



MINISTRY OF HEALTH
SINGAPORE

NATIONAL GUIDELINES ON NURSING MANAGEMENT OF NASOGASTRIC TUBE IN ADULT PATIENTS





Acknowledgements

The *National Guidelines on Nursing Management of Nasogastric Tube in Adult Patients (2022)* has been developed by the Nasogastric Tube (NGT) Review Workgroup (see **Table A-1** for composition) for the purpose of providing guidance on its placement and management, its use in feeding and its relevant training. The NGT Workgroup would like to thank the clinical experts (listed in **Table A-2**) for their assistance in providing consultation and the resource institutions (listed in **Table A-3**) that provided their policies and / or inputs for the Workgroup’s review.

Table A-1 Composition of NGT Review Workgroup

Name	Institution	Designation
Ms Tan Soh Chin (Chairperson)	Singapore Health Services (SingHealth)	Senior Director
Dr Angel Lee (Co-Chairperson)	St Andrew’s Community Hospital	Medical Director
Ms Phyllis Tan	All Saints Home	Head of Nursing
Ms Tan Poh Choo Janet	Changi General Hospital	Advanced Practice Nurse
Ms Precilla Lai	Home Nursing Foundation	Advanced Practice Nurse
Dr James Alvin Low	Khoo Teck Puat Hospital	Senior Consultant
Dr Adelina Young	Ministry of Health	Deputy Director (Clinical Quality, Performance and Value)
Ms Yeo Ai Wah	Regional Health System Office, National University Health System	Advanced Practice Nurse
Ms Tan Mui Lan	St Andrew’s Community Hospital	Advanced Practice Nurse
Dr Khin Khin Win	Tan Tock Seng Hospital	Consultant
Ms Tan Hongyun	Woodlands Health	Advanced Practice Nurse
Secretariat Team		
Dr Karen Koh	Ministry of Health	Assistant Chief Nursing Officer (Acute Care)
Ms Helen Goh	Ministry of Health	Assistant Chief Nursing Officer (Community Care)
Ms Katherine Soh	Ministry of Health	Senior Assistant Director (Chief Nursing Officer’s Office)
Ms Carolyn Ho	Ministry of Health	Senior Manager (Chief Nursing Officer’s Office)

Ms Yeap Rui Ting	Ministry of Health	Manager (Chief Nursing Officer’s Office)
Ms Angela Chiu	Ministry of Health	Manager (Chief Nursing Officer’s Office)

Information of members is accurate as at the time of appointment of the NGT Review Workgroup, 19 August 2021.

Table A-2 List of Clinical Experts Consulted

Name	Institution	Designation
Ms Leong Chin Jong	Agency for Integrated Care	Senior Assistant Director (Clinical), Quality & Productivity Division
Mrs Magdalin Cheong	Changi General Hospital	Head & Deputy Director, Dietetic & Food Services Department
Dr Lim Li Lin	National University of Singapore	Assistant Professor, Department of Medicine
Dr Constance Teo Ee Hoon	Singapore General Hospital	Senior Consultant (Department of Otolaryngology)
Dr Lim Yen Peng	Tan Tock Seng Hospital	Head of Department, Senior Principal Dietitian
Adjunct Associate Professor Gervais Wan	Tan Tock Seng Hospital	Senior Consultant, Department of Diagnostic Radiology

Information of clinical experts consulted is accurate as of March 2022.

Table A-3 List of Resource Institutions for the NGT Review Workgroup

Institution	Institution
Ang Mo Kio-Thye Hua Kwan Hospital	NTUC Health
Home Nursing Foundation	Peacehaven Nursing Home
Jaga-Me Home Care Nursing	St Andrew’s Community Hospital
National Healthcare Group	St Luke’s ElderCare
National University Health System	Singapore Health Services (SingHealth)
Alice Lee Centre for Nursing Studies, National University of Singapore	Society for the Aged Sick

The Workgroup would like to acknowledge the contributions from nurse leaders and nurses, specialty nursing chapters from the Singapore Nurses’ Association and Institutes of Higher Learning for their valuable feedback on the guidelines.



Foreword

Since the Nursing Clinical Practice Guidelines on Nursing Management of Nasogastric Tube Feeding in Adult Patients was published in 2010 by the Ministry of Health, nurses continue to assume a primary role in providing care to patients with nasogastric tubes for enteral administration of fluids, nutritional formulae or medications. While nasogastric tube insertion and feeding are common nursing practices, they are considered complex procedures which generally require adequately trained, skilled and competent nurses to carry out. Despite the fact that serious adverse events involving nasogastric tube insertion and feeding are rare, some healthcare institutions have requested that the pre-existing clinical practice guidelines and practices be reviewed and updated with the latest available evidence and best practices, and to highlight recommended precautionary measures.

The Nasogastric Tube Review Committee was convened in 2021 to look at the potential challenges and gaps faced in various healthcare settings, namely acute care, community care and home care, and propose how these could be addressed. The Committee also adapted their recommendations to align with sector-specific practices in the acute and community care settings.

The publication of these National Guidelines on Nursing Management of Nasogastric Tube in Adult Patients is a product involving multiple engagements with active participation from both medical and nursing champions in the various sectors. I wish to thank them for their time and contributions, which have undoubtedly helped to provide the desired alignment in best practices across healthcare settings.

I hope that nurses will find the information useful in addressing and anticipating the issues commonly encountered during the care provision for adult patients with nasogastric tubes, to prevent complications and promote the safety and well-being of these patients.

Ms Paulin Koh
Chief Nursing Officer
Ministry of Health



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1. Introduction



1.1 Background

The previously published MOH Clinical Practice Guidelines on Nursing Management of Nasogastric Tube Feeding in Adult Patients (2010) served as a useful tool in assisting clinical decision-making regarding nursing care provided to patients with nasogastric tubes and had been widely adopted and adapted in many institutional policies. However, similar to international experience, adverse incidents related to nasogastric tube (NGT) placement, feeding or nursing care in Singapore continue to be reported, demonstrating that the risk to patient safety still persists.

Based on the above and locally submitted incident reports and data, the Ministry of Health appointed a Nasogastric Tube Review Workgroup (“Workgroup”) which was given the following tasks:

- (i) to review and update pre-existing practices and guidelines to be in line with best practices,
- (ii) to make recommendations on how to improve the processes of NGT placement, feeding, management and nursing care across various healthcare settings, and
- (iii) to guide the training and competency requirements for nurses managing NGTs.



1.2 Purpose / Scope of the Guidelines

This set of guidelines aims to provide guidance regarding the nursing management of NGT in adult patients for enteral administration of fluids, nutrition supplements and medications. The guidelines have taken into consideration available research findings, existing evidence-based guidelines, institutional policies, and the consensus of subject-matter experts in the field to provide recommendations on specific issues in the nursing management of NGT practice. The drafts of the guidelines were also circulated to healthcare institutions and clinical experts (listed in **Table A-2**) for peer review on the validity, reliability and practicality of the recommendations.

However, practitioners must have the required competencies and continue to exercise clinical judgement and holistic assessment in the management of patients with NGT. **Therefore, this set of guidelines should be implemented with considerations of each individual patient’s clinical condition, nutritional status, available treatment options and overall treatment goals. Other considerations include resource availability, institutional policies, the ethics of individual patient’s circumstances and the objective to do no harm.**

Sector-specific recommendations are included in a comment box for institutions’ reference such as the one below:

Note for Home Care Setting:



1.3 Implementation of Guidelines

This set of guidelines is intended as a simple and readable reference for clinical staff on the nursing management of nasogastric tube in adult patients. It is expected that these guidelines will be adopted after discussion with each institution’s management and clinical staff. Institutions may review how these guidelines may complement or be incorporated into their existing institutional protocols. However, the guidelines should be adapted to local contexts to suit a particular setting, situation or patient. This set of guidelines also replaces the Nursing Clinical Practice Guidelines on Nursing Management of Nasogastric Tube Feeding in Adult Patients published by the Ministry of Health in July 2010.



1.4 Limitations

These guidelines are not intended to serve as the legal standard of nursing care. The contents of this publication are guidelines for clinical practice, based on the best available relevant evidence and expert clinical opinion at the time of development. Users of these guidelines should continue to determine appropriate and safe patient care practices, based on assessment of the circumstances of the individual patient, their own clinical experiences and the knowledge of the most recent research findings.

Till the state of the art improves further, the absence of a wholly reliable test to ensure placement means that nasogastric feeding will never be completely without risk. Institutions should take this into consideration and ensure that measures are taken to reduce risk where possible through various means such as implementing guidelines, staff supervision and training, checklists and the simplification of processes.



2. Indications for Nasogastric Tube Insertion, Assessment of Right Placement and Risk Profiling of Patients



2.1 Overview

The requirement for NGT placement will depend on its indications, an assessment of the patient's risk profile and the treatment goals set for the patient. Institutions and community care services are encouraged to develop policies and guidelines on NGT placement, care and management that include providing advice for appropriately trained healthcare professionals to perform risk assessments of patients, identify high risk / challenging patients where NGT placement may be contraindicated and consider alternatives where applicable. Care planning should also be discussed with the clinical team, speech therapists, dietitians, and the patient / family members where available.



2.2 Identifying Patients Who Require NGT Insertion and Feeding

The use of enteral feeding should only be indicated if oral intake is insufficient or unsafe for the individual. The following factors should be assessed before determining if a person should be placed on NGT feeding:

- Clinical conditions of the patient [see **Section 2.3(a)** for examples of patients who need further assessment on the suitability of NGT insertion and feeding].
- Assessment by speech therapist for swallowing ability if applicable.
- Patient's nutritional needs, determined using a suitable nutritional screening tool. Consult a Dietitian to ensure that the choice of enteral feed meets the recommended dietary requirements of the patient.
- Patient's requirements based on individual clinical history, conditions, diagnosis, physical examination, laboratory values, functional tests, radiologic findings, and ability to adequately meet requirements via oral feeding.



2.3 Recommended Precautionary Measures

Patients with the following conditions may need further specialist assessment of their suitability for NGT insertion and feeding because of the attendant risks involved (please note that the list is non-exhaustive):

- base of skull / facial / nasal trauma
- deformities or tumours (e.g. at the face, nose, oesophagus, throat or stomach)
- post-surgery (e.g. at the face, nose, throat, stomach or brain)
- post-radiation (within six months) to facial and oral areas
- behavioural challenges (e.g. risk of resistance and struggle during procedure, frequent pulling of the tube due to discomfort or agitation)
- physiological anorexia or psychological problems
- oesophagus disorders (e.g. strictures, varices)
- neuromuscular disease
- coagulation abnormality
- unconscious patient

It is important to document in the patient's health records any difficult or challenging situations / conditions that may necessitate specific resources to better support insertion and care of the NGT. For example, certain NGT insertions may need to be performed under radiological guidance at hospitals. Institutions and community care services may also consider having a list of contraindications to NGT insertion where appropriate.

Competency in NGT management for nurses should include understanding and assessment of the risks and monitoring of the patient involved in the following five stages:

- i. NGT insertion,
- ii. Confirmation / testing of NGT placement,
- iii. NGT feeding with enteral nutrition formulae / medications, especially drug-nutrient interactions and drugs compatible for NGT delivery (e.g. liquid suspension like phenytoin or solid dispersible tablets like paracetamol),
- iv. Monitoring plan for each individual patient, and
- v. NGT removal

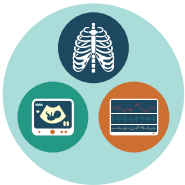
Nurses should be aware of non-pharmacological approaches available to alleviate patients' fears, anxieties, and discomfort **before, during, and after** NGT insertion. For example, the presence of loved ones or caregivers may help to provide assurance to patients. Nurses can also provide reassurance to patients by explaining the procedure in a simple and gentle manner. Avoid restraining the patient and ensure a conducive environment whenever possible.



2.4 Goals and Outcomes

There is a need for clear indications for NGT insertion and goals of care to be achieved for patients and this should be documented and communicated to patients, caregivers and healthcare providers involved in the care before the insertion of NGT. The purpose for NGT insertion and expected care outcomes for patients should be conveyed and understood by all parties prior to its commencement. The care outcomes should also be monitored and communicated during handover if the patient transfers between care settings, for example the adequacy / tolerance of NGT feeding and observation for weight changes.

3. Placement and Confirmation of Nasogastric Tube Position



3.1 Overview

It is critical to ensure that the placement of the NGT is in the correct position with reliable confirmatory methods before commencing feeding. There are many new emerging methods being explored such as the use of capnography, ultrasound or electro-magnetic guided processes but there has not been conclusive evidence nor is the method readily accessible. While chest X-ray is still the gold standard to confirm NGT placement, this exposes the patient to radiation risk if there were multiple exposures and causes inefficiencies in the system because manpower is required to escort the patient to the imaging facility and confirm the radiographic image, which delays the commencement of feeding. It is also not practical to repeatedly subject the patient to chest X-rays subsequent to tube insertion as the checking of tube placement needs to be repeated each time before feeding. We need to be mindful that there continues to be a small risk that the NGT may have been inserted into the respiratory tract / pleura or may have migrated out of a previously confirmed position. Hence, various existing guidelines and protocols are still relevant and useful to guide practices while we wait for more effective and efficient bedside confirmatory methods or technology.



3.2 Challenges and Gaps Identified

There are various methods that can be used to confirm the position of the NGT. However, based on local reported incidents, each method does have its potential challenges and gaps as listed in **Table 3.1**:

Table 3.1 Potential Challenges and Gaps Identified from Local Incidents

S/N	Method	Common Challenges and Gaps Identified
1	pH Testing and Aspiration	<ul style="list-style-type: none">• Cut-off values for pH levels are not standardised• Inter-rater variation of different pH test strips poses challenges in pH reading• No aspirate is obtained• Poor management and quality of pH strips / papers
2	Auscultation	<ul style="list-style-type: none">• Use of auscultation as a sole confirmatory method in some instances and settings• Subjective and dependent on carer’s skills / experience
3	Chest X-ray (CXR)	<ul style="list-style-type: none">• Logistics and cost of performing a CXR• Lack of clarity and standardisation on when CXR should be done• CXR is not readily available for patients in home care settings (including operational and financial difficulties to do so)• Trained personnel is required to interpret results from CXR



3.3 Recommended Precautionary Measures

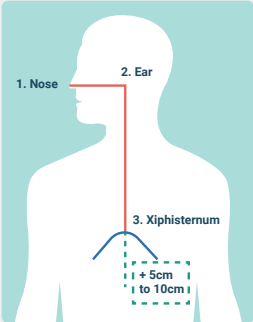
Implementation of precautionary measures, improved communication, close monitoring, and education of both patients and healthcare professionals can help to prevent or reduce the occurrence of incidents. The recommended precautionary measures to take note of are listed in **Table 3.2** below:

Table 3.2 Recommended Precautionary Measures

1. Measurement of NGT: Nose-Ear-Xiphoid (NEX) + 5 to 10cm

Recommended Practices:

- The measurement of the length of NGT to be inserted should be from the nasal tip to the earlobe and then to the mid-point between the xiphoid process and the umbilicus (or 5cm below the xiphoid process) i.e. Nose-Ear-Xiphoid (NEX) plus an additional 5 to 10cm (as shown in the pictorial illustration on the right and in **Annex A**).
- Mark the intersection where the NGT enters the nostril and use this marking to document the tube placement position. In cases where the NGT does not have imprinted markings, consider using indelible ink to mark the intersection.



• **Rationale:** A modified NEX method (NEX + 5 to 10cm) has been demonstrated to be more reliable than NEX in obtaining the correct tip positioning on CXR and gastric aspirate within 2 hours after insertion (Torsy et al., 2020).

2. Pre-insertion / Feeding Checks

Recommended Practices:

- Institutions are recommended to use a combination of methods of assessment. Patient assessment is key and should be carried out prior to NGT insertion, during, and after insertion as well as before proceeding to establish the placement of NGT with either pH testing or chest X-ray.
- Before NGT insertion, staff should assess patient for indications of NGT, any potential contraindications, identification of high-risk patients requiring further specialist review, or if bedside insertion is medically appropriate.
- Institutions are recommended to include potential contraindications in their institutional guidelines to ascertain if bedside insertion is appropriate.
- Staff should ensure that any signs or symptoms of patient’s distress (such as breathlessness, nausea, recent vomiting etc.) have been addressed before proceeding to the next course of action.
- After NGT insertion or pre-feeding, staff should ensure a visual check as follows:

- Inspect if the NGT has migrated to a different position by:
1. Ensuring that the NGT is not visibly misplaced at the nostril or the marking (if present) on the NGT has not been shifted.
 2. Ensuring that there is no coiling of the NGT at the back of the mouth or obvious tube migration.

• **Rationale:** Patient assessment is key in promoting safety measures and avoiding placement-related injury (Jones et al., 2017).

3. pH Testing and Gastric Fluid Aspiration

Recommended Practices:

- Institutions should include in their policies the proper storage, use, and management of pH testing strips / paper in accordance with the manufacturer's instructions (e.g. recommended storage conditions to prevent oxidation). Where possible, standardisation of the type of pH paper used should be ensured across partner institutions.
- The pH indicator strip with 0.5 gradations is recommended for usage (National Patient Safety Agency, 2011 and Stirland, 2017).
- The **first approach** is obtaining an aspirate for pH testing via the following steps:
 1. Visually examine the characteristics of the aspirate before pH testing to differentiate between gastric intestinal, or respiratory content (pls refer to **Table 3.3**).
 2. Ensure that an aspirate amount of at least 1 ml is obtained for the purpose of pH testing.
 3. A pH level of ≤ 5.5 (equal or less than 5.5) indicates that it is safe to proceed with feeding (Fernandez et al., 2010; JBI, 2021 and Stirland, 2017).
 4. A pH level of > 5.5 (more than 5.5) indicates that the NGT may not be in the stomach. Staff should carry out the visual checks mentioned above (in section 2 of **Table 3.2**) before checking if the required **decision criteria** have been fulfilled to commence feeding:

Check if at least 2 or more of the following **decision criteria** have been met:

- Aspirate is more than 10 ml and resembles gastric content.
- Patient is on pH altering medication in the last 24 hours (for example medication from the class of Proton Pump Inhibitor, H2 Receptor Antagonist or Antacids).
- Same pH or lower for the last 24 hours.
- Loud and clear "whooshing" sound during auscultation (see section below on Auscultation for more information).

- A recommended flowchart to check for the correct placement of NGT can be found in the poster in **Annex B**.
- **Rationale:** It is critical that the subsequent colour on the pH paper can be clearly distinguished, especially between the range of pH 5 and 6 (National Patient Safety Agency, 2011 and Stirland, 2017). The use of auscultatory method or the "whooshing" sound should not be used as the sole method to establish the placement of the NGT (ASPEN, 2017; JBI, 2021 and MOH, 2010). However, there is still value in carrying out the auscultatory method by trained staff at the bedside to provide additional information when taken into the context of other assessments or findings for decision-making.

4. Chest X-Ray (CXR)

Recommended Practices:

- In the event that the first approach is not successful, the **second approach** is to utilise CXR to confirm the position of NGT when both pH testing and additional checks have failed.
- The CXR order / request should indicate clearly that its purpose is to check for correct NGT placement.
- CXR continues to be recommended as the confirmatory check for NGT placements that could not be confirmed at the bedside after failed pH testing.

- Pre-CXR patient checks or assessments are recommended before sending the patient for CXR after a pH testing has failed, e.g. signs suggesting possible migration of NGT such as coiling at the back of the mouth (oropharynx) or change in the external marking of NGT at the nostrils etc.
- **Rationale:** The use of CXR as a substitute for pH testing is costly and exposes patients to unnecessary radiation. It is also not feasible in the community as a first approach. Reliance on CXR without sufficient controls or governance may give a false sense of security for those providing care for patients with NGT (Jones et al., 2020). It is important to note that there are still limitations to CXR as results are highly dependent on the interpreter.

5. Auscultation

Recommended Practices:

- The auscultation method should **not** be the sole method used to confirm the correct position of the NGT. However, it may be used in conjunction with the **first approach** (described above) and other measures e.g. clinical judgement, nature of aspirate, length of the NGT, no coiling of the tube at the back of the oral cavity, etc.
- Where indicated, nurses should inform the next-of-kin about the risks of using the auscultation method to confirm the correct positioning of the NGT, for example tracheal intubation and false confirmation of the NGT placement, as auscultation may not differentiate between respiratory and gastrointestinal placement of the NGT.

Note for Home Care and Nursing Home Settings:

When no gastric aspirate is obtained after troubleshooting, consider manoeuvres to obtain gastric aspirate such as repositioning the patient to a left lateral position if there are no contraindications. Inject 10-20 ml of air and wait for up to 30 minutes and try to check for aspirate again.

For **new** NGT:

- If no aspirate is obtained, remove and re-attempt NGT insertion if needed.

For **existing** NGT:

- If no aspirate is obtained even after positioning the patient to left lateral side, reposition the patient in an upright position and instil up to a maximum of 10 ml of cool boiled / distilled water progressively and slowly in intervals of 5 minutes through the NGT.
- Assess if the flow of water is smooth and monitor for any drop in patient's oxygen saturation level. Stop immediately if there is any presence of difficulties in water flow or a drop in patient's oxygen saturation level or if patient is showing any signs of respiratory distress.
- Wait for up to 30 minutes before trying to obtain aspirate again.
- If there is still no aspirate obtained, a trained staff member should perform the auscultation to hear the first "whoosh" sound (sound should be loud and clear).
- When in doubt, more senior or experienced nursing staff should be asked to perform the auscultation.

• **Rationale:** Nurses in the community who have been assessed competent may use the auscultatory method as an option when there is no aspirate for existing NGT and when all the above measures (except CXR) have been exhausted to confirm placement. Patients on pro-kinetic medications (for example domperidone, metoclopramide, cisapride etc.) have faster emptying of stomach contents and this may lead to challenges in obtaining aspirate despite repositioning. The clinical team managing the patient would need to weigh the risks of the auscultatory approach which would include “additional checks”, patient assessment and monitoring versus CXR whereby the recourse to costly urgent returns for radiological assessment might not be risk-free (Jones et al., 2017).

6. Methods for Additional Checks (To perform as appropriate)

Recommended Practices:

- The “instillation of water” check should not be used alone but in conjunction with first-approach methods as additional steps after passing the required “checks” (as mentioned in this table under point 3 - “pH Testing and Gastric Fluid Aspiration”).
- The following additional checks may be performed as appropriate:
 - i. **Monitoring of oxygen saturation level (SpO2).** Use a pulse oximeter to monitor oxygen saturation level and observe for signs of respiratory distress such as cough, increased respiratory rate, throat secretions, and breathlessness. Monitoring of oxygen saturation level is a useful measure when used in conjunction with the instillation of water as it provides clinical information suggesting the possibility of incorrect tube placement. Oxygen saturation level of a patient should be measured before any procedure to establish a baseline measurement. While the oxygen saturation level should be 95% and above in adult patients, it could be lower in some elderly patients. Nurses should cross-check that the oxygen saturation levels are within the patient’s usual recorded baseline.
 - ii. **Instillation of water.** Instil up to a maximum of 10 ml of cool boiled / distilled water progressively and slowly in intervals of 5 minutes and observe for any desaturation and signs of respiratory distress such as cough, increased respiratory rate, throat secretions, and breathlessness. Proceed to feed if no changes in oxygen saturation level or respiratory patterns are observed. Generally, most drinking water may be regarded safe for healthy people. However, for immunocompromised patients, the clinical team may wish to consider sterile water for irrigation for enteral feeding to avoid possible contamination of pathogen outbreaks with water supply (ASPEN, 2017).

• **Rationale:** In patients with achlorhydria or hypochlorhydria, obtaining gastric fluids aspiration can be very challenging. Instillation of minimal amount of water as a form of gastric lavage for pH testing will help provide an avenue for tube placement, especially in settings with a lack of access to diagnostic imaging.



3.4 Visual Characteristics of NGT Aspirate

When inspecting the NGT aspirate, it is important to distinguish the different characteristics of the various locations that the aspirate may be drawn from. When this information is combined with the use of pH testing, it can be helpful to determine whether the position of the NGT is in the respiratory or gastrointestinal zone.

If the aspirate is coffee-ground, bloody or ambiguous, it should not be discarded. Instead, escalate and inform the clinical / medical team to review both the patient and the NGT aspirate for further management.

Table 3.3 Examples of Visual Characteristics of NGT Aspirate

Gastric	Intestinal	Respiratory
May be grassy green with sediment, brown (if blood is present and has been acted on by gastric acid). May also appear clear and colourless (often with shreds of off-white to tan mucus or sediment). Partially digested feeds may appear in aspirate as white to yellow curds.	Generally more transparent than gastric aspirate and may appear bile stained, ranging in colour from light to dark golden yellow or brownish-green.	Tracheobronchial secretion may consist of off-white to tan sediment.

[Source: Adapted from MOH (2010) Nursing Clinical Practice Guidelines 1/2010, Nursing Management of Nasogastric Tube Feeding in Adult Patients.]



3.5 Documentation

The following list is recommended to be recorded or documented to provide a holistic view of the patient and the NGT insertion process:

- Date and time of insertion
- Type and size of NGT
- Characteristics of gastric aspirate
- pH reading of gastric aspirate
- Position of NGT, e.g. left or right nostril
- Length of NGT inserted (if there is measurement marking for radio-opaque tubes) or external length of NGT (if there is no measurement marking)
- Any difficulties with NGT insertion
- Any special assistance with NGT insertion, i.e. guidewire guided, fluoroscopy-guided etc
- Methods of checking placement
- Date of X-ray (if done)
- Patient’s tolerance to insertion
- Due date for change of NGT (include reason for earlier change if applicable)
- Due date for review of need for NGT



4. Management of Nasogastric Tube, Insertion and Feeding Methods



4.1 Overview and General Recommendations for Nasogastric Tube Management

The management of NGT is complex and should be approached with care and caution. The care provided would require repeated assessments and continuous monitoring before, during, and after insertion of the NGT as well as measures to mitigate any potential risk to patient safety.

4.1.1 Selection of Appropriate NGT

The selection of an appropriately-sized tube and the type of tube to be used are determined by clinical assessment of the patient's needs, intended use of the tube, and estimated duration of NGT feeding.

Soft, flexible and small fine-bore tube (8 Fr to 12 Fr) remains as the recommended tube size for adult nasogastric feeding. Where possible, select a tube with a larger bore diameter without sacrificing the patient's comfort to improve flow and reduce the risk of clogging (ASPEN, 2017).

However, the selection of the NGT will also need to take into consideration potential ulceration to the nose as well as reflux and aspiration of feeds. The use of polyurethane or silicone tubes is preferred for anticipated long-term feeding while polyvinylchloride (PVC) tubes should be used for short periods of time (ASPEN, 2017 and National Nurses Nutrition Group, 2016).

4.1.2 Interval for Changing the NGT

The interval for changing a patient's NGT should follow the manufacturer's recommendations. The NGT may be changed more frequently or left in-situ for an extended duration, depending on the patient's condition and subject to the doctor's advice. Changing of NGT must be documented, including the date and reason for an earlier change, if applicable.

4.1.3 Securement of the NGT

The NGT should be secured to the nose using medical grade adhesive tape that wraps around the tube in a manner to prevent pressure against the tissue to minimise pressure sores from developing (ASPEN, 2017). The securement tape should be changed when soiled or at least once a day.

There needs to be routine patient monitoring incorporated in the nursing care for any signs of tissue pressure along the NGT against patient's skin, adequate securement, and patient's discomfort.

4.1.4 Maintaining the Patency of the NGT

It is critical to maintain the patency of the NGT to prevent unnecessary multiple reinsertions of the NGT. The flushing of NGT with water before and after intermittent feeding or medication administration has been found to be helpful and most effective in restoring tube patency and preventing clogging (ASPEN, 2017).

The recommended amount of water for flushing ranges from 15 ml to 30 ml (ASPEN, 2017 and MOH, 2010). However, the volume of water used for the purposes of irrigation needs to take into consideration the patient's condition and overall tolerable daily fluid allowance.

4.1.5 Positioning of Patients

It is important to ensure that patients are correctly positioned with an elevation of head of bed (HOB) at 30° or more during and after feeding for an appropriate period of time unless contraindicated (ASPEN, 2017 and MOH, 2010). For patients on prolonged bedrest, the National Pressure Ulcer Advisory Panel (NPUAP) recommends limiting HOB to 30° and avoiding placing patients directly on a pressure ulcer (NPUAP, 2014).

It may also be necessary to review the scheduled feeding regime and manage feed tolerance when high gastric residuals are detected.

4.1.6 Maintaining Oral Hygiene

Staff and caregivers should always ensure that the oral hygiene of the patient is maintained as the presence of the NGT may compromise the hygiene of the oral cavity, which can lead to infections, halitosis, crusted secretions, and bleeding, etc.

4.1.7 Assessment and Monitoring

It is essential for institutions to clearly state the required processes for assessment and monitoring for the management of NGT to ensure that the appropriate standards of nursing care are being provided.

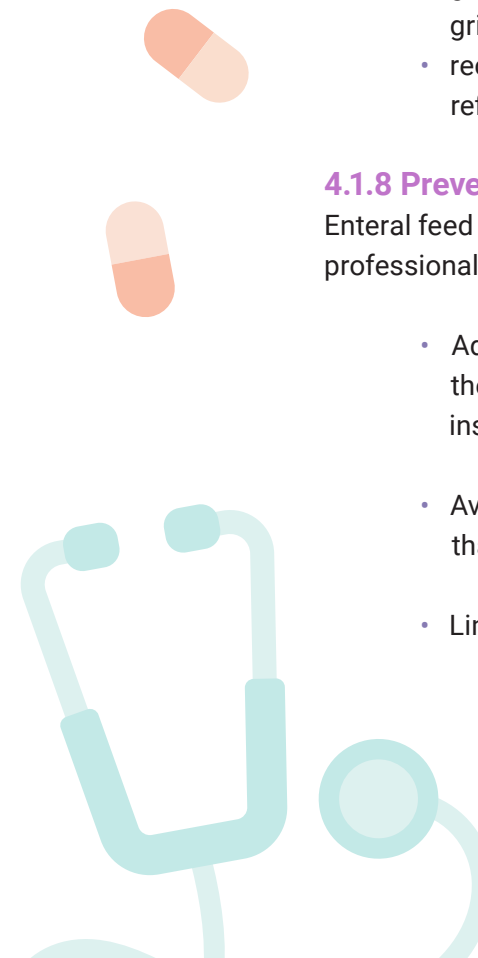
Assessing and monitoring the effectiveness of the enteral nutrition support and preventing feeding-associated complications are also important. Monitoring includes:

- prescribed versus delivered nutrient intake
- anthropometric data such as current weight versus baseline weight, history of weight loss, etc.
- fluid balance record as in input / output charts
- clinical chemistry such as biochemistry and haematology results
- gastrointestinal function such as nausea, vomiting, or diarrhoea
- general condition such as temperature, respiratory rate, level of alertness, facial grimaces, etc.
- recognising signs and symptoms of patients at risk of complications such as refeeding syndrome, pulmonary aspiration, etc.

4.1.8 Prevention of Enteral Feeding Contamination and Infection

Enteral feed provides a culture for microbial growth and patients are dependent on healthcare professionals to minimise this risk. The following practice is recommended:

- Administration sets and containers should be discarded every 24 hours or follow the manufacturer's recommendation for the duration of the enteral feeding or institutional policies.
- Avoid reusing the enteral delivery device for open and closed systems for durations that exceed the manufacturer's recommendations.
- Limit the hang time as follows:
 - maximum 8 hours for open enteral feeding systems
 - maximum 4 hours for infusion of reconstituted powder formula and enteral nutrition formula with additives (ASPEN 2017, and MOH, 2010).





4.2 Challenges and Gaps Identified From Local Incidents

The potential challenges and gaps in the management of NGT are detailed in **Table 4.1** below.

Table 4.1 Potential Challenges and Gaps in Management of NGT

S/N	Challenge	Potential Gaps Identified
1	Establishing NGT in Appropriate Placement / Obtaining Aspirate	<ul style="list-style-type: none">• No aspirate could be obtained immediately after NGT insertion
2	Lack of Assessment (feeding and insertion)	<ul style="list-style-type: none">• Lack of a standardised policy on the assessment methods for NGT feeding and insertion (before, during, and after)
3	Measurement and Management of External Length of NGT	<ul style="list-style-type: none">• Lack of a standardised policy or practice, including lack of consistency on how to measure external length of NGT, and assessment of appropriateness of length
4	NGT-related Issues	<ul style="list-style-type: none">• Failure to recognise coiling of NGT at the back of the throat• Clogging of NGT due to improper care or feeding of medications with inappropriate formulation, leading to the need for reinsertion• Frequent removal of NGT by the patient, leading to the need for reinsertion• Inappropriate size of NGT selected, causing discomfort to the patient



4.3 Recommended Mitigating Measures

The following risk mitigation measures as shown in **Table 4.2** are recommended to prevent NGT-related issues.

Table 4.2 Recommended Mitigating Measures

1. Establishing NGT in Appropriate Placement and Obtaining Aspirate
<p>Recommendations:</p> <ul style="list-style-type: none">• The following steps may be considered to obtain aspirate for pH testing:<ul style="list-style-type: none">• (Applicable only for newly inserted NGT) Ensure the NGT has been inserted slightly deeper by 5-10 cm beyond xiphoid process (NEX + 5 to 10 cm) and check for aspirate again (Jones et al., 2020).• Physical manoeuvres, e.g. turn the patient onto left lateral position up to 30 minutes unless contraindicated.• Introduction of air to try and dislodge the tube from the stomach mucosa / wall, e.g. inject 10-20ml using a 50 ml syringe.

- Wait for production of gastric juices (recommended waiting time of up to 30 minutes) before rechecking for aspirate.
- (Applicable only for **existing** NGT) Instil up to 10 ml of cool boiled / distilled water progressively and slowly in intervals of 5 minutes while monitoring oxygen saturation level and observing for signs of respiratory distress. Oxygen saturation level should be stable and within the usual baseline recorded for the patient. Recheck for aspirate within 30 minutes.

2. Lack of Assessment (insertion, feeding and monitoring)

- Recommendations:**
- Institutions should review and include the following assessments in Standard Operating Procedures (SOPs):
- a) NGT Insertion**
- Assessments **before** insertion include:
 - Verify doctor’s orders and indications for feeding
 - Verify patient’s identity
 - Check for any contra-indications
 - Nurses should pay particular attention to patients who are unable to display signs of distress by assessing the patient’s vital signs as baseline (e.g. heart rate, blood pressure and oxygen saturation level) and observing if there is more resistance than expected while the tube passes through the nasopharyngeal passage, or any change in patient’s behaviour such as agitation or restlessness
 - Assessments **during** insertion include:
 - No coiling of tube at the back of oral cavity
 - No significant resistance
 - Minimal physical symptoms e.g. retching, gagging, coughing, cyanosis, agitation or restlessness, or drop in oxygen saturation level
 - Additional checks, as appropriate, if pH testing is >5.5 and passes additional 2 decision criteria:

- Take baseline of oxygen saturation level
 - Flush not more than 10 ml water slowly and observe for any desaturation
 - Observe the patient for any respiratory distress or physical signs of discomfort, e.g. breathlessness, coughing, vomiting or agitation
 - Assessments **after** insertion include:
 - Check against documented inserted position
 - Tube is securely fixed in position
 - Assess patient’s mouth to ensure the tube is not coiled
 - Physical signs of discomfort e.g. breathlessness, coughing, vomiting or agitation

b) NGT Feeding

- Assessments **before** feeding include:
 - Check for any possible changes in position of NGT (see **Table 3.2** in Chapter 3)
 - Observe the patient for any signs of discomfort or restlessness
 - Assessment of gastric contents / residue
- Assessments **during** feeding include:
 - Observe the patient for any signs of respiratory distress, discomfort, or agitation
 - Monitoring of oxygen saturation level
- Assessments **after** feeding include:
 - Monitor the patient for any physical signs and symptoms, e.g. abdominal discomfort / distension, diarrhoea and vomiting, any respiratory distress or discomfort
 - Monitoring of oxygen saturation level

3. Measurement and Management of External Length of NGT

Recommendations:

- Institutions should use a combination of methods to confirm the placement of the tube. While the measurement of the external length of the NGT is useful as a method to identify red flags that the NGT has migrated, it should not be the single mode of assessment to confirm the placement of the NGT.
- The external measurement would also not identify whether a tube is placed in the lungs or coiled in the oesophagus. This would require further testing as indicated. Other methods such as checking for the coiling of NGT in the oral cavity are also signs of tube migration.

4. NGT-related Issues

Recommendations:

- The following measures are recommended to mitigate potential NGT-related issues:

a) Tube Coiling

- NGT should be removed and reinserted in the event of coiling.

b) Clogged NGT

- **Gentle** back-and-forth motion through a syringe with an attached plunger and warm water is the most common and effective method to loosen the clog (ASPEN, 2017). Replace the NGT if tube remains clogged.

c) Methods Which are Not Recommended for Feeding

- Do not use any forceful pushing method for feeding (i.e. plunger push / pull method is not recommended). Gravitational methods or the use of enteral feeding pumps to deliver enteral feeds are recommended (MOH, 2010 and ASPEN, 2017).

d) Understanding Which Medications Can or Cannot Be Administered With NGT

- Suggest for institutions to involve a Pharmacist or Physician to assess the appropriateness of the route of administration of medication. In patients with poly-pharmacy, it is recommended that the Pharmacist provides a schedule for the medications if separation is indicated to avoid altered drug bioavailability.

- Institutions should also include a drug information list in their policy that is easily available to staff. This drug information list / manual serves to identify the medications which are suitable or unsuitable to be dissolved before administration through the NGT. The drug information list / manual should be updated in a timely manner.

The following are some suggested examples (list is non-exhaustive):

- Enteric-coated and sustained release medications should not be crushed.
 - Sublingual and buccal medications are not to be administered via feeding tubes.
 - Medications (e.g. Nexium) that are crushed or inadequately dissolved may end up clogging the tube because of the sediments (which need to be stirred or shaken well before feeding to prevent the sediments from blocking the tube). It is important for staff to know whether medications can be crushed by checking the drug indications for more information.
- Medications should not be added directly to the enteral formula or into the enteral feeding bag.
- Medications administered through the NGT should preferably be in liquid or syrup form if available.



4.4 Bolus Volume and Gastric Residual Volume (GRV)

Bolus volume of feeds should be monitored and strictly adhered to not more than 400 ml. Lesser volumes may be considered for smaller built patients (e.g. 350 ml) and according to individual tolerance and the required amount of daily feed. Staff must take note that the maximum volume of 400 ml includes medications and water that are given with feeds.

A GRV that is greater than 200 ml requires prompt and careful bedside evaluation. This would include review of the feeding methods, adjustment of feed volume / rate or choice of enteral nutrition formula. GRV readings should be evaluated in conjunction with physical examination for abdominal distension, absence of bowel sounds, and presence of nausea and vomiting (MOH, 2010). The effects and benefits of discarding or returning residual gastric aspirate remain inconclusive (Wen et al., 2019).

While returning residual gastric aspirate can improve the fluid and electrolyte balance, it can potentially increase the risk of tube blockage and contamination. Therefore, the returning of residual gastric aspirate should be based on clinical decision and on a case-by-case basis. However, very abnormal-looking aspirate such as bloody aspirate as well as bilious or faecal aspirate must not be returned to patients. It is recommended that they be kept and subject to clinical evaluation for further patient management.



4.5 Frequent Removal of NGT by Patient

Frequent removal of the NGT by the patient can be a regular occurrence, especially in home care patients. Some mitigating measures include the wearing of mittens or using headbands / clips to secure the NGT in place. Sometimes, family may also prefer to remove the tube for social functions (due to aesthetic or dignity reasons). However, if the patient is not comfortable with the NGT or regularly removes the NGT, a joint decision should be made between the caregiver and healthcare team on whether alternative methods of feeding delivery would be more appropriate to support the patient's nutrition.

Considerations should also include the patient’s quality of life, selection of an appropriate size of the NGT, the burden of tube feeding to the patient, and the expected care outcomes to be achieved. For ethical reasons, a patient who keeps removing the NGT could feel strongly against having it, which reflects the quality of life and burden to the patient. It is not recommended to repeatedly insert the NGT in such instances.

Typically, a family conference or Advanced Care Planning can be held to discuss the way forward, including alternative methods such as Percutaneous Endoscopic Gastrostomy (PEG) tube feeding or “careful oral feeding”. During the care plan discussion, the risks involved for the proposed method/s should be explained to the family, and precautions should be taken to minimise the risks as much as possible.



4.6 Care Transition

4.6.1 Pre-discharge Assessment

Institutions are strongly encouraged to conduct pre-discharge assessments before a patient transitions to another care setting.

- Considerations to include in pre-discharge checklist:
 - Establish tolerance to NGT at the goal regimen prior to discharge
 - Provide written and verbal instructions to the patient and / or caregivers well before discharge
 - Ascertain that the patient / caregiver demonstrates competence in NGT care and feeding
 - Ensure referral to a service provider or follow-up care for management of the NGT in the community
 - Provide memo for handover to receiving care institution, especially if there is a change in regime for nursing home patients on long term NGT feeding
 - Provide memo from a dietitian if patient was assessed
 - Prior to discharge, educate the patient and / or caregiver on how to obtain necessary supplies

Institutions should also improve their own workflow and triaging process. e.g. setting a fast-track workflow for non-acute / sub-acute patients. It is also important to ensure a two-way effective information exchange between care settings.



4.6.2 Caregiver Training

As part of care transition, institutions may need to provide resources (such as pamphlets) or training for caregivers. Caregivers should receive appropriate training from a qualified healthcare provider or training institution with a structured programme to be equipped with the necessary care skills, e.g. recognising signs of distress, how to ease patients’ fears / discomfort, what are normal and abnormal readings and when to alert care providers.

5. Escalation Processes



5.1 Overview

The culture of **patient safety** must remain as top priority and institutions need to put in place an escalation process or protocols to address challenging situations in NGT management.



5.2 Insertion Attempts

Repeated attempts of NGT insertion put patients at risk of injury. The maximum number of attempts should not exceed five times in total by two qualified / trained nurses:

Nurse A	Nurse B
• Maximum of three attempts	• Maximum of two attempts
• Nurse A to seek assistance from Nurse B after three failed attempts	• Nurse B should be more experienced than Nurse A in NGT insertion (not necessarily by level of seniority)
• Do factor in a resting period (e.g. 30 minutes) between attempts made by Nurse A and Nurse B • To seek advice from a medical expert for radiological insertion after all five attempts have failed	



5.3 Escalation Protocol

It is recommended for a clear escalation protocol to be incorporated within the institution’s policy, which should be made easily available and accessible for nurses’ reference. The protocol should include:

- Criteria on when to escalate to a more experienced nurse or doctor after failed attempts.
- Criteria to send patients to Emergency Department for institutions without imaging facilities.
- A decision tree or flowchart for escalation processes during and after office working hours.

A reference flowchart for the acute care and community care sectors can be found in the poster in **Annex B**.

6. Training and Competency



6.1 Overview

All nurses have the responsibility to ensure that they have the necessary updated knowledge, skills, and competencies in providing the nursing care involved in caring for patients on NGT. Apart from trained medical experts, NGT insertion should only be carried out by trained Enrolled Nurses (ENs) and Registered Nurses (RNs).



6.2 Institutional Governance and Development of Staff Training and Competency Policies

Institutions should determine the necessity and frequency of competency assessments for staff and ensure competency assessments are included in their policy and procedure for in-service staff.

Decision-making matrix or escalation protocols should be developed and incorporated into the guidelines and training processes.

There needs to be a mechanism in place to ensure staff's continuous competence to ensure currency of the required skill set.

Institutions should ensure that educators and trainers are adequately trained and updated with latest CPG guidelines and SOPs. Trainers should also take the initiative to keep abreast of the latest guidelines as part of professionalism.



6.3 Staff Competency (Training Areas)

Apart from being competent in NGT insertion and feeding, the following areas of competencies are also required and should be included in staff training protocols:

a) Importance of Hand Hygiene When Providing Care for Patients with NGT

Nurses should maintain effective hand hygiene in all aspects of care such as NGT insertion and enteral feeding preparation and administration to minimise transference of microbial growth.

b) Competencies in the Various Techniques Required to Establish Correct Positioning of the NGT

Nurses need to obtain competence in the various techniques such as:

- Methods to obtain aspirate
- Differentiating the aspirate contents
- pH testing of aspirate
- Conducting the additional checks when appropriate
- Use of stethoscope to differentiate bowel sounds and the "whooshing" sound for air insufflation (including its technique)

c) Recognising NGT and Enteral Feeding Related Complications and its Management

Complications associated with NGT-related and enteral feeding therapy may be avoided through monitoring measures and vigilant care. Nurses need to familiarise themselves with potential complications and the subsequent management required. These include:

- Identifying patients at risk for refeeding syndrome, signs and symptoms of refeeding syndrome, and its management.
- Identifying patients at risk of pulmonary aspiration and strategies to reduce the risk (e.g. measurement of GRV, keeping head of bed elevated at 30° during enteral feed administration etc.).
- Recognising respiratory distress or physical signs of discomfort as part of the assessment and monitoring care for patients on NGT (e.g. oxygen saturation levels, breathlessness, coughing, agitation, or non-verbal signs of discomfort etc.). For subsequent monitoring, they should also be able to identify symptoms of pneumonitis (e.g. fever, increased respiration rate, desaturation) to escalate for early medical review and intervention to prevent pneumonia.

d) Knowledge of Medicines That Are Suitable or Not Suitable to Be Administered Through NGT

Nurses need to be more aware of the types of medications that can or cannot be administered through the NGT (understanding of pharmacology, therapeutics, and drug indications to prevent tube blockage).

e) Knowledge of Handling, Storage and Preparation of Enteral Feeds

Nurses should have knowledge of the appropriate temperature of feeds and the administration and safe storage of opened or unused formula, as the inappropriate reconstitution of powdered formula or the addition of protein powder to liquid formula can increase the risk of tube blockage.

f) Training in Pressure Area Management

The NGT may cause undue pressure on the nostril where it is anchored and this may impair blood flow, leading to localised injury or necrosis. Nurses should attain the knowledge and skills required to secure the NGT in a manner that would prevent pressure against the surrounding tissue as well as the routine assessment, monitoring and interventions to prevent the development of sores (ASPEN, 2017).

g) Techniques to Alleviate Anxiety

Nurses are to be familiar with ways to alleviate the anxiety of patients with delirium / Parkinson's / Behavioural and Psychological Symptoms of Dementia (BPSD) so that there would be less struggle with NGT insertion. Some examples of techniques to alleviate patients' anxiety include explaining the procedure in a simple and gentle manner and ensuring a conducive environment for patients whenever possible.

h) Understanding Ethical Concerns of Chemical Restraints

Clinicians need to be clear on the indications of NGT insertion and goal of care. If needed, a discussion should be conducted with family / caregivers in decision-making prior to NGT insertion. During the evaluation to determine the suitability of providing enteral nutrition via NGT, clinicians and nurses need to include ethical considerations for patients that require chemical restraints to reduce the risk of NGT removal. This is an important consideration as chemical restraint involves the use of antipsychotic or sedatives which may result in unwanted effects for the patient such as increased dependence and functional decline.

i) Providing Clear Instructions

Staff authorised to order the CXR should document the instructions clearly to the radiologists for the indications of the CXR. Institutional clinical governance should be in place to qualify authorised medical personnel to interpret the CXR.



6.4 Delegation of NGT-related Tasks to Support Care Staff

Support care staff (i.e. Nursing Aides / Healthcare Assistants) who are assisting nurses in patient care are often involved in NGT-related procedures and tasks such as checking the placement of NGT and NGT feeding.

Institutions are responsible for the delegation of these tasks. There should be clear and up-to-date institutional policies and procedures to govern the delegation of NGT-related procedures to all support care staff.

The policies and procedures should clearly define the following:

- a) All parties involved in the delegation process, their eligibility criteria, roles, responsibilities and accountability.
- b) The selection, training, and supervision of nursing aides and support care staff involved in the procedure.

All support care staff must be trained and assessed to be competent before they are eligible to participate in the delegated task.

Ensuring that all staff receive the required competency-based training will help to prevent, reduce risks, errors, and harm that occur to patients during the provision of care.



Glossary

Auscultation	In this context, it is the action of listening to sounds over the epigastrium, typically with a stethoscope.
Air Insufflation	It refers to the action of injecting air for purpose of “whoosh” test.
Careful Oral Feeding	It refers to the continuation of hand feeding the patient small amounts of food and / or drink for quality of life i.e. taste for pleasure.
Nasogastric Tube (NGT)	It is a flexible feeding tube that can be inserted through the nose into the stomach. It is commonly used for the delivery of feeds, medications, fluids, or for drainage of gastric contents.
Nasogastric Tube Placement	It refers to the technique or skill to insert the NGT into the correct position.
Nasogastric Tube Feeding	Tube feeding is a therapy where a feeding tube provides a nutrient solution through a tube into the stomach or intestines (MOH, 2010).
Nose-Ear-Xiphoid (NEX) Measurement	Measuring the distance of the NGT from the tip of the nose to the earlobe then to the xiphoid process to determine the appropriate length of NGT to be inserted (See Annex A for pictorial measurement of NEX + 5 to 10cm).
pH Testing	It is the testing of gastric aspirate’s pH by using pH indicator paper.
Pulmonary Aspiration	The inhalation of food or liquid into the lungs.
Refeeding Syndrome	A set of physiological and metabolic complications associated with reintroducing adequate nutrition too rapidly for a person with severe protein-calorie malnutrition.
“Whoosh” Technique	The “whoosh” technique refers to air being rapidly injected down an NGT while auscultating over the epigastrium at the same time.

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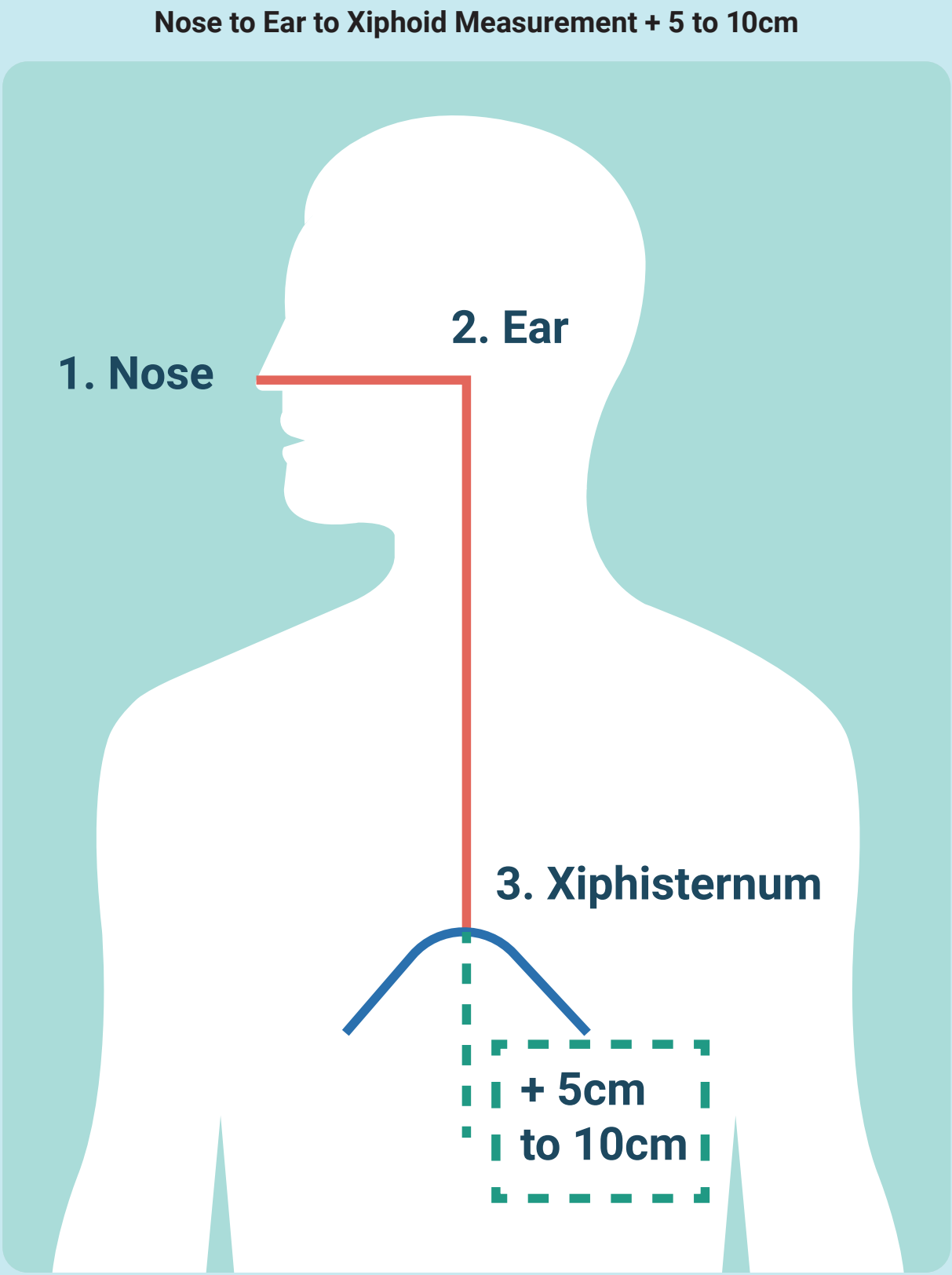
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Annex A



NURSING MANAGEMENT OF NASOGASTRIC TUBE (NGT) IN ADULT PATIENTS

(Published Oct 2022)



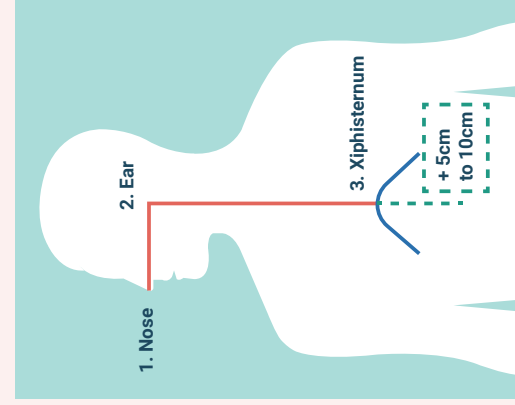
SAFETY ALERT:

Consider factors such as patient's clinical condition, indications and contraindications for NGT before determining if a person should be placed on NGT feeding. While nasogastric tube insertion and feeding are common nursing practices, they are considered complex procedures which require adequately trained, skilled and competent nurses to carry out.

Focus Points

Patient Assessment and Monitoring is key

Location of NGT placement is at NEX + 5cm to 10cm

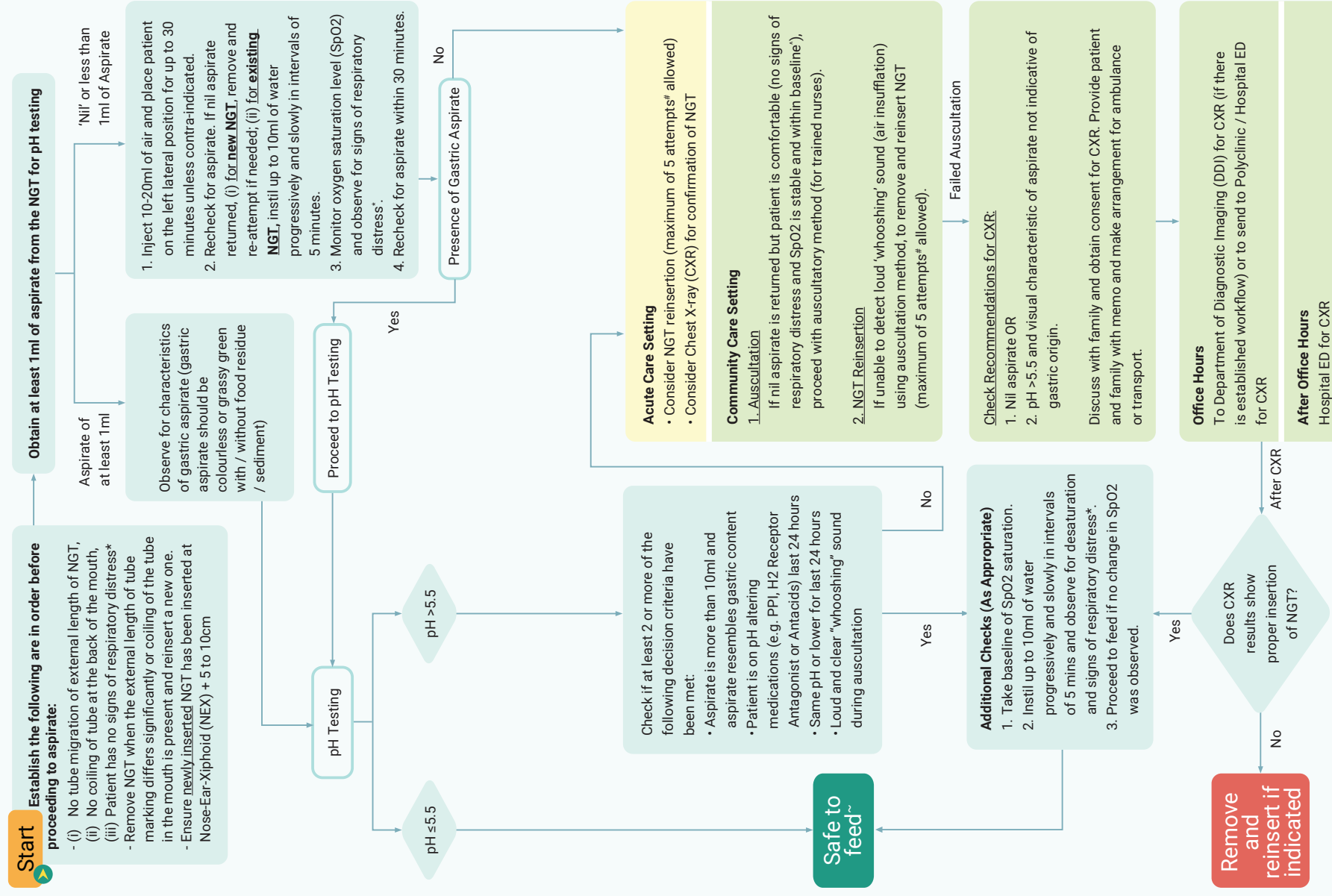


At least 1ml of NGT Aspirate for pH Testing

Cut-off at pH ≤ 5.5 as safe to feed

Safe to feed only when pH > 5.5 + pass at least 2 Decision Criteria

Flowchart for Checking of Correct NGT Placement



* Signs of respiratory distress include cough, increased respiratory rate, throat secretions and breathlessness.
Nurse A to escalate to a more experienced Nurse B (or medical expert) after 3 attempts. Attempts to reinsert by both Nurse A and B (or medical expert) should not exceed 5 times. To include a resting period of 30 minutes between Nurse A and Nurse B.
^ In cases where oxygen saturation level is less than 95%, especially for elderly patients, check that the saturation level is within the usual baseline recorded for the patient.
~Exercise caution and continue monitoring patient after feeding to ensure there is no post-feeding distress.

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SINGAPORE