### Table 4.2: Canadian Stroke Best Practices Swallow Screening and Assessment Tools

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<th>Author/Name of test</th>
<th>Components of test</th>
<th>Results of original validation study</th>
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| Daniels et al. 1997 ¹ | "Any Two" | - Items included: 6 clinical features-dysphonia, dysarthria, abnormal phonation cough (includes water-swallowing test), abnormal gag reflex, cough after swallow and voice change after swallow were assessed.  
- Scoring: Presence of any 2 of the items distinguished patients with/without dysphagia  
- Sample: 59 acute stroke survivors were studied within 5 days of hospital admission.  
- Diagnostic standard: VMBS exam  
- Prevalence of dysphagia: 74.6%  
- The sensitivities and specificities of individual items ranged from 31%-76.9% and 61%-88%, respectively. Overall: Sensitivity: 92% Specificity: 67% |
| Logemann et al. 1999 ² | 28 items divided into 5 categories:  
  i) 4 medical history variables  
  ii) 6 behavioural variables  
  iii) 2 gross motor variables  
  iv) 9 observations from oromotor testing  
  v) 7 observations during trial swallows  
- Scoring: logistic regression was used to identify best single predictors and best combination of predictors. The tool was designed to identify the presence or absence of aspiration, oral stage disorder, pharyngeal delay, and pharyngeal stage disorder.  
- Sample: 202 consecutive patients (34% stroke) referred by their physicians for possible dysphagia.  
- Diagnostic standard: VMBS exam  
- Prevalence of dysphagia: 57.5%  
- Aspiration: Throat clearing, reduced laryngeal elevation and a history of recurrent pneumonia were the best combination of predictors. Sensitivity: 69% Specificity: 73%  
- Pharyngeal stage swallow disorder: reduced laryngeal elevation was the best single predictor. Sensitivity: 72% Specificity: 67% |
| Perry 2001 ³ | Standardized Swallowing Assessment | 7 items in 2 sections plus water swallowing test  
  Section 1: 2 items to ensure the patient is physically capable of taking the test.  
  Section 2: 5 items comprising a checklist  
- Scoring: if answers to any question is no, then patient fails the screen, otherwise, proceed to water swallow test (3 trials of 1 teaspoon with progression to ½ cup). If any sign of problems (coughing, choking, change in voice quality), then patient fails.  
- Sample: 200 consecutive admissions of acute stroke.  
- Diagnostic Standard: Clinical judgement of SLP  
- Prevalence of dysphagia: 47%  
- Sensitivity: 97% Specificity: 90% |
<p>| Trapl et al. 2007 ⁴ | Preliminary Assessment (vigilance, throat clearing, saliva swallow) | Diagnostic standard: fiberoptic endoscopic evaluation using the |</p>
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<td><strong>The Gugging Swallowing Screen (GUSS)</strong></td>
<td>Direct swallow (semisolid, liquid, solid swallow trials) Scoring: Total scores ranged from 0 (worst) - 20 (no dysphagia). A cut-off score of 14 was selected Sample: 50 first-ever acute stroke patients with suspected dysphagia</td>
<td>Penetration Aspiration Scale to interpret the results. Prevalence of dysphagia: 73% First group of 19 patients using the GUSS to identify subjects at risk of aspiration: Sensitivity: 100%, Specificity: 50% Second group of 30 patients Sensitivity: 100% Specificity: 69% Interrater reliability: Kappa=0.835</td>
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<td><strong>Martino et al. 2009</strong></td>
<td>Items included: presence of dysphonia before/after water swallowing test, impaired pharyngeal sensation and abnormal tongue movement. Scoring: pass=4/4 items; fail ≥1/4 items Sample: 311 stroke patients (103 acute, 208 rehabilitation)</td>
<td>Diagnostic standard: VMBS exam. Prevalence of dysphagia: 39% Sensitivity: 91% Specificity: 67% Interrater reliability (based on observations from 50 subjects) ICC =0.92 (95% CI: 0.85-0.96)</td>
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<td><strong>Edmiaston et al. 2009 USA</strong></td>
<td>Items included: Glasgow Coma Scale score &lt;13, presence of facial, tongue or palatal asymmetry/weakness. If no to all 3 items, then proceed to 3 oz water swallowing test. Scoring: If there is evidence of change in voice quality, cough or change in vocal quality 1 minute after water swallowing test = fail. Sample: 300 acute stroke patients screened by nurses within 8 to 32 hours following admission.</td>
<td>Diagnostic standard: Mann Assessment of Swallowing Ability (MASA), performed by a SPL. Prevalence of dysphagia: 29% Sensitivity (Dysphagia): 91% Specificity: 74% Sensitivity (aspiration risk): 95% Specificity: 68% Interrater reliability: Kappa=94%</td>
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<td><strong>Turner-Lawrence et al. 2009</strong></td>
<td>The two-tiered bedside tool was developed by SLPs. Tier 1 items included: voice quality, swallowing complaints, facial asymmetry, and aphasia. Tier 2 items included a water swallow test, with evaluation for swallowing difficulty, voice quality compromise, and pulse oximetry desaturation (≥ 2%). Patients failing tier 1 did not move forward to tier 2. Scoring: Patients who passed both tiers were considered to be low-risk. Sample: a convenience sample of 84 stroke patients (ischemic/hemorrhagic) screened by 45 ER MDs.</td>
<td>Diagnostic standard: formal assessment conducted by an SLP Prevalence of dysphagia: 57% Sensitivity: 96% Specificity: 56% Interrater reliability: Kappa=0.90</td>
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| Modified Mann Assessment of Swallowing Ability (MMASA) | 12 of the 24 MASA items were retained including: alertness, co-operation, respiration, expressive dysphasia, auditory comprehension, dysarthria, saliva, tongue movement, tongue strength, gag, voilitional cough and palate movement.  
Scoring: Maximum score is 100 (no dysphagia). A cut-off score of 94 was used to identify patients at risk of dysphagia  
Sample: 150 consecutive patients with acute ischemic stroke were assessed by 2 neurologists shortly after admission to hospital. | Diagnostic standard: MASA conducted by SLP  
Prevalence of dysphagia: 36.2%  
Sensitivity: 87% & 93%  
Specificity: 86% & 84%  
Interrater reliability: Kappa=0.76 |
| Schrock et al. 2011 | 5 Items included: Alert and able to sit upright for 10 minutes, weak, wet or abnormal voice, drooling, slurred speech and weak, or inaudible cough.  
Scoring: ≥1 items answered yes=failed screen  
Sample: 283 patients admitted to the Emergency department with acute stroke and screened for the presence of dysphagia by nurses | Diagnostic standard: VMBS  
Prevalence of dysphagia at 30 days: 32%  
Sensitivity: 95%  
Specificity: 55%  
Interrater reliability: Kappa=0.69 |

### Reference List