfunction (apraxia)	
	Ataxia	Ataxia	438.84	stroke late effect - ataxia	
			781.2	abnormality of gait	
			781.3	lack of coordination	
			331.89	cerebral ataxia	
			334.3	other cerebellar ataxia	
			334.4	cerebellar ataxia in diseases classified elsewhere	
	Decreased consciousness, altered mental status, coma	ALTLOC	780.0	Alteration of consciousness	
			780.01	Coma	
			780.02	Transient alteration of awareness	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes	
Neurological Signs, Symptoms, Disability						
			780.03	Persistent vegetative state		
			780.09	Other -Drowsiness, Semicoma, Somnolence, Stupor, and Unconsciousness		
			780.97	Altered mental status		
	Seizure or seizure disorder	SeizureDis	780.3x	convulsions		
			345.xx	seizure disorder		
			436	acute, but ill-defined, cerebrovascular disease (apoplexy)		
	Dysphagia or other clinical swallowing impairment	DysphagiaSwall	438.82	Other late effects of cerebrovascular accident-dysphagia		
				787.2x	Dysphagia	
	Paralysis (in any combination)	Paralysis	438.2x	Hemiplegia/hemiparesis		
				438.3x	Monoplegia of upper limb	
				438.4x	Monoplegia of lower limb	
				438.5x	Other paralytic syndrome	
				342.xx	Hemiplegia/hemiparesis	
				344.3x	Monoplegia lower limb	
				344.4x	Monoplegia upper limb	
				344.5x	Monoplegia unspecified limb	
				344.8x	Other specified paralytic states (including locked in syndrome)	
				344.9	Paralysis, unspecified	
	Arm Weakness	ArmWk	438.3	Monoplegia of upper limb		
				438.30	Monoplegia of upper limb affecting unspecified side	
				438.31	Monoplegia of upper limb affecting dominant side	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			438.32	Monoplegia of upper limb affecting nondominant side	
			344.4x	Monoplegia upper limb	
	Conjugate deviation of eyes	ConDevEye	378.87	Other dissociated deviation of eye movements	
	Tube feeding (enteral nutrition)	TubeFeed	99.6	Enteral infusion of concentrated nutritional substances	Procedure code
			43.11	Percutaneous gastrostomy	Procedure code
			43.19	Other gastrostomy	Procedure code
			46.32	Percutaneous jejunostomy	Procedure code
			46.39	Other enterostomy	Procedure code
			96.36	Irrigation of gastrostomy or enterostomy	Procedure code
			97.02	Replacement of gastrostomy tube	Procedure code
			97.03	Replacement of enterostomy tube	Procedure code
			Perenteral nutrition	TPN	99.15
	Spinal Cord penetration	SpinalCordPen	323.9	Unspecified cause of encephalitis, myelitis, and encephalomyelitis	
			326.x	Late effects of intracranial abscess or pyogenic infection	
	Any post-stroke disability	AnyPostStrokeDis	438.xx	Late effects of stroke	
	Large vessel pre-cerebral atherosclerosis	LVesselPreCerAth	433.xx	Precerebral atherosclerosis	
	Other cerebral ischemic signs or symptoms	OCerISOS	437.xx	Other and ill-defined cerebrovascular disease	
Medical Complications after Stroke					
	Pneumonia (not defined as	Pneumonia	480.x	Viral pneumonia	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
	aspiration)		481	Pneumococcal pneumonia	
			482.xx	Other bacterial pneumonia	
			483.x	Pneumonia due to other specified organism	
			484.x	Pneumonia in infectious diseases classified elsewhere	
			485	Bronchopneumonia, organism unspecified	
			486	Pneumonia, organism unspecified	
	Aspiration pneumonia	Apneumonia	507.x	Pneumonitis due to solids and liquids	
	Dehydration	Dehydration	276.5x	volume depletion	
	Osmolality >297 mOsm/kg	Osmolality	276.0	hyperosmolality	
	Urea:creatinine ratio >80 (renal failure)	UreaCreaR	584.xx	acute renal failure	
			585.xx	chronic renal failure	
			586.xx	renal failure, unspecified	
	Urinary tract infection	UrinTraInfec	599.0	Urinary tract infection, site not specified	
			590.1x	Acute pyelonephritis	
			590.2x	Renal and perinephric abscess	
			590.3	Pyeloureteritis cystica	
			590.8	Other pyelonephritis, NOS	
			595.9	Cystitis, unspecified	
			601.0	Acute Prostatitis	
			601.2	Abscess of Prostate	
	Urinary incontinence	UrinInc	788.30	Urinary incontinence, unspecified	
			788.31	Urge incontinence	
			788.32	Stress incontinence, male	
			788.33	Mixed incontinence (female) (male)	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			788.34	Incontinence without sensory awareness	
			788.35	Post-void dribbling	
			788.36	Nocturnal enuresis	
			788.37	Continuous leakage	
			788.38	Overflow incontinence	
			788.39	Other urinary incontinence	
			625.6	Stress incontinence, female	
			788.91	Functional urinary incontinence (due to cognitive impairment or severe physical disability or immobility)	
			596.5x	Other functional disorders of the bladder	
			344.61	Neurogenic bladder	
	Urinary retention	UrinRet	788.2x	Urinary retention	
		Mechanical	96.01	Insertion of nasopharyngeal airway	Procedure code
			96.02	Insertion of oropharyngeal airway	Procedure code
			96.03	Insertion of esophageal obdurator airway	Procedure code
			96.04	Insertion of endotracheal tube	Procedure code
			96.05	Other intubation of respiratory tract	Procedure code
	Mechanical ventilation (respiratory failure)		96.70	Continuous invasive mechanical ventilation of unspecified duration	Procedure code
			96.71	Continuous invasive mechanical ventilation for less than 96 consecutive hours	Procedure code
			96.72	Continuous invasive mechanical ventilation for 96 consecutive hours or more	Procedure code

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			427.5	Cardiac arrest	
			518.81	Acute respiratory failure	
			518.84	Acute and chronic respiratory failure	
	Cardiopulmonary arrest (can code as diagnosis and procedure measures separately)	CardArrest	427.5	Cardiac arrest	
			799.1	Respiratory arrest	
			518.81	Acute respiratory failure	
			518.84	Acute and chronic respiratory failure	
			99.6x	Conversion of cardiac rhythm	Procedure code
			96.01	Insertion of nasopharyngeal airway	Procedure code
			96.02	Insertion of oropharyngeal airway	Procedure code
			96.03	Insertion of esophageal obdurator airway	Procedure code
			96.04	Insertion of endotracheal tube	Procedure code
			96.05	Other intubation of respiratory tract	Procedure code
	Pressure ulcers	PressUlcers	707.0x	Pressure ulcer	
			707.2x	Pressure ulcer stage	
	Cellulitis	Cellulitis	681.xx	Cellulitis of fingers and toes	
			682.xx	Other cellulitis and abscess	
			683	Acute lymphadenitis	
			684	Impetigo	
			782.86	Necrotizing fasciitis	
	Sepsis	Sepsis	038.xx	Septicemia	
			790.7	Bacteremia	
			995.91	Sepsis	
			995.92	Severe Sepsis	
	DVT	DVT	451.1x	Thrombophlebitis of Deep vessels of lower extremities	
			451.8x	Thrombophlebitis of other sites	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			453.4x	Venous thromboembolism and thrombosis of deep vessels of lower extremity	
	Pulmonary embolism	PulEmb	415.1x	Pulmonary embolism and infarction	
	Depression	Depression		(use Elixhauser Indicator definition)	
	All gastrointestinal bleeds (ulcer with bleeding, upper/lower gastrointestinal hemorrhage)	AllGastroBleed	531	Gastric ulcer	
			531.0x	Acute with hemorrhage	
			531.1x	Acute with perforation	
			531.2x	Acute with hemorrhage and perforation	
			531.3x	Acute without mention of hemorrhage or perforation	
			531.4x	Chronic or unspecified with hemorrhage	
			531.5x	Chronic or unspecified with perforation	
			531.6x	Chronic or unspecified with hemorrhage and perforation	
			531.7x	Chronic without mention of hemorrhage or perforation	
			531.9x	Unspecified as acute or chronic, without mention of hemorrhage or perforation	
			532	Duodenal ulcer	
			532.0x	Acute with hemorrhage	
			532.1x	Acute with perforation	
			532.2x	Acute with hemorrhage and perforation	
		532.3x	Acute without mention of hemorrhage or perforation		

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			532.4x	Chronic or unspecified with hemorrhage	
			532.5x	Chronic or unspecified with perforation	
			532.6x	Chronic or unspecified with hemorrhage and perforation	
			532.7x	Chronic without mention of hemorrhage or perforation	
			532.9x	Unspecified as acute or chronic, without mention of hemorrhage or perforation	
			533	Peptic ulcer, site unspecified	
			533.0x	Acute with hemorrhage	
			533.1x	Acute with perforation	
			533.2x	Acute with hemorrhage and perforation	
			533.3x	Acute without mention of hemorrhage or perforation	
			533.4x	Chronic or unspecified with hemorrhage	
			533.5x	Chronic or unspecified with perforation	
			533.6x	Chronic or unspecified with hemorrhage and perforation	
			533.7x	Chronic without mention of hemorrhage or perforation	
			533.9x	Unspecified as acute or chronic, without mention of hemorrhage or perforation	
			578	Gastrointestinal hemorrhage	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes	
Neurological Signs, Symptoms, Disability						
			578.0	Hematemesis		
			578.1	Blood in stool		
			578.9	Hemorrhage of gastrointestinal tract, unspecified		
Other risk factors for complications (including hemorrhagic transformation)						
appeared at row 50	Large vessel pre-cerebral atherosclerosis	LVesselPreCerAth	433.xx	Precerebral atherosclerosis		
	Treatment with thrombolysis	TreWThrom	99.10	Injection or infusion of thrombolytic agent	Procedure code	
			V45.88	Status post administration of tPA in a different facility within the last 24 hours prior to admission to the current facility.		
	Diabetes	DM		Elixhauser Indicator (Uncomplicated and complicated diabetes)		
	Admission glucose (for a 100mg/dl increment in glucose) (elevated glucose)	AdmGlucose	790.2x	Abnormal glucose		
				Impaired fasting glucose		
				Impaired glucose tolerance		
				Other abnormal glucose		
	Hypertension	Hypertension	401.x	Essential hypertension		
				Malignant hypertension		
				Benign hypertension		
				Hypertension nos		
				402.x	Hypertensive heart disease	
					Malignant hypertension	
					Malignant w/out CHF	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
				Malignant with CHF	
				Benign	
				Benign hyper w/out CHF	
				Benign hypertension w/ CHF	
				Unspecified	
				Unspecified w/out CHF	
				Unspecified w/ CHF	
			403.x	Hypertensive renal disease	
			404.x	Hypertensive heart and renal disease	
				Benign hypertensive heart and renal disease	
				Unspecified	
			405.x	Secondary hypertension	
				Secondary hypertension	
				Mal second hypertension	
				Renovascular	
				Other	
				Benign	
				Renovascular	
				Other	
				Second hypertension nos	
				Unspecified, renovascular	
				Second hypertension nec	
			437.2	Hypertensive encephalopathy	
		AcuMyoInf	410.x	Acute myocardial infarction	
				of anterolateral wall	
				of other anterior wall	
				of inferolateral wall	
	Acute myocardial infarction				

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
				of inferoposterior wall	
				of other inferior wall	
				of other lateral wall	
				True posterior wall infarction	
				Subendocardial infarction	
				of other specified sites	
				Unspecified site	
	Left sided valvular heart disease	LSVHRD	394.x	Disease of the mitral valve	
			395.x	Disease of the aortic valve	
			396.x	Disease of the mitral and aortic valve	
	Right sided valvular heart disease	RSVHRD	397.x	Diseases of other endocardial structures	
	Atrial fibrillation	AtrFib	427.31	Atrial fibrillation	
			427.32	Atrial flutter	
	Other cardiac arrhythmias	OCarArr		Cardiac dysrhythmias	
			427.0	Paroxysmal supraventricular tachycardia	
			427.1	Paroxysmal ventricular tachycardia	
			427.2	Paroxysmal tachycardia, unspecified	
			427.3	Atrial fibrillation and flutter	
				Atrial fibrillation	
				Atrial flutter	
			427.4	Ventricular fibrillation and flutter	
			427.41	Ventricular fibrillation	
			427.42	Ventricular flutter	
			427.5	Cardiac arrest	
			427.6	Premature beats	
			427.60	Premature beats, unspecified	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			427.61	Supraventricular premature beats	
			427.69	Other	
			427.8	Other specified cardiac dysrhythmias	
			427.81	Sinoatrial node dysfunction	
			427.89	Other (rhythm disorder)	
			427.9	Cardiac dysrhythmias, unspecified	
	Heart failure with preserved left ventricular function			Elixhauser Indicator (CHF)	
	Systolic heart failure	SysHRFail	428.1	Left heart failure	
			428.2	Systolic heart failure	
			428.4	Combined systolic and diastolic heart failure	
	History of CHF (left heart failure, cardiomyopathy)	HisCHF	398.91	Rheumatic heart failure	
			402.01	Malignant hypertensive heart disease w/CHF	
			402.11	Benign hypertensive heart disease w/chf	
			402.91	Unspecified hypertensive heart disease w/chf	
			404.01	Hypertensive heart and renal disease, with congestive heart failure, malignant	
			404.03	W/congestive and renal failure, malignant	
			404.11	Hypertensive heart and renal disease w/chf, benign	
			404.13	Hypertensive heart and renal disease benign w/ chf and renal failure	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			404.91	Unspecified w/chf	
			404.93	Unspecified w/chf and renal failure	
			425.0	Endomyocardial fibrosis	
			425.1	Hypertrophic obstructive cardiomyopathy	
			425.2	Obscure cardiomyopathy of Africa	
			425.3	Endocardial fibroelastosis	
			425.4	Other primary cardiomyopathies	
			425.5	Alcoholic cardiomyopathy	
			425.7	Nutritional and metabolic cardiomyopathy	
			425.8	Cardiomyopathy in other diseases classified elsewhere	
			425.9	Secondary cardiomyopathy, unspecified	
			428.0	Congestive heart failure	
			428.1	Left heart failure	
			428.2	Systolic Heart Failure	
			428.3	Diastolic Heart Failure	
			428.4	Combined systolic and diastolic heart failure	
			428.9	Heart failure unspecified	
		AlscHRD	410	Acute myocardial infarction	
			410.0x	of anterolateral wall	
			410.1x	of other anterior wall	
			410.2x	of inferolateral wall	
			410.3x	of inferoposterior wall	
			410.4x	of other inferior wall	
			410.5x	of other lateral wall	
	Any Ischemic Heart Disease: Coronary artery disease, angina, acute myocardial infarction, prior myocardial infarction				

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			410.6x	True posterior wall infarction	
			410.7x	Subendocardial infarction	
			410.8x	of other specified sites	
			410.9x	Unspecified site	
			411	Other acute and subacute forms of ischemic heart disease	
			411.0	Postmyocardial infarction syndrome	
			411.1	Intermediate coronary syndrome	
			411.81	Acute coronary occlusion without myocardial infarction	
			411.89	Other (coronary insufficiency (acute), Subendocardial ischemia)	
			412	Old myocardial infarction	
			413	Angina pectoris	
			413.0	Angina decubitus	
			413.1	Prinzmetal angina	
			413.9	Other and unspecified angina pectoris	
			414	Other forms of chronic ischemic heart disease	
			414.0	Coronary atherosclerosis	
			414.00	of unspecified type of vessel, native or graft	
			414.01	of native coronary artery	
			414.02	of autologous biological bypass graft	
			414.03	of nonautologous biological bypass graft	
			414.04	of artery bypass graft	
			414.05	of unspecified type of bypass graft	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			414.06	of native coronary artery of transplanted heart	
			414.07	of bypass graft (artery) (vein) of transplanted heart	
			414.1	Anuerysm and dissection of heart	
			414.10	Anuerysm of heart (wall)	
			414.11	Anuerysm of coronary vessels	
			414.12	Dissection of coronary artery	
			414.19	Other anuerysm of heart	
			414.2	Chronic total occlusion of coronary artery	
			414.3	Coronary atherosclerosis due to lipid rich plaque	
			414.8	Other specified forms of chronic ischemic heart disease	
			414.9	Chronic ischemic heart disease, unspecified	
			429.2	Cardiovascular disease	
	Hyperlipidemia	Hyperlipidemia	272	Disorders of lipid metabolism	
			272.0	Pure hypercholesterolemia	
			272.1	Pure hyperglyceridemia	
			272.2	Mixed hyperlipidemia	
			272.3	Hyperchylomicronemia	
			272.4	Other unspecified hyperlipidemia	
			272.5	Lipoprotein deficiencies	
			272.6	lipodystrophy	
			272.7	Lipidoses	
			272.8	Other disorders of lipid metabolism	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			272.9	Unspecified disorder of lipid metabolism	
	Dementia or Alzheimer's Disease	DemAlzDis	331.0	Alzheimer's disease	
			331.1	Frontotemporal dementia	
			331.2	Senile degeneration of the brain	
			331.82	Dementia with Lewy bodies	
			331.83	Mild cognitive impairment, so stated	
			290.xx	Dementias	
			294.1	Dementia in conditions classified elsewhere	
	Anemia (Hematocrit <30%)	AnemiaHem	280.x	Iron deficiency anemia	
			281.x	Other deficiency anemias	
			282.x	Hereditary hemolytic anemias	
			283.x	Acquired hemolytic anemias	
			284.xx	Aplastic anemia and other bone marrow failure syndromes	
			285.xx	Other and unspecified anemias	
	Peripheral vascular disease	PerVasDis	440	Atherosclerosis of aorta	
			440.1	Of renal artery	
			440.2x	Of native arteries of extremities	
				Unspecified	
				With intermittent claudication	
				With rest pain	
				With ulceration	
				With gangrene	
				Other	
				440.3	Of unspecified bypass graft of the extremities
		440.31	Of autologous vein of bypass graft		

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			440.32	Of nonautologous vein of bypass graft	
			440.8	Of other specified arteries	
			440.9	Generalized and unspecified atherosclerosis	
			441	Aortic aneurysm and dissection	
			441.0x	Dissection of aorta	
			441.1	Thoracic aneurysm, ruptured	
			441.2	Thoracic aneurysm w/o mention of rupture	
			441.3	Abdominal aneurysm, ruptured	
			441.4	Abdominal aneurysm w/o mention of rupture	
			441.5	Aortic aneurysm of unspecified site, ruptured	
			441.6	Thoracoabdominal aneurysm w/rupture	
			441.7	Thoracoabdominal aneurysm w/o rupture	
			441.9	Aortic aneurysm of unspec site w/o rupture	
			443.xx	Other peripheral vascular disease	
				Thromboangiitis obliterans	
				Other specified pvd	
				Peripheral angiopathy in disease classified elsewhere	
				Other	
				Pvd unspec	
			447.1	Stricture of artery	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes		
Neurological Signs, Symptoms, Disability							
			557	Acute vascular insufficiency of intestine			
			557.1	Chronic vascular insufficiency of intestine			
			557.9	Unspec vascular insufficiency of intestine			
			785.4	Gangrene (785.4)			
			V43.4	Blood vessel replaced			
	Low platelet count	LowPlaCnt	287.3x	Primary thrombocytopenia			
				287.4x	Secondary thrombocytopenia		
				287.5x	Thrombocytopenia, unspecified		
				286.4	von Willebrand's Disease		
	Bleeding Disorders (excluding platelet disorders)	BleDisExPlaDis	286.0	Coagulation defects			
				286.1			
				286.2			
				286.3			
				286.5			
				286.6			
				286.7			
				286.9			
					287.8	Other specified hemorrhagic conditions	
					287.9	Unspecified hemorrhagic conditions	
	Anticoagulation	Anticoagulation	V58.61	Anticoagulant - long term use			
				964.2	Poisoning by anticoagulant		
				E934.2	Anticoagulant	E codes are coded separately	
				E858.2	Accidental poisoning by agents affecting blood constituents	E codes are coded separately	
	Hypercoagulable state	HypCoaSta	289.81	Primary hypercoagulable state			

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			289.82	Secondary hypercoagulable state	
	Elixhauser Comorbidities	EliCom		Remaining Elixhauser Comorbidity Indicators	
Life style and habits					
	Drug dependence	DrgDep	304.xx	Drug dependence	
			305.2x	Cannabis abuse	
			305.3x	Hallucinogen abuse	
			305.4x	Sedative abuse	
			305.5x	Opioid abuse	
			305.6x	Cocaine abuse	
			305.7x	Amphetamine abuse	
	Heavy ethanol use	HeaEth	303.0x	Acute alcohol intoxication	
			303.9x	Other and unspecified alcohol dependence	
			291.x	Alcohol-related psychosis	
			305.0x	Alcohol abuse	
			571.0	Alcoholic fatty liver	
			571.1	Acute alcoholic hepatitis	
			572.2	Alcoholic cirrhosis of liver	
			572.3	Alcoholic liver damage, unspecified	
			V11.3	History of alcohol abuse	
	Smoker, current	SmokerCur	305.1x	Tobacco use disorder	
			V15.82	History of tobacco use	
Stroke type and history					
	First incidence of stroke			<Identify prior strokes by prior admits or ???>	
	Recurrent strokes	RecStroke	431.xx	Hemorrhagic stroke	Identify from prior admissions; also identify from
			433.01	occlusion of basilar artery with stroke	

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes	
Neurological Signs, Symptoms, Disability						
			433.11	occlusion of carotid artery with stroke	following admissions	
			433.21	occlusion of vertebral artery with stroke		
			433.31	occlusion of multiple and bilateral arteries with stroke		
			433.81	other specified precerebral artery occlusion with stroke		
			433.91	unspecified artery occlusion with stroke		
			434.xx	occlusion of cerebral arteries (stroke)		
			438.xx	stroke late effects		
	Former TIA	FormTIA	435.0	Basilar artery syndrome	Identifiy from prior admissions; also identify from following admissions	
				435.1		Vetebral artery syndrome
				435.2		Subclavian steal syndrome
				435.3		Vertebrobasilar artery syndrome
				435.8		Other specified transient cerebral ischemias
				435.9		Unspecified transient cerebral ischemias
	TIA (resolved)	TIAReslvd	V12.54	TIA with resolved symptoms		
	All cerebral hemorrhage (including hemorrhage transformations)	ACerHemIncHemTran	431	Intracerebral hemorrhage	Identify during prior, current, and subsequent admissions as separate variables	
				430		Subarachnoid hemorrhage
				432.x		Other and unspecified intracranial hemorrhage

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
	Lenticulostriate arteries infarction	LenArteriesInf	434.9	Cerebral artery occlusion, unspecified	
	Falls	Falls	E88x	(E-codes for falls)	E codes are coded separately
Admission History					
	Transferred to another hospital at index admission			<identify transfers based upon admit/discharge hx>	
	Pre-stroke institutionalization			(source of admission in past year - from residential care or skilled nursing facility)	
	Fever (48 h)	Fever48h	780.60		
	DNR			DNR in first 48 hours (OSHPD variable)	
In-hospital medical complications					
	(consider list of medical complications during index hospitalization)				
In-hospital evaluation (recommended processes)					
	Head CT	HeadCT	87.03	CAT scan of head	Procedure code
	Brain MRI	BrainMRI	88.91	MRI of brain and brain stem	Procedure code
	Carotid imaging	CarotidImaging	88.71	Diagnostic ultrasound of head and neck	Procedure code
			00.21	Intravascular imaging of extracranial cerebral vessels	Procedure code
			88.41	Arteriography of cerebral arteries	Procedure code
	Swallowing study	Swallowstudy	87.61	barium swallow	Procedure code

Appendix Table D-1. Codes for Stroke Patient Outcomes, Predictors, and Processes of Care: ICD9-CM Codes and Data Definitions

Clinical Categories	Complications and Risk Factors		ICD-9 Codes	Description of Code	Notes
Neurological Signs, Symptoms, Disability					
			42.29	other diagnostic procedures on esophagus	Procedure code
			42.23	other esophagoscopy	Procedure code
	Echocardiogram	Echocardiogram	88.72	Diagnostic ultrasound of heart	Procedure code

Appendix Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Clinical Categories	Complications and Risk Factors		CPT Codes	Description of Code	Notes
Medical Complications after Stroke					
	Mechanical ventilation (respiratory failure)	Mechnical_ed	31500	Intubation, endotracheal, emergency procedure	Procedure code
			94002	Ventilator management (initial)	Procedure code
			94003	Ventilator management (follow-up)	Procedure code
	Cardiopulmonary arrest (can code as diagnosis and procedure measures separately)	CardArrest_ed	92950	Cardiopulmonary rescucitation	
			92953	Temporary transcutaneous pacing	
			92960	Cardioversion (external)	
			92961	Cardioversion (internal)	Procedure code
Other risk factors for complications (including hemorrhagic transformation)					Angiography through existing catheter for follow-up study for transcatheter therapy, embolization or infusion
	Treatment with thrombolysis	TreWThrom_ed	37195	Thrombolysis, cerebral, by intravenous infusion	Intravenous thrombolysis
			37184	Primary percutaneous transluminal mechanical thrombectomy, noncoronary ... including ... thrombolytic injection	Catheter-directed intra-arterial thrombolysis. Code with catheterization codes (below)
			37185	Second and all subsequent vessels	
			37186	Secondary percutaneous transluminal mechanical thrombectomy ...	
			37201	Transcatheter therapy, infusion for thrombolysis other than coronary	

Appendix Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Clinical Categories	Complications and Risk Factors		CPT Codes	Description of Code	Notes
Medical Complications after Stroke					
			75896	Transcatheter therapy infusion, any method, S&I	
			75898	Angiography through existing catheter for follow-up study for transcatheter therapy, embolization or infusion	
			36215	Catheterization, L common carotid	Catheterization codes must be combined with thrombolytic codes
			36216	Catheterization, R common carotid, L internal carotid, L external carotid, L vertebral	
			36217	Catheterization, R internal carotid, R external carotid, R vertebral, basilar, all cerebral arteries	
			36218	Catheterization, Additional second- and third-order vessels within the same family Note: For each separate access, code the highest order vessel	
In-hospital evaluation (recommended processes)					
	Head CT	CTHead_ed	70450	CT HEAD/BRAIN W/O CONTRAST	
			70460	CT HEAD/BRAIN W/ CONTRAST	
			70470	CT HEAD/BRAIN W/O & W/ CONTRAST	
	CT Angiography	CTAngiography_ed	70496	CT ANGIOGRAPHY HEAD	
			70498	CT ANGIOGRAPHY NECK	
	MRI Brain	MRIBrain_ed	70551	MRI HEAD W/O CONTRAST	
			70552	MRI HEAD W/ CONTRAST	

Appendix Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Clinical Categories	Complications and Risk Factors		CPT Codes	Description of Code	Notes
Medical Complications after Stroke					
			70553	MRI HEAD W/ & W/O CONTRAST	
	MR Angiography	MRAngiography_ed	70544	MRA HEAD W/O CONTRAST	
			70545	MRA HEAD W/ CONTRAST	
			70546	MRA HEAD W & W/O CONTRAST	
			70547	MRA NECK W/O CONTRAST	
			70548	MRA NECK W CONTRAST	
			70549	MRA NECK W & W/O CONTRAST	
		Crotic Ultrasound	CaroticUltrasound_ed	93880	Diagnostic Ultrasounds - Carotid Arteries
	Carotid and Cerebral Angiography	CCAangiography_ed	75665	Angiography, carotid, cerebral, unilateral, radiological supervision and interpretation	
			75671	Angiography, carotid, cerebral, bilateral, radiological supervision and interpretation	
			75676	Angiography, carotid, cervical, unilateral, radiological supervision and interpretation	
			75680	Angiography, carotid, cervical, bilateral, radiological supervision and interpretation	
			75685	Angiography, vertebral, cervical, and/or intracranial, radiological supervision and interpretation	
			75705	Angiography, spinal, selective, radiological supervision and interpretation	
	Brain MRI Carotid imaging	Swallowstudy_ed	72430	Swallowing function, with cineradiography/videoradiography	

Appendix Table D-2. Additional Codes for Emergency Department to Hospital Transfer Patients (Emergency Department Database Records)

Clinical Categories	Complications and Risk Factors		CPT Codes	Description of Code	Notes
Medical Complications after Stroke					
			92610	Evaluation of oral and pharyngeal swallowing function	
			92611	Motion fluoroscopic evaluation of swallowing function by cine or video recording	
			92612	Flexible fiberoptic endoscopic evaluation of swallowing by cine or video recording	
			92613	Physician interpretation and report only	
			92616	Flexible fiberoptic endoscopic evaluation of swallowing and laryngeal sensory testing by cine or video recording	
			92617	Physician interpretation and report only	
	Echocardiogram	Echocardiogram_ed	93303	Transthoracic echocardiography	
			93304	Transthoracic echocardiography	
			93306	Transthoracic echocardiography	
			93307	Transthoracic echocardiography	
			93308	Transthoracic echocardiography	
			93312	Transthoracic echocardiography	
			93314	Transesophageal echocardiography	
			93315	Transesophageal echocardiography	
			93317	Transesophageal echocardiography	
			93320	Transesophageal echocardiography	
			93321	Transesophageal echocardiography	
			93325	Transesophageal echocardiography	
			93350	Transesophageal echocardiography	
		93351	Transesophageal echocardiography		

Appendix E: Hospital Sample

Appendix Table E: Hospital Sample

OSHPD ID	Participating Facility Name	Address	Total No. of Cases
190034	Antelope Valley Hospital Medical Center	1600 West Ave J Lancaster, CA 93534	28
154101	Bakersfield Heart Hospital	3001 Sillect Ave. Bakersfield, CA 93311	27
190110	Brotman Medical Center	3828 Delmas Terrace Culver City, CA 90232	27
380929	California Pacific Medical Center	2333 Buchanan Street San Francisco, CA 94115	27
070924	Contra Costa Regional Medical Center	2500 Alhambra Avenue Martinez, CA 94553-3156	27
500852	Doctors Medical Center	1441 Florida Ave. Modesto, CA 95350	27
190315	Garfield Medical Center	525 North Garfield Avenue Monterey Park, CA 91754	27
430779	Good Samaritan Hospital	2425 Samaritan Drive San Jose, CA 95124	27
490964	Healdsburg District Hospital	1375 University Ave. Healdsburg, CA 95448	8
071018	John Muir Medical Center - Concord Campus	2540 East Street Concord, CA 94524	27
010858	Kaiser Foundation Hosp - Hayward	27400 Hesperian Boulevard Hayward, CA 94545	27
410804	Kaiser Foundation Hosp - Redwood City	1150 Veterans Blvd. Redwood City, CA 94063	27
370730	Kaiser Foundation Hosp - San Diego	4647 Zion Avenue Main Hospital - Basement San Diego, CA 92120	28
494019	Kaiser Foundation Hosp - Santa Rosa	401 Bicentennial Way Santa Rosa, CA 95403	27
190429	Kaiser Foundation Hosp - Sunset	4733 Sunset Blvd. 1st Flr. Los Angeles, CA 90027	27
014132	Kaiser Foundation Hospital - Fremont	39400 Paseo Padre Parkway Fremont, CA 94538	27
190431	Kaiser Foundation Hospital - Harbor City	25825 South Vermont Avenue Main Hospital 1st Floor Harbor City, CA 92677	27
191228	LAC/USC Medical Center	1200 North State Street Los Angeles, CA 90033-1029	27
420491	Lompoc Healthcare District	508 East Hickory Lompoc, CA 93436-7337	27
190525	Long Beach Memorial Medical Center	2801 Atlantic Avenue Long Beach, CA 90806	28
301248	Los Alamitos Medical Center	3751 Katella Avenue Los Alamitos, CA 90720	27
190500	Marina Del Rey Hospital	4650 Lincoln Blvd. Marina Del Rey, CA 90291	27
450936	Mayers Memorial Hospital District	43568 Highway 299 E Fall River Mills, CA 96028	3
430837	O'Connor Hospital	2105 Forest Ave. San Jose, CA 95128	27
370755	Palomar Medical Center	555 E. Valley Parkway Escondido, CA 92025-3048	28
190680	Providence Little Company of Mary Medical Center San Pedro	1300 W. Seventh Street San Pedro, CA 90732	27
190796	Ronald Reagan UCLA Medical Center	757 Westwood Plaza Los Angeles, CA 90095	25
301325	Saddleback Memorial Medical Center- San Clemente Campus	654 Camino de Los Mares San Clemente, CA 92672-2827	27
100899	Saint Agnes Medical Center	1303 E Herndon Ave. Fresno, CA 93720	28
434138	Saint Louise Regional Hospital	9400 No Name Uno Gilroy, CA 95020	26
150788	San Joaquin Community Hospital	2615 Chester Avenue Bakersfield, CA 93301	27
190687	Santa Monica - UCLA Medical Center	1250-16Th Street Santa Monica, CA 90404	25
491064	Santa Rosa Memorial Hospital	1165 Montgomery Drive Santa Rosa, CA 95402	27
281078	St. Helena Hospital	10 Woodland Road St. Helena, CA 94574	17

Appendix Table E: Hospital Sample

OSHPD ID	Participating Facility Name	Address	Total No. of Cases
430905	Stanford University Hospital and Clinics	1101 Welch Road, Suite A-3 MC 5306 Palo Alto, CA 94304	27
310791	Sutter Auburn Faith Hospital	11815 Education St. Auburn, CA 95602-2410	27
481094	Sutter Solano Medical Center	300 Hospital Drive Solano, CA 94589	27
484001	VacaValley Hospital	1000 Nut Tree Road Vacaville, CA 95688-4100	27
190859	West Hills Hospital Medical Center	7300 Medical Center Drive West Hills, CA 91307	27

Total Cases: 1,000

Appendix F:

Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-2. Reliability of Condition Present on Admission (All
Conditions)

Table F-3: Reliability of Procedures

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
CCS Category		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
2	Septicemia (except in labor)	12	6	2	961	0.86	0.99	0.67	1.00	0.99	981	0.75	0.09	0.58	0.92
3	Bacterial infection; unspecified site	47	16	16	902	0.75	0.98	0.75	0.98	0.97	981	0.73	0.05	0.64	0.82
4	Mycoses	7	10	4	960	0.64	0.99	0.41	1.00	0.99	981	0.49	0.12	0.26	0.72
6	Hepatitis	9	1	2	969	0.82	1.00	0.90	1.00	1.00	981	0.86	0.08	0.69	1.00
10	Immunizations and screening for infectious disease	0	18	0	963		0.98	0.00	1.00	0.98					
14	Cancer of colon	1	15	1	964	0.50	0.98	0.06	1.00	0.98	981	0.11	0.10	-0.09	0.31
19	Cancer of bronchus; lung	10	6	0	965	1.00	0.99	0.63	1.00	0.99	981	0.77	0.09	0.59	0.95
23	Other non-epithelial cancer of skin	1	10	1	969	0.50	0.99	0.09	1.00	0.99	981	0.15	0.14	-0.11	0.42
24	Cancer of breast	4	26	0	951	1.00	0.97	0.13	1.00	0.97	981	0.23	0.10	0.04	0.42
29	Cancer of prostate	8	30	0	943	1.00	0.97	0.21	1.00	0.97	981	0.34	0.09	0.16	0.51
42	Secondary malignancies	16	4	1	960	0.94	1.00	0.80	1.00	0.99	981	0.86	0.06	0.74	0.98
44	Neoplasms of unspecified nature or uncertain behavior	8	5	13	955	0.38	0.99	0.62	0.99	0.98	981	0.46	0.11	0.25	0.67
47	Other and unspecified benign neoplasm	6	13	3	959	0.67	0.99	0.32	1.00	0.98	981	0.42	0.12	0.19	0.65
48	Thyroid disorders	136	4	21	820	0.87	1.00	0.97	0.98	0.97	981	0.90	0.02	0.86	0.94
49	Diabetes mellitus without complication	230	26	51	674	0.82	0.96	0.90	0.93	0.92	981	0.80	0.02	0.76	0.84
50	Diabetes mellitus with complications	63	18	9	891	0.88	0.98	0.78	0.99	0.97	981	0.81	0.04	0.74	0.88
51	Other endocrine disorders	16	4	2	959	0.89	1.00	0.80	1.00	0.99	981	0.84	0.06	0.71	0.97

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
52	Nutritional deficiencies	21	14	8	938	0.72	0.99	0.60	0.99	0.98	981	0.64	0.07	0.51	0.78
53	Disorders of lipid metabolism	408	25	100	448	0.80	0.95	0.94	0.82	0.87	981	0.75	0.02	0.71	0.79
54	Gout and other crystal arthropathies	34	3	12	932	0.74	1.00	0.92	0.99	0.98	981	0.81	0.05	0.72	0.90
55	Fluid and electrolyte disorders	136	45	32	768	0.81	0.94	0.75	0.96	0.92	981	0.73	0.03	0.68	0.79
58	Other nutritional; endocrine; and metabolic disorders	82	29	45	825	0.65	0.97	0.74	0.95	0.92	981	0.65	0.04	0.57	0.72
59	Deficiency and other anemia	118	21	30	812	0.80	0.97	0.85	0.96	0.95	981	0.79	0.03	0.74	0.85
62	Coagulation and hemorrhagic disorders	19	5	9	948	0.68	0.99	0.79	0.99	0.99	981	0.72	0.07	0.58	0.86
63	Diseases of white blood cells	13	6	9	953	0.59	0.99	0.68	0.99	0.98	981	0.63	0.09	0.45	0.80
79	Parkinson's disease	15	2	5	959	0.75	1.00	0.88	0.99	0.99	981	0.81	0.07	0.67	0.95
81	Other hereditary and degenerative nervous system conditions	8	14	4	955	0.67	0.99	0.36	1.00	0.98	981	0.46	0.11	0.25	0.67
82	Paralysis	225	128	35	593	0.87	0.82	0.64	0.94	0.83	981	0.62	0.03	0.57	0.67
83	Epilepsy; convulsions	47	11	5	918	0.90	0.99	0.81	0.99	0.98	981	0.85	0.04	0.77	0.92
84	Headache; including migraine	17	10	6	948	0.74	0.99	0.63	0.99	0.98	981	0.67	0.08	0.52	0.82
85	Coma; stupor; and brain damage	14	16	6	945	0.70	0.98	0.47	0.99	0.98	981	0.55	0.09	0.38	0.72
86	Cataract	10	9	28	934	0.26	0.99	0.53	0.97	0.96	981	0.33	0.08	0.17	0.49
87	Retinal detachments; defects; vascular occlusion; and retinopathy	27	5	12	937	0.69	0.99	0.84	0.99	0.98	981	0.75	0.06	0.64	0.87
88	Glaucoma	25	8	19	929	0.57	0.99	0.76	0.98	0.97	981	0.64	0.06	0.51	0.76
89	Blindness and vision defects	24	30	10	917	0.71	0.97	0.44	0.99	0.96	981	0.53	0.07	0.40	0.65

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
91	Other eye disorders	7	14	6	954	0.54	0.99	0.33	0.99	0.98	981	0.40	0.11	0.19	0.61
93	Conditions associated with dizziness or vertigo	6	8	3	964	0.67	0.99	0.43	1.00	0.99	981	0.52	0.13	0.27	0.77
94	Other ear and sense organ disorders	16	8	11	946	0.59	0.99	0.67	0.99	0.98	981	0.62	0.08	0.46	0.78
95	Other nervous system disorders	316	140	48	477	0.87	0.77	0.69	0.91	0.81	981	0.61	0.03	0.56	0.66
96	Heart valve disorders	45	38	18	880	0.71	0.96	0.54	0.98	0.94	981	0.59	0.05	0.49	0.68
97	Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease)	27	15	9	930	0.75	0.98	0.64	0.99	0.98	981	0.68	0.06	0.56	0.80
98	Essential hypertension	582	44	75	280	0.89	0.86	0.93	0.79	0.88	981	0.73	0.02	0.69	0.78
99	Hypertension with complications and secondary hypertension	114	30	20	817	0.85	0.96	0.79	0.98	0.95	981	0.79	0.03	0.73	0.85
100	Acute myocardial infarction	24	4	1	952	0.96	1.00	0.86	1.00	0.99	981	0.90	0.04	0.82	0.99
101	Coronary atherosclerosis and other heart disease	216	21	48	696	0.82	0.97	0.91	0.94	0.93	981	0.82	0.02	0.77	0.86
102	Nonspecific chest pain	4	8	0	969	1.00	0.99	0.33	1.00	0.99	981	0.50	0.15	0.20	0.80
103	Pulmonary heart disease	12	6	9	954	0.57	0.99	0.67	0.99	0.98	981	0.61	0.09	0.43	0.79
104	Other and ill-defined heart disease	10	7	61	903	0.14	0.99	0.59	0.94	0.93	981	0.21	0.06	0.09	0.32
105	Conduction disorders	33	64	46	838	0.42	0.93	0.34	0.95	0.89	981	0.31	0.05	0.22	0.41
106	Cardiac dysrhythmias	286	36	42	617	0.87	0.94	0.89	0.94	0.92	981	0.82	0.02	0.78	0.86
107	Cardiac arrest and ventricular fibrillation	4	9	2	966	0.67	0.99	0.31	1.00	0.99	981	0.42	0.14	0.14	0.70
108	Congestive heart failure; nonhypertensive	120	23	52	786	0.70	0.97	0.84	0.94	0.92	981	0.72	0.03	0.66	0.78

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
109	Acute cerebrovascular disease	964	17	0	0	1.00	0.00	0.98		0.98					
110	Occlusion or stenosis of precerebral arteries	15	44	15	907	0.50	0.95	0.25	0.98	0.94	981	0.31	0.07	0.18	0.44
111	Other and ill-defined cerebrovascular disease	13	18	2	948	0.87	0.98	0.42	1.00	0.98	981	0.56	0.09	0.38	0.73
112	Transient cerebral ischemia	0	12	0	969		0.99	0.00	1.00	0.99					
113	Late effects of cerebrovascular disease	41	22	17	901	0.71	0.98	0.65	0.98	0.96	981	0.66	0.05	0.56	0.76
114	Peripheral and visceral atherosclerosis	44	8	19	910	0.70	0.99	0.85	0.98	0.97	981	0.75	0.05	0.66	0.84
115	Aortic; peripheral; and visceral artery aneurysms	10	2	1	968	0.91	1.00	0.83	1.00	1.00	981	0.87	0.08	0.72	1.00
117	Other circulatory disease	24	112	10	835	0.71	0.88	0.18	0.99	0.88	981	0.24	0.04	0.15	0.33
118	Phlebitis; thrombophlebitis and thromboembolism	8	17	2	954	0.80	0.98	0.32	1.00	0.98	981	0.45	0.10	0.24	0.65
122	Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	34	9	14	924	0.71	0.99	0.79	0.99	0.98	981	0.73	0.05	0.63	0.84
126	Other upper respiratory infections	10	7	11	953	0.48	0.99	0.59	0.99	0.98	981	0.52	0.10	0.32	0.71
127	Chronic obstructive pulmonary disease and bronchiectasis	81	15	27	858	0.75	0.98	0.84	0.97	0.96	981	0.77	0.03	0.70	0.84
128	Asthma	45	6	11	919	0.80	0.99	0.88	0.99	0.98	981	0.83	0.04	0.75	0.91
129	Aspiration pneumonitis; food/vomitus	42	11	7	921	0.86	0.99	0.79	0.99	0.98	981	0.81	0.04	0.73	0.90
130	Pleurisy; pneumothorax; pulmonary collapse	2	22	2	955	0.50	0.98	0.08	1.00	0.98	981	0.14	0.09	-0.04	0.31
131	Respiratory failure; insufficiency; arrest (adult)	26	21	11	923	0.70	0.98	0.55	0.99	0.97	981	0.60	0.06	0.48	0.73
133	Other lower respiratory disease	10	17	2	952	0.83	0.98	0.37	1.00	0.98	981	0.50	0.10	0.31	0.70
134	Other upper respiratory disease	5	6	8	962	0.38	0.99	0.45	0.99	0.99	981	0.41	0.13	0.16	0.66

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
135	Intestinal infection	8	1	3	969	0.73	1.00	0.89	1.00	1.00	981	0.80	0.10	0.60	0.99
138	Esophageal disorders	93	9	22	857	0.81	0.99	0.91	0.97	0.97	981	0.84	0.03	0.78	0.89
139	Gastroduodenal ulcer (except hemorrhage)	9	10	4	958	0.69	0.99	0.47	1.00	0.99	981	0.56	0.11	0.35	0.76
140	Gastritis and duodenitis	11	10	4	956	0.73	0.99	0.52	1.00	0.99	981	0.60	0.10	0.41	0.79
141	Other disorders of stomach and duodenum	2	5	7	967	0.22	0.99	0.29	0.99	0.99	981	0.24	0.14	-0.04	0.53
143	Abdominal hernia	6	6	8	961	0.43	0.99	0.50	0.99	0.99	981	0.45	0.12	0.21	0.69
146	Diverticulosis and diverticulitis	9	4	17	951	0.35	1.00	0.69	0.98	0.98	981	0.45	0.10	0.26	0.65
149	Biliary tract disease	4	0	7	970	0.36	1.00	1.00	0.99	0.99	981	0.53	0.16	0.22	0.84
151	Other liver diseases	9	5	6	961	0.60	0.99	0.64	0.99	0.99	981	0.62	0.11	0.41	0.82
153	Gastrointestinal hemorrhage	6	9	3	963	0.67	0.99	0.40	1.00	0.99	981	0.49	0.13	0.25	0.74
155	Other gastrointestinal disorders	141	44	88	708	0.62	0.94	0.76	0.89	0.87	981	0.60	0.03	0.54	0.66
156	Nephritis; nephrosis; renal sclerosis	9	7	3	962	0.75	0.99	0.56	1.00	0.99	981	0.64	0.11	0.43	0.85
157	Acute and unspecified renal failure	46	4	14	917	0.77	1.00	0.92	0.98	0.98	981	0.83	0.04	0.75	0.91
158	Chronic renal failure	103	16	29	833	0.78	0.98	0.87	0.97	0.95	981	0.79	0.03	0.74	0.85
159	Urinary tract infections	117	19	30	815	0.80	0.98	0.86	0.96	0.95	981	0.80	0.03	0.74	0.85
161	Other diseases of kidney and ureters	11	27	5	938	0.69	0.97	0.29	0.99	0.97	981	0.39	0.08	0.23	0.56
162	Other diseases of bladder and urethra	4	6	2	969	0.67	0.99	0.40	1.00	0.99	981	0.50	0.15	0.19	0.80
163	Genitourinary symptoms and ill-defined conditions	23	34	15	909	0.61	0.96	0.40	0.98	0.95	981	0.46	0.06	0.33	0.59
164	Hyperplasia of prostate	44	9	12	916	0.79	0.99	0.83	0.99	0.98	981	0.80	0.04	0.71	0.88

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
197	Skin and subcutaneous tissue infections	8	2	1	970	0.89	1.00	0.80	1.00	1.00	981	0.84	0.09	0.66	1.00
199	Chronic ulcer of skin	24	1	10	946	0.71	1.00	0.96	0.99	0.99	981	0.81	0.06	0.70	0.92
200	Other skin disorders	4	6	1	970	0.80	0.99	0.40	1.00	0.99	981	0.53	0.16	0.22	0.84
202	Rheumatoid arthritis and related disease	14	1	6	960	0.70	1.00	0.93	0.99	0.99	981	0.80	0.08	0.65	0.94
203	Osteoarthritis	80	12	52	837	0.61	0.99	0.87	0.94	0.93	981	0.68	0.04	0.61	0.75
204	Other non-traumatic joint disorders	12	14	18	937	0.40	0.99	0.46	0.98	0.97	981	0.41	0.08	0.25	0.58
205	Spondylosis; intervertebral disc disorders; other back problems	44	7	38	892	0.54	0.99	0.86	0.96	0.95	981	0.64	0.05	0.54	0.74
206	Osteoporosis	52	9	24	896	0.68	0.99	0.85	0.97	0.97	981	0.74	0.04	0.66	0.83
211	Other connective tissue disease	114	113	69	685	0.62	0.86	0.50	0.91	0.81	981	0.44	0.03	0.37	0.51
212	Other bone disease and musculoskeletal deformities	4	3	9	965	0.31	1.00	0.57	0.99	0.99	981	0.39	0.14	0.12	0.67
213	Cardiac and circulatory congenital anomalies	11	3	7	960	0.61	1.00	0.79	0.99	0.99	981	0.68	0.09	0.50	0.87
237	Complication of device; implant or graft	1	11	0	969	1.00	0.99	0.08	1.00	0.99	981	0.15	0.13	-0.11	0.42
238	Complications of surgical procedures or medical care	4	7	0	970	1.00	0.99	0.36	1.00	0.99	981	0.53	0.16	0.22	0.84
239	Superficial injury; contusion	14	13	4	950	0.78	0.99	0.52	1.00	0.98	981	0.61	0.09	0.45	0.78
244	Other injuries and conditions due to external causes	20	20	10	931	0.67	0.98	0.50	0.99	0.97	981	0.56	0.07	0.41	0.70
252	Malaise and fatigue	3	43	5	930	0.38	0.96	0.07	0.99	0.95	981	0.10	0.06	-0.01	0.21
253	Allergic reactions	3	26	2	950	0.60	0.97	0.10	1.00	0.97	981	0.17	0.09	0.00	0.34
257	Other aftercare	3	194	1	783	0.75	0.80	0.02	1.00	0.80	981	0.02	0.01	-0.01	0.05

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
259	Residual codes; unclassified	46	121	48	766	0.49	0.86	0.28	0.94	0.83	981	0.26	0.04	0.18	0.34
651	Anxiety disorders	20	4	16	941	0.56	1.00	0.83	0.98	0.98	981	0.66	0.07	0.52	0.80
653	Delirium, dementia, and amnesic and other cognitive disorders	134	24	23	800	0.85	0.97	0.85	0.97	0.95	981	0.82	0.03	0.77	0.87
657	Mood disorders	93	9	57	822	0.62	0.99	0.91	0.94	0.93	981	0.70	0.03	0.63	0.77
659	Schizophrenia and other psychotic disorders	7	3	4	967	0.64	1.00	0.70	1.00	0.99	981	0.66	0.12	0.43	0.90
660	Alcohol-related disorders	28	12	9	932	0.76	0.99	0.70	0.99	0.98	981	0.72	0.06	0.60	0.83
661	Substance-related disorders	18	6	6	951	0.75	0.99	0.75	0.99	0.99	981	0.74	0.07	0.60	0.88
663	Screening and history of mental health and substance abuse codes	95	121	25	740	0.79	0.86	0.44	0.97	0.85	981	0.48	0.04	0.41	0.55
2603	E Codes: Fall	13	26	85	857	0.13	0.97	0.33	0.91	0.89	981	0.14	0.05	0.05	0.23
2617	E Codes: Adverse effects of medical drugs	6	40	1	934	0.86	0.96	0.13	1.00	0.96	981	0.22	0.07	0.07	0.36
2620	E Codes: Unspecified	0	11	0	970		0.99	0.00	1.00	0.99					
2621	E Codes: Place of occurrence	98	1	842	40	0.10	0.98	0.99	0.05	0.14	981	0.01	0.00	0.00	0.01
	Categories with Few Observations														
1	Tuberculosis	1	3	0	977	1.00	1.00	0.25	1.00	1.00	981	0.40	0.28	-0.14	0.94
5	HIV infection	3	0	0	978	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
7	Viral infection	4	0	4	973	0.50	1.00	1.00	1.00	1.00	981	0.66	0.16	0.36	0.97
8	Other infections; including parasitic	2	5	2	972	0.50	0.99	0.29	1.00	0.99	981	0.36	0.19	0.00	0.72
9	Sexually transmitted infections (not HIV or hepatitis)	2	1	0	978	1.00	1.00	0.67	1.00	1.00	981	0.80	0.20	0.41	1.00

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
11	Cancer of head and neck	0	5	0	976		0.99	0.00	1.00	0.99					
12	Cancer of esophagus	0	0	0	981		1.00		1.00	1.00					
13	Cancer of stomach	1	2	0	978	1.00	1.00	0.33	1.00	1.00	981	0.50	0.31	-0.10	1.00
15	Cancer of rectum and anus	1	1	0	979	1.00	1.00	0.50	1.00	1.00	981	0.67	0.31	0.05	1.00
16	Cancer of liver and intrahepatic bile duct	0	1	1	979	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
17	Cancer of pancreas	3	1	0	977	1.00	1.00	0.75	1.00	1.00	981	0.86	0.14	0.58	1.00
18	Cancer of other GI organs; peritoneum	0	5	0	976		0.99	0.00	1.00	0.99					
20	Cancer; other respiratory and intrathoracic	0	0	0	981		1.00		1.00	1.00					
21	Cancer of bone and connective tissue	0	0	0	981		1.00		1.00	1.00					
22	Melanomas of skin	3	4	0	974	1.00	1.00	0.43	1.00	1.00	981	0.60	0.18	0.24	0.96
25	Cancer of uterus	2	4	0	975	1.00	1.00	0.33	1.00	1.00	981	0.50	0.22	0.07	0.92
26	Cancer of cervix	0	0	0	981		1.00		1.00	1.00					
27	Cancer of ovary	0	4	0	977		1.00	0.00	1.00	1.00					
28	Cancer of other female genital organs	1	0	1	979	0.50	1.00	1.00	1.00	1.00	981	0.67	0.31	0.05	1.00
30	Cancer of testis	0	1	0	980		1.00	0.00	1.00	1.00					
31	Cancer of other male genital organs	0	0	0	981		1.00		1.00	1.00					
32	Cancer of bladder	2	6	0	973	1.00	0.99	0.25	1.00	0.99	981	0.40	0.20	0.01	0.78
33	Cancer of kidney and renal pelvis	1	5	0	975	1.00	0.99	0.17	1.00	0.99	981	0.28	0.22	-0.15	0.72
34	Cancer of other urinary organs	0	1	0	980		1.00	0.00	1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
35	Cancer of brain and nervous system	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
36	Cancer of thyroid	0	0	0	981		1.00		1.00	1.00					
37	Hodgkin`s disease	0	2	0	979		1.00	0.00	1.00	1.00					
38	Non-Hodgkin`s lymphoma	5	1	0	975	1.00	1.00	0.83	1.00	1.00	981	0.91	0.09	0.73	1.00
39	Leukemias	4	1	1	975	0.80	1.00	0.80	1.00	1.00	981	0.80	0.14	0.53	1.00
40	Multiple myeloma	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
41	Cancer; other and unspecified primary	0	1	0	980		1.00	0.00	1.00	1.00					
43	Malignant neoplasm without specification of site	3	1	0	977	1.00	1.00	0.75	1.00	1.00	981	0.86	0.14	0.58	1.00
45	Maintenance chemotherapy; radiotherapy	0	0	0	981		1.00		1.00	1.00					
46	Benign neoplasm of uterus	0	0	0	981		1.00		1.00	1.00					
56	Cystic fibrosis	0	0	0	981		1.00		1.00	1.00					
57	Immunity disorders	0	0	0	981		1.00		1.00	1.00					
60	Acute posthemorrhagic anemia	2	3	1	975	0.67	1.00	0.40	1.00	1.00	981	0.50	0.22	0.07	0.92
61	Sickle cell anemia	0	0	0	981		1.00		1.00	1.00					
64	Other hematologic conditions	0	0	0	981		1.00		1.00	1.00					
76	Meningitis (except that caused by tuberculosis or sexually transmitted disease)	0	0	2	979	0.00	1.00		1.00	1.00					
77	Encephalitis (except that caused by tuberculosis or sexually transmitted disease)	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
78	Other CNS infection and poliomyelitis	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
80	Multiple sclerosis	2	0	0	979	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
90	Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)	2	1	0	978	1.00	1.00	0.67	1.00	1.00	981	0.80	0.20	0.41	1.00
92	Otitis media and related conditions	2	1	3	975	0.40	1.00	0.67	1.00	1.00	981	0.50	0.22	0.07	0.92
116	Aortic and peripheral arterial embolism or thrombosis	0	2	0	979		1.00	0.00	1.00	1.00					
119	Varicose veins of lower extremity	0	0	0	981		1.00		1.00	1.00					
120	Hemorrhoids	2	3	1	975	0.67	1.00	0.40	1.00	1.00	981	0.50	0.22	0.07	0.92
121	Other diseases of veins and lymphatics	0	4	0	977		1.00	0.00	1.00	1.00					
123	Influenza	0	0	0	981		1.00		1.00	1.00					
124	Acute and chronic tonsillitis	0	0	0	981		1.00		1.00	1.00					
125	Acute bronchitis	0	0	2	979	0.00	1.00		1.00	1.00					
132	Lung disease due to external agents	1	1	1	978	0.50	1.00	0.50	1.00	1.00	981	0.50	0.31	-0.10	1.00
136	Disorders of teeth and jaw	1	2	0	978	1.00	1.00	0.33	1.00	1.00	981	0.50	0.31	-0.10	1.00
137	Diseases of mouth; excluding dental	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
142	Appendicitis and other appendiceal conditions	0	0	0	981		1.00		1.00	1.00					
144	Regional enteritis and ulcerative colitis	1	0	1	979	0.50	1.00	1.00	1.00	1.00	981	0.67	0.31	0.05	1.00
145	Intestinal obstruction without hernia	2	3	0	976	1.00	1.00	0.40	1.00	1.00	981	0.57	0.22	0.13	1.00
147	Anal and rectal conditions	0	1	1	979	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
148	Peritonitis and intestinal abscess	0	0	0	981		1.00		1.00	1.00					
150	Liver disease; alcohol-related	0	0	0	981		1.00		1.00	1.00					
152	Pancreatic disorders (not diabetes)	2	0	2	977	0.50	1.00	1.00	1.00	1.00	981	0.67	0.22	0.23	1.00
154	Noninfectious gastroenteritis	1	0	1	979	0.50	1.00	1.00	1.00	1.00	981	0.67	0.31	0.05	1.00
160	Calculus of urinary tract	1	3	5	972	0.17	1.00	0.25	0.99	0.99	981	0.20	0.17	-0.14	0.53
165	Inflammatory conditions of male genital organs	0	0	0	981		1.00		1.00	1.00					
166	Other male genital disorders	3	1	2	975	0.60	1.00	0.75	1.00	1.00	981	0.67	0.18	0.31	1.00
167	Nonmalignant breast conditions	0	1	0	980		1.00	0.00	1.00	1.00					
168	Inflammatory diseases of female pelvic organs	0	0	0	981		1.00		1.00	1.00					
169	Endometriosis	0	0	0	981		1.00		1.00	1.00					
170	Prolapse of female genital organs	0	0	0	981		1.00		1.00	1.00					
171	Menstrual disorders	0	1	0	980		1.00	0.00	1.00	1.00					
172	Ovarian cyst	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
173	Menopausal disorders	1	3	3	974	0.25	1.00	0.25	1.00	0.99	981	0.25	0.20	-0.15	0.64
174	Female infertility	0	0	0	981		1.00		1.00	1.00					
175	Other female genital disorders	1	1	1	978	0.50	1.00	0.50	1.00	1.00	981	0.50	0.31	-0.10	1.00
176	Contraceptive and procreative management	0	1	0	980		1.00	0.00	1.00	1.00					
177	Spontaneous abortion	0	0	0	981		1.00		1.00	1.00					
178	Induced abortion	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
179	Post abortion complications	0	0	0	981		1.00		1.00	1.00					
180	Ectopic pregnancy	0	0	0	981		1.00		1.00	1.00					
181	Other complications of pregnancy	0	0	0	981		1.00		1.00	1.00					
182	Hemorrhage during pregnancy; abruptio placenta; placenta previa	0	0	0	981		1.00		1.00	1.00					
183	Hypertension complicating pregnancy; childbirth and the puerperium	0	0	0	981		1.00		1.00	1.00					
184	Early or threatened labor	0	0	0	981		1.00		1.00	1.00					
185	Prolonged pregnancy	0	0	0	981		1.00		1.00	1.00					
186	Diabetes or abnormal glucose tolerance complicating pregnancy; childbirth; or the puerperium	0	0	0	981		1.00		1.00	1.00					
187	Malposition; malpresentation	0	0	0	981		1.00		1.00	1.00					
188	Fetopelvic disproportion; obstruction	0	0	0	981		1.00		1.00	1.00					
189	Previous C-section	0	0	0	981		1.00		1.00	1.00					
190	Fetal distress and abnormal forces of labor	0	0	0	981		1.00		1.00	1.00					
191	Polyhydramnios and other problems of amniotic cavity	0	0	0	981		1.00		1.00	1.00					
192	Umbilical cord complication	0	0	0	981		1.00		1.00	1.00					
193	OB-related trauma to perineum and vulva	0	0	0	981		1.00		1.00	1.00					
194	Forceps delivery	0	0	0	981		1.00		1.00	1.00					
195	Other complications of birth; puerperium affecting management of mother	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
196	Normal pregnancy and/or delivery	0	0	0	981		1.00		1.00	1.00					
198	Other inflammatory condition of skin	5	2	0	974	1.00	1.00	0.71	1.00	1.00	981	0.83	0.12	0.60	1.00
201	Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease)	0	1	2	978	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
207	Pathological fracture	2	3	2	974	0.50	1.00	0.40	1.00	0.99	981	0.44	0.21	0.04	0.85
208	Acquired foot deformities	3	3	0	975	1.00	1.00	0.50	1.00	1.00	981	0.67	0.18	0.31	1.00
209	Other acquired deformities	2	3	1	975	0.67	1.00	0.40	1.00	1.00	981	0.50	0.22	0.07	0.92
210	Systemic lupus erythematosus and connective tissue disorders	4	0	1	976	0.80	1.00	1.00	1.00	1.00	981	0.89	0.11	0.67	1.00
214	Digestive congenital anomalies	0	0	0	981		1.00		1.00	1.00					
215	Genitourinary congenital anomalies	0	0	1	980	0.00	1.00		1.00	1.00					
216	Nervous system congenital anomalies	0	0	0	981		1.00		1.00	1.00					
217	Other congenital anomalies	2	1	2	976	0.50	1.00	0.67	1.00	1.00	981	0.57	0.22	0.13	1.00
218	Live born	0	0	0	981		1.00		1.00	1.00					
219	Short gestation; low birth weight; and fetal growth retardation	0	0	0	981		1.00		1.00	1.00					
220	Intrauterine hypoxia and birth asphyxia	0	0	0	981		1.00		1.00	1.00					
221	Respiratory distress syndrome	0	0	0	981		1.00		1.00	1.00					
222	Hemolytic jaundice and perinatal jaundice	0	0	0	981		1.00		1.00	1.00					
223	Birth trauma	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
224	Other perinatal conditions	0	0	0	981		1.00		1.00	1.00					
225	Joint disorders and dislocations; trauma-related	1	0	1	979	0.50	1.00	1.00	1.00	1.00	981	0.67	0.31	0.05	1.00
226	Fracture of neck of femur (hip)	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
227	Spinal cord injury	0	0	0	981		1.00		1.00	1.00					
228	Skull and face fractures	0	0	0	981		1.00		1.00	1.00					
229	Fracture of upper limb	3	1	1	976	0.75	1.00	0.75	1.00	1.00	981	0.75	0.17	0.41	1.00
230	Fracture of lower limb	1	1	0	979	1.00	1.00	0.50	1.00	1.00	981	0.67	0.31	0.05	1.00
231	Other fractures	4	3	3	971	0.57	1.00	0.57	1.00	0.99	981	0.57	0.16	0.26	0.88
232	Sprains and strains	0	0	0	981		1.00		1.00	1.00					
233	Intracranial injury	2	1	0	978	1.00	1.00	0.67	1.00	1.00	981	0.80	0.20	0.41	1.00
234	Crushing injury or internal injury	0	4	0	977		1.00	0.00	1.00	1.00					
235	Open wounds of head; neck; and trunk	1	2	0	978	1.00	1.00	0.33	1.00	1.00	981	0.50	0.31	-0.10	1.00
236	Open wounds of extremities	1	2	1	977	0.50	1.00	0.33	1.00	1.00	981	0.40	0.28	-0.15	0.94
240	Burns	0	0	0	981		1.00		1.00	1.00					
241	Poisoning by psychotropic agents	0	0	0	981		1.00		1.00	1.00					
242	Poisoning by other medications and drugs	0	0	0	981		1.00		1.00	1.00					
243	Poisoning by nonmedicinal substances	0	0	0	981		1.00		1.00	1.00					
245	Syncope	1	5	0	975	1.00	0.99	0.17	1.00	0.99	981	0.28	0.22	-0.15	0.72
246	Fever of unknown origin	0	10	0	971		0.99	0.00	1.00	0.99					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
247	Lymphadenitis	0	0	0	981		1.00		1.00	1.00					
248	Gangrene	2	0	0	979	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
249	Shock	3	3	1	974	0.75	1.00	0.50	1.00	1.00	981	0.60	0.18	0.24	0.96
250	Nausea and vomiting	5	1	0	975	1.00	1.00	0.83	1.00	1.00	981	0.91	0.09	0.73	1.00
251	Abdominal pain	3	0	0	978	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
254	Rehabilitation care; fitting of prostheses; and adjustment of devices	0	0	0	981		1.00		1.00	1.00					
255	Administrative/social admission	0	4	0	977		1.00	0.00	1.00	1.00					
256	Medical examination/evaluation	0	1	0	980		1.00	0.00	1.00	1.00					
258	Other screening for suspected conditions (not mental disorders or infectious disease)	0	0	0	981		1.00		1.00	1.00					
260	E Codes: All (external causes of injury and poisoning)	0	0	0	981		1.00		1.00	1.00					
650	Adjustment disorders	1	5	0	975	1.00	0.99	0.17	1.00	0.99	981	0.28	0.22	-0.15	0.72
652	Attention-deficit, conduct, and disruptive behavior disorders	1	0	1	979	0.50	1.00	1.00	1.00	1.00	981	0.67	0.31	0.05	1.00
654	Developmental disorders	2	3	0	976	1.00	1.00	0.40	1.00	1.00	981	0.57	0.22	0.13	1.00
655	Disorders usually diagnosed in infancy, childhood, or adolescence	0	0	0	981		1.00		1.00	1.00					
656	Impulse control disorders, NEC	0	0	0	981		1.00		1.00	1.00					
658	Personality disorders	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-1. Reliability of Overall Diagnosis (All Conditions)

Table F-1: Reliability of Overall Diagnosis (All Conditions)															
662	Suicide and intentional self-inflicted injury	0	0	0	981		1.00		1.00	1.00					
670	Miscellaneous disorders	0	0	0	981		1.00		1.00	1.00					
2601	E Codes: Cut/pierceb	0	0	0	981		1.00		1.00	1.00					
2602	E Codes: Drowning/submersion	0	0	0	981		1.00		1.00	1.00					
2604	E Codes: Fire/burn	0	0	0	981		1.00		1.00	1.00					
2605	E Codes: Firearm	0	0	0	981		1.00		1.00	1.00					
2606	E Codes: Machinery	0	6	0	975		0.99	0.00	1.00	0.99					
2607	E Codes: Motor vehicle traffic (MVT)	0	0	0	981		1.00		1.00	1.00					
2608	E Codes: Pedal cyclist; not MVT	0	0	0	981		1.00		1.00	1.00					
2609	E Codes: Pedestrian; not MVT	0	0	3	978	0.00	1.00		1.00	1.00					
2610	E Codes: Transport; not MVT	0	0	1	980	0.00	1.00		1.00	1.00					
2611	E Codes: Natural/environment	0	1	1	979	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
2612	E Codes: Overexertion	0	0	0	981		1.00		1.00	1.00					
2613	E Codes: Poisoning	0	0	0	981		1.00		1.00	1.00					
2614	E Codes: Struck by; against	0	2	0	979		1.00	0.00	1.00	1.00					
2615	E Codes: Suffocation	0	1	0	980		1.00	0.00	1.00	1.00					
2616	E Codes: Adverse effects of medical care	0	7	0	974		0.99	0.00	1.00	0.99					
2618	E Codes: Other specified and classifiable	0	0	0	981		1.00		1.00	1.00					
2619	E Codes: Other specified; NEC	0	2	0	979		1.00	0.00	1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)															
CCS Category		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
	Overall Agreement	5900	399	235	108	0.96	0.21	0.94	0.31	0.90	6642	0.21	0.02	0.17	0.25
3	Bacterial infection; unspecified site	32	6	5	4	0.86	0.40	0.84	0.44	0.77	47	0.27	0.17	-0.05	0.60
42	Secondary malignancies	16	0	0	0	1.00		1.00		1.00					
48	Thyroid disorders	127	8	1	0	0.99	0.00	0.94	0.00	0.93	136	-0.01	0.01	-0.04	0.01
49	Diabetes mellitus without complication	220	6	4	0	0.98	0.00	0.97	0.00	0.96	230	-0.02	0.01	-0.04	-0.01
50	Diabetes mellitus with complications	58	5	0	0	1.00	0.00	0.92		0.92					
51	Other endocrine disorders	13	3	0	0	1.00	0.00	0.81		0.81					
52	Nutritional deficiencies	19	1	1	0	0.95	0.00	0.95	0.00	0.90	21	-0.05	0.04	-0.12	0.02
53	Disorders of lipid metabolism	388	18	2	0	0.99	0.00	0.96	0.00	0.95	408	-0.01	0.01	-0.02	0.00
54	Gout and other crystal arthropathies	33	1	0	0	1.00	0.00	0.97		0.97					
55	Fluid and electrolyte disorders	115	6	7	8	0.94	0.57	0.95	0.53	0.90	136	0.50	0.12	0.26	0.73
58	Other nutritional; endocrine; and metabolic disorders	75	4	2	1	0.97	0.20	0.95	0.33	0.93	82	0.21	0.21	-0.19	0.62
59	Deficiency and other anemia	101	8	8	1	0.93	0.11	0.93	0.11	0.86	118	0.04	0.11	-0.17	0.25
62	Coagulation and hemorrhagic disorders	16	3	0	0	1.00	0.00	0.84		0.84					
63	Diseases of white blood cells	6	0	5	2	0.55	1.00	1.00	0.29	0.62	13	0.27	0.18	-0.07	0.61
79	Parkinson's disease	15	0	0	0	1.00		1.00		1.00					
82	Paralysis	209	12	4	0	0.98	0.00	0.95	0.00	0.93	225	-0.03	0.01	-0.05	-0.01
83	Epilepsy; convulsions	40	2	2	3	0.95	0.60	0.95	0.60	0.91	47	0.55	0.20	0.16	0.94

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
84	Headache; including migraine	14	1	1	1	0.93	0.50	0.93	0.50	0.88	17	0.43	0.33	-0.22	1.00	
85	Coma; stupor; and brain damage	7	3	2	2	0.78	0.40	0.70	0.50	0.64	14	0.19	0.27	-0.34	0.71	
87	Retinal detachments; defects; vascular occlusion; and retinopathy	25	2	0	0	1.00	0.00	0.93		0.93						
88	Glaucoma	25	0	0	0	1.00		1.00		1.00						
89	Blindness and vision defects	23	0	1	0	0.96		1.00	0.00	0.96						
94	Other ear and sense organ disorders	14	2	0	0	1.00	0.00	0.88		0.88						
95	Other nervous system disorders	272	41	2	1	0.99	0.02	0.87	0.33	0.86	316	0.03	0.04	-0.05	0.10	
96	Heart valve disorders	37	6	1	1	0.97	0.14	0.86	0.50	0.84	45	0.16	0.18	-0.19	0.52	
97	Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease)	25	2	0	0	1.00	0.00	0.93		0.93						
98	Essential hypertension	559	20	3	0	0.99	0.00	0.97	0.00	0.96	582	-0.01	0.00	-0.02	0.00	
99	Hypertension with complications and secondary hypertension	107	5	2	0	0.98	0.00	0.96	0.00	0.94	114	-0.03	0.01	-0.05	0.00	
100	Acute myocardial infarction	17	1	4	2	0.81	0.67	0.94	0.33	0.79	24	0.33	0.22	-0.10	0.77	
101	Coronary atherosclerosis and other heart disease	198	6	11	1	0.95	0.14	0.97	0.08	0.92	216	0.07	0.10	-0.13	0.26	
103	Pulmonary heart disease	9	2	1	0	0.90	0.00	0.82	0.00	0.75	12	-0.12	0.09	-0.30	0.05	
105	Conduction disorders	29	2	0	2	1.00	0.50	0.94	1.00	0.94	33	0.64	0.23	0.18	1.00	
106	Cardiac dysrhythmias	246	22	16	2	0.94	0.08	0.92	0.11	0.87	286	0.03	0.07	-0.10	0.15	
108	Congestive heart failure; nonhypertensive	106	7	7	0	0.94	0.00	0.94	0.00	0.88	120	-0.06	0.02	-0.09	-0.03	
109	Acute cerebrovascular disease	937	10	14	3	0.99	0.23	0.99	0.18	0.98	964	0.19	0.10	-0.01	0.38	
110	Occlusion or stenosis of precerebral arteries	15	0	0	0	1.00		1.00		1.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
111	Other and ill-defined cerebrovascular disease	9	3	1	0	0.90	0.00	0.75	0.00	0.69	13	-0.13	0.10	-0.34	0.08	
113	Late effects of cerebrovascular disease	34	2	5	0	0.87	0.00	0.94	0.00	0.83	41	-0.07	0.04	-0.15	0.00	
114	Peripheral and visceral atherosclerosis	42	2	0	0	1.00	0.00	0.95		0.95						
117	Other circulatory disease	14	5	4	1	0.78	0.17	0.74	0.20	0.63	24	-0.06	0.19	-0.43	0.32	
122	Pneumonia (except that caused by tuberculosis or sexually transmitted disease)	19	3	9	3	0.68	0.50	0.86	0.25	0.65	34	0.13	0.16	-0.19	0.45	
127	Chronic obstructive pulmonary disease and bronchiectasis	78	2	1	0	0.99	0.00	0.98	0.00	0.96	81	-0.02	0.01	-0.04	0.01	
128	Asthma	43	2	0	0	1.00	0.00	0.96		0.96						
129	Aspiration pneumonitis; food/vomitus	9	6	14	13	0.39	0.68	0.60	0.48	0.52	42	0.07	0.14	-0.21	0.35	
131	Respiratory failure; insufficiency; arrest (adult)	8	4	6	8	0.57	0.67	0.67	0.57	0.62	26	0.24	0.19	-0.13	0.60	
138	Esophageal disorders	88	5	0	0	1.00	0.00	0.95		0.95						
140	Gastritis and duodenitis	6	4	1	0	0.86	0.00	0.60	0.00	0.55	11	-0.17	0.15	-0.46	0.12	
155	Other gastrointestinal disorders	114	18	8	1	0.93	0.05	0.86	0.11	0.82	141	-0.02	0.07	-0.16	0.12	
157	Acute and unspecified renal failure	26	6	9	5	0.74	0.45	0.81	0.36	0.67	46	0.18	0.15	-0.12	0.48	
158	Chronic renal failure	92	6	4	1	0.96	0.14	0.94	0.20	0.90	103	0.12	0.15	-0.18	0.41	
159	Urinary tract infections	82	11	16	8	0.84	0.42	0.88	0.33	0.77	117	0.23	0.11	0.02	0.44	
161	Other diseases of kidney and ureters	9	1	1	0	0.90	0.00	0.90	0.00	0.82	11	-0.10	0.07	-0.24	0.04	
163	Genitourinary symptoms and ill-defined conditions	14	4	3	2	0.82	0.33	0.78	0.40	0.70	23	0.17	0.22	-0.27	0.60	
164	Hyperplasia of prostate	43	1	0	0	1.00	0.00	0.98		0.98						
199	Chronic ulcer of skin	19	2	3	0	0.86	0.00	0.90	0.00	0.79	24	-0.11	0.05	-0.22	-0.01	
202	Rheumatoid arthritis and related disease	12	1	1	0	0.92	0.00	0.92	0.00	0.86	14	-0.08	0.05	-0.18	0.03	

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
203	Osteoarthritis	76	4	0	0	1.00	0.00	0.95		0.95						
204	Other non-traumatic joint disorders	10	1	1	0	0.91	0.00	0.91	0.00	0.83	12	-0.09	0.06	-0.22	0.03	
205	Spondylosis; intervertebral disc disorders; other back problems	39	5	0	0	1.00	0.00	0.89		0.89						
206	Osteoporosis	52	0	0	0	1.00		1.00		1.00						
211	Other connective tissue disease	103	7	4	0	0.96	0.00	0.94	0.00	0.90	114	-0.05	0.02	-0.08	-0.01	
213	Cardiac and circulatory congenital anomalies	9	2	0	0	1.00	0.00	0.82		0.82						
239	Superficial injury; contusion	11	0	3	0	0.79		1.00	0.00	0.79						
244	Other injuries and conditions due to external causes	5	7	2	6	0.71	0.46	0.42	0.75	0.55	20	0.15	0.19	-0.22	0.53	
259	Residual codes; unclassified	37	5	3	1	0.93	0.17	0.88	0.25	0.83	46	0.11	0.18	-0.25	0.46	
651	Anxiety disorders	17	2	1	0	0.94	0.00	0.89	0.00	0.85	20	-0.07	0.05	-0.17	0.03	
653	Delirium, dementia, and amnestic and other cognitive disorders	125	7	1	1	0.99	0.13	0.95	0.50	0.94	134	0.18	0.17	-0.15	0.51	
657	Mood disorders	80	11	2	0	0.98	0.00	0.88	0.00	0.86	93	-0.04	0.02	-0.08	0.01	
660	Alcohol-related disorders	24	2	1	1	0.96	0.33	0.92	0.50	0.89	28	0.34	0.29	-0.23	0.92	
661	Substance-related disorders	18	0	0	0	1.00		1.00		1.00						
663	Screening and history of mental health and substance abuse codes	91	3	1	0	0.99	0.00	0.97	0.00	0.96	95	-0.02	0.01	-0.04	0.01	
	Categories with Few Observations															
1	Tuberculosis	1	0	0	0	1.00		1.00		1.00						
2	Septicemia (except in labor)	2	2	2	6	0.50	0.75	0.50	0.75	0.67	12	0.25	0.29	-0.32	0.82	
4	Mycoses	5	1	0	1	1.00	0.50	0.83	1.00	0.86	7	0.59	0.35	-0.09	1.00	
5	HIV infection	3	0	0	0	1.00		1.00		1.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
6	Hepatitis	8	1	0	0	1.00	0.00	0.89		0.89						
7	Viral infection	4	0	0	0	1.00		1.00		1.00						
8	Other infections; including parasitic	2	0	0	0	1.00		1.00		1.00						
9	Sexually transmitted infections (not HIV or hepatitis)	1	1	0	0	1.00	0.00	0.50		0.50						
13	Cancer of stomach	1	0	0	0	1.00		1.00		1.00						
14	Cancer of colon	0	1	0	0		0.00	0.00		0.00						
15	Cancer of rectum and anus	0	1	0	0		0.00	0.00		0.00						
17	Cancer of pancreas	3	0	0	0	1.00		1.00		1.00						
19	Cancer of bronchus; lung	10	0	0	0	1.00		1.00		1.00						
22	Melanomas of skin	2	0	1	0	0.67		1.00	0.00	0.67						
23	Other non-epithelial cancer of skin	1	0	0	0	1.00		1.00		1.00						
24	Cancer of breast	1	2	1	0	0.50	0.00	0.33	0.00	0.25	4	-0.50	0.38	-1.00	0.23	
25	Cancer of uterus	1	1	0	0	1.00	0.00	0.50		0.50						
28	Cancer of other female genital organs	1	0	0	0	1.00		1.00		1.00						
29	Cancer of prostate	7	1	0	0	1.00	0.00	0.88		0.88						
32	Cancer of bladder	2	0	0	0	1.00		1.00		1.00						
33	Cancer of kidney and renal pelvis	1	0	0	0	1.00		1.00		1.00						
35	Cancer of brain and nervous system	1	0	0	0	1.00		1.00		1.00						
38	Non-Hodgkin`s lymphoma	5	0	0	0	1.00		1.00		1.00						
39	Leukemias	4	0	0	0	1.00		1.00		1.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
40	Multiple myeloma	1	0	0	0	1.00		1.00		1.00						
43	Malignant neoplasm without specification of site	3	0	0	0	1.00		1.00		1.00						
44	Neoplasms of unspecified nature or uncertain behavior	7	1	0	0	1.00	0.00	0.88		0.88						
47	Other and unspecified benign neoplasm	6	0	0	0	1.00		1.00		1.00						
60	Acute posthemorrhagic anemia	0	0	1	1	0.00	1.00		0.50	0.50						
78	Other CNS infection and poliomyelitis	1	0	0	0	1.00		1.00		1.00						
80	Multiple sclerosis	2	0	0	0	1.00		1.00		1.00						
81	Other hereditary and degenerative nervous system conditions	6	2	0	0	1.00	0.00	0.75		0.75						
86	Cataract	7	2	1	0	0.88	0.00	0.78	0.00	0.70	10	-0.15	0.11	-0.37	0.07	
90	Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease)	2	0	0	0	1.00		1.00		1.00						
91	Other eye disorders	7	0	0	0	1.00		1.00		1.00						
92	Otitis media and related conditions	2	0	0	0	1.00		1.00		1.00						
93	Conditions associated with dizziness or vertigo	6	0	0	0	1.00		1.00		1.00						
102	Nonspecific chest pain	4	0	0	0	1.00		1.00		1.00						
104	Other and ill-defined heart disease	10	0	0	0	1.00		1.00		1.00						
107	Cardiac arrest and ventricular fibrillation	0	0	3	1	0.00	1.00		0.25	0.25						
115	Aortic; peripheral; and visceral artery aneurysms	10	0	0	0	1.00		1.00		1.00						
118	Phlebitis; thrombophlebitis and thromboembolism	4	2	0	2	1.00	0.50	0.67	1.00	0.75	8	0.50	0.27	-0.02	1.00	
120	Hemorrhoids	2	0	0	0	1.00		1.00		1.00						
126	Other upper respiratory infections	10	0	0	0	1.00		1.00		1.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
130	Pleurisy; pneumothorax; pulmonary collapse	1	0	0	1	1.00	1.00	1.00	1.00	1.00	2	1.00	0.00	1.00	1.00	
132	Lung disease due to external agents	1	0	0	0	1.00		1.00		1.00						
133	Other lower respiratory disease	9	1	0	0	1.00	0.00	0.90		0.90						
134	Other upper respiratory disease	4	1	0	0	1.00	0.00	0.80		0.80						
135	Intestinal infection	4	0	3	1	0.57	1.00	1.00	0.25	0.63	8	0.25	0.23	-0.19	0.69	
136	Disorders of teeth and jaw	1	0	0	0	1.00		1.00		1.00						
137	Diseases of mouth; excluding dental	1	0	0	0	1.00		1.00		1.00						
139	Gastroduodenal ulcer (except hemorrhage)	7	0	2	0	0.78		1.00	0.00	0.78						
141	Other disorders of stomach and duodenum	1	0	1	0	0.50		1.00	0.00	0.50						
143	Abdominal hernia	5	1	0	0	1.00	0.00	0.83		0.83						
144	Regional enteritis and ulcerative colitis	1	0	0	0	1.00		1.00		1.00						
145	Intestinal obstruction without hernia	2	0	0	0	1.00		1.00		1.00						
146	Diverticulosis and diverticulitis	9	0	0	0	1.00		1.00		1.00						
149	Biliary tract disease	3	1	0	0	1.00	0.00	0.75		0.75						
151	Other liver diseases	5	4	0	0	1.00	0.00	0.56		0.56						
152	Pancreatic disorders (not diabetes)	1	0	0	1	1.00	1.00	1.00	1.00	1.00	2	1.00	0.00	1.00	1.00	
153	Gastrointestinal hemorrhage	3	1	2	0	0.60	0.00	0.75	0.00	0.50	6	-0.29	0.21	-0.70	0.13	
154	Noninfectious gastroenteritis	0	1	0	0		0.00	0.00		0.00						
156	Nephritis; nephrosis; renal sclerosis	8	1	0	0	1.00	0.00	0.89		0.89						
160	Calculus of urinary tract	0	1	0	0		0.00	0.00		0.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
162	Other diseases of bladder and urethra	4	0	0	0	1.00		1.00		1.00						
166	Other male genital disorders	3	0	0	0	1.00		1.00		1.00						
172	Ovarian cyst	1	0	0	0	1.00		1.00		1.00						
173	Menopausal disorders	1	0	0	0	1.00		1.00		1.00						
175	Other female genital disorders	1	0	0	0	1.00		1.00		1.00						
197	Skin and subcutaneous tissue infections	6	1	1	0	0.86	0.00	0.86	0.00	0.75	8	-0.14	0.10	-0.34	0.05	
198	Other inflammatory condition of skin	5	0	0	0	1.00		1.00		1.00						
200	Other skin disorders	4	0	0	0	1.00		1.00		1.00						
207	Pathological fracture	2	0	0	0	1.00		1.00		1.00						
208	Acquired foot deformities	2	1	0	0	1.00	0.00	0.67		0.67						
209	Other acquired deformities	2	0	0	0	1.00		1.00		1.00						
210	Systemic lupus erythematosus and connective tissue disorders	4	0	0	0	1.00		1.00		1.00						
212	Other bone disease and musculoskeletal deformities	4	0	0	0	1.00		1.00		1.00						
217	Other congenital anomalies	2	0	0	0	1.00		1.00		1.00						
225	Joint disorders and dislocations; trauma-related	1	0	0	0	1.00		1.00		1.00						
226	Fracture of neck of femur (hip)	1	0	0	0	1.00		1.00		1.00						
229	Fracture of upper limb	3	0	0	0	1.00		1.00		1.00						
230	Fracture of lower limb	1	0	0	0	1.00		1.00		1.00						
231	Other fractures	4	0	0	0	1.00		1.00		1.00						
233	Intracranial injury	2	0	0	0	1.00		1.00		1.00						

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-2. Reliability of Condition Present on Admission (All Conditions)

Table F-2: Reliability of Condition Present on Admission (All Conditions)																
235	Open wounds of head; neck; and trunk	0	0	1	0	0.00			0.00	0.00						
236	Open wounds of extremities	1	0	0	0	1.00		1.00		1.00						
237	Complication of device; implant or graft	1	0	0	0	1.00		1.00		1.00						
238	Complications of surgical procedures or medical care	1	0	1	2	0.50	1.00	1.00	0.67	0.75	4	0.50	0.38	-0.23	1.00	
245	Syncope	1	0	0	0	1.00		1.00		1.00						
248	Gangrene	2	0	0	0	1.00		1.00		1.00						
249	Shock	0	2	1	0	0.00	0.00	0.00	0.00	0.00	3	-0.80	0.59	-1.00	0.35	
250	Nausea and vomiting	2	1	1	1	0.67	0.50	0.67	0.50	0.60	5	0.17	0.45	-0.71	1.00	
251	Abdominal pain	0	2	0	1		0.33	0.00	1.00	0.33						
252	Malaise and fatigue	2	1	0	0	1.00	0.00	0.67		0.67						
253	Allergic reactions	2	0	0	1	1.00	1.00	1.00	1.00	1.00	3	1.00	0.00	1.00	1.00	
257	Other aftercare	0	0	1	2	0.00	1.00		0.67	0.67						
650	Adjustment disorders	0	0	1	0	0.00			0.00	0.00						
652	Attention-deficit, conduct, and disruptive behavior disorders	1	0	0	0	1.00		1.00		1.00						
654	Developmental disorders	1	0	0	1	1.00	1.00	1.00	1.00	1.00	2	1.00	0.00	1.00	1.00	
658	Personality disorders	0	1	0	0		0.00	0.00		0.00						
659	Schizophrenia and other psychotic disorders	5	1	0	1	1.00	0.50	0.83	1.00	0.86	7	0.59	0.35	-0.09	1.00	

Appendix Table F-3: Reliability of Procedures

Table F-3: Reliability of Procedures															
CCS Categories		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
Specific non-CCS Measures															
	DNR	114	84	56	727	0.67	0.90	0.58	0.93	0.86	981	0.53	0.03	0.46	0.60
	tPA	101	3	27	850	0.79	1.00	0.97	0.97	0.97	981	0.85	0.03	0.80	0.90
CCS Measures															
4	Diagnostic spinal tap	5	5	4	967	0.56	0.99	0.50	1.00	0.99	981	0.52	0.14	0.25	0.80
54	Other vascular catheterization; not heart	22	11	11	937	0.67	0.99	0.67	0.99	0.98	981	0.66	0.07	0.52	0.79
58	Hemodialysis	12	3	1	965	0.92	1.00	0.80	1.00	1.00	981	0.86	0.07	0.71	1.00
59	Other OR procedures on vessels of head and neck	9	2	0	970	1.00	1.00	0.82	1.00	1.00	981	0.90	0.07	0.76	1.00
61	Other OR procedures on vessels other than head and neck	12	0	1	968	0.92	1.00	1.00	1.00	1.00	981	0.96	0.04	0.88	1.00
70	Upper gastrointestinal endoscopy; biopsy	13	3	5	960	0.72	1.00	0.81	0.99	0.99	981	0.76	0.08	0.60	0.92
71	Gastrostomy; temporary and permanent	34	8	3	936	0.92	0.99	0.81	1.00	0.99	981	0.85	0.04	0.77	0.94
93	Other non-OR upper GI therapeutic procedures	1	2	17	961	0.06	1.00	0.33	0.98	0.98	981	0.09	0.09	-0.08	0.26
177	Computerized axial tomography (CT) scan head	206	5	689	81	0.23	0.94	0.98	0.11	0.29	981	0.04	0.01	0.02	0.05
178	CT scan chest	3	1	30	947	0.09	1.00	0.75	0.97	0.97	981	0.16	0.08	0.00	0.31
179	CT scan abdomen	5	3	29	944	0.15	1.00	0.63	0.97	0.97	981	0.23	0.09	0.06	0.40
180	Other CT scan	7	2	29	943	0.19	1.00	0.78	0.97	0.97	981	0.30	0.09	0.13	0.48
183	Routine chest X-ray	0	0	740	241	0.00	1.00		0.25	0.25					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

Table F-3: Reliability of Procedures															
CCS Categories		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
185	Upper gastrointestinal X-ray	1	2	65	913	0.02	1.00	0.33	0.93	0.93	981	0.02	0.03	-0.03	0.08
188	Cerebral arteriogram	57	12	257	655	0.18	0.98	0.83	0.72	0.73	981	0.21	0.03	0.15	0.26
191	Arterio- or venogram (not heart and head)	5	2	7	967	0.42	1.00	0.71	0.99	0.99	981	0.52	0.14	0.25	0.80
192	Diagnostic ultrasound of head and neck	119	13	388	461	0.23	0.97	0.90	0.54	0.59	981	0.20	0.02	0.16	0.24
193	Diagnostic ultrasound of heart (echocardiogram)	136	15	365	465	0.27	0.97	0.90	0.56	0.61	981	0.24	0.02	0.19	0.28
195	Diagnostic ultrasound of urinary tract	3	0	18	960	0.14	1.00	1.00	0.98	0.98	981	0.25	0.12	0.02	0.47
196	Diagnostic ultrasound of abdomen or retroperitoneum	2	2	22	955	0.08	1.00	0.50	0.98	0.98	981	0.14	0.09	-0.04	0.31
197	Other diagnostic ultrasound	10	5	59	907	0.14	0.99	0.67	0.94	0.93	981	0.22	0.06	0.10	0.34
198	Magnetic resonance imaging	125	10	433	413	0.22	0.98	0.93	0.49	0.55	981	0.18	0.02	0.14	0.21
199	Electroencephalogram (EEG)	19	6	51	905	0.27	0.99	0.76	0.95	0.94	981	0.38	0.06	0.25	0.50
201	Cardiac stress tests	3	2	8	968	0.27	1.00	0.60	0.99	0.99	981	0.37	0.15	0.07	0.67
202	Electrocardiogram	1	0	753	227	0.00	1.00	1.00	0.23	0.23	981	0.00	0.00	0.00	0.00
206	Microscopic examination (bacterial smear; culture; toxicology)	0	0	23	958	0.00	1.00		0.98	0.98					
213	Physical therapy exercises; manipulation; and other procedures	0	31	8	942	0.00	0.97	0.00	0.99	0.96	981	-0.01	0.00	-0.02	-0.01
215	Other physical therapy and rehabilitation	1	40	12	928	0.08	0.96	0.02	0.99	0.95	981	0.02	0.04	-0.05	0.09
216	Respiratory intubation and mechanical ventilation	48	11	8	914	0.86	0.99	0.81	0.99	0.98	981	0.82	0.04	0.75	0.90
222	Blood transfusion	28	13	11	929	0.72	0.99	0.68	0.99	0.98	981	0.69	0.06	0.57	0.81
223	Enteral and parenteral nutrition	10	8	95	868	0.10	0.99	0.56	0.90	0.90	981	0.14	0.04	0.05	0.22

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

Table F-3: Reliability of Procedures															
CCS Categories		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
226	Other diagnostic radiology and related techniques	2	1	61	917	0.03	1.00	0.67	0.94	0.94	981	0.06	0.04	-0.02	0.13
227	Other diagnostic procedures (interview; evaluation; consultation)	1	15	1	964	0.50	0.98	0.06	1.00	0.98	981	0.11	0.10	-0.09	0.31
231	Other therapeutic procedures	102	42	3	834	0.97	0.95	0.71	1.00	0.95	981	0.79	0.03	0.74	0.85

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

Table F-3: Reliability of Procedures															
Categories with Few Observations		TP	FP	FN	TN	Sens	Spec	PPV	NPV	Accuracy	N	Kappa	SE Kappa	Lower Kappa	Upper Kappa
1	Incision and excision of CNS	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
2	Insertion; replacement; or removal of extracranial ventricular shunt	0	0	0	981		1.00		1.00	1.00					
3	Laminectomy; excision intervertebral disc	0	0	0	981		1.00		1.00	1.00					
5	Insertion of catheter or spinal stimulator and injection into spinal canal	0	0	0	981		1.00		1.00	1.00					
6	Decompression peripheral nerve	0	0	0	981		1.00		1.00	1.00					
7	Other diagnostic nervous system procedures	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
8	Other non-OR or closed therapeutic nervous system procedures	0	0	0	981		1.00		1.00	1.00					
9	Other OR therapeutic nervous system procedures	1	1	0	979	1.00	1.00	0.50	1.00	1.00	981	0.67	0.31	0.05	1.00
10	Thyroidectomy; partial or complete	0	0	0	981		1.00		1.00	1.00					
11	Diagnostic endocrine procedures	0	1	0	980		1.00	0.00	1.00	1.00					
12	Other therapeutic endocrine procedures	0	0	0	981		1.00		1.00	1.00					
13	Corneal transplant	0	0	0	981		1.00		1.00	1.00					
14	Glaucoma procedures	0	0	0	981		1.00		1.00	1.00					
15	Lens and cataract procedures	0	0	0	981		1.00		1.00	1.00					
16	Repair of retinal tear; detachment	0	0	0	981		1.00		1.00	1.00					
17	Destruction of lesion of retina and choroid	0	0	0	981		1.00		1.00	1.00					
18	Diagnostic procedures on eye	0	0	0	981		1.00		1.00	1.00					
19	Other therapeutic procedures on eyelids; conjunctiva; cornea	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

20	Other intraocular therapeutic procedures	0	0	0	981		1.00		1.00	1.00					
21	Other extraocular muscle and orbit therapeutic procedures	0	0	0	981		1.00		1.00	1.00					
22	Tympanoplasty	0	0	0	981		1.00		1.00	1.00					
23	Myringotomy	0	0	0	981		1.00		1.00	1.00					
24	Mastoidectomy	0	0	0	981		1.00		1.00	1.00					
25	Diagnostic procedures on ear	0	0	0	981		1.00		1.00	1.00					
26	Other therapeutic ear procedures	0	1	0	980		1.00	0.00	1.00	1.00					
27	Control of epistaxis	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
28	Plastic procedures on nose	0	0	0	981		1.00		1.00	1.00					
29	Dental procedures	0	0	0	981		1.00		1.00	1.00					
30	Tonsillectomy and/or adenoidectomy	0	0	0	981		1.00		1.00	1.00					
31	Diagnostic procedures on nose; mouth and pharynx	0	0	0	981		1.00		1.00	1.00					
32	Other non-OR therapeutic procedures on nose; mouth and pharynx	0	0	0	981		1.00		1.00	1.00					
33	Other OR therapeutic procedures on nose; mouth and pharynx	0	1	0	980		1.00	0.00	1.00	1.00					
34	Tracheostomy; temporary and permanent	4	3	0	974	1.00	1.00	0.57	1.00	1.00	981	0.73	0.15	0.43	1.00
35	Tracheoscopy and laryngoscopy with biopsy	2	1	1	977	0.67	1.00	0.67	1.00	1.00	981	0.67	0.22	0.23	1.00
36	Lobectomy or pneumonectomy	0	0	0	981		1.00		1.00	1.00					
37	Diagnostic bronchoscopy and biopsy of bronchus	2	3	1	975	0.67	1.00	0.40	1.00	1.00	981	0.50	0.22	0.07	0.92
38	Other diagnostic procedures on lung and bronchus	0	0	0	981		1.00		1.00	1.00					
39	Incision of pleura; thoracentesis; chest drainage	1	1	0	979	1.00	1.00	0.50	1.00	1.00	981	0.67	0.31	0.05	1.00
40	Other diagnostic procedures of respiratory tract and mediastinum	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

41	Other non-OR therapeutic procedures on respiratory system	0	1	1	979	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
42	Other OR Rx procedures on respiratory system and mediastinum	0	0	1	980	0.00	1.00		1.00	1.00					
43	Heart valve procedures	0	0	0	981		1.00		1.00	1.00					
44	Coronary artery bypass graft (CABG)	0	0	1	980	0.00	1.00		1.00	1.00					
45	Percutaneous transluminal coronary angioplasty (PTCA)	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
46	Coronary thrombolysis	0	0	0	981		1.00		1.00	1.00					
47	Diagnostic cardiac catheterization; coronary arteriography	2	0	1	978	0.67	1.00	1.00	1.00	1.00	981	0.80	0.20	0.41	1.00
48	Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator	5	4	1	971	0.83	1.00	0.56	1.00	0.99	981	0.66	0.14	0.39	0.94
49	Other OR heart procedures	0	0	1	980	0.00	1.00		1.00	1.00					
50	Extracorporeal circulation auxiliary to open heart procedures	0	0	0	981		1.00		1.00	1.00					
51	Endarterectomy; vessel of head and neck	0	0	0	981		1.00		1.00	1.00					
52	Aortic resection; replacement or anastomosis	0	0	0	981		1.00		1.00	1.00					
53	Varicose vein stripping; lower limb	0	0	0	981		1.00		1.00	1.00					
55	Peripheral vascular bypass	0	0	0	981		1.00		1.00	1.00					
56	Other vascular bypass and shunt; not heart	0	0	0	981		1.00		1.00	1.00					
57	Creation; revision and removal of arteriovenous fistula or vessel-to-vessel cannula for dialysis	0	1	0	980		1.00	0.00	1.00	1.00					
60	Embolectomy and endarterectomy of lower limbs	0	0	0	981		1.00		1.00	1.00					
62	Other diagnostic cardiovascular procedures	0	0	0	981		1.00		1.00	1.00					
63	Other non-OR therapeutic cardiovascular procedures	2	0	0	979	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
64	Bone marrow transplant	0	0	0	981		1.00		1.00	1.00					
65	Bone marrow biopsy	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

66	Procedures on spleen	0	0	0	981		1.00		1.00	1.00					
67	Other therapeutic procedures; hemic and lymphatic system	0	0	0	981		1.00		1.00	1.00					
68	Injection or ligation of esophageal varices	0	0	0	981		1.00		1.00	1.00					
69	Esophageal dilatation	0	0	0	981		1.00		1.00	1.00					
72	Colostomy; temporary and permanent	0	0	0	981		1.00		1.00	1.00					
73	Ileostomy and other enterostomy	0	0	0	981		1.00		1.00	1.00					
74	Gastrectomy; partial and total	0	0	0	981		1.00		1.00	1.00					
75	Small bowel resection	0	0	0	981		1.00		1.00	1.00					
76	Colonoscopy and biopsy	3	0	1	977	0.75	1.00	1.00	1.00	1.00	981	0.86	0.14	0.58	1.00
77	Proctoscopy and anorectal biopsy	0	0	0	981		1.00		1.00	1.00					
78	Colorectal resection	0	0	0	981		1.00		1.00	1.00					
79	Local excision of large intestine lesion (not endoscopic)	0	0	0	981		1.00		1.00	1.00					
80	Appendectomy	0	0	0	981		1.00		1.00	1.00					
81	Hemorrhoid procedures	0	0	0	981		1.00		1.00	1.00					
82	Endoscopic retrograde cannulation of pancreas (ERCP)	0	0	0	981		1.00		1.00	1.00					
83	Biopsy of liver	0	0	0	981		1.00		1.00	1.00					
84	Cholecystectomy and common duct exploration	0	1	0	980		1.00	0.00	1.00	1.00					
85	Inguinal and femoral hernia repair	0	0	0	981		1.00		1.00	1.00					
86	Other hernia repair	0	0	0	981		1.00		1.00	1.00					
87	Laparoscopy (GI only)	0	0	0	981		1.00		1.00	1.00					
88	Abdominal paracentesis	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

89	Exploratory laparotomy	0	0	0	981		1.00		1.00	1.00					
90	Excision; lysis peritoneal adhesions	0	0	0	981		1.00		1.00	1.00					
91	Peritoneal dialysis	0	0	0	981		1.00		1.00	1.00					
92	Other bowel diagnostic procedures	0	0	0	981		1.00		1.00	1.00					
94	Other OR upper GI therapeutic procedures	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
95	Other non-OR lower GI therapeutic procedures	0	1	1	979	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
96	Other OR lower GI therapeutic procedures	0	0	0	981		1.00		1.00	1.00					
97	Other gastrointestinal diagnostic procedures	0	0	0	981		1.00		1.00	1.00					
98	Other non-OR gastrointestinal therapeutic procedures	0	1	0	980		1.00	0.00	1.00	1.00					
99	Other OR gastrointestinal therapeutic procedures	0	0	0	981		1.00		1.00	1.00					
100	Endoscopy and endoscopic biopsy of the urinary tract	0	0	0	981		1.00		1.00	1.00					
101	Transurethral excision; drainage; or removal urinary obstruction	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
102	Ureteral catheterization	0	0	0	981		1.00		1.00	1.00					
103	Nephrotomy and nephrostomy	0	0	0	981		1.00		1.00	1.00					
104	Nephrectomy; partial or complete	0	0	0	981		1.00		1.00	1.00					
105	Kidney transplant	0	0	0	981		1.00		1.00	1.00					
106	Genitourinary incontinence procedures	0	0	0	981		1.00		1.00	1.00					
107	Extracorporeal lithotripsy; urinary	0	0	0	981		1.00		1.00	1.00					
108	Indwelling catheter	0	5	2	974	0.00	0.99	0.00	1.00	0.99	981	0.00	0.00	-0.01	0.00
109	Procedures on the urethra	0	0	0	981		1.00		1.00	1.00					
110	Other diagnostic procedures of urinary tract	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

111	Other non-OR therapeutic procedures of urinary tract	0	2	0	979		1.00	0.00	1.00	1.00					
112	Other OR therapeutic procedures of urinary tract	0	0	0	981		1.00		1.00	1.00					
113	Transurethral resection of prostate (TURP)	0	0	0	981		1.00		1.00	1.00					
114	Open prostatectomy	0	0	0	981		1.00		1.00	1.00					
115	Circumcision	0	0	0	981		1.00		1.00	1.00					
116	Diagnostic procedures; male genital	0	0	0	981		1.00		1.00	1.00					
117	Other non-OR therapeutic procedures; male genital	0	0	0	981		1.00		1.00	1.00					
118	Other OR therapeutic procedures; male genital	0	0	0	981		1.00		1.00	1.00					
119	Oophorectomy; unilateral and bilateral	0	0	0	981		1.00		1.00	1.00					
120	Other operations on ovary	0	0	0	981		1.00		1.00	1.00					
121	Ligation or occlusion of fallopian tubes	0	0	0	981		1.00		1.00	1.00					
122	Removal of ectopic pregnancy	0	0	0	981		1.00		1.00	1.00					
123	Other operations on fallopian tubes	0	0	0	981		1.00		1.00	1.00					
124	Hysterectomy; abdominal and vaginal	0	0	0	981		1.00		1.00	1.00					
125	Other excision of cervix and uterus	0	0	0	981		1.00		1.00	1.00					
126	Abortion (termination of pregnancy)	0	0	0	981		1.00		1.00	1.00					
127	Dilatation and curettage (D&C); aspiration after delivery or abortion	0	0	0	981		1.00		1.00	1.00					
128	Diagnostic dilatation and curettage (D&C)	0	0	0	981		1.00		1.00	1.00					
129	Repair of cystocele and rectocele; obliteration of vaginal vault	0	0	0	981		1.00		1.00	1.00					
130	Other diagnostic procedures; female organs	0	0	0	981		1.00		1.00	1.00					
131	Other non-OR therapeutic procedures; female organs	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

132	Other OR therapeutic procedures; female organs	0	0	0	981		1.00		1.00	1.00					
133	Episiotomy	0	0	0	981		1.00		1.00	1.00					
134	Cesarean section	0	0	0	981		1.00		1.00	1.00					
135	Forceps; vacuum; and breech delivery	0	0	0	981		1.00		1.00	1.00					
136	Artificial rupture of membranes to assist delivery	0	0	0	981		1.00		1.00	1.00					
137	Other procedures to assist delivery	0	0	0	981		1.00		1.00	1.00					
138	Diagnostic amniocentesis	0	0	0	981		1.00		1.00	1.00					
139	Fetal monitoring	0	0	0	981		1.00		1.00	1.00					
140	Repair of current obstetric laceration	0	0	0	981		1.00		1.00	1.00					
141	Other therapeutic obstetrical procedures	0	0	0	981		1.00		1.00	1.00					
142	Partial excision bone	0	0	0	981		1.00		1.00	1.00					
143	Bunionectomy or repair of toe deformities	0	0	0	981		1.00		1.00	1.00					
144	Treatment; facial fracture or dislocation	0	0	0	981		1.00		1.00	1.00					
145	Treatment; fracture or dislocation of radius and ulna	0	1	0	980		1.00	0.00	1.00	1.00					
146	Treatment; fracture or dislocation of hip and femur	1	0	0	980	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
147	Treatment; fracture or dislocation of lower extremity (other than hip or femur)	0	0	0	981		1.00		1.00	1.00					
148	Other fracture and dislocation procedure	0	0	0	981		1.00		1.00	1.00					
149	Arthroscopy	0	0	0	981		1.00		1.00	1.00					
150	Division of joint capsule; ligament or cartilage	0	0	0	981		1.00		1.00	1.00					
151	Excision of semilunar cartilage of knee	0	0	0	981		1.00		1.00	1.00					
152	Arthroplasty knee	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

153	Hip replacement; total and partial	0	0	0	981		1.00		1.00	1.00					
154	Arthroplasty other than hip or knee	0	0	0	981		1.00		1.00	1.00					
155	Arthrocentesis	0	1	0	980		1.00	0.00	1.00	1.00					
156	Injections and aspirations of muscles; tendons; bursa; joints and soft tissue	0	0	0	981		1.00		1.00	1.00					
157	Amputation of lower extremity	0	0	3	978	0.00	1.00		1.00	1.00					
158	Spinal fusion	0	0	0	981		1.00		1.00	1.00					
159	Other diagnostic procedures on musculoskeletal system	0	0	0	981		1.00		1.00	1.00					
160	Other therapeutic procedures on muscles and tendons	0	0	0	981		1.00		1.00	1.00					
161	Other OR therapeutic procedures on bone	0	0	0	981		1.00		1.00	1.00					
162	Other OR therapeutic procedures on joints	0	0	0	981		1.00		1.00	1.00					
163	Other non-OR therapeutic procedures on musculoskeletal system	0	0	0	981		1.00		1.00	1.00					
164	Other OR therapeutic procedures on musculoskeletal system	0	0	0	981		1.00		1.00	1.00					
165	Breast biopsy and other diagnostic procedures on breast	0	0	0	981		1.00		1.00	1.00					
166	Lumpectomy; quadrantectomy of breast	0	0	0	981		1.00		1.00	1.00					
167	Mastectomy	0	0	0	981		1.00		1.00	1.00					
168	Incision and drainage; skin and subcutaneous tissue	0	0	0	981		1.00		1.00	1.00					
169	Debridement of wound; infection or burn	0	0	0	981		1.00		1.00	1.00					
170	Excision of skin lesion	0	0	0	981		1.00		1.00	1.00					
171	Suture of skin and subcutaneous tissue	0	0	0	981		1.00		1.00	1.00					
172	Skin graft	0	0	0	981		1.00		1.00	1.00					
173	Other diagnostic procedures on skin and subcutaneous tissue	0	0	0	981		1.00		1.00	1.00					

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

174	Other non-OR therapeutic procedures on skin and breast	0	0	0	981		1.00		1.00	1.00					
175	Other OR therapeutic procedures on skin and breast	0	0	0	981		1.00		1.00	1.00					
176	Other organ transplantation	0	0	0	981		1.00		1.00	1.00					
181	Myelogram	0	0	0	981		1.00		1.00	1.00					
182	Mammography	0	0	1	980	0.00	1.00		1.00	1.00					
184	Intraoperative cholangiogram	0	0	0	981		1.00		1.00	1.00					
186	Lower gastrointestinal X-ray	0	0	0	981		1.00		1.00	1.00					
187	Intravenous pyelogram	0	0	0	981		1.00		1.00	1.00					
189	Contrast aortogram	3	0	0	978	1.00	1.00	1.00	1.00	1.00	981	1.00	0.00	1.00	1.00
190	Contrast arteriogram of femoral and lower extremity arteries	0	4	0	977		1.00	0.00	1.00	1.00					
194	Diagnostic ultrasound of gastrointestinal tract	0	0	0	981		1.00		1.00	1.00					
200	Nonoperative urinary system measurements	0	0	0	981		1.00		1.00	1.00					
203	Electrographic cardiac monitoring	0	2	1	978	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
204	Swan-Ganz catheterization for monitoring	0	1	0	980		1.00	0.00	1.00	1.00					
205	Arterial blood gases	0	1	0	980		1.00	0.00	1.00	1.00					
207	Radioisotope bone scan	0	0	5	976	0.00	1.00		0.99	0.99					
208	Radioisotope pulmonary scan	0	0	0	981		1.00		1.00	1.00					
209	Radioisotope scan and function studies	2	0	1	978	0.67	1.00	1.00	1.00	1.00	981	0.80	0.20	0.41	1.00
210	Other radioisotope scan	0	0	0	981		1.00		1.00	1.00					
211	Therapeutic radiology for cancer treatment	0	0	0	981		1.00		1.00	1.00					
212	Diagnostic physical therapy	1	8	1	971	0.50	0.99	0.11	1.00	0.99	981	0.18	0.16	-0.13	0.49

TP: True Positive; FP: False Positive; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Appendix Table F-3: Reliability of Procedures

214	Traction; splints; and other wound care	0	2	0	979		1.00	0.00	1.00	1.00					
217	Other respiratory therapy	0	3	1	977	0.00	1.00	0.00	1.00	1.00	981	0.00	0.00	0.00	0.00
218	Psychological and psychiatric evaluation and therapy	0	0	0	981		1.00		1.00	1.00					
219	Alcohol and drug rehabilitation/detoxification	0	2	0	979		1.00	0.00	1.00	1.00					
220	Ophthalmologic and otologic diagnosis and treatment	0	0	0	981		1.00		1.00	1.00					
221	Nasogastric tube	0	4	0	977		1.00	0.00	1.00	1.00					
224	Cancer chemotherapy	0	0	0	981		1.00		1.00	1.00					
225	Conversion of cardiac rhythm	2	8	0	971	1.00	0.99	0.20	1.00	0.99	981	0.33	0.18	-0.01	0.67
228	Prophylactic vaccinations and inoculations	0	6	1	974	0.00	0.99	0.00	1.00	0.99	981	0.00	0.00	0.00	0.00
229	Nonoperative removal of foreign body	0	0	0	981		1.00		1.00	1.00					
230	Extracorporeal shock wave other than urinary	0	0	0	981		1.00		1.00	1.00					

Appendix G:
Validation of PDD- Derived Measures versus Clinical
Chart Abstraction

Appendix G: Validation of PDD- Derived Measures versus Clinical Chart Abstraction

Appendix G: Validation of PDD- Derived Measures Versus Clinical Chart Abstraction												
Description	Abstraction Measure	OSHPD Measure	TP	FP	FN	TN	pctagree	kappa	senCLM	spcCLM	ppvCLM	npvCLM
TPA	A_tpa4	TreWThrom	116	11	4	839	0.98	0.93	0.97	0.99	0.91	1.00
Smoke in Prior Year	A_smoke	Current Smoker	12	93	122	720	0.77	-0.03	0.09	0.89	0.11	0.86
Mechanical Ventilation	A_mechvent	Mechanical Ventilation (any)	0	54	0	927	0.94			0.94	0.00	1.00
Hx TIA	A_priorTIA	FormTIA	40	14	873	54	0.10	-0.02	0.04	0.79	0.74	0.06
Gender	A_male	male	484	0	9	488	0.99	0.98	0.98	1.00	1.00	0.98
Hospital Death	A_died	Hdeath	88	9	1	876	0.99	0.94	0.99	0.99	0.91	1.00
DNR-CPR	A_dnr	DNR01	111	59	48	763	0.89	0.61	0.70	0.93	0.65	0.94
Neurological Findings												
Hemiplegia	A_hemiplegic	Hemiplegia	324	42	287	328	0.66	0.37	0.53	0.89	0.89	0.53
Hemineglect	A_hemineglect	Hemineglect	6	4	91	880	0.90	0.10	0.06	1.00	0.60	0.91
Chronic Conditions												
Atrial Fibrillation	hx_afib	Atrial Fibrillation (any)	198	58	15	710	0.93	0.80	0.93	0.92	0.77	0.98
CHF	hx_chf	History of CHF (any)	112	48	37	784	0.91	0.67	0.75	0.94	0.70	0.95
COPD	hx_copd	Chronic Lung Disease	81	30	53	817	0.92	0.61	0.60	0.96	0.73	0.94
Coronary Artery Disease	hx_cad	AlsCHRd_any	187	63	45	686	0.89	0.70	0.81	0.92	0.75	0.94
Myocardial Infarction	hx_MI	AcuMyoInf_any	4	15	99	863	0.88	0.03	0.04	0.98	0.21	0.90
Peripheral Vascular Disease	hx_PVD	PerVasDis_any	46	19	23	893	0.96	0.66	0.67	0.98	0.71	0.97
Hyperlipidemia	hx_hyplip	Hyperlipidemia_any	373	64	87	457	0.85	0.69	0.81	0.88	0.85	0.84
Hypertension	hx_HTN	Hypertension_any	597	46	185	153	0.76	0.42	0.76	0.77	0.93	0.45
Hypertension (complicated)	hx_HTN	HTN_C_any	650	42	132	157	0.82	0.53	0.83	0.79	0.94	0.54
Diabetes	hx_DM	DM_any	214	18	115	634	0.86	0.67	0.65	0.97	0.92	0.85
Diabetes (complicated)	hx_DM	DMCX_any	60	1	269	651	0.72	0.23	0.18	1.00	0.98	0.71
Any Diabetes	hx_DM	DM_all_any	274	19	55	633	0.92	0.83	0.83	0.97	0.94	0.92
Renal Failure	hx_renal	RenlFail_any	15	85	1	880	0.91	0.24	0.94	0.91	0.15	1.00
Any Renal Problem	hx_renal	anyRenal_any	16	261	0	704	0.73	0.08	1.00	0.73	0.06	1.00
Dementia	hx_dement	DemAlzDis_any	54	17	82	828	0.90	0.47	0.40	0.98	0.76	0.91

Appendix G: Validation of PDD- Derived Measures versus Clinical Chart Abstraction

Appendix G: Validation of PDD- Derived Measures Versus Clinical Chart Abstraction												
Description	Abstraction Measure	OSHPD Measure	TP	FP	FN	TN	pctagree	kappa	senCLM	spcCLM	ppvCLM	npvCLM
Depression	hx_depress	Depress_any	77	17	53	834	0.93	0.65	0.59	0.98	0.82	0.94
Thromboembolic Disease	hx_DVTpe	DVT_any	1	7	22	951	0.97	0.05	0.04	0.99	0.13	0.98
Any Thromboembolic Disease	hx_DVTpe	PulEmb_any	0	2	23	956	0.97	0.00	0.00	1.00	0.00	0.98
Deep Vein Thrombosis or Pulmonary Embolism	hx_DVTpe	anyclot_any	1	9	22	949	0.97	0.05	0.04	0.99	0.10	0.98
AIDS	hx_HIV	AIDS_any	1	0	2	978	1.00	0.50	0.33	1.00	1.00	1.00
Liver Disease	hx_livdz	Liver_any	7	3	5	966	0.99	0.63	0.58	1.00	0.70	0.99
Lymphoma	hx_lymph	Lymph_any	2	2	4	973	0.99	0.40	0.33	1.00	0.50	1.00
Solid tumor last 5 years	hx_tumor5yr	Tumor_any	9	8	44	920	0.95	0.24	0.17	0.99	0.53	0.95
Metastatic Tumor	hx_metasCA	METS_any	8	11	6	956	0.98	0.48	0.57	0.99	0.42	0.99
Peptic Ulcer Disease	hx_Pulcer	Ulcer_any	0	0	21	960	0.98		0.00	1.00		0.98
Peptic Ulcer Disease (Any)	hx_Pulcer	AllGastroBleed_any	7	15	14	945	0.97	0.31	0.33	0.98	0.32	0.99
Rheumatologic Disorder	hx_rheuma	Arth_any	8	17	5	951	0.98	0.41	0.62	0.98	0.32	0.99
Acute Conditions												
Pneumonia	adm46d	Pneumonia_POA	4	9	37	931	0.95	0.13	0.10	0.99	0.31	0.96
Aspiration Pneumonia	adm46d	Apneumonia_POA	7	26	34	914	0.94	0.16	0.17	0.97	0.21	0.96
Any Pneumonia	adm46d	ALLpneumonia_POA	11	33	30	907	0.94	0.23	0.27	0.96	0.25	0.97
Myocardial Infarction	adm46e	AcuMyoInf_POA	8	8	9	956	0.98	0.48	0.47	0.99	0.50	0.99
Renal Failure	adm46f	Renfail_POA	16	82	24	859	0.89	0.18	0.40	0.91	0.16	0.97
Renal Failure	adm46f	UreaCreaR_POA	5	11	35	930	0.95	0.16	0.13	0.99	0.31	0.96
Dehydration	adm46h	Dehydration_POA	0	4	75	902	0.92	-0.01	0.00	1.00	0.00	0.92
Dehydration	adm46h	Hypovolemia_POA	0	7	75	899	0.92	-0.01	0.00	0.99	0.00	0.92
Depression	adm46i	Depress_POA	60	31	51	839	0.92	0.55	0.54	0.96	0.66	0.94
Dysphagia	adm46j	Dysphagia_POA	19	10	180	772	0.81	0.12	0.10	0.99	0.66	0.81
Urinary Tract Infection	adm46k	UrinTraInfec_POA	12	16	110	843	0.87	0.12	0.10	0.98	0.43	0.88
Pressure Ulcers	adm46l	PressUlcers_POA	2	1	17	961	0.98	0.18	0.11	1.00	0.67	0.98
Hospital Complications												
Myocardial Infarction	adm64a	AcuMyoInf_Any	8	11	7	955	0.98	0.46	0.53	0.99	0.42	0.99

Appendix G: Validation of PDD- Derived Measures versus Clinical Chart Abstraction

Appendix G: Validation of PDD- Derived Measures Versus Clinical Chart Abstraction												
Description	Abstraction Measure	OSHPD Measure	TP	FP	FN	TN	pctagree	kappa	senCLM	spcCLM	ppvCLM	npvCLM
Myocardial Infarction	adm64a	AcuMyoInf_CX	1	2	14	964	0.98	0.11	0.07	1.00	0.33	0.99
Thromboembolic Disease	adm64b	DVT_Any	0	8	0	973	0.99			0.99	0.00	1.00
Thromboembolic Disease	adm64b	DVT_CX	0	3	0	978	1.00			1.00	0.00	1.00
Pulmonary Embolism	adm64c	PulEmb_Any	1	1	0	979	1.00	0.67	1.00	1.00	0.50	1.00
Pulmonary Embolism	adm64c	PulEmb_CX	0	0	1	980	1.00		0.00	1.00		1.00
Pneumonia	adm64d	Pneumonia_Any	22	18	44	897	0.94	0.38	0.33	0.98	0.55	0.95
Aspiration Pneumonia	adm64d	APneumonia_Any	30	23	36	892	0.94	0.47	0.45	0.97	0.57	0.96
Any Pneumonia	adm64d	ALLpneumonia_Any	51	40	15	875	0.94	0.62	0.77	0.96	0.56	0.98
Pneumonia	adm64d	pneum_cx	8	5	58	910	0.94	0.18	0.12	0.99	0.62	0.94
Aspiration Pneumonia	adm64d	Apneum_cx	19	14	47	901	0.94	0.35	0.29	0.98	0.58	0.95
Any Pneumonia	adm64d	allPneum_cx	26	18	40	897	0.94	0.44	0.39	0.98	0.59	0.96
Dehydration	adm64e	Dehydration_Any	43	36	17	885	0.95	0.59	0.72	0.96	0.54	0.98
Dehydration	adm64e	Dehydration_cx	0	4	60	917	0.93	-0.01	0.00	1.00	0.00	0.94
Dehydration	adm64e	Hypovolemia_Any	43	47	17	874	0.93	0.54	0.72	0.95	0.48	0.98
Dehydration	adm64e	Hypovolemia_cx	0	7	60	914	0.93	-0.01	0.00	0.99	0.00	0.94
Depression	adm64f	Depress_Any	59	35	45	842	0.92	0.55	0.57	0.96	0.63	0.95
Depression	adm64f	Depress_cx	1	2	103	875	0.89	0.01	0.01	1.00	0.33	0.89
Dysphagia	adm64g	Dysphagia_Any	18	12	185	766	0.80	0.11	0.09	0.98	0.60	0.81
Dysphagia	adm64g	Dysphagia_cx	0	1	203	777	0.79	0.00	0.00	1.00	0.00	0.79
Falls	adm64h	Falls	0	39	2	940	0.96	0.00	0.00	0.96	0.00	1.00
UTI	adm64i	UrinTraInfec_Any	106	29	33	813	0.94	0.74	0.76	0.97	0.79	0.96
UTI	adm64i	UTI_cx	23	5	116	837	0.88	0.24	0.17	0.99	0.82	0.88
Pressure Ulcers	adm64j	PressUlcers_Any	2	19	2	958	0.98	0.15	0.50	0.98	0.10	1.00
Pressure Ulcers	adm64j	PressUlcers_cx	0	3	4	974	0.99	0.00	0.00	1.00	0.00	1.00
Hypoxia	adm64k	AnyResp_Any	5	122	9	845	0.87	0.05	0.36	0.87	0.04	0.99
Hypoxia	adm64k	AnyResp_cx	3	41	11	926	0.95	0.08	0.21	0.96	0.07	0.99

Appendix H:

Table H-1. Comparison of Measures by DNR (as reported in PDD)

Table H-2. Comparison of Measures by no CPR (as abstracted)

Table H-3. Comparison of Measures by no Mechanical Ventilation (as abstracted)

Table H-4. Comparison of Measures by Hospital Death

Appendix Table H-1. Comparison of Measures by DNR (as reported in PDD)

Table H-1: Comparison of Measures by DNR (as reported in PDD)

	DNR = No					DNR = Yes				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
No CPR	811	0.06	0.24	0	1	170	0.65	0.48	0	1
No mechanical ventilation (MV)	811	0.03	0.17	0	1	170	0.25	0.44	0	1
Discuss change in CPR	811	0.05	0.22	0	1	170	0.23	0.42	0	1
Discuss change in MV	811	0.04	0.20	0	1	170	0.14	0.34	0	1
No CPR or discuss change in CPR	811	0.09	0.29	0	1	170	0.71	0.46	0	1
Withdraw or withhold MV	811	0.04	0.19	0	1	170	0.07	0.26	0	1
Palliative Care Consultation	811	0.02	0.13	0	1	170	0.16	0.37	0	1
Time to Palliative Care Consultation	12	5.00	5.03	0	19	28	3.64	2.06	0	7
CPR baseline decision (day)	47	1.34	4.31	0	28	108	0.43	1.22	0	8
CPR follow up decision (day)	44	5.41	5.79	0	28	38	2.32	2.68	0	10
MV baseline decision (day)	21	0.38	0.59	0	2	41	0.61	1.59	0	8
MV follow up decision (day)	34	5.21	4.65	0	19	21	2.57	2.71	0	10
Hospital Death	811	0.06	0.24	0	1	170	0.24	0.43	0	1
Death 30 days	811	0.13	0.33	0	1	170	0.51	0.50	0	1
Length of stay (days)	811	5.45	6.35	0	101	170	5.57	5.16	0	30

Appendix Table H-2. Comparison of Measures by no CPR (as abstracted)

Table H-2 Comparison of Measures by no CPR (as abstracted)

	CPR = No					CPR = Yes				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
No mechanical ventilation (MV)	822	0.01	0.10	0	1	159	0.36	0.48	0	1
Discuss change in CPR	822	0.04	0.20	0	1	159	0.30	0.46	0	1
Discuss change in MV	822	0.04	0.19	0	1	159	0.17	0.38	0	1
No CPR or discuss change in CPR	822	0.04	0.20	0	1	159	1.00	0.00	1	1
Withdraw or withhold MV	822	0.03	0.18	0	1	159	0.10	0.30	0	1
Palliative Care Consultation	822	0.02	0.13	0	1	159	0.17	0.38	0	1
Time to Palliative Care Consultation	13	5.77	4.40	3	19	27	3.22	2.14	0	7
CPR baseline decision (day)	0					155	0.70	2.60	0	28
CPR follow up decision (day)	38	6.18	4.27	0	19	44	2.07	4.53	0	28
MV baseline decision (day)	9	0.56	1.01	0	3	53	0.53	1.40	0	8
MV follow up decision (day)	31	6.10	4.37	0	19	24	1.75	2.31	0	10
Hospital Death	822	0.05	0.22	0	1	159	0.30	0.46	0	1
Death 30 days	822	0.13	0.34	0	1	159	0.52	0.50	0	1
Length of stay (days)	822	5.47	6.30	0	101	159	5.50	5.34	0	33

Appendix Table H-3. Comparison of Measures by no Mechanical Ventilation (as abstracted)

Table H-3: Comparison of Measures by no Mechanical Ventilation (as abstracted)

	Mechanical ventilation = Yes					Mechanical Ventilation = No				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
No CPR	915	0.11	0.31	0	1	66	0.86	0.35	0	1
Discuss change in CPR	915	0.07	0.25	0	1	66	0.32	0.47	0	1
Discuss change in mechanical ventilation (MV)	915	0.04	0.19	0	1	66	0.36	0.48	0	1
No CPR or discuss change in CPR	915	0.15	0.35	0	1	66	0.91	0.29	0	1
Withdraw or withhold MV	915	0.04	0.19	0	1	66	0.12	0.33	0	1
Palliative Care Consultation	915	0.03	0.18	0	1	66	0.17	0.38	0	1
Time to Palliative Care Consultation	29	3.90	3.57	0	19	11	4.45	2.21	1	7
CPR baseline decision (day)	101	0.77	3.06	0	28	54	0.57	1.40	0	8
CPR follow up decision (day)	64	4.70	5.18	0	28	18	1.39	1.88	0	7
MV baseline decision (day)	0					62	0.53	1.34	0	8
MV follow up decision (day)	34	5.88	4.39	0	19	21	1.48	1.78	0	7
Hospital Death	915	0.07	0.26	0	1	66	0.36	0.48	0	1
Death 30 days	915	0.17	0.38	0	1	66	0.55	0.50	0	1
Length of stay (days)	915	5.42	6.13	0	101	66	6.24	6.51	0	36

Appendix Table H-4. Comparison of Measures by Hospital Death

Table H-4: Comparison of Measures by Hospital Death

	Hospital Death = No					Hospital Death = Yes				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
No CPR	892	0.13	0.33	0	1	89	0.53	0.50	0	1
No mechanical ventilation (MV)	892	0.05	0.21	0	1	89	0.27	0.45	0	1
Discuss change in CPR	892	0.04	0.21	0	1	89	0.47	0.50	0	1
Discuss change in MV	892	0.03	0.17	0	1	89	0.36	0.48	0	1
No CPR or discuss change in CPR	892	0.15	0.35	0	1	89	0.72	0.45	0	1
Withdraw or withhold MV	892	0.02	0.13	0	1	89	0.33	0.47	0	1
Palliative Care Consultation	892	0.03	0.18	0	1	89	0.15	0.36	0	1
Time to Palliative Care Consultation	29	3.45	1.76	0	7	11	5.64	5.32	0	19
CPR baseline decision (day)	110	0.55	2.76	0	28	45	1.09	2.11	0	9
CPR follow up decision (day)	38	4.21	5.38	0	28	44	3.77	4.38	0	19
MV baseline decision (day)	39	0.36	1.04	0	6	23	0.83	1.72	0	8
MV follow up decision (day)	24	4.17	4.22	0	14	31	4.23	4.25	0	19
Death 30 days	892	0.12	0.33	0	1	89	0.90	0.30	0	1
Length of stay (days)	892	5.19	5.11	0	58	89	8.30	12.19	0	101

Appendix I:
Geocoding Results: Comparison of Measures Across
Records with Replacement of Missing Data (tract-
level) with Zip Code Level Data

The FREQ Procedure

Statistics for Table of death by coxread

Appendix I: Geocoding Results: Comparison of Measures across Records with Replacement of missing data (tract-level) with zip code level data

Variable	Census Tract (Replace Missing Data)				Zip Code			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Census 2000 Measures								
% Non-English Speakers	9.4	10.6	0.0	60.0	9.7	9.1	0.0	57.1
Per Capita Income (\$)	26,172	14,764	5,725	114,318	25,912	13,482	7,632	114,359
% Income < 200% Poverty	0.0	0.2	0.0	1.0	28.9	15.9	0.0	83.9
% No High School Degree	28.4	18.3	0.0	86.9	20.7	13.7	0.0	74.9
% Rural Residence	20.6	15.7	0.0	78.2	0.0	0.2	0.0	1.0
Calculated Distance								
Distance - residence to stroke hospital (miles)	9.3	28.8	0.0	477.8	10.1	28.7	0.1	477.8

N = 981