Videofluoroscopic evaluation of oropharyngeal swallowing function (VFS):

The role of speech and language therapists

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Mission Statement

The Royal College of Speech and Language Therapists (RCSLT) recommends that any person with feeding or swallowing difficulties (dysphagia) have access to instrumental evaluation of swallowing.

Scope of Paper

This position paper describes speech and language therapy contribution to videofluoroscopic evaluation of oropharyngeal swallowing disorders (VFS). Speech and language therapists (SLTs) have a key role in delivering this clinical service in a multidisciplinary context. This position paper is directed at all SLTs leading and participating in VFS clinics, and at those SLTs considering setting up such clinics. We expect that it will underpin clinical practice in VFS clinics and that it will be supplemented by locally agreed clinical governance protocols. This paper does not cover non-swallow uses of videofluoroscopy, which should be addressed in local procedures. At all times VFS is subject to the Ionising Radiation (Medical Exposure) Regulations 2000 (and subsequent amendments of 2006 and 2011).[1-3]

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Dysphagia: Modified Barium Swallow Position Paper, pg 4. Copyright © The Speech Pathology Association of Australia 2005. Reprinted with permission.[4]

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1 Context

1.1 Background

VFS is a modification of the standard barium swallow X-ray examination. Oropharyngeal swallowing physiology and anatomy is evaluated as the patient eats and drinks a radiopaque substance such as barium sulphate. The radiopaque substance may be mixed with food or drink. The moving images of the oropharyngeal swallow are recorded for interpretation. VFS is used to assess swallowing in all patient populations and across all age groups.

1.2 Scope of practice

Speech and language therapists have a unique role in the assessment and management of oropharyngeal dysphagia and play a key part in delivering VFS services in a multidisciplinary context. The Society and College of Radiographers in conjunction with the Royal College of Radiologists have produced guidance for team-working in clinical imaging.[5]

At all times VFS is subject to the Ionising Radiation (Medical Exposure) Regulations 2000 (and subsequent amendments of 2006 and 2011).[1-3] SLTs must have approval, including IR(ME)R entitlement, from their employer to undertake VFS. The SLT's responsibilities in relation to VFS must be stated in their job description. Speech and language therapy departments should develop local policies and procedures for VFS. Clinical competence to undertake VFS must be evidenced by specialist training relevant to the clinical caseload. For examples of general training levels, please see RCSLT website http://www.rcslt.org/members/publications/publications2/downloadable. If an SLT undertakes any extended roles or duties their local clinical governance structures must approve and insure this practice.

1.3 Description of the VFS evaluation

Eating, drinking and swallowing involve the coordination of a rapid sequence of movements of the oral structures, pharynx, larynx, trachea and oesophagus. As some components of the swallow cannot be accurately assessed clinically there is a need for instrumental evaluation such as VFS. The VFS is viewed on a monitor/screen and recorded. Image recording enables review of the evaluation and sharing with the patient, carer and members of the multidisciplinary team (MDT). Stored images allow direct comparison between repeat evaluations and form part of the patient record.

VFS typically uses assessment in the lateral and may also include the anteroposterior and other planes. Positioning, manoeuvres and texture

modifications may be trialled during the VFS to determine their impact on swallowing efficiency and safety. Following the VFS, patients' oropharyngeal swallow features are analysed and recommendations for optimising swallow efficiency and safety are determined. These recommendations are then documented and discussed with the patient, carers and the MDT.

1.4 Purpose of VFS

VFS is a hypothesis-driven adjunct to a full case history and clinical assessment of the patient. The purposes of VFS are detailed by many authors and may include evaluation of:[6-10]

- Oropharyngeal structures (including surgical reconstruction).
- Swallowing physiology, including lip and tongue function, velopharyngeal closure, base of tongue retraction, hyolaryngeal elevation, pharyngeal contraction, upper oesophageal sphincter function, and airway protection mechanisms.
- Known or suspected oropharyngeal dysphagia.
- Swallow function using a range of food and fluid consistencies.
- Presence of and response to silent or overt aspiration.
- Impact of therapeutic interventions on swallowing physiology, safety and efficiency.
- Timing of swallow events.
- Response to biofeedback.
- Effect of fatigue on swallowing physiology.

The purpose of VFS may also include:

- Patient, carer and health professional education.
- Contribution to the diagnostic profile in the context of a multidisciplinary assessment.
- Monitoring of changes in dysphagia over time.

Typical patient groups include individuals with:

- Acquired neurological disorders, e.g. stroke, traumatic brain injury, degenerative neurological conditions.
- Benign and malignant head and neck conditions, e.g. globus, diverticulum, laryngectomy, swallowing difficulties post-chemoradiotherapy.
- Tracheostomy with or without ventilation.
- Respiratory conditions, e.g. chronic obstructive pulmonary disease and chronic lung disease associated with prematurity.
- Spinal injuries.

- Burns or trauma.
- Cerebral palsy.
- Neurodevelopmental and congenital disorders.
- Learning disabilities.
- Cleft lip/palate/velo-pharyngeal insufficiency.

1.5 Suitability for VFS and contra-indications

" Referral for VFS must be clinically justified in line with IR(ME)R legislation.[1-3] The suitability and safety of VFS is assessed on an individual basis. Speech Pathology Australia (SPA) has published a list of clinical questions to be considered prior to VFS with both children and adults (see 'Suitability for VFS' below).[4] The original SPA terminology ('MBS' (modified barium swallow) for VFS and 'speech pathologist' for SLT) and references are retained throughout this section.

1.5.1 Suitability for VFS

Factors for consideration include:

- Does the patient display symptoms of dysphagia at the oral, pharyngeal and/or upper oesophageal stage of the swallow and require further assessment/therapeutic information that cannot be gained from a clinical dysphagia assessment?
- What is the patient's state of alertness/consciousness and medical status?
- What is the patient's capability of accepting food and fluid into the mouth?
- Is the patient allergic to the contrast agent used for the procedure?
- Is the patient able to be transported to the screening room for the procedure?
- Can the patient be positioned safely for the procedure, taking into consideration their developmental age and any skeletal abnormalities?
- Is silent aspiration suspected?
- Does the patient present with an unclear aetiology for the symptoms of dysphagia?
- Does the patient present with a continued and unexplained history of chest infections and/or pneumonia?
- Are anatomical or physiological reasons for the patient's dysphagia suspected?

- Is the patient suspected of having dysphagia that is contributing to nutritional, hydrational or pulmonary compromise?[11]
- Is the patient suspected of having swallowing difficulties specific to the oesophageal stage only (in this instance the patient may be more appropriate for a Barium Swallow)?
- Would a baseline of swallowing function be useful for future comparison?[12]
- Is further evidence required to assist decision making regarding the patient's nutritional needs (e.g. oral and/or non-oral methods)?
- Is information regarding change in swallow function in relation to an implemented therapy program required?
- Is the patient identified as a potential dysphagia rehabilitation candidate?
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- Does the patient have any dietary or allergy restrictions to food/fluids (e.g. salt restrictions)?

Additional factors that speech pathologists may need to consider when conducting MBS procedures with paediatric patients include:

- The patient's chronological and developmental level when selecting and presenting food/fluid and thickeners for the procedure.[7]
- The interpretation of the MBS is to be consistent with the patient's chronological and developmental age, knowledge of normal paediatric anatomy, growth and swallowing function.[13]

1.5.2 Contra-indications

Contraindications for VFS may include:

- Patient pregnancy (as determined by local procedures).
- Medical instability and level of consciousness.
- Where portable ventilation is not possible.
- Difficulty maintaining an appropriate position.
- Difficulty cooperating with the procedure.
- Extreme distress.
- Known or suspected adverse reaction to contrast media.
- Nil by mouth for reasons other than dysphagia

Unforeseen or adverse incidents may occur during the VFS study; these would be more likely in patients where there is:

- Suspicion of large volume aspiration.
- Recent history of respiratory distress/arrest due to aspiration.
- Suspicion of fistulae.”[4]

1.6 Multidisciplinary context

The decision to perform the VFS is made in a multidisciplinary context and must be discussed with the medical practitioner and broader MDT overseeing the patient's care. Where there is disagreement as to how appropriate the procedure is, local negotiation should seek to ensure a satisfactory outcome for the patient.

VFS clinics usually consist of the conducting SLT and a radiologist, and where appropriate the treating SLT. The RCSLT considers that the designated radiologist retains overall clinical responsibility at all times for the conduct and governance of VFS clinics. Dependent on local protocol and clinical governance arrangements and in the absence of a radiologist, radiographers may assume responsibility for functions as defined by IR(ME)R.[1-3] If the radiologist is not present in the VFS clinic, arrangements must be in place to ensure ready access to appropriate medical, nursing and other support in the event of an adverse incident.

In paediatric VFS clinics the presence of a radiologist is considered best practice for initial assessments. Other clinic variations may be possible for review VFS subject to local negotiations and appropriate clinical governance arrangements.

1.7 Facilities and equipment

1.7.1 Imaging and sound

The VFS images must be recorded. Recording and viewing equipment should have the facility for still-advance to enable frame-by-frame analysis. If sound recording is available it may benefit the VFS.

Some evidence suggests that VFS screened at a pulse rate of less than 15 pulses per second may not detect all features of clinical interest.[14 15] Dose reference levels (DRLs) must be balanced with benefit for the individual patient and must be recorded and audited as agreed with the medical physics expert.[16] Best-quality images should be determined in discussion with the radiologist and/or radiographer.

1.7.2 Physical equipment parameters

The x-ray equipment must comply with IR(ME)R.[1-3] It must be able to accommodate a range of patients' own seating and positioning requirements. This is crucial for obtaining optimum VFS images. Specially designed chairs are commercially available for VFS but these are not suitable for all patients. Seats may need to be radiolucent and consideration must be given to their height and position in relation to the x-ray machinery. Toys and other age-appropriate distraction materials

must be available in paediatric clinics. Other professionals, such as medical engineers, radiographers, physiotherapists and occupational therapists, can advise on positioning and on equipment such as hoists and slings.

1.7.3 Contrast materials

Contrast media to be used for VFS must be agreed locally and documented in local protocols.

In patients at high risk of aspiration the initial test swallow should be of small volume. Water soluble contrast materials, such as non-ionic isotonic agents e.g. Omnipaque or Gastromiro, may be the preferred option. *Use of Gastrografin is contra-indicated due to its hypertonic properties and carries an attendant risk of pulmonary oedema if aspirated.*[17]

Consideration must be given as to how the contrast medium will affect the taste and viscosity of any food or fluid that it is added to.[18 19] The coating properties of barium sulphate mixed with water alone may result in over-interpretation of post-swallow oral and/or pharyngeal residue. Departing from manufacturers' user instructions may invalidate licence use.

1.8 The VFS pathway

1.8.1 Referral

Patients will be referred for a VFS study according to local procedures.

'Referrer' for VFS is a defined role under IR(ME)R.[1-3] SLTs undertaking this role must be specifically entitled by their local IR(ME)R employer following IR(ME)R training.[1-3]

Patients must undergo an appropriate evaluation of swallowing by an SLT according to locally agreed procedures prior to VFS being undertaken.

1.8.2 Patient and carer information

Patient and carer information must be available in a variety of accessible formats. The information should include the nature, risks, purpose and possible outcomes of the VFS.

Some patient groups, for example those with learning disabilities and children, may benefit from visiting the x-ray suite prior to the VFS.

1.8.3 Consent

The referring SLT must discuss the referral with the patient, parents or carer and gain their consent in accordance with local guidelines.

Certain individuals may be subject to legal requirements; in the UK these are defined by The Mental Capacity Act 2005[20 21] or Adults with Incapacity (Scotland) Act 2000.[22 23]

Consent to the use and storage of the VFS images may be required in addition to consent to undergo the VFS.

It is good practice to document consent.

1.8.4 VFS protocol

Significant variability exists in the literature and in published protocols for VFS. Practitioners should consult these to determine appropriate local protocols. It is not possible therefore to recommend a standard VFS protocol. VFS should always follow as systematic and structured a framework as possible to allow for comparison within and between patients. VFS is a dynamic assessment and should be flexible to allow changes to protocol or framework dependent on the patient's presentation or their response to the evaluation.

1.8.5 Terminology

VFS terminology varies widely across the literature. It is suggested that consistent terminology is agreed locally in discussion with MDT colleagues.

1.8.6 Reliability of interpretation of VFS images

Interpretation of images is an IR(ME)R Operator role.[1-3] There is evidence in the literature that the reliability of interpretation of VFS is variable but may be improved locally by:

- Team discussion to reach consensus.[24]
- Training provided by an experienced practitioner to improve inter-rater agreement.[25 26] This principle has received a recent significant boost from the development of the MBSImP framework in which training to practitioner level requires 80% agreement with the set criteria.[27]
- Use of penetration / aspiration scale.[28]
- Use of SLT competencies to inform training of SLTs (examples of locally developed competencies are available in the Members' area of the RCSLT website).

1.8.7 Clinical application of VFS findings

Interpretation and subsequent recommendations for management must be placed in the context of normal development and ageing, patient disease, co-morbidity and patient choice. SLTs must have knowledge of the normal variability of swallowing.[29]

VFS provides a snapshot a patient's swallow and may not be wholly representative of the patient's normal pattern of swallowing. The VFS findings should be applied with reference to the full case history and clinical observations.

1.8.8 VFS reporting

Reporting of images is an IR(ME)R Operator role.[1-3] VFS reporting is subject to professional standards.[30] The report should be circulated in an appropriately timely fashion to the MDT, and may be shared with the patient and carers as appropriate. Unexpected findings, including unsuspected medical conditions, must be included in any report.

2 Health, safety and data protection

2.1 Health and safety: General procedures

2.1.1 Radiation protection

VFS is carried out in a designated radiology area with appropriate radiation protection equipment in compliance with the ionising regulations.[31] SLTs must adhere to these regulations as formally determined at local level.

2.1.2 Safety

Arrangements must be in place to ensure that the VFS evaluation is safe for attending patients and carers. Appropriate risk assessment should be carried out by the MDT. There must be immediate access to emergency trained personnel and equipment, e.g. suction and resuscitation team, in the event of possible adverse events including:

- Reaction to aspiration (routine access to chest physiotherapy should be available in the event of a significant event).
- Deterioration in the condition of an acutely unwell patient.
- Detection of previously unsuspected tracheo-oesophageal fistula.

SLTs involved in the conduct of VFS must be aware of health and safety requirements and must adhere to local policies and procedures.

2.2 Data protection: Storage of images

Storage of images is subject to legal requirements. These requirements are interpreted at a local level and must be incorporated into local VFS procedures. Dose-related incidents must be reported to the IR(ME)R Inspector.[1-3]

2.3 Clinical incident reporting

All clinical incidents or adverse events related to the VFS procedure must be reported according to local protocols.

3 Professional issues

3.1 Medico-legal issues

The medico-legal issues associated with professional practice are beyond the scope of this document. Documents covering this area include:

- Communicating Quality 3 [30]
- Health Professions Council: Managing fitness to practise [32]
- Department of Health. Practitioners with Special Interests. Implementing a scheme for Allied Health Professionals with Special Interests [33]

The RCSLT provides an insurance policy that indemnifies all its practising members in the UK, Channel Islands and the Isle of Man where their actions meet the professional and clinical practice expectations laid out in RCSLT guidance. This covers proven liability arising from alleged professional negligence, breach of professional conduct and damage to property.[30]

3.2 Audit and research

VFS services should be audited on a regular basis within an IR(ME)R and local clinical governance framework. SLTs specialising in VFS are encouraged to pursue the development of an evidence base in VFS.

4 Workforce development, competencies and training

The following structure is recommended to ensure a safe and professionally governed VFS service:[34]

- Lead SLT in VFS.
- Clinical specialist in VFS.
- Trainee specialist in VFS.

All SLTs working in the area of dysphagia must have background knowledge of VFS studies to inform their clinical assessment and management. Service managers must ensure that adequate resources are in place to monitor and support the maintenance of competencies in VFS for appropriate grades of staff.

It is acknowledged that there is a variety of models for VFS skill training available at a local or national level that satisfy local training requirements. It is recommended that speech and language therapy services adopt or develop a formal competency programme as a part of their professional governance structure. An individual SLT's level of competence should be maintained and reviewed at annual appraisal.

SLTs undertaking VFS must participate in peer-review activities in order to maintain, develop and share knowledge and expertise with colleagues within the service and throughout local/regional networks.

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