London Nursing Stroke Competencies

Nutrition, Hydration and Diabetes in Acute Stroke

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Malnutrition

“A state in which a deficiency, excess or imbalance of energy, protein and other nutrients causes measurable adverse effects on tissue / body form, body function and clinical outcome” (Elia, 2003)

Undernutrition is defined by BAPEN (2003) as:

- a body mass index (BMI) $<18.5\text{kg/m}^2$ and
- unintentional weight loss of 5-10% within the last three to six months
Malnutrition and Stroke

- Prevalence of malnutrition in patients admitted to hospital following a stroke ranges from **6% to 62%** (Foley et al., 2009)

- Quarter of patients become more malnourished in the first weeks after a stroke (Yoo et al., 2008)

- Malnutrition is an independent predictor of **poor outcomes** after stroke (FOOD Trial, 2003)

- Malnutrition is an independent predictor of **mortality**, **LOS**, and **hospitalization costs** at 6 months post stroke (Gomes, Emery & Weekes, 2015)
Risk of Malnutrition Is an Independent Predictor of Mortality, Length of Hospital Stay, and Hospitalization Costs in Stroke Patients (Gomes, Emery & Weekes, 2015)

<table>
<thead>
<tr>
<th>Mortality rates and hazard ratios</th>
<th>n</th>
<th>Mortality rates (Chi-square test)</th>
<th>Univariate Cox Proportional Hazards Model</th>
<th>Multivariable* Cox Proportional Hazards Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hazard Ratio</td>
<td>95% CI</td>
</tr>
<tr>
<td>Risk of malnutrition</td>
<td>537</td>
<td>( p&lt;0.001 )</td>
<td>( p&lt;0.001 )</td>
<td></td>
</tr>
<tr>
<td>Low risk</td>
<td>342</td>
<td>6%</td>
<td>Reference group</td>
<td></td>
</tr>
<tr>
<td>Medium risk</td>
<td>39</td>
<td>26%</td>
<td>4.9</td>
<td>2.3-10.5</td>
</tr>
<tr>
<td>High risk</td>
<td>156</td>
<td>42%</td>
<td>9.3</td>
<td>5.6-15.3</td>
</tr>
</tbody>
</table>

*adjusted for age, gender, ethnicity, type and severity of stroke (NIHSS score) + stroke risk factors: HT, diabetes, dyslipidemia, smoking, IHD, heart failure, AF, previous TIA and heavy alcohol consumption
Cumulative length of hospital stay

Median number of days in each category of risk of malnutrition (MUST)

Risk of malnutrition

- Low risk: 14 days
- Medium risk: 19 days
- High risk: 48 days

Guy’s and St Thomas’ NHS Foundation Trust
Hospitalisation costs

Costs of hospitalisation according to risk of malnutrition (MUST)

Risk of malnutrition

Low risk
Medium risk
High risk

Costs of hospitalisation (median £)

- Low risk
- Medium risk
- High risk
Dehydration

- More than half of stroke patients dehydrated at some point during their admission
- Associated with severe stroke and poor outcomes
- Predictor of institutionalisation and death

(Rowat, Graham & Dennis, 2012)

Focusing on interventions to reduce the frequency and duration of dehydration have the potential to improve patient outcomes after stroke
Dehydration

• ‘Patients with acute stroke should have their hydration assessed using multiple methods within **four hours** of arrival at hospital, and should be **reviewed regularly** and managed so that normal hydration is maintained’ (National clinical guideline for stroke, 2016)

• **No tests** were found consistently useful in diagnosing current water-loss dehydration (Hooper et al., 2015)

• Commonly used methods:
  - monitoring of fluid intake
  - dry mouth / symptoms of thirst
  - urine colour or volume
  - blood pressure and heart rate
  - urea: creatinine ratio
  - plasma osmolality
Dehydration

- Risk factors for dehydration:
  - Greater age
  - Female
  - Stroke severity
  - Prescribed diuretics

- Dehydrated patients more likely to require parenteral fluids or enteral tube feeding

- Dysphagia significantly more prevalent in dehydrated than hydrated patients

(Rowat, Graham & Dennis, 2012)
Post stroke dysphagia

- Prevalence of dysphagia in stroke patients between 28 and 65%
- Dysphagia improves significantly during the early days and after two weeks, 90% of patients swallow safely
- Dysphagia is associated with increased mortality, morbidity, and institutionalization due to increased risk of aspiration, pneumonia, malnutrition and dehydration
Texture modified diet

- Texture modified diets are often nutritionally inadequate (Foley et al, 2006)
- May require supplementary tube feeding and/or ONS (NICE 2006)
- Wright et al. (2005)
  - 55 older inpatients (25 normal diet vs 30 modified diet)
  - 24 hour weighed intake and food charts
  - Modified diet group consumed 40% less energy and protein
  - Why? Reduced choice, more feeding difficulties, presentation, less palatable
Thickened fluids

- Patients requiring thickened fluids are less likely to meet fluid requirements (Whelan 2001, Vivanti et al 2009) and nutritional needs

- Thickened fluid intake was 455mls/day on average. Whelan (2001)

- Vivanti et al (2009) - patients got more fluid from their food than they did from thickened fluids
Identifying Malnutrition
Nutritional Screening

- All patients should be screened for malnutrition and the risk of malnutrition at the time of admission and at least weekly thereafter (National clinical guideline for stroke, 2012)

- Referred to an appropriately trained healthcare professional for detailed nutritional assessment, individualised advice and monitoring

- MUST has been validated for use in patients with stroke (Gomes, Emery & Weekes, 2015)

- Audited in the RCP Sentinel stroke national audit programme (SSNAP)

- Results reported quarterly and available for individual Trusts
### Step 1: BMI score

<table>
<thead>
<tr>
<th>BMI kg/m²</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
<td>&gt;20 (&gt;30 Obese)</td>
<td>0</td>
</tr>
<tr>
<td>18.5-20</td>
<td>1</td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>2</td>
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</tbody>
</table>

### Step 2: Weight loss score

<table>
<thead>
<tr>
<th>Unplanned weight loss in past 3-6 months</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>%</td>
<td>Score</td>
</tr>
<tr>
<td>&lt;5</td>
<td>0</td>
</tr>
<tr>
<td>5-10</td>
<td>1</td>
</tr>
<tr>
<td>&gt;10</td>
<td>2</td>
</tr>
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</table>

### Step 3: Acute disease effect score

- If patient is acutely ill and there has been or is likely to be no nutritional intake for >5 days, Score 2

### Step 4: Overall risk of malnutrition

Add scores together to calculate overall risk of malnutrition:
- Score 0: Low Risk
- Score 1: Medium Risk
- Score 2 or more: High Risk

### Step 5: Management guidelines

#### 0 Low Risk
- Routine clinical care
  - Repeat screening
  - Hospital – weekly
  - Care Homes – monthly
  - Community – annually for special groups (e.g., those >75 yrs)

#### 1 Medium Risk
- Observe
  - Document dietary intake for 3 days
  - If adequate – little concern and repeat screening
  - Hospital – weekly
  - Care Homes – at least monthly
  - Community – at least every 2-3 months
  - If inadequate – clinical concern – follow local policy. Set goals, improve and increase overall nutritional intake, monitor and review care plan regularly

#### 2 or more High Risk
- Treat
  - Refer to dietitian, nutritional support team or implement local policy
  - Set goals, improve and increase overall nutritional intake
  - Monitor and review care plan
  - Hospital – weekly
  - Care Homes – monthly
  - Community – monthly
  - Advanced deterioration or no benefit is expected from nutritional support (e.g., imminent death)

**All risk categories:**
- Treat underlying conditions and provide help and advice on food choices, eating, and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

**Obesity:**
- Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.

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See the "MUST" explanatory booklet for further details and the "MUST" report for updating guidance.
Malnutrition

• Causes:
  – Reduced dietary intake
  – Increased nutritional needs
## Factors impacting oral intake following stroke

<table>
<thead>
<tr>
<th>Physical</th>
<th>Psychological</th>
<th>Organisational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphagia</td>
<td>Depression</td>
<td>Lack of feeding assistance</td>
</tr>
<tr>
<td>Drowsiness</td>
<td>Anxiety</td>
<td>Adapted cutlery</td>
</tr>
<tr>
<td>Hemiparesis</td>
<td>Bereavement</td>
<td>Inappropriate menu choices</td>
</tr>
<tr>
<td>Visual impairment</td>
<td>Mental illness</td>
<td>Unfamiliar foods</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>Apathy</td>
<td>Cold food</td>
</tr>
<tr>
<td>Pain</td>
<td>Poor motivation</td>
<td>Timings of meals</td>
</tr>
<tr>
<td>GI symptoms</td>
<td>Loneliness</td>
<td>Interruptions to mealtimes</td>
</tr>
<tr>
<td>Co-morbidities e.g. diabetes</td>
<td>Self-esteem</td>
<td>Rushed mealtimes</td>
</tr>
<tr>
<td>Poor dentition</td>
<td>Independence</td>
<td>Ward environment</td>
</tr>
<tr>
<td>Sore or dry mouth</td>
<td>Substance abuse</td>
<td>Ward culture</td>
</tr>
<tr>
<td>Oral thrush</td>
<td></td>
<td>Staff knowledge</td>
</tr>
<tr>
<td>Changes in taste and smell</td>
<td></td>
<td></td>
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<tr>
<td>Polypharmacy</td>
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</table>
Increased nutritional needs

- Ischaemic stroke (Weekes and Elia, 1992)
- Haemorrhagic stroke (Piek et al., 1989)
- Fever, infection or inflammation
- Open wounds - pressure ulcers
- Malabsorption
- Increased losses
- Activity levels

![Ischemic stroke](image1)

- A clot blocks blood flow to an area of the brain

![Hemorrhagic stroke](image2)

- Bleeding occurs inside or around brain tissue
**Tackling the problem**

1. Dietary counselling
2. Food fortification
3. Nutritional supplements
4. Enteral feeding
5. Parenteral feeding
Food fortification

Food fortification is adding high energy/protein foods to meals to increase the calorie/protein content.

Examples of food fortification on the wards:

- Add **saucers** such as full fat mayonnaise to meals
- Grated **cheese** portions to add to mashed potato, soups and to sprinkle over main dishes
- **Butter or unsaturated spread** portions to add to vegetables and potatoes
- **Honey, jam** or **sugar** sachets to add to fruit juice, desserts and cereals
Oral Nutritional Supplements

• Oral nutritional supplements come in a range of styles, formats, types, energy and protein densities, flavours

• Improving palatability:
  - Pre thickened for dysphagic patients
  - Mix with milk or hot chocolate or coffee
  - Better tolerated chilled
  - Explore different flavours

• Significantly reduced pressure sores, increased energy intake and increased protein intake (Geeganage et al, 2012)
Tube feeding

- When to introduce
- Nasogastric feeding
- Gastrostomy feeding
- Complications
- Ethical considerations
Tube Feeding

NG, NJ

PEG/RIG, PEG-J

JEJ
Nasogastric tube feeding

• People with acute stroke who are unable to take adequate nutrition and fluids orally should be:
  – considered for tube feeding with a nasogastric tube within 24 hours of admission
  – considered for a nasal bridle tube or gastrostomy if they are unable to tolerate a nasogastric tube

• Contraindications and complications
When to check tube position?

• On initial placement

• Before feeding, flushing or giving medications (unless feed in progress)

• Following wretching, vomiting, coughing or suctioning

• If the tube appears to have moved

• After a patient has pulled at the tube

• With new, unexplained respiratory symptoms
Nasogastric tube feeding

Beavan et al. (2010)

- Multi-centre RCT using four different hospitals in the UK
- Patients who required NGT feeding due to dysphagia following acute stroke
- 104 patients (51 in the intervention group vs 53 in control)
- Primary outcome measure: the proportion of prescribed feed and fluid delivered over the two weeks following randomization
- Intervention group received 17% more feed than the control group (75% vs 57%) ($P = 0.002$)
- No serious adverse events related to use of nasal bridle reported but epistaxis reported in 37% with bridle vs 15% in control
Gastrostomy Feeding

- Gastrostomy feeding should be considered for patients who:
  - Who need but are unable to tolerate NGT
  - Unable to swallow adequate food and fluid orally at 4 weeks
  - At long term high risk of malnutrition

- Contraindications
- Complications
Gastrostomy or NGT?

- 2 Cochrane Reviews comparing NGT and gastrostomy

- Gastrostomy feeding was associated with:
  - fewer feeding failures
  - higher feed delivery
  - fewer incidents of gastrointestinal bleeding
  - fewer pressure sores

- No significant difference in terms of
  - mortality
  - dependency or length of hospital stay
  - incidence of chest infection or pneumonia

- Starting tube feeding early after stroke may reduce death although the information available remains inconclusive

Gomes et al., 2015. Geeganage et al., 2012
Ethical considerations

• Informed consent vs in best interests
• Intensity of nutritional intervention should match that of medical care plan
• Establish ceiling of nutritional intervention collaboratively with MDT and NOK
• SLT assessment e.g. re: risk feeding supported by care bundle
• Involve pt, family & carers as early as possible and manage their expectations
• State realistic goals with time limits.
• Review these with the medical team to determine whether still of overall benefit; if not, then stop
• MDT input with prioritised for dignity and respect
Diabetes and Acute Stroke

Two main types of diabetes:

**type 1 diabetes** – where the body's immune system attacks and destroys the cells that produce insulin

**type 2 diabetes** – where the body doesn't produce enough insulin, or the body's cells don't react to insulin

Treatment for diabetes: Lifestyle changes (diet, exercise, weight loss), tablets (e.g. Biguanide, Sulphonylureas, DPP-4 inhibitors), insulin (e.g. short, medium and long acting insulin)

Diabetes almost **doubles** the having a stroke and is a contributing factor in **20% of strokes** in England, Wales and Northern Ireland (Stroke Statistics, 2017)
Acute Stroke and Hyperglycaemia

• Hyperglycaemia occurs in 30–40% of patients with acute ischaemic stroke including individuals without a known history of diabetes (Luitse et al, 2012)

• Associated with poor functional outcome, possibly through aggravation of ischaemic damage by disturbing recanalisation and increasing reperfusion injury (Luitse et al, 2012)

• Nondiabetic ischaemic stroke patients with hyperglycemia have a 3-fold higher 30-day mortality rate and in diabetic patients with ischaemic stroke 2-fold higher (Capes et al, 2001)

• Target range for blood glucose in acute stroke: 5-15mmol/L (National clinical guideline for stroke, 2016)
Diabetes in Stroke – Monitoring/ Treatment

• Close monitoring of blood glucose to detect hyper/hypo glycaemia

• Enteral tube feeding: **Random daily** capillary blood glucose initially until stable, **four hourly** if unstable or has diabetes

• In case of hypoglycaemia (CBG’s <4 mmol/L) or hyperglycaemia (CBG’s >15mmol/L) treat in accordance with inpatient Trust guidelines, inform medical team and consider referring to the diabetes specialist team if hypoglycaemia/ hyperglycaemia

• Consider diet/ enteral tube feeding, medication/ insulin and timing

(National clinical guideline for stroke, 2016, BAPEN, 2016)
References


