

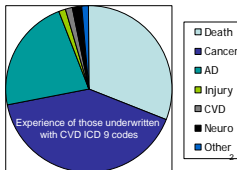
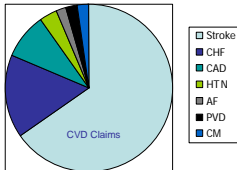
Cardiovascular Disease LTC Underwriting Perspective

Rosalie Mastropolo, MD
LTCIF April 24, 2009

This material is presented to physicians and other insurance underwriting professionals for educational purposes only. It does not constitute medical advice, is not intended to provide underwriting rules or guidelines, nor is it a substitute for professional judgment in connection with any individual cases.

MetLife CVD Claims Experience

- CVD claims make up a small percentage of total claims (~16%)
- Of those claims, most can be attributed to CVA & CHF
- Of those people underwritten with ICD 9 codes indicated CVD, many die without going into claim.
- Of those that do go into claim, CVD claims constitute <1%.



Agenda

- Considerations in underwriting stroke risk
- Considerations in underwriting CHF risk

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What is a stroke?

- Reduction in arterial blood flow to the brain resulting in ischemia & brain cell death.
- Symptoms are related to the area of the brain that is compromised.

Update 17.1 4

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Stroke Epidemiology

- Prevalence: 6,500,000 Americans
- Prevalence of "silent" CVA twice as high
- Prevalence higher in the elderly, men, & Blacks.
- Each year, ~ 795,000 Americans have a stroke
 - 610,000 have a new event
 - 185,000 have a recurrent stroke
- Annual stroke mortality: 143,579 deaths
- ~25% of survivors remain ADL dependent
- Median survival after a first stroke
 - 60-69 yo: 6.8 yrs for men, 7.4 yrs for women
 - 70-79 yo: 5.4 yrs for men, 6.4 yrs for women
 - ≥.80yo: 1.8 yrs for men, 3.1 yrs for women
- Estimated direct & indirect cost of stroke for 2009 is \$68.9 billion

Age Group	Men (%)	Women (%)
20-39	~0.5	~0.5
40-59	~2.5	~3.5
60-79	~8.5	~8.5
80+	~17.5	~14.5

Heart Disease and Stroke Statistics
AHA 2009 Update 5

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Types of Strokes

- Brain ischemia: ~85%
 - Thrombosis
 - Large vessel disease
 - Small vessels disease (lacunes)
 - Embolism
 - Cardiac: AF, RHD, CHF, PFO, mechanical valves, myxoma, SBE
 - Aortic atheroma
 - Arterial to arterial
 - Exacerbated by prothrombotic conditions
- Brain hemorrhage: ~15%
 - ICH: HTN, trauma, vascular malformations
 - SAH: vascular malformations

Furie KL, et al. NEJM2000;342:1743 6

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Case 1

- 73yo female – 63in; 150lbs; nonsmoker.
 - App: HTN x 10yrs-vasotec; high cholesterol-zocor; & NIDDM-on metformin. 2008 ER visit for an ear infection.
 - APS:
 - HTN – BPs:160/100 range until 3 yrs ago. On vasotec – 130/80.
 - Hyperlipidemia – LDL ~ 95.
 - NIDDM – no complications; A1Cs 6.2-6.7 range.
 - 3/08 felt dizzy and wobbly on her feet- lasted 20 min; sent to ER – by the time she got there, symptoms had subsided.
 - w/u: EKG-LVH; echo-mild LVH (1.2/1.2); carotids OK; MRI-moderate T2 hyperintensities in the periventricular & subcortical white matter likely related to chronic microvascular ischemic changes. DWI (-) for acute infarct.
 - Risk? Offer?
 - What if she had hx of migraines?

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MetLife Continuum of People at Risk for a CVD Event

Adapted from aaha.org

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People at Risk for a CHD Event

- Traditional (causative) cardiac risk factors
 - Elevated blood pressure (BP \geq 140/90 mm Hg)
 - Diabetes (fasting plasma glucose \geq 126 mg/dl)
 - Cigarette smoking (RR2) (any current smoking)
 - Elevated serum LDLcholesterol (\geq 160 mg/dl)
 - Low HDL cholesterol (<35 mg/dl)
- Predisposing
 - Obesity
 - Physical Inactivity
 - Socioeconomic, Ethnic, Geographic-SE USA, Behavioral /Psychological factors
- Metabolic syndrome: NCEP ATP III: \geq 3 of 5 Criteria
 - Waist circumference > 40 in, men; 35 in, women
 - TG \geq 150mg/dl
 - HDL-C < 40mg/dl, men ; 50mg/dl, women
 - Blood pressure \geq 130/ \geq 85 or treatment for HTN
 - Fasting glucose 100-125 mg/dl

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People at Risk for a CHD Event

- Conditional Risk Factors
 - Lipids:
 - Lipoprotein (a), ApoA, ApoB, small LDL
 - Inflammatory Marker:
 - hs CRP, wbc, IL6, TNF, Lp- PLA2
 - Hemostatic/Thrombotic Markers:
 - homocysteine, fibrinogen
- Risk Markers of Subclinical Disease
 - Ankle - Brachial Index (ABI)
 - Carotid Intimal - Medial Thickness (CIMT)
 - EBCT
 - Atherosclerosis in other vascular beds
 - Microalbuminuria and/or renal insufficiency
- Other
 - Atrial fibrillation
 - Sickle cell disease
 - Birth control pills

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MetLife Framingham Stroke Risk Profile

Estimated 10-yr CVA risk in 70yo, BPsys 160mmHG

Risk Category	Men (%)	Women (%)
A	~5	~5
B	~15	~10
C	~20	~15
D	~30	~35
E	~40	~45
F	~60	~80
G	~85	~95

BP Rx: No Yes Yes Yes Yes Yes Yes
 DM: No No Yes Yes Yes Yes Yes
 Cigs: No No No Yes Yes Yes Yes
 Prior CVD: No No No No Yes Yes Yes
 Prior AF: No No No No No Yes Yes
 EKG-LVH: No No No No No No Yes

<http://www.framinghamheartstudy.org> 11

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Transient Ischemic Attacks

- Focal neurologic deficit lasting < 24hrs
 - 33% of these TIAs would be considered infarctions d/t abnormal MRI findings
- D/D:
 - seizure, migraine, syncope, nerve root compression, vestibulopathy, MS
- ~15% of CVAs are preceded by a TIA
- After a TIA, the 90day risk of stroke is 3-17%, highest within the first month.

Giles MF, et al. Lancet Neurol 2007; 6:1063.
- Predictors of stroke:
 - age >60yo, DM, BP>140/90, focal sx's of weakness or speech impairment, TIA lasting > 10 min, & presence of abnormality on MRI.

Rothwell PM, et al. Lancet 2005; 366: 29.
- People who have had a TIA have a 10-year stroke risk of 18.8% and a 10-year combined stroke, MI or vascular death rate of 42.8% (~4%/yr)

van Wijk, et al. Lancet 2005; 365:2098

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White Matter Lesions (UBOs)

- Areas of demyelination d/t small vessel ischemia found on MRIs
- More likely to be found in the elderly or hypertensives, especially those who are longstanding & poorly controlled
- Severity, especially in the periventricular region of the brain, & progression correlates to increased stroke & dementia risk
 - CHS: 2.4-3.7 increase in CVA risk
- Significance of WMLs in women with migraines is unclear.

Watson R. SOA-LTC Insurance Section 10/06:18

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Case 1

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- APS:
 - HTN – BPs:160/100 range until 3 yrs ago. On vasotec ~ 130/80.
 - Hyperlipidemia – LDL ~ 95.
 - NIDDM – no complications; A1Cs 6.2-6.7 range. **FRS 27%/3%**
 - 3/06 felt dizzy and wobbly on her feet- lasted 20 min; sent to ER – by the time she got there, symptoms had subsided.
 - w/u: EKG-LVH; echo-mild LVH (1.2/1.2); carotids OK; MRI-moderate T2 hyperintensities in the periventricular & subcortical white matter likely related to chronic microvascular ischemic changes. DWI (-) for acute infarct. **D/D: vestibulopathy vs TIA MRI changes with sxs**
- Risk? Offer?
- What if she had hx of migraines?

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Case 2

- 64yo male; 74in; 199 lbs; former smoker
 - App: HTN, hyperlipidemia & CAD-s/p stent to his RCA for angina, no MI. Meds: lisinopril, lipitor, ASA, plavix.
- APS:
 - controlled HTN – BPs ~ 120/80
 - controlled lipids – TC/HDL 150/58, LDL 74
 - 2005 presented with unstable angina, cath- 95% prox RCA; minor luminal irregularities in LAD & LCx. PCI with stent. 2006 c/o atypical chest pain-echo: WNL; ETT: negative for ischemia to 13 METS. Carotid bruit heard on right; DUS-50-60% lesion on right, MRA suggested the lesion was ~30%. Rx: observation. Repeat DUS 07- suggesting 30% stenosis- unchanged
- Risk? Offer?
- What if the carotid stenosis was 75%? If he had a prior TIA & surgery?

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 - Risk? Offer? **FRS 10%/4%**
 - What if the carotid stenosis was 75%? **Surgery may be recommended**
 - If he had a prior TIA & surgery? **Make sure the TIA was related to the stenosis; with surgery, he maintains ~2%/yr risk**

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Case 3 & 4

<ul style="list-style-type: none"> • 70 yr old male with controlled HTN & hx of chronic atrial fibrillation. Echo: nml LV size & function; nml wall thickness; nml valves; LA mildly dilated (4.5 cm). Meds: atenolol, coumadin (INRs OK at ~2.5). Feels well, active-plays doubles tennis. • Risk? Offer? • Same guy but with DM & persistent atrial fibrillation - last episode 2yrs ago- on sotolol & ASA and echo showing LVH. • Any difference? 	<ul style="list-style-type: none"> • 50 yr old male with longstanding hx of lone atrial fibrillation. Echo is nml. Meds: ASA, flecanide. Last episode of palpitations was 3mos ago. • Risk? Offer? • What if he had a pulmonary vein ablation?
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Atrial Fibrillation & Embolic Stroke

- Fibrillating atria (72hrs) causes blood stasis which along with activation of hemostatic systems causes clot to form in the left atrium.
- 1/2 of all embolic CVAs; 1/6 of all ischemic strokes.
- Large territory stroke
- Risk is ongoing & present in all forms of AF
- Risk related to risk factors- both clinical & echocardiographic- & rx
- Prevalence of AF is >2million

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Manning W.J. et al. UptoDate 17.1

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Embolic CVA's & Nonvalvular AF

- Prevalence increases with age (RR 1.5/decade)
 - 1.3%/patient/year in those aged 50 - 59
 - 5.1%/patient/year in those aged 80 - 89
- Clinical risk factors include:
 - Prior TIA (RR 2.5) - ~ 6-9%/yr
 - HTN (RR 1.6) - 1.5-3%/yr
 - DM (RR 1.7) - 2-3.5%/yr
 - CHF (RR 1.4)
- Echocardiographic risk factors include:
 - LV dysfunction, "smoke", clot, large LAAA, and aortic plaque
 - Possible- LA size, mitral annular calcification
- Many are silent. SPINAF trial noted 15% of those with AF with evidence of CVA on CT.

Manning WJ, et al Up to Date 17.1 22

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CHADS Score

Walraven WC, et al. Arch Int Med 2003; 163:936

Medical condition	# points
CHF	1
HTN	1
Age 75+	1
DM	1
Prior CVA	2

CHADS Score	Yearly Risk of CVA
0	1.9%
1	2.8%
2	4.0%
3	5.9%
4	8.5%
5	12.5%
6	18.2%

Coumadin decreases risk of CVA by 66%
 ASA decreases risk of CVA by 25%
 Active A suggests an intermediate risk with ASA + plavix 23

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Case 3 & 4

- 70 yr old male with controlled HTN & hx of chronic atrial fibrillation. Echo: nml LV size & function; nml wall thickness; nml valves; LA mildly dilated (4.5 cm). Meds: atenolol, coumadin (INRs OK at ~2.5). Feels well, active-plays doubles tennis.
 - Risk? Offer? **CHADS 2.8% (1%)**
 - Same guy but with DM & persistent atrial fibrillation - last episode 1yr ago- on sotalol & ASA and echo showing LVH. **4.0% (3%)**
 - Any difference? **Yes**
- 50 yr old male with longstanding hx of lone persistent atrial fibrillation. Echo is nml. Meds: ASA, flecanide. Last episode of palpitations was 3mos ago.
 - Risk? Offer?
 - What if he had a pulmonary vein ablation?
 - No difference in use of anticoagulation - unclear of risk of recurrence**

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Cases 5 & 6

<p>70 yr old female who had an echo done for c/o palpitations. Echo/doppler noted a PFO. She feels well. Any concerns? Offer?</p>	<p>35 yr old football player s/p small CVA three year ago from which he has had a complete recovery. w/u was negative save for a PFO that was subsequently closed. Any concerns? Offer?</p>
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Patent Foramen Ovale

- PFO is an embryologic remnant of fetal circulation with a failure to seal the flap of the primum septum to the secundum septum. Can be associated with atrial septal aneurysm.
- Prevalence: 25% of population; as an incidental finding, does not have any excess risk.
- Associated with cryptogenic CVA in the younger pt
- Blood shunts right to left when right heart pressure exceeds left & can cause a "paradoxical embolism."
- Risk of recurrent strokes is approximately 2-5% annually with higher rates found in those with high risk features (larger lesions, increased R to L shunting, presence of an ASA)
- While there is a trend that closure of PFO may improve prognosis prospective randomized trials are still ongoing.

Hara H, et al. Up to Date 17.1
Prabhakaran S, et al. Up to Date 17.1

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Cases 5 & 6

<p>70 yr old female who had an echo done for c/o palpitations. Echo/doppler noted a PFO. She feels well. Any concerns? Offer? No concerns.</p>	<p>35 yr old football player s/p small CVA three year ago from which he has had a complete recovery. w/u was negative save for a PFO that was subsequently closed. Any concerns? Offer? Yes concerns.</p>
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Types of Heart Failure

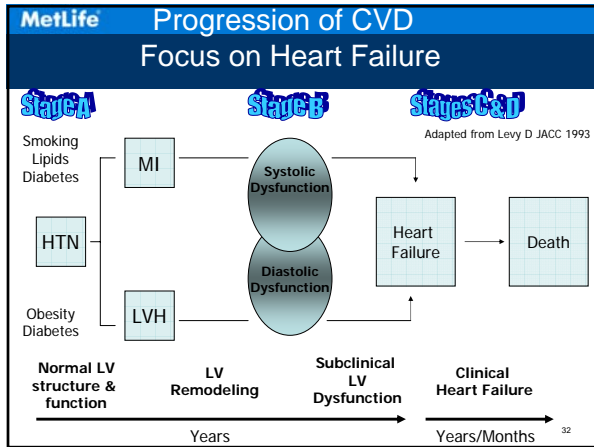
Systolic dysfunction

- weakness of the heart muscle resulting in impaired ventricular emptying
- causes
 - CAD – MI
 - dilated cardiomyopathy
 - valvular heart disease-usually regurgitant lesions

Diastolic dysfunction

- defect in cardiac relaxation & compliance resulting in a "stiff" ventricle with impaired diastolic filling leading to high pressures
- causes
 - ischemia
 - HTN
 - hypertrophic cardiomyopathy
 - aortic stenosis
- risk factors:
 - Old age, DM, obesity

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Symptoms/Signs of Heart Failure

- Symptoms:
 - Low flow: fatigue, lack of energy, confusion, irritability, anorexia
 - High pressures: SOB, DOE, PND
 - Fluid retention: edema
 - Can be exacerbated by volume overload, fever, arrhythmia
- Signs:
 - Rales
 - S3, S4, murmurs
 - Peripheral edema
 - Tachycardia

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Common Findings in Heart Failure

- Laboratory Findings
 - Anemia
 - Chronic renal insufficiency – high creatinine
 - Electrolyte abnormalities – low sodium
 - Pre-renal azotemia – high BUN/cr ratio
- Electrocardiogram
 - Old MI
 - Arrhythmia
 - LBBB, LVH
- CXR
 - Size & shape of the heart
 - Pulmonary venous congestion
 - Pleural effusion

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BNP Brain Natriuretic Peptide

- Hormone produced by the brain & heart in response to circulatory volume expansion & LV wall stress.
- Potent diuretic, natriuretic, & vascular smooth muscle relaxant. Regulates BP & fluid status through loss of salt and water and vasodilatation.
- Normal values should account for age, gender, and BMI. Values are also higher in people with chronic renal insufficiency.
- Higher values are associated with CHF - both systolic and diastolic.

Condition	BNP Level (approx.)
No CHF	100
LV dys	200
CHF	1100

Dao Q, et al. JACC 2001;37:379

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Echocardiogram

- Assessment of chamber sizes
- Assessment of LV function (LVEF)
- Assessment of wall motion
- Assessment of wall thickness.
- Assessment of LA size
- Assessment of valve function
- Assessment of intracardiac pressures

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MetLife Predictors of Survival/Morbidity in CHF d/t Systolic Dysfunction

- LVEF
- Functional Class
- Low peak VO₂ with maximal exercise
 - VO₂max < 10ml/min/kg (normal 20ml/min/kg)
- Degree of neurohormonal activation
 - serum sodium, serum BUN, & BNP
- Concomitant diastolic dysfunction/ reduced RV function
- Markers of reduced tissue perfusion
 - low MAP, renal insufficiency
- Arrhythmias

Colucci WS, et al. Up to Date 17.1 37

MetLife LV function

- Severity
 - ? lower limit
- Cause:
 - Potential for recovery
 - Post tachycardia cardiomyopathy
 - Hibernating myocardium
 - Resolved idiopathic cardiomyopathy
 - Potential for worsening
 - Remodeling after Qwave MI
 - Myocardium at jeopardy
 - Late valve replacement
 - Recent onset dilated cardiomyopathy

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MetLife Exercise Testing and MET Levels

Stage	Minutes	METs (VO ₂) Bruce	METs (VO ₂) Balke	METs (VO ₂) Ergo
I	1	3.0	3.0	50 Watts 4.0 METs
	3	4.0	4.0	
II	4	5.0	5.0	100 Watts 6.0 METs
	6	7.0	6.0	
III	7	8.5	6.5	150 Watts 8.0 METs
	8	9.0	7.0	
	9	10.0	7.5	
IV	10	11.0	8.0	200 Watts 10 METs
	11	13.0	8.5	
	12	14.0	9.0	

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Typical Treatment of Heart Failure

Stage A

- Treat risk factors that promote CHF
- ACE Inhibitors/ ARBs
 - SOLVD- 16% in all cause mortality in Class 2,3 & 4
 - Ve-HeFT- 28% in all cause mortality in Class 2,3 & 4
 - HOPE- reduces mortality in diabetics and s/p MI

Stage B

- Beta-blockers
 - MERIT- 34% in all cause mortality in Class 3&4 pts
 - US Carvedilol Heart Failure Study- 65% in all cause mortality

Stage C

- Digoxin
 - used to control symptoms and in those with atrial fibrillation

Stage D

- Diuretics
- Aldosterone antagonists - spironolactone
 - RALES trial - 30% reduction in all cause mortality in NYHA class III and IV.

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Case 1

- 62yo female, teacher, with DM & HTN, both of which are now controlled on metformin & diovan.
- APS notable for c/o fatigue & SOB but on application she states she is active with grandchildren.
- EKG with LVH with strain.
- Labs: BUN/cr of 32/1.
- Notes from cardiology:
 - Echo: LAE (4.9), concentric LVH (1.3), nml LVEF (60%), mild MR, stage II diastolic dysfunction, mild pulmonary HTN (RVSP ~38mm)
 - Stress MIBI: 5min Bruce; no ischemia

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Case 2

- 72 year old male treated for CHF for years by his GP with dig and lasix. Echo with LVEDD of 6.5 cm and LVEF 30%.
- Admitted last yr with another exacerbation and seen by his new partner- sent for cath- 3 vessel CAD and underwent CABG. Had a new lease on life with increased energy & exercise tolerance-playing golf, hiking. ETT- 7 mets, no ischemia. Echo: LVEDD 5.7; LA 4; LVEF 48%.

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Case 3

- 55yo male- 68in; 170lbs; HTN, hyperlipidemia, CAD on lipitor, diovan, ASA.
- APP: MI in 2005; EKG with CLBBB; doing well- no chest pain, no SOB. BP controlled; nml PE; BUN/cr 25/1.5. Sees cardiology.
- Cardiology APP: MI in 2005. Cath: total mid-LAD; 50% lesions in the RCA & LCx. LV aneurysm. LVEF 45%. 2007 stress MIBI: 6 min Bruce (7METS); no ischemia; LV dilation with exercise; increased pulmonary uptake. LVEF 45%.

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Case 4

60yr old male – 72in; 197lbs- healthy, active admits to MVP followed by cardiology.
APS: Hx of MVP with MR followed closely – no symptoms, active.
Last echo 10/08:
LA 4.5cm (sl increased)
LVEDD 5.8cm (sl increased)
LVESD 3.5cm
FS 45% LVEF ~65%
Mitral valve prolapse
Doppler: moderate MR; no change since 10/07;
Pulmonary pressures nml.

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Thank-you!
Questions?

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