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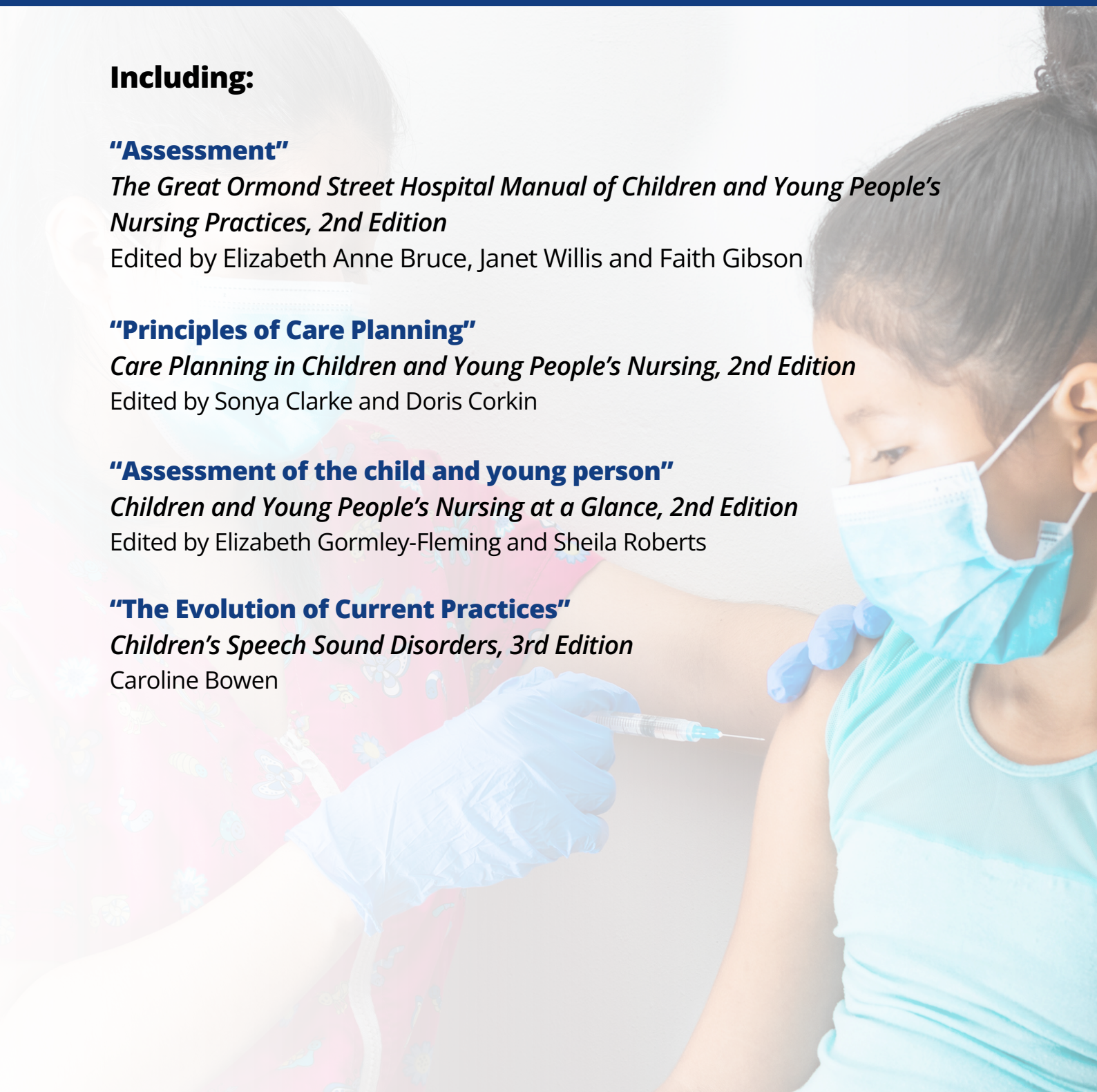

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Chapter 1

Assessment

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Chapter contents

Procedure guidelines

The Great Ormond Street Hospital Manual of Children and Young People's Nursing Practices, Second Edition. Edited by Elizabeth Anne Bruce, Janet Williss, and Faith Gibson.

2 Introduction

Assessment forms the first part of any nursing activity and is the first step in delivering nursing care. Without a comprehensive assessment of the child or young person (CYP) and family's needs, care cannot be planned, delivered, or evaluated effectively (Broom 2007). For most CYPs and their families, the nursing assessment is often the first contact that they have with the nursing team and it is important that this is seen as a positive, helpful, and informative process (Moorey 2010a).

Each CYP and member of their family should be approached as an individual. Much about the CYP's illness or problem can be discovered through observing them at play, or interacting with their family, without the nurse needing to touch or examine them.

To aid ease of use, this chapter is organised into six distinct sections.

Section 1: General Principles: This section outlines the general principles that should run throughout the assessment process, and which should support the nurse's assessment of the CYP.

Section 2: Present Illness: Issues surrounding the CYP's present illness are then explored and this includes examining the current issues that have brought the CYP into the healthcare setting.

Section 3: Past History: For many CYPs, their current problems may be related to previous illnesses and/or injuries, so this forms an important part of the assessment process.

Section 4: Family History: Likewise, many conditions may be hereditary or have a tendency to run in families, so the health history of other family members may provide important information on actual or potential health problems for the CYP.

Section 5: Vital Signs and Baseline Measurements: The measuring of vital signs is a core essential skill for all healthcare practitioners working with infants and CYPs (RCN 2017). It provides valuable information about the CYP's state of health and can identify signs of illness, disease, or deterioration, allowing early intervention and treatment. Standards for assessing, measuring, and monitoring vital signs in infants and CYPs have been described (RCN 2017). Vital signs are also a core component of a paediatric track and trigger or early warning system. These systems can assist staff in recognising CYPs 'at risk' of deterioration (Chapman et al. 2016) and form part of the safe system framework for those at risk of deterioration recommended by the Royal College of Paediatrics and Child Health (RCPCH 2018). Other routine measurements, such as height and weight, provide essential information about the CYP's growth and development, which is especially important in cases of chronic illness.

Section 6: Review of Body Systems: The subsequent physical examination is separated into nine 'systems' based on the approach used throughout the 'admission assessment' documentation currently in use at Great Ormond Street Hospital. The information gained thus far should be utilised to guide the nurse on the structure and depth of the physical examination of each system. The process is not designed to be fragmented, but to encourage the nurse to structure the examination around the CYP and family's individual needs, while providing a comprehensive healthcare assessment. Not every system will need to be examined to the same depth, but if actual or potential problems are identified within a certain system, special attention should be paid to examining that area in detail. The 'systems review' section is designed to be read in conjunction with other relevant chapters of this book.

Finally, assessment is an ongoing, dynamic process. Although this chapter provides a structured approach to performing a full nursing assessment, it is not designed to be prescriptive and the nurse should remain responsive to the CYP and family's needs at all times. Assessment of the CYP is also addressed in many other chapters in this book, including but not limited to Chapter 9: Early Recognition and Management of the Seriously Ill Child; Chapter 21: Neurological Care (neurological observations); Chapter 23: Orthopaedic Care (neurovascular observations); and Chapter 24: Pain Management (pain assessment).

Section 1: General principles

Procedure guideline 1.1 General principles of assessment

Statement	Rationale
1 Before undertaking the assessment, the nurse should consider the CYP's age, gender, culture, and religious beliefs, as well as their physical and developmental needs.	1 These factors should influence how the nurse approaches the assessment process.
2 Throughout the assessment process the nurse should refer any serious concerns about any aspect of the CYP's well-being to a senior nursing or medical colleague.	2 To ensure that if help is immediately required, it is sought quickly and from the appropriate source.
3 The nurse should be familiar with the parent-held child health record (commonly known as the 'red book'), previous healthcare records, and referral letter if appropriate.	3 To guide the assessment process, avoid unnecessary repetition, and highlight priorities for assessment.

Procedure guideline 1.1 General principles of assessment *(continued)*

Statement	Rationale
4 Establish who has parental responsibility (PR) for the CYP.	4 Only a person with PR can consent to any form of care or treatment (including the assessment process) of a CYP under 16 years of age (unless they are considered competent to consent for themselves). Fathers do not automatically acquire PR and either parent can have this revoked by the Court.
5 Establish a rapport with the CYP and family by: • Introducing yourself by name and role. • Establishing what they would like to be called. • Being welcoming in a warm, friendly fashion. • Maintaining good eye contact throughout the assessment process.	5 To reduce any anxiety they may have and promote effective assessment (Moorey 2010a).
6 Ensure all explanations are described in language appropriate for the CYP's age and development (Moorey 2010b), taking into account any learning and/or physical disabilities (Thurgate 2006).	6 To ensure understanding.
7 Use jargon-free, nontechnical terms throughout the assessment process. If jargon is unavoidable, ensure this is clearly explained and documented.	7 To ensure understanding.
8 Explain to the CYP and family the purpose and format of the assessment process (Moorey 2010b).	8 To reduce any anxiety that they may have. Cooperation and open communication is more likely if they understand what is happening and why.
9 Select the environment where the assessment is to be conducted. Ensure it is warm and private and if possible is decorated in an age-appropriate manner (Engel 2006).	9 To promote comfort for the CYP and maintain confidentiality. The needs of an adolescent are different to those of an infant.
10 When recording the health assessment, use the CYP and family's own words wherever possible.	10 To ensure accuracy of information.
11 Encourage the CYP and family to ask questions and voice any concerns.	11 To ensure effective communication and reduce anxiety. Parents/carers' concerns about their child may provide an important clue about the CYP's overall condition (Moorey 2010a).
12 Establish the CYP and family's first language. If it is not spoken English, do they need an interpreter or signer to be present? Are there any other language needs, such as British Sign Language or Makaton?	12 Effective communication is essential to the assessment process.
13 Use a mixture of open and closed questions.	13 Open questions elicit broader, more general information. Closed questions can be used to gain more specific information and clarify information.
14 Clarify your understanding of the issues by reflecting back the CYP and family's statements, such as 'when you said that you had a headache in your tummy, did you mean that your tummy was hurting?'	14 To ensure correct interpretation of the information provided.
15 a) If equipment is used to measure or assess the CYP it should be appropriate for their needs and staff should be trained in its use. b) Equipment must be checked, calibrated, and cleaned prior to use in accordance with manufacturer's guidelines and local policies (RCN 2017).	15 a) To ensure appropriate assessment and accurate measurement. b) To prevent cross-infection.
16 All assessments and measurements should be documented as soon as possible after they have been recorded. All entries should be signed and dated, and a note made of any action taken as a result of the assessment.	16 To facilitate inter-professional communication and accurately record the CYP's progress.

Section 2: Present illness

Procedure guideline 1.2 Present illness

Statement	Rationale
1 Find out what the CYP and family's reason for attending the hospital or clinic is.	1 This will provide important information about their perception of their needs and healthcare problems.
2 Ascertain what they consider to be the main health problem or need.	2 The needs of the CYP and family may not be the same as those perceived by the healthcare workers. This will also help the nurse to structure the assessment process.
3 Ask the CYP and family to describe the symptoms of the illness or problem in their own words.	3 To structure the assessment process and ensure effective assessment and communication.
4 a) If they have symptoms of pain, what words or sounds does the CYP use to describe their pain? b) Establish with the CYP and family the exact location, duration, and frequency of the pain. Does anything trigger the pain to start? What helps to relieve the pain (including over-the-counter medicines used)? c) Severity may be assessed using pain assessment tools appropriate for the CYP's age.	4 a) To ensure effective communication and assessment of pain. b) Establishing factors that aggravate or relieve the pain may help with the diagnosis and the planning of nursing care. c) Pain assessment tools will help to more accurately monitor the CYP's pain and response to treatment. For further information, see Chapter 24: Pain Management.
5 Does the CYP have any known infections?	5 If so, they may need to be isolated to prevent the spread of infection. For further information, see Chapter 13: Infection Prevention and Control.

Section 3: Past history

Procedure guideline 1.3 Past history

Principle	Rationale
1 Taking details of the CYP's past history and illnesses is an important part of the assessment process.	1 The CYP's past history may offer important information about their current healthcare issues (Miller and Hinton 2014).
2 CYPs who are experiencing developmental or neurological problems and all those under two years of age should have their prenatal, birth, and neonatal history assessed (Engel 2006).	2 The prenatal, birth, and neonatal history is especially important for these CYPs as developmental and neurological problems may be related to their prenatal and birth history (Sables-Baus and Robinson 2011).
3 The prenatal history should include details about maternal health, any infections or medications taken, abnormal maternal bleeding, weight gain, and the duration of and any other difficulties encountered during the pregnancy (Sables-Baus and Robinson 2011).	3 To provide a comprehensive assessment.
4 The birth history should include the duration of labour, type of delivery, and any maternal complications.	4 To provide a comprehensive assessment.
5 The neonatal history should include weight and condition at birth, as well as details of any admission to special care or neonatal intensive care. Any other complications or difficulties, such as respiratory distress, jaundice, or feeding problems should also be noted. The results of an infant's Guthrie test should be established.	5 To provide a comprehensive assessment.
6 Has the CYP been in hospital before? If so, when was this and what was wrong with them? More detailed information may be found within the CYP's healthcare records.	6 The current illness may be related to previous illness or past surgery.
7 How has the CYP responded to previous illnesses, procedures, and hospitalisations?	7 A CYP who is chronically ill or who has been in hospital numerous times may need different support from one who has never been in hospital before. Identification of procedures that are known to distress the CYP (such as venepuncture) enables practitioners to adopt strategies to lessen the distress.

Procedure guideline 1.3 Past history *(continued)*

Principle	Rationale
8 a) What medicines is the CYP currently taking? Note the dosage and frequency of all medications, including 'over-the-counter' medicines. b) Establish the CYP and parent/carer's understanding of the drugs and the reasons for their use.	8 a) To allow a review of the current medications and ensure that the current regimen is continued. b) The assessment also provides an opportunity for education surrounding their medications.
9 Is the CYP allergic to anything? If so, what are the medicines or products that they are allergic to? a) What type of reaction did they have to the medicine/product? Who told you that it was an allergic reaction? b) Has the CYP taken this or similar drugs/products after this reaction occurred? If yes, did they experience similar problems?	9 Failure to document a serious allergy places the CYP at risk of anaphylaxis if the medicine/product is subsequently given. The CYP and family may mistake a medication's side effects for an allergy (e.g. gastrointestinal (GI) disturbance during antibiotic therapy). Misdiagnosing a reaction can lead to the CYP being deprived of effective treatment.
10 Has the CYP had any of the common communicable diseases such as chickenpox, mumps, or measles? Have they been in recent contact with anyone else who has these illnesses?	10 It is important to establish if they have acquired immunity to any of these common illnesses, as well as establishing that they are not currently an infection risk to other children.
11 Has the CYP been immunised? If so, take details of which vaccinations they have received and when. Check this against the current recommended immunisation schedule. a) Make a note of any vaccinations they have not received and the reason why.	11 They may be at risk of illness if they have not received their vaccinations. The assessment may also provide an opportunity for education and health promotion. For further information see Chapter 12: Immunisations.

Section 4: Family history

Procedure guideline 1.4 Family history

Principle	Rationale
1 What is the family composition? Who lives at home with the CYP? Do they have siblings? If so, what are their names and ages?	1 To develop an understanding of the CYP as an individual and member of a family.
2 Are the parents/carers employed? If so, what are their occupations? If both parents work, who cares for the CYP?	2 Parental occupation can have an impact on the health and well-being of the CYP and family. Financial difficulties may adversely affect the health and well-being of the family and the individual.
3 Where do the CYP and family live? Do they own their own house or rent? How long have they lived at that address?	3 Problems with housing can have a significant effect on the CYP's physical, emotional, and psychological well-being (Harker 2006). Hospitalisation that is a significant distance from the family home may affect the ability of other family members to visit and lead to isolation and stress.
4 Ask about the health of the parents, grandparents, and siblings. Do they have any current health concerns or have they suffered from serious illness in the past?	4 The health of the CYP's family may give clues to the nature of the CYP's illness (Miller and Hinton 2014). Inherited diseases such as cystic fibrosis, congenital heart disease may be identified through examination of the family history.
5 Does the CYP attend school? Which one? Overall, how are they progressing? Are there any problems that the parents/carers or CYP are aware of?	5 Problems at school may negatively impact on health (Oberklaid 2014). Problems may be related to current health problems (e.g. difficulties with hearing or eyesight may affect the ability to learn) or can be the cause of health problems (e.g. bullying at school may lead to anxiety, causing behavioural problems, weight loss, sleeping difficulties, etc. (Wolke et al. 2014).
6 Does the family see any other medical or allied health professionals on a regular basis?	6 Other professionals may provide important information about the CYP and family. Communication and liaison with other healthcare teams is equally important.
7 Do the CYP and/or family have any other concerns regarding the CYP's general health and social needs?	7 To enable them to voice concerns about issues that may not have been covered within the assessment.

Section 5: Vital signs and baseline measurements

Procedure guideline 1.5 Monitoring plan and early warning score

Statement	Rationale
1 All CYPs admitted to hospital should have a documented monitoring plan (RCN 2011).	1 To facilitate communication among the multiprofessional team members.
2 The monitoring plan should be reviewed at least daily by the multiprofessional team.	2 To ensure the plan is appropriate for the CYP's needs.
3 All CYPs should also be assessed using a Paediatric Early Warning System or similar tool (RCN 2017).	3 To detect early signs of deterioration and ensure appropriate escalation to a senior healthcare worker if needed (Chapman et al. 2010). See Chapter 9: Early Recognition and Management of the Seriously Ill Child.

Procedure guideline 1.6 Measuring temperature

Statement	Rationale
1 Core temperature varies in childhood and is dependent on a number of factors including age, environmental factors, and illness.	1 It is important to assess temperature against age appropriate values, taking into account environmental factors and current state of health.
2 Peripheral temperature monitoring is useful for CYPs where there are concerns about fluid balance status or peripheral perfusion.	2 A significant difference between the core and peripheral temperature may indicate poor perfusion to the skin from dehydration or shock (Advanced Life Support Group 2011 (ALSG) 2016).
3 a) All CYPs should have a temperature recorded on admission (RCN 2017). b) The ongoing frequency of temperature monitoring should reflect the CYP's clinical condition.	3 a) To establish a baseline. b) To provide individualised care.
4 a) If the temperature reading falls outside the normal range, measurements should be taken more frequently until the temperature normalises. b) Fever in children under 5 years should be assessed using the National Institute for Health and Clinical Excellence (NICE) guidelines (NICE 2019).	4 a) To assess temperature instability and severity, to monitor disease progression and to monitor temperature control techniques. b) Infection is the leading cause of death in children under the age of 5 years. Therefore fever must be assessed using a systematic approach (NICE 2019).
5 a) The site and equipment selected for temperature measurement should take into account the CYP's age, local policy guidance and the preferences of the CYP and family (RCN 2011; Sund-Levander and Grodzinsky 2013). b) The manufacturer's instructions and local guidelines for the selected temperature measurement device should be followed. c) Infants under the age of 4 weeks should have their temperature measured with an electronic thermometer in the axilla (NICE 2019). d) Infants and children from 4 weeks to 5 years should have their temperature measured with an electronic/chemical dot thermometer in the axilla or an infra-red tympanic thermometer (NICE 2019; RCN 2017). e) The rectal route is not recommended unless other routes and methods are impossible or impractical (RCN 2017).	5 a) To ensure safety and improve adherence. b) Individual devices vary in the time needed to ensure accurate measurement, cleaning, and calibration requirements. e) There is a risk of bowel perforation, discomfort, and distress to the CYP due to the invasive nature of this route (El-Radhi 2013).
6 *Axillary temperature measurement:* a) It may be helpful to place younger children on their parent's/carer's lap. b) Measurements via this route may be inaccurate in the early stages of a fever (El-Radhi 2014).	6 a) To ensure safety and improve adherence. b) Peripheral vasoconstriction may cool the skin and sweating may cause the skin temperature to be lower than the core temperature, resulting in inaccurate readings (El-Radhi 2014).

Procedure guideline 1.6 Measuring temperature *(continued)*

Statement	Rationale
7 *Oral temperature measurement:* a) Ensure the CYP is sitting or lying. b) Do not measure the temperature via this route if the CYP has had a hot or cold drink in the previous 20 minutes. c) Avoid this route if the CYP is uncooperative, comatose, tachypnoeic, seizure-prone, or had recent oral surgery (El-Radhi 2013).	7 a–b) To prevent inaccurate readings. c) To prevent complications.
8 *Tympanic temperature measurement:* a) Ensure the CYP is sitting or lying. b) Perform an ear tug: For children under 1 year, pull the ear straight back. For CYPs aged 1 to adult, pull the ear up and back. c) While tugging the ear, fit the probe snugly into the ear canal (with a firm seal around the external auditory meatus), orientating the tip toward the tympanic membrane. d) Avoid using tympanic thermometer measurements in children under three years of age (El-Radhi 2014). It may also be difficult in children with very small external ear canals. e) Do not use this route if the CYP has acute otitis media, sinusitis, or had recent surgery to the ear.	8 b) To straighten the ear canal in order to allow a clear view of the eardrum. c) To allow the sensor to measure the heat from the eardrum and not the sides of the ear canal. d) They may be inaccurate in children under 3 years of age (El-Radhi 2014). e) To avoid causing damage to the eardrum.
9 *Rectal temperature measurement:* a) If the rectal route must be used, younger infants may be placed in the supine position with knees flexed toward the abdomen. b) For older CYPs, place prone or lying on their side. c) Do not use if the CYP has had anal or rectal surgery, chemotherapy, or has diarrhoea or rectal irritation (Engel 2006).	9 a) To ensure safety and improve adherence. b) To ensure safety and improve adherence. c) To prevent secondary complications.
10 Assess the temperature against age-appropriate values. a) The measurement should be documented according to local policy and the method and device from which the temperature was recorded should be noted.	10 Normal temperature varies slightly with age. a) To ensure accuracy, consistency, and comparability.

Procedure guideline 1.7 Measuring heart rate

Statement	Rationale
1 In older CYPs, heart rate can be assessed by palpating the radial artery (Rawlings-Anderson and Hunter 2008; RCN 2011). In infants and children under 2 years of age, auscultation of the apical beat with a stethoscope is recommended (Howlin and Brenner 2010; RCN 2017).	1 To provide an accurate record. The pulse is difficult to palpate in younger children (Howlin and Brenner 2010).
2 If the CYP is crying or very distressed, wait until they are calmer (Engel 2006).	2 Crying and distress may increase the pulse rate.
3 Count the pulse for a full minute (Howlin and Brenner 2010). Electronic data should be cross-checked by auscultation or palpation of the pulse (RCN 2017).	3 To ensure an accurate reading, as the pulse may be irregular (Rawlings-Anderson and Hunter 2008; RCN 2011).
4 If using palpation, assess if the pulse is regular and of normal volume.	4 An irregular pulse may indicate cardiac abnormalities. A bounding pulse may indicate patent ductus arteriosus or aortic regurgitation, while a thready, weak pulse may indicate sepsis, severe dehydration, congestive heart failure, or aortic stenosis (Howlin and Brenner 2010).
5 Assess the heart rate against age-appropriate values (Bonafide et al. 2013; Fleming et al. 2011; Rawlings-Anderson and Hunter 2008) taking into account factors such as exercise, fever, anxiety, and stress (Howlin and Brenner 2010; Nijman et al. 2012). Document the heart rate on the appropriate chart, noting the CYP's activity at the time.	5 To identify if the values are abnormal and ensure accuracy, consistency, and comparability.

Procedure guideline 1.8 Measuring respiratory rate

Statement	Rationale
1 Avoid letting the CYP know that respirations are being counted.	1 Self-consciousness may alter the respiratory rate and depth.
2 If the CYP is crying or very distressed, you may have to wait until they are calmer.	2 To gain an accurate recording, as crying and distress may increase the respiratory rate (Aylott 2006).
3 In infants and young children, place a hand just below the child's xiphoid process. Observation alone is adequate in the older CYP.	3 To assess the infant/CYP's breathing.
4 a) Count the breaths for 1 full minute. b) Observe the rate, rhythm, depth, and effort.	4 a) To ensure an accurate reading as the respirations of infants and young CYP may be irregular (RCN 2011). b) Respirations should be regular, of normal depth and normal effort. Deep sighing respirations (Kussmaul breathing) may indicate acidosis or poisoning.
5 a) Assess respiratory rate against age-appropriate values, taking into account factors such as exercise, fever, anxiety, and stress (Howlin and Brenner 2010; Nijman et al. 2012). b) Document the respiratory rate on the appropriate chart.	5 a) Normal respiratory rate varies with age (Bonafide et al. 2013; Fleming et al. 2011). Rapid respiratory rates (tachypnoea) may indicate fever, anxiety, pain, or respiratory distress. Low respiratory rates (bradypnoea) may indicate overdosage with opiates. Bradypnoea following a period of respiratory distress may indicate exhaustion. This is a clinical emergency and appropriate action must be taken (ALSG 2016). b) To ensure accuracy, consistency, and comparability.

Procedure guideline 1.9 Measuring blood pressure

Statement	Rationale
1 The CYP should be calm, relaxed, and stress free, in a warm environment, with tight or restrictive clothing removed from the limb identified for measurement.	1 To minimise the effect of extraneous influences which may temporarily alter the blood pressure (BP) (Perloff et al. 1993). Anxiety and distress may cause the BP to be artificially high.
2 The CYP should be in a seated position with the measurement taken on the right arm.	2 The right arm is generally the preferred arm for blood pressure measurement for consistency and comparison with international reference tables. International reference tables for BP centiles are based on manual readings measured on arms only. A diagnosis of high BP can be made only on arm BP measurements. Treatment for hypertension should never be started without first establishing an arm BP.
3 a) Position the CYP in a seated position for 3–5 minutes with their feet on the ground and their legs uncrossed (Beevers et al. 2001a; Foster-Fitzpatrick et al. 1999). b) The arm should be well supported, horizontal, and positioned at the level of mid-sternum. c) Leg BP should only be measured in exceptional circumstances. If the BP has to be measured on the leg the infant/CYP should be lying flat on the bed for 5 minutes.	a) BP can be significantly increased if the legs are crossed (Foster-Fitzpatrick et al. 1999). If the CYP is lying down, the BP may read slightly lower due to peripheral amplification of the pulse pressure (Lurbe et al. 2009; Beevers et al. 2001a). b) If the CYP's arm is below or above the level of the heart, the BP can be overestimated or underestimated by 10 mmHg respectively (Perloff et al. 1993). c) BP measurement in legs should never be used as a diagnostic measurement of hypertension because of the artefactual abnormalities found in leg measurements.
4 Choose the correct blood pressure cuff, ensuring: The inflatable part of the cuff (the bladder) is long enough to encircle at least 90% and preferably 100% of the upper arm circumference (Figure 1.1).	4 To ensure an accurate recording (Howlin and Brenner 2010; Lurbe et al. 2009; Vyse 1987).

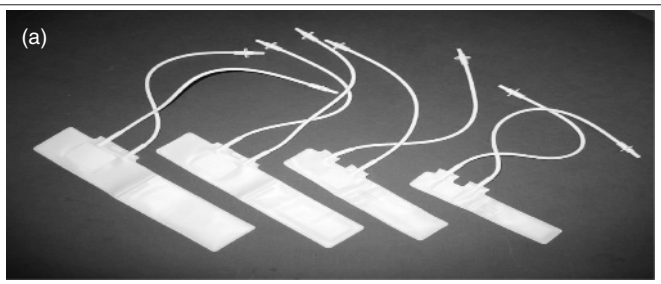
Procedure guideline 1.9 Measuring blood pressure *(continued)*

Statement	Rationale
The width of the bladder should ideally be the full length from under the arm axilla to the olecranon (elbow) or the largest cuff that can fit onto the upper arm and still allow auscultation of the brachial artery. If these criteria cannot both be met, the largest cuff available for the arm should be used (Beevers et al. 2001a).	
Apply the correct cuff ensuring that: a) It fits firmly and is well secured (Perloff et al. 1993). b) The centre of the cuff bladder (usually labelled artery) is placed over the brachial artery. c) The tubing from the cuff is not crossing the auscultatory area. d) There is no IV cannula or infusion on the limb.	b) Too narrow a cuff will yield a reading that is falsely high. Too wide a cuff, if not correctly fitted, may result in a lower reading (Howlin and Brenner 2010). d) To reduce the risk of tissue damage and extravasation.
5 *For measurements using automated devices only:* a) Set the correct patient size (neonate/ paediatric/ adult) on the monitor. b) Set the monitor for a single measurement or automatic measurement as required. c) Start the measurement procedure following the manufacturer's instructions. d) Keep the arm still during measurement. e) Ensure that the cuff is not wrapped too tightly around the limb if the BP is to be measured continuously (Rationale 47). f) Continue to point 11.	5 a) If the monitor inflation settings are too high this may cause considerable discomfort to the CYP and cause increased BP due to pain. d) Movement artefact is often responsible for falsely high readings or an inability for the monitor to register a reading, but this is not always the case. In this situation a manual BP should be taken.
If the oscillometric device inflates and deflates repeatedly without displaying the BP, this can indicate the BP is either too low or high for the automated monitor to register (Lurbe et al. 2009). If this occurs, a manual BP should be measured (see Figure 1.1).	
6. *For manual measurements using stethoscope or Doppler:* a) Position the manometer • Vertically at eye level. • Not more than 1 m from the observer (Perloff et al. 1993). b) Ensure you are comfortably positioned and able to inflate and deflate the cuff gradually with ease before proceeding (Perloff et al. 1993). c) For measurements using the stethoscope continue to point 8.	6 a) To prevent observer error (Beevers et al. 2001b). b) To prevent injury to staff and ensure the procedure is performed accurately on the first attempt, preventing unnecessary repeating of the procedure and reduce the risk of further distressing the CYP (Perloff et al. 1993).
7 *For measurements using the Doppler only:* a) Place the Doppler over the position of maximal pulsation of the brachial artery in the arm or radial pulse in the wrist and pump up the cuff. b) When the pulse sound disappears, this is the estimated systolic BP. c) Now deflate the cuff.	7 a) Prevents underestimation of systolic pressure by misreading the Korotkoff sound; this will ensure that the auscultatory gap is not missed (Perloff et al. 1993) b) A doppler cannot identify the diastolic BP because it detects only the acoustic waves moving toward the transducer.
8 *For measurements using stethoscope palpation or Doppler:* a) Gently place the stethoscope Doppler/fingers gently over artery to feel/hear the CYP's pulse b) Inflate the bladder rapidly and steadily to a pressure of 30 mmHg above the previously estimated systolic BP (McAlister and Straus 2001). c) Reduce the cuff pressure at 2–3 mmHg per second.	8 a) Pressing too firmly on the artery could occlude it, affecting the accuracy and reproducibility of the measurement (Perloff et al. 1993). b) A slow inflation can cause venous congestion and increases the likelihood of an inaccurate measurement. c) A rapid deflation can result in recording errors (Nolan and Nolan 1993). NB: Using the Accoson Greenlight device reduces this risk as it displays a green light when the reduction of pressure is at the recommended speed (Graves et al. 2004).
9 a) Listen for repetitive, clear tapping sounds. When first heard for two consecutive beats, the first consecutive beat indicates the systolic BP (McAlister and Straus 2001). b) Mentally note this value to the nearest 2 mmHg (Beevers et al. 2001b). c) For measurement using the Doppler, continue to point 11.	9 a) This is Korotkoff phase 1 sound, which identifies the systolic blood pressure (Howlin and Brenner 2010; McAlister and Straus 2001).

(continued)

Procedure guideline 1.9 Measuring blood pressure *(continued)*

Statement	Rationale
10 *For measurements using stethoscope only:* a) Continue to reduce the cuff pressure at 2–3 mmHg per second. b) The point at which repetitive sounds disappear (Phase 5) is the diastolic BP (Beevers et al. 2001b; McAlister and Straus 2001) c) Mentally note this value to the nearest 2 mmHg (Beevers et al. 2001b). d) If Korotkoff sounds can be heard to 0 mmHg, repeat the measurement after at least 1 minute's rest with less pressure on the stethoscope. e) If the Korotkoff sounds persist, identify the diastolic pressure at the point where the sound becomes muffled (Howlin and Brenner 2010; McAlister and Straus 2001). f) Document that Korotkoff phase 4 sound (K4) has been used.	10 b) This is Korotkoff phase 5 sound (K5), which identifies the diastolic blood pressure (Howlin and Brenner 2010; McAlister and Straus 2001) d) The sounds persist in some CYPs. e) This is Korotkoff phase 4 sound (K4) (Howlin and Brenner 2010; McAlister and Straus 2001)
11 Continue to completely deflate the cuff rapidly (McAlister and Straus 2001).	11 To prevent discomfort.
12 a) Document the BP using arrows with the tips pointing up for the systolic BP (∧) and pointing down (∨) for the diastolic value. The tip of the arrow should indicate the value. b) Note the CYP's position, limb used, cuff size, and method of measurement. c) Document if they were anxious, restless, or distressed during the procedure.	12 a) For consistency and accuracy of documentation. b) There are many factors that can cause a spuriously high reading, which may lead to unnecessary instigation and inappropriate treatment (Beevers et al. 2001b).
13 a) Assess the significance of the measurement by reference to local guidelines or recognised reference ranges. b) If the BP readings are above the expected level for gender, age, and height and the CYP is calm and not in any discomfort during the BP measurement, it should be re-measured three times, leaving at least 1 minute between readings. c) Make sure the cuff bladder size is correct and continue to monitor. If the readings obtained are consistently high a 4-limb BP should be measured. If the problem continues a manual BP is recommended using a Doppler for infants and small children and a stethoscope for older CYPs (Figure 1.1). d) If the BP measurement is consistently high and there are no other contributing factors, a measurement should be performed on both arms and legs (Beevers et al. 2001a; Perloff et al. 1993) and the arm with the highest reading, which should then be used regularly (McAlister and Straus 2001). e) Report significant differences in limb recordings to a medical practitioner.	13 a) There are no automated monometers that have been validated for use in hypertensive CYPs (Lunn et al. 2009). b) Automated devices tend to under-read at low BP and over-read at very high BP, and this may be clinically significant, especially for children/young people with hypertension. c) The pressure differences between arms can be >10 mmHg in some hypertensive CYPs (McAlister and Straus 2001). d) A high reading on the right arm BP and a low reading on the leg BP can be a sign of coarctation of the aorta, which can be confirmed by bilateral weak femoral pulses and echocardiogram. e) To ensure prompt action if required.
14 a) If repeated measurements are required, where possible the same limb, cuff size, position, and method should be used. b) If the CYP's BP is to be monitored continually, make sure the cuff is not wrapped too tightly around the limb. c) Remove and reapply the BP cuff hourly, observing the colour, warmth, and sensitivity of the limb.	14 a), b) To ensure consistent and reproducible measurements (National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents 2004). c) Frequent repeated measurement can cause purpura, ischaemia, and neuropathy.
15 a) If the reading is difficult to ascertain (common in small, unsettled children) stop, take a rest, and retry when the CYP is settled. b) If it is necessary to repeat the recording, the cuff should be allowed to fully deflate, and a minute elapse before the next measurement is attempted (Ramsay et al. 1999). c) The CYP should be fully settled before the measurement is attempted. Consider distraction therapy or referral to a play specialist if the CYP is particularly anxious. For further information, see Chapter 27: Play as a Therapeutic Tool. For definitions of blood pressure categories see Figure 1.3. For BP centile chart see Figure 1.4.	15 a) To obtain an accurate reading. BP readings will be elevated in unsettled CYPs. b) To prevent venous congestion, resulting in an inaccurate BP (Nolan and Nolan 1993). c) To prevent falsely high readings due to distress.



(b)

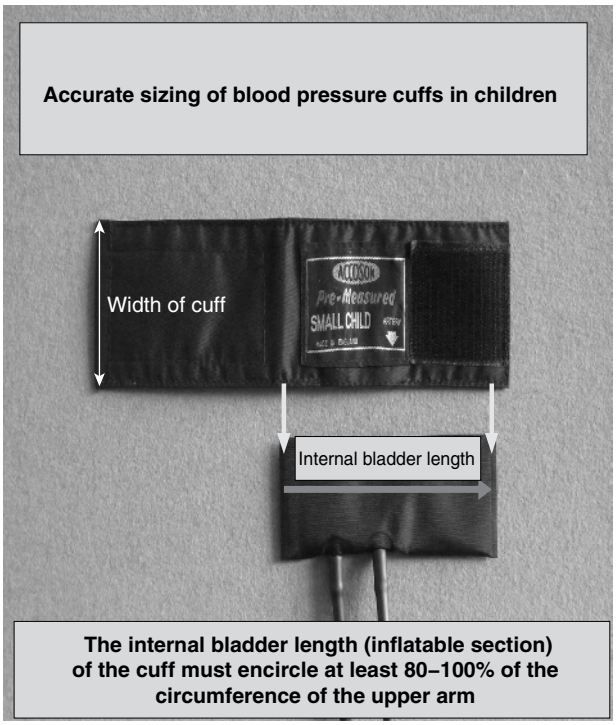


Figure 1.1 Blood pressure cuffs. (a) Integrated bladder; (b) cuff with internal bladder.

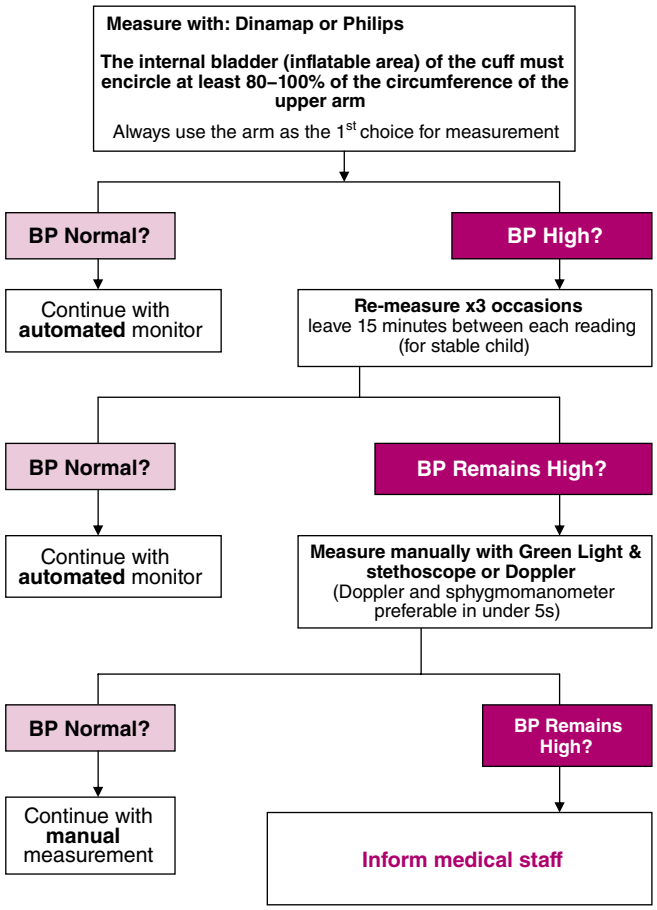


Figure 1.2 Blood pressure measurement.

Categories	For Children Aged 1–<13 y	For Children Aged ≥13 y
Normal BP	<90th percentile	<120/<80 mm Hg
Elevated BP	≥90th percentile to <95th percentile or 120/80 mm Hg to <95th percentile (whichever is lower)	120/<80 to 129/<80 mm Hg
Stage 1 Hypertension	≥95th percentile to <95th percentile + 12 mmHg, or 130/80 to 139/89 mm Hg (whichever is lower)	130/80 to 139/89 mm Hg
Stage 2 Hypertension	≥95th percentile + 12 mm Hg, or ≥140/90 mm Hg (whichever is lower)	≥140/90 mm Hg

Figure 1.3 Updated Definitions of blood pressure Categories and Stages. *Source:* Flynn et al. (2017).

Age	BP centile	Boys - Height Centile													
		SBP							DBP						
		5%	10%	25%	50%	75%	90%	95%	5%	10%	25%	50%	75%	90%	95%
1	50th	85	85	86	86	87	88	88	40	40	40	41	41	42	42
	90th	98	99	99	100	100	101	101	52	52	53	53	54	54	54
	95th	102	102	103	103	104	105	105	54	54	55	55	56	57	57
	95th +12	114	114	115	115	116	117	117	66	66	67	67	68	69	69
2	50th	87	87	88	89	89	90	91	43	43	44	44	45	46	46
	90th	100	100	101	102	103	103	104	55	55	56	56	57	58	58
	95th	104	105	105	106	107	107	108	57	58	58	59	60	61	61
	95th+12	116	117	117	118	119	119	120	69	70	70	71	72	73	73
3	50th	88	89	89	90	91	92	92	45	46	46	47	48	49	49
	90th	101	102	102	103	104	105	105	58	58	59	59	60	61	61
	95th	106	106	107	107	108	109	109	60	61	61	62	63	64	64
	95th +12	118	118	119	119	120	121	121	72	73	73	74	75	76	76
4	50th	90	90	91	92	93	94	94	48	49	49	50	51	52	52
	90th	102	103	104	105	105	106	107	60	61	62	62	63	64	64
	95th	107	107	108	108	109	110	110	63	64	65	66	67	67	68
	95th +12	119	119	120	120	121	122	122	75	76	77	78	79	79	80
5	50th	91	92	93	94	95	96	96	51	51	52	53	54	55	55
	90th	103	104	105	106	107	108	108	63	64	65	65	66	67	67
	95th	107	108	109	109	110	111	112	66	67	68	69	70	70	71
	95th +12	119	120	121	121	122	123	124	78	79	80	81	82	82	83
6	50th	93	93	94	95	96	97	98	54	54	55	56	57	57	58
	90th	105	105	106	107	109	110	110	66	66	67	68	68	69	69
	95th	108	109	110	111	112	113	114	69	70	70	71	72	72	73
	95th +12	120	121	122	123	124	125	126	81	82	82	838	84	84	85
7	50th	94	94	95	97	98	98	99	56	56	57	58	58	59	59
	90th	106	107	108	109	110	111	111	68	68	69	70	70	71	71
	95th	110	110	111	112	114	115	116	71	71	727	73	73	74	74
	95th +12	122	122	123	124	126	127	128	83	83	84	85	85	86	86
8	50th	95	96	97	98	99	99	100	57	57	58	59	59	60	60
	90th	107	108	109	110	111	112	112	69	70	70	71	72	72	73
	95th	111	112	112	114	115	116	117	72	73	73	74	75	75	75
	95th +12	123	124	124	126	127	128	129	84	85	85	86	87	87	87
9	50th	96	97	98	99	100	101	101	57	58	59	60	61	62	62
	90th	107	108	109	110	111	112	113	70	71	72	73	74	74	74
	95th	112	112	113	115	116	118	119	74	74	75	76	76	77	77
	95th +12	124	124	125	127	128	130	131	86	86	87	88	88	89	89
10	50th	97	98	99	100	101	102	103	59	60	61	62	63	63	64
	90th	108	109	11	112	113	115	116	72	73	74	74	75	75	76
	95th	112	113	114	116	118	120	121	76	76	77	77	78	78	78
	95th +12	124	125	126	128	130	132	133	88	88	89	89	90	90	90
11	50th	99	99	101	102	103	104	106	61	61	62	63	63	63	63
	90th	110	111	112	114	116	117	118	74	74	75	75	75	76	76
	95th	114	114	116	118	120	123	124	77	78	78	78	78	78	78
	95th +12	126	126	128	130	132	135	136	89	90	90	90	90	90	90
12	50th	101	101	102	104	106	108	109	61	62	63	63	63	63	63
	90th	113	114	115	117	119	121	122	75	75	75	75	75	76	76
	95th	116	117	118	121	124	126	128	78	78	78	78	78	79	79
	95th +12	128	129	130	133	136	138	140	90	90	90	90	90	91	91
13	50th	103	104	105	108	110	111	112	61	60	61	62	63	64	65
	90th	115	116	118	12	124	126	126	74	74	74	75	76	77	77
	95th	119	120	122	125	128	130	131	78	78	78	78	80	81	81
	95th +12	131	132	134	137	140	142	143	90	90	90	90	92	93	93
14	50th	105	106	109	111	112	113	113	60	60	62	64	65	66	67
	90th	119	120	123	126	127	128	129	74	74	75	77	78	79	80
	95th	123	125	127	130	132	133	134	77	78	79	81	82	83	84
	95th +12	135	137	139	142	144	145	146	89	90	91	93	94	95	96
15	50th	108	110	112	113	114	114	114	61	62	64	65	66	67	68
	90th	123	124	126	128	129	130	130	75	76	78	79	80	81	81
	95th	127	129	131	132	134	135	135	78	79	81	83	84	85	85
	95th +12	139	141	143	144	146	147	147	90	91	93	95	96	97	97
16	50th	111	112	114	115	115	116	116	63	64	66	67	68	69	69
	90th	126	127	128	129	131	131	132	77	78	79	80	81	82	82
	95th	130	131	133	134	135	136	137	80	81	83	84	85	86	86
	95th +12	142	143	145	146	147	148	149	92	93	95	96	97	98	98
17	50th	114	115	116	117	117	118	118	65	66	67	68	69	70	70
	90th	128	129	130	131	132	133	134	78	79	80	81	82	82	83
	95th	132	133	134	135	137	138	138	81	82	84	85	86	86	87
	95th +12	144	145	146	147	149	150	150	93	94	96	97	98	98	99

Figure 1.4 Blood pressure levels for boys and girls by age and height percentiles. *Source:* Flynn et al. (2017).

Age	BP centile	Girls - Height Centile													
		SBP							DBP						
		5%	10%	25%	50%	75%	90%	95%	5%	10%	25%	50%	75%	90%	95%
1	50th	84	85	86	86	87	88	88	41	42	42	43	44	45	46
	90th	98	99	99	100	101	102	102	54	55	55	56	57	58	58
	95th	101	102	102	103	104	105	105	59	59	60	60	61	62	62
	95th +12	113	114	114	115	116	117	117	71	71	72	72	73	74	74
2	50th	87	87	88	89	90	91	91	45	46	47	48	49	50	51
	90th	101	101	102	103	104	105	106	58	58	59	60	61	62	62
	95th	104	105	106	106	107	108	109	62	63	63	64	65	66	66
	95th +12	116	117	118	118	119	120	121	74	75	75	76	77	78	78
3	50th	88	89	89	90	91	92	93	48	48	49	50	51	53	53
	90th	102	103	104	104	105	106	107	60	61	61	62	63	64	65
	95th	106	106	107	108	109	110	110	64	65	65	66	67	68	69
	95th +12	118	118	119	120	121	122	122	76	77	77	78	79	80	81
4	50th	89	90	91	92	93	94	94	50	51	51	53	54	55	55
	90th	103	104	105	106	107	108	108	62	63	64	65	66	67	67
	95th	107	108	109	109	110	111	112	66	67	68	69	70	70	71
	95th +12	119	120	121	121	122	123	124	78	79	80	81	82	82	83
5	50th	90	91	92	93	94	95	96	52	52	53	55	56	57	57
	90th	104	105	106	107	108	109	110	64	65	66	67	68	69	70
	95th	108	109	109	110	111	112	113	68	69	70	71	72	73	73
	95th +12	120	121	121	122	123	124	125	80	81	82	83	84	85	85
6	50th	92	92	93	94	96	97	97	54	54	55	56	57	58	59
	90th	105	106	107	108	109	110	111	67	67	68	69	70	71	71
	95th	109	109	110	111	112	113	114	70	71	72	72	73	74	74
	95th +12	121	121	122	123	124	125	126	82	83	84	84	85	86	86
7	50th	92	93	94	95	97	98	99	55	55	56	57	58	59	60
	90th	106	106	107	109	110	111	112	68	68	69	70	71	72	72
	95th	109	110	111	112	113	114	115	72	72	73	73	74	74	75
	95th +12	121	122	123	124	125	126	127	84	84	85	85	86	86	87
8	50th	93	94	95	97	98	99	100	56	56	57	59	60	61	61
	90th	107	107	108	110	111	112	113	69	70	71	72	72	73	73
	95th	110	111	112	113	115	116	117	72	73	74	74	75	75	75
	95th +12	122	123	124	125	127	128	129	84	85	86	86	87	87	87
9	50th	95	95	97	98	99	100	101	57	58	59	60	60	61	61
	90th	108	108	109	111	112	113	114	71	71	72	73	73	73	73
	95th	112	112	113	114	116	117	117	74	74	75	75	75	75	75
	95th +12	124	124	125	126	128	129	130	86	86	87	87	87	87	87
10	50th	96	97	98	99	101	102	103	58	59	59	60	61	61	62
	90th	109	110	111	112	113	115	116	72	73	73	73	73	73	73
	95th	113	114	114	116	117	119	120	75	75	76	76	76	76	76
	95th +12	125	126	126	128	129	131	132	87	87	88	88	88	88	88
11	50th	98	99	101	102	104	105	106	60	60	60	61	62	63	64
	90th	111	112	113	114	116	118	120	74	74	74	74	74	75	75
	95th	115	116	117	118	120	123	124	76	77	77	77	77	77	77
	95th +12	127	128	129	130	132	135	136	88	89	89	89	89	89	89
12	50th	102	102	104	105	107	108	108	61	61	61	62	64	65	65
	90th	114	115	116	118	120	122	122	75	75	75	75	76	76	76
	95th	118	119	120	122	124	125	126	78	78	78	78	79	79	79
	95th +12	130	131	132	134	136	137	138	90	90	90	90	91	91	91
13	50th	104	105	106	107	108	108	109	62	62	63	64	65	65	66
	90th	116	117	119	121	122	123	123	75	75	75	76	76	76	76
	95th	121	122	123	124	126	126	127	79	79	79	79	80	80	81
	95th +12	133	134	135	136	138	138	139	91	91	91	91	92	92	93
14	50th	105	106	107	108	109	109	109	63	63	64	65	66	66	66
	90th	118	118	120	122	123	123	123	76	76	76	76	77	77	77
	95th	123	123	124	125	126	127	127	80	80	80	80	81	81	82
	95th +12	135	135	136	137	138	139	139	92	92	92	92	93	93	94
15	50th	105	106	107	108	109	109	109	64	64	64	65	66	67	67
	90th	118	119	121	122	123	123	124	76	76	76	77	77	78	78
	95th	124	124	125	126	127	127	128	80	80	80	81	82	82	82
	95th +12	136	136	137	138	139	139	140	92	92	92	93	94	94	94
16	50th	106	107	108	109	109	110	110	64	64	65	66	66	67	67
	90th	119	120	122	123	124	124	124	76	76	76	77	78	78	78
	95th	124	125	125	127	127	128	128	80	80	80	81	82	82	82
	95th +12	136	137	137	139	139	140	140	92	92	92	93	94	94	94
17	50th	107	108	109	110	110	110	111	64	64	65	66	66	66	67
	90th	120	121	123	124	124	125	125	76	76	77	77	78	78	78
	95th	125	125	126	127	128	128	128	80	80	80	81	82	82	82
	95th +12	137	137	138	139	140	140	140	92	92	92	93	94	94	94

Figure 1.4 *(continued)*

Procedure guideline 1.10 Measuring oxygen saturation

Statement	Rationale
1 Pulse oximetry provides a measure of arterial blood oxygen saturation. It does NOT assess the level of tissue oxygenation or the adequacy of ventilation. Carbon dioxide levels may be high despite normal oxygen saturation levels.	1 Pulse oximetry forms only one part of respiratory status assessment. It is important to remember that serious respiratory complications may still be present despite normal oxygen saturation levels.
2 Select the site to apply the probe. Potential sites include fingers, toes, earlobes, and the bridge of the nose (Higgins 2005). The site with the best pulsatile flow should be selected initially and reviewed. The most appropriate probe for the site selected should be used.	2 Site selection is an important factor in the quality of the reading.
3 Apply the probe and operate the equipment according to the manufacturer's instructions.	3 To ensure safe practice.
4 Assess pulse detection by comparing the signal with the CYP's pulse.	4 To assess the reliability of the recording.
5 Set appropriate alarm parameters in light of the CYP's current condition.	5 To detect deterioration at an early stage.
6 Rotate the probe site regularly.	6 To prevent skin damage.
7 Record the oxygen saturation levels, alongside concurrent oxygen therapy and other clinically significant findings such as respiratory effort, consciousness level, and position.	7 To ensure that recordings are clinically relevant.
8 Pulse oximetry may not be accurate in the following circumstances: • High ambient light levels (fluorescent and xenon lights) • Nail varnish present (Hakverdioğlu et al. 2014) • Motion artefact • Reduced pulse volume • Hypotension • Low cardiac output • Vasoconstriction • Hypothermia • Presence of other haemoglobins: carboxyhaemoglobin (carbon monoxide poisoning), and methaemoglobin (congenital or acquired) • Surgical and imaging dyes: methylene blue, indocyanine green, and indigo carmine cause falsely low readings. However pulse oximetry is NOT affected by anaemia, jaundice, or skin pigmentation (Resuscitation Council [UK] 2011).	8 Pulse oximetry should be used with caution in these circumstances, and alternative means of assessing oxygenation should be used (e.g. blood gas analysis).

Procedure guideline 1.11 Growth assessment

Statement	Rationale
1 Growth assessment encompasses height, weight, and head circumference.	1 All three measurements are needed to provide a comprehensive assessment of the CYP.
2 Assessment of growth is vital and provides a sensitive guide to: • health, • development, • nutritional status, • the response to treatment. (Hall 2000).	2 A healthy, adequately nourished, and emotionally secure CYP grows at an optimal rate (Stanhope et al. 1994). A slow rate of growth could suggest a pathological disorder requiring diagnosis and possible treatment, e.g. malabsorption, an eating disorder, hypertension, psychosocial problems, craniopharyngioma (Sherwood et al. 1986; Skuse 1989). CYPs with disabilities may be particularly at risk (Lionti et al. 2013).
3 While single measurements provide an indication of expected "normal values", serial measurements are more useful.	3 Serial measurements allow progress to be tracked over time and the relationship between the three measurements to be assessed (Schilg and Hulse 1997).

Procedure guideline 1.12 Measuring height

Statement	Rationale
1 All CYPs in hospital should have their height measured and plotted on a centile chart every three months.	1 Hospitalised CYPs are at nutritional risk. Serial measurements allow for a more accurate assessment of growth rate.
2 The appropriate equipment to measure the height of the CYP should be selected. This is dependent on the CYP's age and developmental and physical ability.	2 To obtain an accurate measurement and maintain the safety of the CYP and staff.
3 Infants and children under two years of age and those who are unable to stand (or find standing difficult) should be measured using a length board or mat (RCPCH 2021). Children and young people over 2 years should be measured using a rigid upright measure with a T piece or a stadiometer (RCPCH 2021).	3 To ensure accuracy and avoid inconsistencies in measurement.
4 A CYP who has one leg shorter than the other should be measured standing on the longest leg.	4 To ensure accuracy and avoid inconsistencies in measurement.
5 In some forms of short stature, body proportions may also be clinically relevant, e.g. achondroplasia, or after spinal irradiation. The most useful body proportion is the relationship between trunk length and leg length. This is obtained by measuring a sitting height and subtracting this from the total height. CYPs who need to be measured lying down should have their crown–rump length measured, i.e. head to bottom. This measurement is then subtracted from their total length.	5 To ensure accuracy and avoid inconsistencies in measurement.
6 Remove shoes or other footwear before measurement. Infants should have nappies removed.	6 To ensure accuracy and avoid inconsistencies in measurement.
7 When measuring a CYP who is standing, they must be positioned with: • feet together and flat on the ground • heels touching the back plate of the measuring instrument • legs must be straight • buttocks against the backboard • scapula, wherever possible, against the backboard • arms loosely at their side.	7 To ensure an accurate measurement. Poor positioning results in inaccurate measurement.
8 When measuring a CYP in the supine position, two people are required: a) Place the measuring board on a firm surface and lay the CYP on the board. b) One person should ensure the head is held in contact with the headboard. c) The other person should position the CYP with: • feet together and flat against the foot board • heels touching the back plate of the measuring instrument • legs straight and in alignment with the body • buttocks against the backboard • scapula, wherever possible, against the backboard. d) The ankles should be held to ensure this position is maintained and firm pressure may need to be applied to keep the legs in position. e) The CYP should be completely aligned and flat on the board.	8 To ensure stability of the measuring device and obtain an accurate measurement. To ensure that the head and body are in complete alignment.
9 When measuring a CYP who is standing, they must be positioned with: (a) feet together and flat on the ground (b) heels touching the back plate of the measuring instrument (c) legs must be straight (d) buttocks against the backboard (e) scapula, wherever possible, against the backboard (f) arms loosely at their side.	9 Poor positioning may result in inaccurate measurement.
10 In both measurement methods, the CYP's head should be positioned with the lower margins of the orbit in the same horizontal plane as the external auditory meatus, i.e. the corner of the eyes horizontal to the middle of the ear (see Figure 1.5) (Lynch-Caris et al. 2008).	10 This position is referred to as the Frankfort plane and ensures accuracy of measurement (Horan et al. 2014; RCPCH 2021).

(continued)

Procedure guideline 1.12 Measuring height *(continued)*

Statement	Rationale
11 The measuring instrument should then be read (ensuring it is at eye level for the standing method) when the CYP has fully exhaled. Record the measurement to the last complete millimetre (Himes 2009).	11 To ensure accuracy and avoid inconsistencies in measurement.
12 It is good practice to take three measurements and use the average (RCPCH 2021).	12 To ensure accuracy and avoid inconsistencies in measurement.
13 For documentation see final section of Procedure guideline 1.14	
14 Any abnormality or deviation from the expected centile should be reported to the CYP's doctor.	14 To facilitate appropriate management.

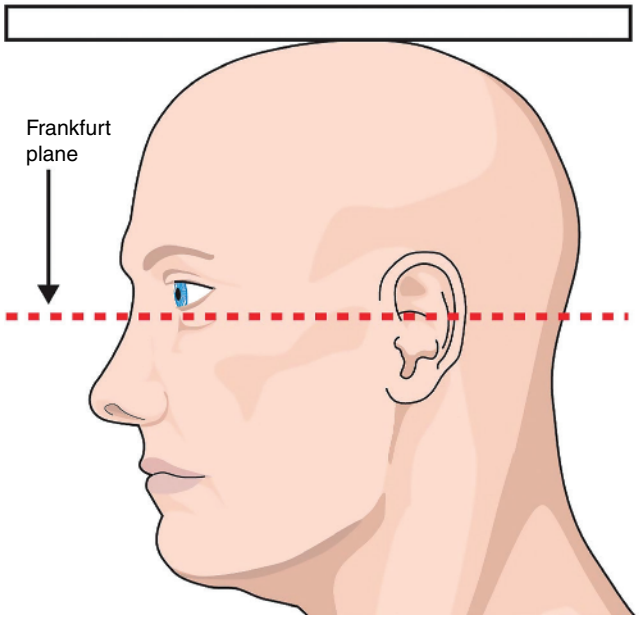


Figure 1.5 Frankfurt plane. *Source:* Adapted from Lynch-Caris (2008).

Procedure guideline 1.13 Measuring weight

Statement	Rationale
1 CYPs should be weighed on admission and at least weekly thereafter. a) Infants should be weighed in the first week as part of the assessment of feeding and thereafter as needed (RCPCH 2021). If there is professional concern or if parents wish, babies can be weighed at 6–8 weeks, 12 and 16 weeks (RCPCH 2021). Thereafter babies should usually be weighed at 12–13 months at the time of routine immunisations. b) Infants and CYP should be weighed more frequently if there is concern about their health and well-being. However in general, babies should be weighed no more than: once a month from 2 weeks to 6 months of age • once every two months from 6 to 12 months of age • once every three months over the age of 1 year (RCPCH 2021).	1 To establish a baseline for future assessment and to monitor growth. Hospitalised CYPs and those with disabilities are at nutritional risk (Joosten and Hulst 2008; Lionti et al. 2013). a) To identify problems early to allow monitoring and intervention if needed. b) Infant weights measured too closely together can be misleading (RCPCH 2021).
2 Children under two years of age should be weighed naked. CYPs over 2 years of age should be weighed in minimal clothing or vest and pants (RCPCH 2012). Nappies, shoes and slippers should be removed and ensure no dolls or teddies held before measurement (RCPCH 2021).	2 To ensure accuracy and avoid inconsistencies in measurement.

Procedure guideline 1.13 Measuring weight *(continued)*

Statement	Rationale
3 If clothing has not been removed or the CYP is weighed with additional equipment, such as a splint or cast, this must be recorded in the CYP's healthcare records.	3 To maintain an accurate record.
4 Class III clinical electronic sales in metric settings should be used (RCPCH 2021). The appropriate type of scales should be selected dependent on the CYP's age and developmental and physical ability. If the CYP is very sick or unable to sit unaided, the CYP should be supported by a carer and weighed together on the scales. The carer should then be weighed alone and their weight subtracted from the combined weight of the CYP and carer.	4 To obtain an accurate measurement and maintain the safety of the CYP and staff.
5 The CYP must be completely on the scales and their weight fully borne.	5 To ensure an accurate measurement.
6 Record the figure shown on the scales to the last complete gram for infants under 4 kg and to the last 100 g for older CYPs above 4 kg.	6 Rounding up the measurement will produce an inaccurate measurement.
7 Help to re-dress the CYP.	7 To maintain comfort and dignity.
8 For documentation see final section of Procedure guideline 1.14	
9 Interpreting results: The centile describes the percentage of the population expected to be below that line. Half of all children should be between 25–75th centile.	9
a) Infant measurements need to be interpreted in relation to length, growth potential and any earlier measurements of the baby (RCPCH 2021).	a) To ensure measurements are interpreted accurately. To provide individualised care.
b) For infants, if there is significant weight loss, or weight is still below birth weight at 2 weeks of age, the % weight loss must be calculated. Weight loss = difference between current weight and birth weight Percentage weight loss = weight loss ÷ birth weight × 100%.	b) To ensure weight loss is calculated accurately.
c) Babies do not all grow at the same rate, so a baby's weight often does not follow a particular centile line, especially in the first year. For infants, some weight loss in the first weeks of life is common, but 80% of infants will have regained this by 2 weeks of age. A weight loss of 10% or more at any stage should be escalated to the treating paediatrician.	c) Recovery of birth weight by 2 weeks suggests that feeding is effective, and that the child is well (RCPCH 2021). Fewer than 5% of babies lose more than 10% of their weight at any stage, and only 1 in 50 are 10% or more lighter than birth weight at 2 weeks (RCPCH 2021).
d) For infants, acute illness may lead to sudden weight loss and a weight centile fall, but this should return to its normal centile within two to three weeks (RCPCH 2021).	d) Fewer than 2% of infants have sustained weight loss and this may indicate underlying health or social issues (RCPCH 2021).
e) A sustained drop through two or more weight centile spaces is unusual and should trigger a fuller assessment including measuring length/height (RCPCH 2021).	e) To identify problems early to allow monitoring and intervention if needed..
10 For CYPs, abnormality or deviation from the expected centile should trigger a fuller assessment and be reported to the paediatrician. Weight loss of more than 10%, or a weight below 0.4th centile needs careful assessment (RCPCH 2021).	10 To identify problems early to allow monitoring and intervention if needed.
a) If the weight is above the 99.6th centile, calculate body mass index (BMI) (RCPCH 2021). Calculating Body Mass Index: BMI uses height and weight to calculate if the weight is healthy. A child whose weight is average for their height will have a BMI between the 25th and 75th centiles, whatever their height centile. BMI above the 91st centile suggests that the child is overweight; a child above the 98th centile is very overweight (clinically obese) (RCPCH 2021). BMI below the 2nd centile is unusual and may reflect under-nutrition (RCPCH 2021).	a) BMI allows better interpretation of weight. Weight above the 99.6th centile may indicate obesity and needs to be interpreted taking account of the CYPs height.

Procedure guideline 1.14 Measuring head circumference

Statement	Rationale
1 Head circumference should be measured: a) Around birth, but ideally not within the first 24 hours. b) At the 8 week check and at any time after that if there are any worries about the child's head growth or development (RCPCH 2021).	1 a) To identify problems early to allow monitoring and intervention if needed. b) Measurements taken in the first 24-hours are unreliable as the head will have been subjected to moulding (RCPCH 2021)
2 Any CYP with a known or suspected neurological or craniofacial abnormality will need their head circumference recorded more frequently.	2 To monitor the CYP's condition. An increase in the volume of cerebrospinal fluid (CSF) can result in an increase in head circumference.
Preparation:	
3 Inform the family, and CYP if age appropriate, of the following: • that a measurement of head circumference measurement is required • the reason for the measurement • what it entails • the likely duration of the procedure	3 To obtain informed consent, reduce anxiety, and aid compliance.
4 Remove hats, bonnets, hair clips and plats and braids wherever possible.	4 To allow for accurate measurement.
Measurement technique:	
1 Use a disposable paper or plastic tape measure.	1 To minimise the risk of cross-infection.
2 Measure the circumference at the point where the head circumference is widest. Take three measurements and use the average (RCPCH 2021).	2 To ensure consistent and accurate measurement.
3 Head circumference centile measurements should track within one centile space.	3 The head circumference centile may show some variation over time, but fewer than 1% of infants drop or rise through more than 2 centile spaces after the first few weeks (RCPCH 2021).
4 Report any fall or rise through 2 or more centile spaces (RCPCH 2021).	4 Very rapid head growth with upward centile crossing can be a sign of hydrocephalus or other problems. Slowing of head growth, with a fall down the centiles may also be a sign of underlying problems of brain or skull growth and development.
Documentation of height, weight and head circumference:	
1 Record the CYP's height, weight and head circumference in their healthcare records as appropriate. Documentation should include the date and time of the measurement as well as the name of the person who performed the procedure.	1 To maintain accurate and consistent documentation.
2 The CYP's weight should be plotted on a standardised growth chart, such as the UK-WHO growth chart (RCPCH 2021).	2 To compare the growth against evidence-based data (Wright et al. 2013).
3 The correct chart should be chosen dependant on the child's age and for infants, gestation.	3 To ensure measurements are interpreted accurately.
4 Use a calendar or date wheel to calculate age. Age should be calculated in weeks for the first 6–12 months and calendar months thereafter. Count forward from the date of birth using the day of birth (RCPCH 2021).	4 Age errors are common (RCPCH 2021).
5 Record measurements and date in ink Plot data points in pencil. Use a dot and do not join up	5 Plotting errors are common and may need to be adjusted.
6 A child is on a centile if within 1/4 space of the line or between the two centiles if not. A centile space is the distance between two centile lines (RCPCH 2021).	
7 Escalate any concerns about the CYP's height, weight and/or head circumference to the appropriate clinician.	7 These may indicate underlying problems of growth and development which need further investigation.

Section 6: Assessment of body systems

Procedure guideline 1.15 Assessing the respiratory and cardiovascular systems

Statement	Rationale
1 Observe and note the CYP's activity level. Are they: a) Calm and behaving appropriately? b) Restless or agitated? c) Listless and drowsy?	1 This is a valuable indicator of their overall state of health. b) Agitation and restlessness may indicate shock or hypoxia. c) Drowsiness and listlessness may indicate serious problems such as late shock or a neurological problem (ALSG 2016)
2 Observe their body posture.	2 A CYP may alter their body position to alleviate symptoms: A CYP with severe airway obstruction or respiratory distress may sit upright in a 'tripod' position to ease their breathing (ALSG 2016). 'Squatting' may indicate a diagnosis of Tetralogy of Fallot (Massoure et al. 2014).
3 Note their general colour. Is this normal for the CYP?	3 Skin colour varies between and within different ethnic groups. Parents/carers will generally have noticed if the CYP's colour has altered from the baseline. Skin colour may indicate underlying disease problems. Pallor (especially when combined with drowsiness and fever in infants) may indicate serious problems such as shock or hypoxia (Hewson et al. 2000). A yellow tinge (jaundice) may indicate liver problems.
4 Observe for peripheral and central cyanosis (blue/purple discolouration). Check the colour of the CYP's tongue.	4 Peripheral cyanosis may be due to vasoconstriction and can be a healthy response to a cold environment. Central cyanosis is a blue or purple discolouration of the tongue and indicates severe hypoxaemia, polycythaemia, or cardiac or pulmonary disease (Shobi et al. 2012).
5 Observe the CYP for mottling and oedema. Look at the hands and nails for colour, shape and condition.	5 Pallor and mottling may indicate heart disease or shock. Oedema may be present in congestive heart failure or renal failure (Howlin and Brenner 2010). Finger clubbing is due to chronic hypoxia and may indicate a chronic heart or lung condition (Howlin and Brenner 2010; Tully et al. 2012). Splinter haemorrhages (small red or black lines in the fingernail beds) may be present in infective endocarditis (Tully et al. 2012).
6 Look at the shape of the CYP's chest. Are there any deformities of the chest wall?	6 Prominence of the sternum and costal cartilages may indicate respiratory or cardiac problems. In older CYPs, a round chest is often indicative of a chronic lung disorder.
7 Does the chest move symmetrically on breathing?	7 In health, the chest should move symmetrically. Decreased movement on one side may indicate pneumonia, pneumothorax, or inhalation of a foreign body.
8 Are there signs of recession (in-drawing of the chest wall)? If so, where is it located and how marked is it (mild, moderate or severe)?	8 Recession is more commonly seen in younger children as their ribs and chest wall are more compliant (Aylott 2006). Recession generally indicates increased work of breathing and respiratory distress (Aylott 2006). The degree of recession generally correlates to the severity of the condition. Severe recession, especially in older CYPs and if accompanied by other signs of respiratory distress, is a sign of severe illness and should be referred to a doctor immediately (ALSG 2016; Carter and Laird 2005; Hewson et al. 2000).
9 Are there visible pulsations or scars? Where are they located?	9 Visible pulsation may be present in health, especially in thin CYPs (Howlin and Brenner 2010). Bulging of the left chest or obvious lifting of the chest wall during contraction (a heave) may indicate left ventricular enlargement or other cardiac problems (Howlin and Brenner 2010). Scars may indicate previous surgery for respiratory or cardiac problems.

(continued)

Procedure guideline 1.15 Assessing the respiratory and cardiovascular systems *(continued)*

Statement	Rationale
10 Does the CYP make any noises when they are breathing? If so, what do they sound like and when do they occur (on inspiration, expiration or both)?	10 Stridor (a high-pitched sound that is generally worse on inspiration) indicates severe upper airway obstruction and may be due to infection (such as croup or epiglottis), post-traumatic injury, neoplasia, or developmental problems such as subglottic haemangioma or laryngomalacia (Carter and Laird 2005; Sasidaran et al. 2011). Wheeziness may indicate asthma, an acute respiratory tract infection or foreign body inhalation. Grunting is a sign of severe respiratory distress (ALSG 2016; Aylott 2006).
11 Are there any problems with the CYP's ears, nose, and throat?	11 Ear, nose, and throat problems are common in CYPs and although most are relatively minor, some may require immediate assessment and treatment (Carter and Laird 2005).
12 Does the CYP have a cough? a) If so, what does it sound like and when does it occur? b) Is the cough productive? If so, describe the nature of the expectorant.	12 a) A severe barking cough, especially with stridor, may indicate croup (Sasidaran et al. 2011). A paroxysmal prolonged bout of coughing (sometimes ending in a sharp intake of breath) may indicate pertussis (whooping cough). b) A productive cough is rare in CYPs and may indicate cystic fibrosis.
13 Do the CYP and/or family have any other concerns regarding the CYP's respiratory or cardiovascular needs?	13 To allow the CYP and family to voice concerns about any issues that may not have been covered within the assessment.

Procedure guideline 1.16 Assessing the neurological system

Statement	Rationale
1 Ask the parent/carer the age at which the CYP first rolled over, sat unaided, crawled, walked, spoke their first words, spoke their first sentence, and dressed without help (Engel 2006). Assess these against developmental guidelines.	1 A through history of the CYP's development is important in order to plan nursing care appropriate for their developmental age. The assessment can also identify neurological and developmental abnormalities.
2 Check the CYP's head circumference against age-appropriate values.	2 A large head (especially within the frontal area) may indicate hydrocephalus. A small head (microcephaly) may be linked to abnormality during the prenatal period (maternal infection, drug use), chromosomal abnormality, or perinatal trauma.
3 a) Observe the CYP for any abnormal movement. Do they move all their limbs? Do they have a normal gait? Are there any areas of flaccidity or spasticity? b) Does the CYP and/or parent/ carer identify any problems with movement?	3 a) Abnormal limb movement may be seen while observing the CYP at play and may result from neurological problems or local injury to a limb. b) Parents/carers and CYPs may have concerns that require further investigation.
4 If indicated, assess the CYP's motor responses. Assess the CYP's limb movement and power (Table 1.1) (Dawes et al. 2007). Assess each limb separately and compare right and left to identify any differences. b) Ask the CYP to hop, skip, and walk heel-to-toe to assess balance and gross motor skills.	4 In-depth assessment of the motor system is only required if there is a suspicion of neurological problems. b) Inability or difficulty to perform any of these may indicate cerebellar dysfunction (Cox 2008).
5 If indicated, assess the CYP's cranial nerves (Table 1.2) (Sables-Baus and Robinson 2011).	5 Testing of the cranial nerves will identify any abnormalities and establish a baseline for further assessment.
6 If indicated, assess the CYP's pupil responses and Glasgow Coma Score (see Chapter 21: Neurological Care)	6 To establish a baseline.
7 Do the CYP and/or family have any other concerns regarding the CYP's neurological needs?	7 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment.

Table 1.1 Observation of limb movement

Observation	Result	Method
Normal power	The patient will be able to push against resistance with no difficulty.	To determine whether the patient has normal power, or mild or severe weakness. Each limb is assessed and recorded separately. Arms: while holding the wrist ask the patient to pull you toward him or her and then push you away. Legs: holding the top of the ankle ask the patient to lift his or her leg off the bed then holding the back of the ankle ask the patient to pull the leg toward him or her.
Miid weakness	The patient will be able to push against resistance but will be easily overcome.	
Severe weakness	The patient will be able to move his or her limbs independently but will be unable to move against resistance.	
Spastic flexion	The patient's limbs will flex in response to painful stimuli. Arms, wrists and possibly the thumb will bend inwards. Legs will pull upwards.	To determine a response of spastic flexion or extension, apply central painful stimuli. If no response is elicited use peripheral painful stimulus.
Extension	The patient's limbs will extend in response to painful stimuli. Elbows, wrists and fingers will straighten stiffly down the side of the body. Legs will stiffen and feet will point downwards.	
No response	There is no motor response despite central and peripheral painful stimuli.	

Source: Adapted from Woodward (1997).

Table 1.2 Testing cranial nerve function of a child

Cranial nerve	Name	Type and when to test	How to test	Abnormal
Cranial nerve I	Olfactory	Test those with head trauma and abnormal mental status	With child's eyes closed occlude one nostril and present an aromatic substance that is non-noxious	
Cranial nerve II	Optic nerve	Papilledema with increased intracranial pressure; optic atrophy	Using the ophthalmoscope to examine the ocular fundus to determine the colour, size, and shape of the optic disc.	
Cranial nerves III, IV, VI	Oculomotor, trochlear, and abducens nerves	Motor function, sensory function, and corneal reflex	Check pupils for size, regularity and equality and consensual light reaction and accommodation. Nysstagmus is a back-and-forth oscillation of the eyes.	Increasing intracranial pressure causes a sudden, unilateral, dilated, and nonreactive pupil. Nystagmus occurs with disease of the vestibular system, cerebellum, or brain stem
Cranial nerve V	Trigeminal nerve	Muscles of mastication, sensory function and corneal reflex	Palpate the temporal and masseter muscles as the person clenches the teeth. Lightly touch a cotton wisp to forehead, cheeks and chin. Place wisp of cotton on the cornea, coming in from the side.	
Cranial nerve VII	Facial nerve	Motor and sensory function	Note mobility and facial symmetry as person responds to request to: smile, frown, close eyes tightly, lift eyebrows, show teeth.	Muscle weakness is shown by flattening of the nasolabial fold, drooping of one side of the face, lower eyelid sagging. These may indicate central nervous system lesions and peripheral nervous system lesions.
Cranial nerve VIII	Acoustic (vestibulocochlear) nerve		Ability to hear normal conversation, by whispered voice, and by Weber and Rinne tuning fork.	

(continued)

Table 1.2 Testing cranial nerve function of a child *(continued)*

Cranial nerve	Name	Type and when to test	How to test	Abnormal
Cranial nerve IX and X	Glossopharyngeal and vagus nerves	Motor and sensory function	Depress tongue with tongue blade and note pharyngeal movement as the person says ''ahhh''; the uvula and soft palate should rise in the midline and tonsillar pillars should move medially.	Absence or asymmetry of soft palate, uvula deviates to side, or asymmetry of tonsillar pillar movements indicate an abnormal finding.
Cranial nerve XI	Spinal accessory nerve		Check for symmetry of sternomastoid and trapezius muscles by asking the person to turn head and shrug shoulders against resistance.	Atrophy or muscle weakness or paralysis indicate abnormal findings.
Cranial nerve XII	Hypoglossal nerve		Inspect tongue. No wasting or tremors should be present. Note the forward thrust in the midline as the person protrudes the tongue.	Atrophy or fasciculations or tongue deviates to side with lesions of hypoglossal nerve.

This information was published in Jarvis (2008).

Procedure guideline 1.17 Assessing nutrition

Statement	Rationale
1 Measure the CYP's weight and height and check these against age-appropriate values, growth charts, and previous records. Use of a nutrition screening tool may highlight CYPs at risk (Gerasimidis et al. 2010; White et al. 2014).	1 To establish if the CYP is growing and developing normally. CYPs in hospital are particularly at risk of malnutrition (Aurangzeb et al. 2012).
2 Is the CYP gaining weight and growing? Are the parents/carers concerned about any aspect of development?	2 Parents/carers are generally the first people to detect poor nutrition or weight gain. Failure to thrive may indicate a number of chronic conditions such as gastro-oesophageal reflux, cardiac, respiratory, liver and renal disease, malignancy, and endocrine and metabolic disorders (Joosten and Hulst 2008).
3 What is the CYP's normal feeding regimen? Do they need help with eating or drinking? Do they use a knife and fork or their fingers to feed themselves? Do they drink from a cup/beaker/bottle?	3 Continuing the CYP's normal regimen will help to decrease anxiety and stress.
4 For infants, are they breast- or bottle-fed and if so, which milk do the parents/carers use?	4 To maintain the current feeding regimen.
5 What are the CYP's likes and dislikes? Are there any foods to which the CYP is allergic or cannot tolerate?	5 To establish the CYP's current regimen and aid the planning of nursing care.
6 Does the CYP require a special diet or food supplements?	6 Wherever possible, these should be continued while the CYP is in hospital.
7 Does the CYP require any additional nutritional support such as overnight feeding or total parenteral nutrition?	7 To establish the CYP's current regimen and aid the planning of nursing care.
8 Is the CYP seeing any other professional, such as a dietician or nurse specialist?	8 To ensure effective communication between professionals, which may offer additional information about the CYP.
9 Do the CYP and/or family have any other concerns regarding the CYP's nutritional needs?	9 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment.

Procedure guideline 1.18 Assessing elimination and sexual development

Statement	Rationale
1 What is the CYP's normal toilet regimen? Can they use the toilet unaided? For younger children, are they potty trained?	1 To plan the CYP's individual care and maintain the CYP and family's normal routine wherever possible.
2 What is the colour and consistency of the CYP's urine? Does it have an odour? Does it hurt when they pass urine?	2 Dark, concentrated urine may indicate dehydration. Cloudy and/or smelly urine may indicate infection. Red or brown urine suggests haematuria.

Procedure guideline 1.18 Assessing elimination and sexual development *(continued)*

Statement	Rationale
3 What is the colour and consistency of the CYP's faeces? Do they have an odour? Does it hurt when they defecate	3 Black stools may indicate melaena from gastrointestinal bleeding. Grey- or clay-coloured stools in a CYP with persistent jaundice may indicate biliary atresia (Davenport 2012). Pale, loose, bulky, offensive stools may indicate coeliac disease (Tran 2014). Liquid or watery green stools may indicate diarrhoea due to infection, inflammation, chemotherapy, or laxative use. Ribbon-like stools may indicate Hirschsprung's disease (Engel 2006).
4 Is the CYP constipated? Do they need aperients, such as laxatives, suppositories or enemas? If so, how often are they required?	4 To maintain current therapy and promote normal bowel actions. Recurrent constipation may indicate more serious gastrointestinal issues (Nurko and Zimmerman 2014).
5 Is there any abnormal discharge from the genital area?	5 Abnormal discharge may result from the presence of a foreign body or infection. Sexually transmitted diseases may result from consensual sex or sexual abuse.
6 In older boys, have they reached puberty? If so, at what age did this occur?	6 Puberty in boys usually starts between 11 and 14 years and is considered delayed if there are no signs by age 14 years (Villanueva and Argente 2014).
7 In older girls, have they developed secondary sexual characteristics (breasts, pubic hair)? If so, at what age did this occur?	7 Breast development before 8 years of age may be normal, but needs further assessment. Puberty in girls is considered delayed if there are no signs by age 13 years (Villanueva and Argente 2014).
8 In older females, have they started menstruating? Are there any problems such as heavy or frequent bleeding or pain? What was the date of their last period?	8 Menstruation problems are a common concern for adolescent females (Bennett and Gray 2014). The possibility that the young person could be pregnant should be examined. CYPs may not declare this in front of their parents/carers.
9 For older children and adolescents, are they sexually active (remembering that they may not disclose this if their parents/carers are present)? If so, are they practising safe sex and using contraception?	9 Adolescents may be sexually active and not disclose this to their parents/carers. The health assessment may be an appropriate opportunity for health promotion and discussion about sexual health.
10 Do the CYP and/or family have any other concerns regarding the CYP's elimination needs or sexual development?	10 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment.

Procedure guideline 1.19 Assessing skin and hygiene

Statement	Rationale
1 Observe the general colour and pigmentation of the skin.	1 Overall skin colour varies between individuals and across ethnic groups. A yellow discolouration may indicate jaundice or liver disease; redness may indicate inflammation or bruising, and paleness may indicate anaemia, or shock.
2 Observe the general condition of the CYP's hair. What is the texture and colour? Is it normally distributed?	2 To establish a baseline for future assessment.
3 Observe the general condition of the CYP's nails. What are their shape and colour?	3 To establish a baseline and identify any problems (Piraccini and Starace 2014).
4 Observe the general condition of the CYP's mouth. Ask about their normal dental routine. When did they last visit the dentist?	4 To establish a baseline for future assessment.
5 Is there any abnormal odour?	5 This may indicate a fungal infection or poor personal hygiene.
6 Are there any abnormal areas of skin? If so, describe their location and appearance.	6 To establish a baseline for future assessment and help to plan nursing care.
7 Is there a rash? If so, describe the duration, site of onset, how it has developed, and if it has spread. Is it transient or persistent? Does it itch? Has the CYP started taking any medication recently?	7 When assessing a rash, it is important to take a thorough history (Watkins 2013). Allergic reactions, eczema, chickenpox (varicella zoster) and bacterial infections such as impetigo may be very pruritic (itchy). Acute urticaria presents with itchy, white or red, raised oedematous weals (hives) and may be triggered by an allergy. A maculopapular rash may indicate a drug reaction or infectious disease (Watkins 2013). Skin may be dried and cracked in eczema and needs regular moisturisation.

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Procedure guideline 1.19 Assessing skin and hygiene *(continued)*

Statement	Rationale
8 Does the rash blanch when pressure is applied?	8 Haemorrhagic rashes do not fade under pressure and may be associated with meningococcal septicaemia, acute leukaemia, or Henoch-Schonlein purpura (Nielsen et al. 2001). These are potentially life-threatening and more experienced advice should be sought immediately.
9 Is anyone else in the family affected?	9 Infestations (such as scabies) or infectious diseases may affect other CYPs or adults in the same household.
10 Does anyone else in the family have a history of skin disorders?	10 Diseases such as eczema or psoriasis can run in families.
11 What is the CYP's normal hygiene routine? Do they prefer a bath or shower? Are there any soaps or products they or their parents/carers would not use?	11 Maintaining the CYP's normal regimen will help to reduce anxiety and promote continuity. For further information see Chapter 11: Personal Hygiene and Pressure Ulcer Prevention.
12 Does the CYP need any assistance with hygiene needs?	12 To plan their nursing care.
13 Establish with the CYP and carer their level of involvement and participation in meeting their hygiene needs.	13 To plan their nursing care.
14 Are there any bruises? If so, where are they located, what is the size and colour, and how did they happen?	14 Bruises may frequently be found on the legs of toddlers as they learn to walk. Multiple bruises or unusual patterns/ locations may be indicative of non-accidental injury and should be referred to a senior colleague for assessment. Suspicions of abuse should be documented and referred to the appropriate social worker. For further information see Chapter 31: Safeguarding Children and Young People.
15 Does the CYP have any wounds? If so, describe their reason, location, size, and appearance. Does the wound need any form of dressings? If so, describe when and how this is changed.	15 Wounds may indicate previous surgery or illness and may need regular reassessment and re-dressing.
16 Assess the CYP for potential or actual risk of pressure sores using a recognised tool.	16 To assess risk on admission and establish a baseline. For further information see Chapter 11: Personal Hygiene and Pressure Ulcer Prevention.
17 Do the CYP and/or family have any other concerns regarding the CYP's skin or hygiene needs?	17 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment.

Procedure guideline 1.20 Assessing mobility

Statement	Rationale
1 Ask the parent/carer the age at which the CYP first rolled over, sat unaided, crawled, walked, and dressed without help. Assess these against normal developmental criteria.	1 A thorough history of the CYP's development is important in order to plan nursing care appropriate for their developmental age. The assessment can also identify mobility and developmental abnormalities (Sharma 2011).
2 How does the CYP normally mobilise? How far can they walk independently?	2 To plan appropriate and individualised nursing care.
3 Observe the CYP for any abnormalities of movement and assess against 'age-appropriate' development.	3 Abnormal movement may result from neurological problems or local injury to the affected limb.
4 If the CYP can walk, observe the gait and note any abnormalities.	4 Infants and toddlers tend to walk bow-legged with a wide-based gait. Limping may indicate a variety of abnormalities including trauma, septic arthritis/osteomyelitis, transient synovitis, slipped femoral capital epiphysis, developmental hip dysplasia, irritable hip, scoliosis, or cerebral palsy (Perry et al. 2011).
5 Does the CYP need any mobility aids such as crutches or a wheelchair?	5 To plan appropriate and individualised nursing care.
6 Do the CYP and/or family have any other concerns regarding the CYP's development or mobility?	6 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment and provide valuable information during the assessment (Sharma 2011).

Procedure guideline 1.21 Assessing development

Statement	Rationale
1 How does the CYP address his parents/carers (e.g. Mummy, Daddy, Mamma, etc.)?	1 To ensure effective communication and promote the CYP's sense of security.
2 Does the CYP have any special toys or comforters? Have they brought them with them?	2 To promote the CYP's normal regimen and sense of security.
3 What is the CYP's normal daily routine? What time do they wake, eat meals, and go to sleep? a) How has the CYP reacted to their illness?	3 To plan the CYP's individual care and maintain the family's normal routine wherever possible. a) To plan individualised nursing care as CYPs react differently to illness.
4 Is the diagnosis and prognosis of the CYP's illness known to the CYP and/or family? What exactly do they understand about their current condition?	4 To maintain confidentiality and plan appropriate and individualised nursing care. To ensure adequate psychological and emotional support.
5 Does the CYP have any emotional, developmental, or mental health problems?	5 To plan appropriate and individualised nursing care and facilitate early diagnosis and intervention (Bellman et al. 2013).
6 Do the CYP and/or family have any other concerns regarding their emotional or psychological needs?	6 To allow the CYP and family to voice concerns about issues that may not have been covered within the assessment (Sharma 2011).

Procedure guideline 1.22 Other relevant information

Statement	Rationale
1 Do the family have a health visitor? If so, what is their name and contact details?	1 The health visitor may provide valuable information on the CYP's development and progress (Bellman et al. 2013).
2 Do the family see any other medical or allied health professionals on a regular basis?	2 Other professionals may provide important information about the CYP and family. Communication and liaison with other healthcare teams is equally important.
3 Does the CYP or family have any other specific needs or difficulties?	3 To plan appropriate and individualised nursing care. The CYP's parents/carers may also have specific health needs or disabilities that affect their ability to care for the CYP at home and/or in hospital.
4 Does the CYP have any problems with their hearing, speech, or eyesight? If so, what specifically are the problems and when was this last assessed?	4 In order to plan the CYP's nursing care and ensure effective communication.
5 Do the CYP and family have any other questions about any aspect of their care?	5 To ensure that all concerns have been addressed and all aspects of the CYP's care recorded.

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Principles of Care Planning: The Nature of Care Planning and Nursing Delivery for Infants, Children, and Young People

CHAPTER 1

Doris Corkin and Pauline Cardwell

(Contribution from Lisa Hughes)

INTRODUCTION

Care planning is a continuous concept that requires ongoing review and adjustment, while children and young people's nursing is a human activity that must be founded on a continuity of care and compassion. The COVID-19 pandemic has made its impact on the family across the globe with many healthcare staff creating new ways of working.

As healthcare professionals, we are accountable for our individual practice. Therefore, we must strive to deliver high quality care, acknowledging evidence-based practice and recognising finite resources within contemporary healthcare systems. In order to achieve success, care planning and delivery of individualised care must encompass effective interdisciplinary and multiprofessional collaboration (Corkin et al. 2012).

Within this second edition, the children and young person's nurse will be provided with an overview of the nursing process, its components, and how these assist in organising and prioritising care delivery to the child and family. Philosophical perspectives of care will also be discussed and how this impacts on care delivery in the clinical setting. In conjunction with these aspects of care planning, several models of nursing will be explored, and their contribution in the planning and delivery of care will be illustrated within the timely updated scenarios in the second section of this book.

SERVICE USER – THE CHILD AND YOUNG PERSON

The involvement of children, young people, and their parents as service users and carers is essential and recognition of their overall contribution to the care planning process. Nurses can achieve this by placing the child, young person, and/or parent at the centre of decision-making, a fundamental part of nursing, actively seeking out their wishes and supporting them to have a voice heard (DoH 2012). Open and timely communication is vital to improve experiences. Governmental policies have identified the importance of involving parents in the care of their children and identified this as a major theme in the development of services (Audit Commission 1993; DH 1991, 1996). Chapter 5 has incorporated views from a young person perspective, also Chapters 11 and 36, alongside the parents' journey.

EQUALITY, DIVERSITY, AND INCLUSION

All individuals, including academic and professional healthcare staff and students have a responsibility to treat all patients and colleagues fairly, with dignity and respect and act in accordance with their Trust Employer and University Equality and Diversity Policies (The Equality Act 2010; NMC 2018a). Equality and inclusion requires recognising, valuing and engaging with diversity. Important to have an awareness of the issues that may be sensitive to others, whilst respecting one's own beliefs and values. Areas that should be considered include age, disability, race, religion/belief, gender, gender reassignment, and sexual orientation. According to Stonehouse (2021), diversity recognizes and values our differences as individuals. Common needs tend to unite us, including the need for good health and a social care service.

Care Planning in Children and Young People's Nursing, Second Edition. Edited by Sonya Clarke and Doris Corkin.

NURSING PROCESS–WHAT IS THE NURSING PROCESS?

The nursing process is a logical, structured approach, which promotes the nurse's critical thinking in a dynamic manner. This process is used to identify and deliver individualised family-centred care, supported by nursing models and philosophies. Yura and Walsh (1978) identified this process, consisting of four interrelated stages (see Figure 1.1):

- Assess
- Plan
- Implement
- Evaluate

During 2011, Castledine acknowledged the evolvement of the nursing process to be a methodical way of thinking that guides care delivery; whilst focusing on the patient the nurse should base best practice on available evidence with artistic interpretation.

More recently, however, this process has sometimes included a fifth stage relating to 'nursing diagnosis'. For example, a six-week-old infant has been brought to the hospital with a history of breathlessness and poor colour, especially during feeds, who tires easily and the weight gain is poor. Upon examination, heart rate and respiratory rate are both increased and this may lead the nurse to consider a possible cardiac related diagnosis. In utilising the nursing process, a problem-solving approach is applied to the management of individualised patient care. The application of the process is continuous and cyclical in nature and commences with the assessment stage.

ASSESSMENT

This important stage of the care planning process aims to collect and record information pertaining to the health status of the individual child and its effect on the family unit. This phase of the nursing process should provide a comprehensive insight into the needs of the child and their impact on the integrity of the family. The children's nurse must consider not only the physical needs of the child but address the social, emotional, and spiritual needs of the child and entire family. In order to achieve a comprehensive assessment, the children's nurse must utilise a range of proficiencies, including theoretical knowledge and interpersonal skills. Matousova-Done and Gates (2006) highlight the need to both observe and listen to the child and family, utilising verbal and non-verbal communication with the use of appropriate questioning skills to ensure an accurate nursing assessment.

A precise and comprehensive assessment is vital to identify the problems which are currently encroaching on the child's health status and ultimately will ensure safe, effective, and efficient nursing care for the child. This stage of the process links closely with the discrete fifth stage identified earlier as nursing diagnosis, which is supported by an accurate and comprehensive assessment of the child's health needs. During the assessment stage the children's nurse is also involved in analysing and interpreting the information collected, thus contributing to the formulation of a care plan.

A very good example of assessment is the ABCDE (airway, breathing, circulation, disability, exposure) systematic approach to assessing the acutely ill child, as recommended by the Resuscitation

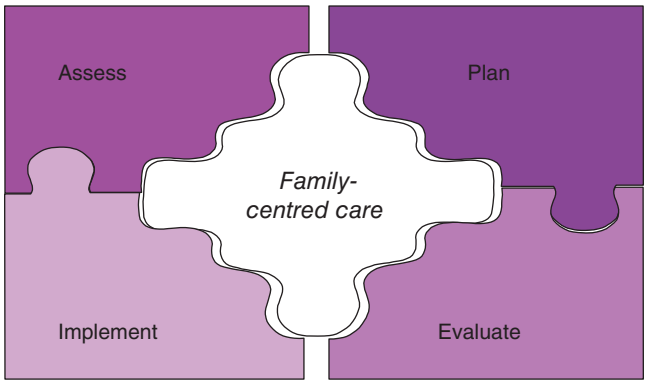

FIGURE 1.1 The nursing process.

Council UK (2021). This approach aims to enable healthcare staff to recognise when they need additional support from the interprofessional team (see Chapter 8). Furthermore, this systematic process helps guide the healthcare professional in planning the frequency of ongoing assessment, especially in the paediatric intensive care setting (see Chapter 17).

PLANNING

During the essential second stage of the process, a plan of care is developed aimed at addressing the problems identified in the assessment phase. This phase of the process involves cognitive and written elements in identifying goals to meet the child's needs. The children's nurse develops mutually agreed goals which endeavour to address the child's problems through the provision of nursing care. These goals are then further developed within the plan, in a sequence of interventions aimed at resolving, controlling or preventing escalation of the problem. In creating these goals, Wright (2005) proposes they should be SMART: specific, measurable, achievable/agreed, realistic, and time-limited. The care plan is developed to guide the nursing interventions in a timely manner to meet the needs of the child and family.

The children's nurse must be able to clearly articulate and document priorities of care, tailored to meeting the individual needs of the child and family, and easily understood by all members of the interdisciplinary team (Cardwell et al. 2011). Effective communication with the child and family are integral to this stage of the nursing process, as the children's nurse must work collaboratively to ensure the care plan is dynamic in meeting the needs of the child and family. In developing the care plan the children's nurse must engage in developing a partnership with the child and family in which they are active partners in the decision-making processes and their involvement in care provision is recognised. This partnership requires empowerment and negotiated involvement of the child and family, which requires skilled children's nurses who are able to ensure children and their families are at the centre of effective care planning (Corlett & Twycross 2006). Having identified, agreed, and set short- and long-term goals specific to the child's needs, these must be regularly evaluated during implementation to ensure they remain responsive to the individual's requirements.

IMPLEMENTATION

This penultimate stage of the nursing process relates to the delivery of care, which has been planned based on the needs of the child and family. Nursing interventions should aim to achieve the goals identified in the care plan and these should clearly identify the actions to be undertaken by the children's nurse. The children's nurse must possess the knowledge, skills, and abilities to deliver the care to the child and assess the appropriateness of planned interventions (Alfaro-LeFevre 2006). Effective communication with the child and family is central to the success of implementing the care plan, which may require adjustment in response to changing needs.

The cooperation and involvement of the child and family is a pre-requisite in this phase of the nursing process. Children and their families must be given choices and involved in decisions regarding nursing interventions, and their participation will personalise their own care implementation. All goals set must be clear and agreed by the child, family, and other carers, including health professionals. Identifiable goals should be achievable, within a realistic timeframe for those involved in care delivery, whilst recognising their continued appropriateness for the child.

EVALUATION

The fourth and final stage of the nursing process requires the children's nurse to consider the impact of the preceding three stages on the child's care trajectory. However, it is essential that the children's nurse continually evaluates the child's response to interventions and modifies planned care to meet the individual's needs and their response to previously identified goals. Overall, this evaluation process aims to recognise changes in the child's condition and identify the need for modification. Analysis of the care delivered by the children's nurse requires critical thinking in order to consider its effectiveness and other possible required interventions to meet the changing needs of the child. The frequency of evaluation may vary depending on the acuity of the child's condition.

This evaluative stage of the nursing process links closely with the assessment phase of the cycle, assessing the attainment of previously identified priorities of care and goals (Heath 2005). Documentation and reporting in this phase of the nursing process is critical in accurately measuring and recording the child's response to planned interventions and to support the continuity of care delivery. Furthermore, this assists in information sharing between healthcare professionals and identification of progress towards goal attainment and also the continued relevance of previously identified goals.

NURSING DIAGNOSES

The North American Nursing Diagnosis Association (NANDA International) is the clearing house for nursing diagnosis work both within the United States of America and internationally (Carpenito-Moyet 2010). This association was initially established in 1973, and later recognised worldwide as NANDA-I in 1982 and is committed to developing the nursing contribution to patient care through 'nursing diagnoses' which informs the creation of care plans (NANDA International 2008). Those care plans approved by NANDA International are rigorously tested and refined in line with current best practice and evidence-based guidelines in clinical settings. Within the NANDA International system, five levels of nursing diagnoses are identified:

- Actual
- Risk
- Possible
- Syndrome
- Wellness

WHAT IS A NURSING DIAGNOSIS?

This is a professional judgement relating to the health problems of the individual or family, which is used to identify appropriate goals and interventions in nursing plans of care, based on a holistic nursing assessment (see Chapter 35).

NURSING PROCESS IN PRACTICE

Overall, this nursing process provides a flexible framework to organise and deliver care of a high standard to the child and family in a holistic manner (NMC 2018a). This facilitates recognition of the individual's contribution, their consent to care, whilst acknowledging organisational quality initiatives, such as policies, procedures, and clinical audit (Holland & Jenkins 2019). This nursing process framework assists the children's nurse in documenting care assessment, planning, implementation, and evaluation, whilst recognising the legal responsibility and professional accountability aspects of accurate record keeping.

Children's nursing is a unique part of the nursing paradigm, with the child and young person's nurse influencing policy and practice (Hollis et al. 2016). In order to apply the nursing process, the children's nurse requires knowledge, skills, and attributes which will only develop over time with practice and experience. Therefore, the nursing student will initially require direct supervision and clinical support (see Chapter 9) in applying the nursing process to their clinical practice, ensuring that care planning and delivery is safe, competent, and effective in meeting the child's and family's needs (NMC 2018b).

PLANNING OF CARE – WHAT IS A CARE PLAN?

A care plan is a comprehensive record (handwritten, pre-printed, or electronic) of essential information which is created following discussions between the child, family, and the children's nurse, detailing priorities of care aimed at meeting the individual's needs (Cardwell et al. 2011). This record consists of a table featuring problem identification, patient goals, and nursing intervention, alongside day-to-day living activities affected (see Appendix 1). This is a legal document which is managed and stored in accordance with legislative and professional guidelines, whilst still being accessible to the individual patient and other healthcare professionals with responsibility for care delivery, whether in the hospital or community setting (NMC 2009).

ACTIVITY 1.1

Look at these practice-based questions.

1. Identify which care planning documentation is currently being used in your clinical placement:
   a. Hospital
   b. Community
2. Discuss with your **practice assessor/supervisor** which nursing model is being utilised to support care delivery:
   a. Has the model been adapted for children's nursing?
   b. How does the model ensure individualised care of the child and family?

In addition to the framework provided by the nursing process, care plans are normally developed with the support of a nursing model, which assists in managing and enhancing effective, high quality care delivery. The development of nursing models attempts to link nursing theory to clinical practice and indirectly informs the growing body of nursing knowledge. Various models of nursing are available and utilised, for example Roper et al. (1985), Casey (1988, 1995), Mead (McClune & Franklin 1987), Orem (1995), and Neuman's system model (Neuman & Fawcett 2002), as well as chapters within this book that demonstrate the application of these models to clinical practice. These models are flexible structures that can be easily adapted to incorporate elements from other models in order to address individual care needs, encouraging the children's nurse to think creatively about the holistic care of the infant, child, or young person and their family.

Increasingly, evidence-based practice is advocated globally as effectively delivering quality care, and thus must be integrated within care plans for the individual (Parsley & Corrigan 1999). The children's nurse must be able to appraise nursing research critically and use this up-to-date knowledge to underpin their clinical judgement and practice, and promote efficiency within healthcare systems. Whilst aiming to provide contemporary high quality care, the children's nurse should reflect upon his/her knowledge and experiential learning, which are key requisites to ensuring best practice as identified in professional regulatory guidelines (NMC 2018a).

The nursing care plan is also supportive of engaging and sustaining interdisciplinary collaboration with the child, family and other health professionals involved in their care. Children's nurses do not work in isolation; instead, care delivery is organised around a team approach and in collaboration with other members of the multiprofessional team. More recently, integrated care pathways have evolved, supporting the development of a multiprofessional document, to which the nursing care plan is integral. These multiprofessional documents are supported by clinical governance and quality agendas within healthcare organisations in delivering effective outcomes (DH 1998).

ACTIVITY 1.2

Using the template below, identify concepts related to care planning. We have given you some ideas for the first letter of each word.

Child-centred care

A_____
R_____
E_____

Process guided by model(s) of care

L_____
A_____
N_____

PHILOSOPHY OF CARE

This aspect of professional practice relates to the expectation of service users and nursing staff in a particular clinical environment of how care and services will be organised and delivered. A philosophy of care helps nurses to define their role and guide practice, within a growing diversity of roles in the clinical environment. Children's nursing, as a distinct field of practice, may relate to a philosophy of care that recognises the individuality of each child and their family, understanding their unique needs in relation to healthcare provision and ensuring their involvement in decisions about their care. The child's needs must be paramount, whether physical, psychological, social, cultural, or spiritual, as well as those of their family, and these should be embedded in the philosophy of care within the clinical environment (RCN 2003).

ACTIVITY 1.3

Seek out the philosophy of care in your clinical placement:

- Enquire from ward manager how this ward philosophy was created.
- Does it identify what children and their families can expect from the service?

WHAT ARE NURSING MODELS?

Nursing models, which are also known as grand theories, attempt to illustrate the theory of nursing practice and facilitate the children's nurse to organise and deliver care. When applied to practice these models of care influence the performance of the nurse and the experience for the child and family (Pearson et al. 2005). The construction and application of nursing models support the development of nursing practice, whilst recognising the values, beliefs and culture of the individual and the changing clinical environment.

Since early work by Fawcett in 1984, numerous nursing models identify the four components of a model as:

- The person
- Their environment
- Health
- Nursing

Care is organised and delivered around identified deficits relating to these components. The development of nursing models, aims to enhance the delivery of family-centred care whilst facilitating the experienced children's nurse to practice autonomously. Through engagement with the child and family the children's nurse is able to identify needs and create a plan of care for the individual and their family, when employing the nursing process in conjunction with a model/s of care.

ROPER, LOGAN, AND TIERNEY – THE 12 ACTIVITIES OF LIVING MODEL

This conceptual model of nursing was devised by three United Kingdom-based nurses and is widely recognised both nationally and internationally. The model is practice orientated whilst incorporating a theoretical framework for care delivery. The model relates to the lifespan of the individual, identifying twelve activities of living (see Table 1.1), which are considered in relation to the continuum of dependence to independence throughout life, appreciating aspects of age, environment, and circumstances which may impinge on this continuum. Each activity of living is influenced by five identified factors, which are biological, psychological, socio-cultural, environmental, and politico-economic (Roper et al. 1985). This model is used in conjunction with the nursing process to identify actual and potential problems for the individual and how nursing care can advance the patient along the dependence to independence continuum. This model of care will be utilised in subsequent chapters such as Chapter 22, illustrating its application in care planning.

Table 1.1 An adaptation of the Roper, Logan, and Tierney Model of Nursing (1985).

1. Maintaining a safe environment	2. Communication	3. Breathing	4. Eating and drinking
• Risk management	• Difficulties with hearing, sight or speech	• Respiratory problems	• Special diets
• Medications	• Cognitive disability	• Cardiac conditions	• Alternative feeding methods
• Infectious diseases	• Interpreter services required	• Compromised airway	• Swallowing difficulties
5. Elimination	**6. Personal cleansing and dressing**	**7. Controlling body temperature**	**8. Mobilising**
• Altered function of bowel/bladder	• Level of dependence	• Abnormal body temperature	• Level of independence
• Infections	• Skin integrity	• Regulatory disorders	• Mobilising disabilities
• Structural anomalies	• Personal preferences	• Environmental factors	• Use of aids
9. Working and playing	**10. Expressing sexuality**	**11. Sleeping**	**12. Dying**
• Relevant to age	• Stage of development	• Altered sleep patterns	• Relevance to illness
• Effects of hospitalisation/illness	• Altered body image	• Sleeping aids	• Fear of dying
• Hobbies/interests	• Sexual preferences	• Environmental factors	• Spiritual needs

CHILD AND FAMILY-CENTRED CARE

Both child- and family-centred care approaches have evolved, as central tenets of children's nursing and other health professionals' practice and viewed as multifaceted concepts that have been reframed during recent years (Coleman 2010; Coyne et al. 2016; Ford et al. 2018). Various attributes of family-centred care are identified in the nursing literature, and include collaborative working, partnerships, respect and involvement of family, negotiation, empowerment/engagement, and provision of a family friendly environment (see Figure 1.2). Whilst there is no clear definition, this concept of family-centred care (FCC) has continued to grow and develop a body of evidence to support its utilisation in contemporary children's nursing practice, since the earlier work of Casey (1988, 1995). The evolvement of the concept FCC and its theoretical underpinnings can be sourced in early work by psychologists Bowlby (1953) and Robertson (1958) who recognised the damaging effects of maternal deprivation and separation caused by hospitalisation on children. These important findings were later endorsed and supported in the findings and recommendations presented by the Platt Report (Ministry of Health 1959).

The development of a national association by parents in 1961 (National Association for the Welfare of Sick Children in Hospital (NAWCH): https://register-of-charities.charitycommission.gov.uk/charity-details/?regid=296295&subid=0) gave parents a voice to demand services which recognised them as central caregivers to their children. This further supported and challenged the need for healthcare delivery for children and their families, to change from a medically dominated service to a service responsive to the needs of children and their families, which provided facilities for parents to remain with their hospitalised child. Recognising and supporting the family as central care providers alongside children's nurses, requires respect for the integrity of the family unit, whatever its structure, with the provision of services which are responsive to the needs of the child and family (United Nations (UN) 1989; Department of Health (DH) 2003). The notion of children, families, and children's nurses as partners in care delivery is integral to achieving the best plan of care and promotes functioning at the highest possible level (Gance-Cleveland 2006). Indeed, Shields et al. (2006) suggest FCC aims to plan and deliver care not just to the child but to the family as a whole, and all family members are recognised as care recipients. An example of how family-centred care can be enhanced in practice is encouraging the presence of parents at the bedside, during a ward round (Montgomery et al. 2016). Optimising the health and safety of hospitalized children.

Further progress has led to the demand for service users, including parents and children, to have a greater voice in shaping future services as identified in more recent literature (DHPSSPS 2005; Noyes 2000). Conversely, Bradshaw et al. (2000/2001) suggest delivering FCC is challenging

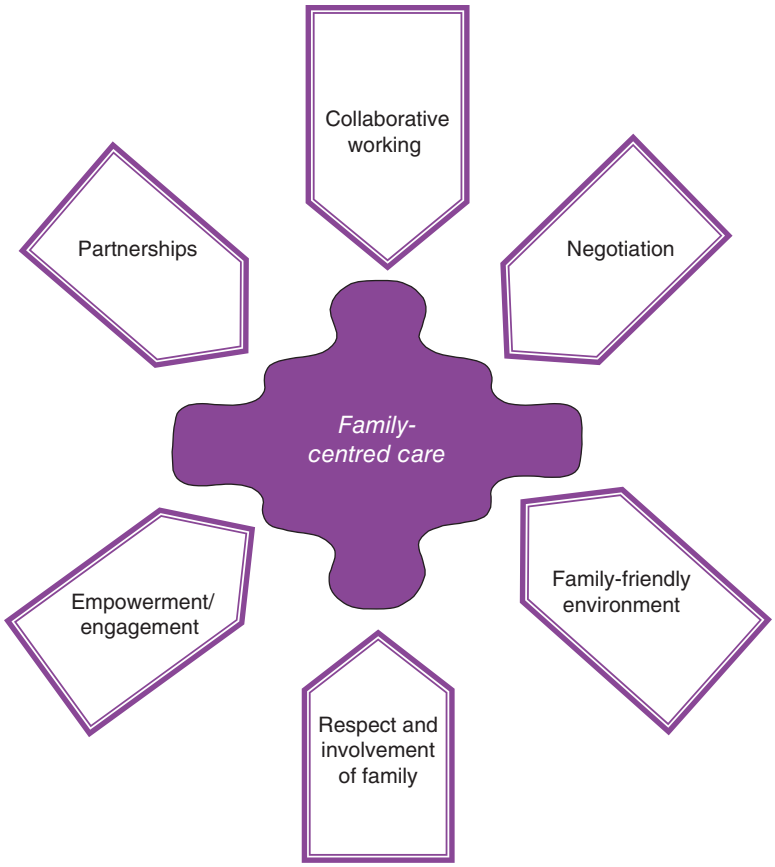

FIGURE 1.2 Attributes of family-centred care.

and demanding, requiring the children's nurse to possess a range of complex skills to ensure its implementation in practice is effective, whilst proposing the theory of FCC has advanced ahead of clinical practice to the detriment of its operationalisation. The lack of a nursing model to support the implementation of this concept in children's nursing is identified by Coleman (2002) as a contributory factor in the difficult translation of the concept from theory to clinical practice.

The lack of involvement of children and their families in the decision-making process regarding their care provision, as perceived by children and their parents, has been identified within nursing literature (Noyes 2000). To address this issue children's nursing must relinquish power in relation to the service they provide and embrace children, young people and their parents as partners in care provision. Family involvement in the design and development of services to meet their individual needs is vital in ensuring an equitable service irrespective of regional, cultural, or socio-economical status.

ACTIVITY 1.4

The nurse plays a vital role in 'Family Nursing' – reflect upon how it has evolved, as a clinical competence, then consider the following:

(a) *Partnerships with Families – across the Lifespan (infant, child, and young person)
Read research: Bannerman et al. (2021) see reference end of this chapter

(b) *Impact of the COVID-19 pandemic on Nurse and Family – important considerations
Needs of the family must be explored if we are to make a difference in health outcomes!

Other frameworks such as 'Me and My Family' a regional document for person-centred assessment and planning of care, is specific to Northern Ireland across the Health and Social Care Trusts. Also during 2014 the Chief Nursing Officer recruited the help of the Northern Ireland

Practice and Education Council for Nursing, to undertake a project in relation to helping nurses and midwives record the care they planned, for example within the Neonatal care setting. The PACE framework was produced (NIPEC 2017) followed by user friendly leaflet – also see children's resources at https://nipec.hscni.net:

PACE = Person centred, Assessment, Plan of Care, Evaluation.

ACTIVITY 1.5

'Test your knowledge' preparing children and young people for hospital – link to valuable resources: animation and information sheets

https://www.edgehill.ac.uk/childrencomingtohospital

THE MEAD MODEL

This model was developed for the intensive care setting and for practical use at the bedside. Mead's framework was adapted from the Roper et al. (1985) nursing model, with which it shares some of its attributes. In addition to knowledge and experience of the intensive care environment, the nurse must be familiar with Roper's model, to ensure care planned is delivered in an effective manner. This adapted model identifies the individuality, lifespan (age), dependence/independence, and needs of the patient as the aspects to be assessed when planning care. Factors which impact on the health and wellbeing of the individual are similar to those identified by Roper et al., namely physical, psychological, environmental, socio-cultural, and politico-economical. Additionally, within the dependent/independent continuum on the nurse, Mead (McClune & Franklin 1987) identifies five stages:

1. Total dependence
2. Intervention
3. Intervention with some prevention
4. Prevention
5. Total independence

Each patient is continuously evaluated within the continuum in relation to the five factors highlighted above, identifying appropriate goals for the patient and progression towards independence, with cognisance of the patient's lifespan position. In conjunction with the nursing process the nurse is able to devise a plan of care unique to the needs of the individual patient. In devising a care plan, physical care needs are subdivided into elements specific to the intensive care environment. These include: respiratory, cardiovascular, pain sedation, neurology, nutrition, elimination, skin care, mobility, psychological and social/cultural, and circumstantial (Viney 1996). To illustrate the stages on the dependence/independence continuum, which are relevant to the neurology element as identified in the Mead model, see Table 1.2 which is linked to care planning in Chapter 16.

Table 1.2 Stages on the neurology dependence/independence continuum.

Criteria for stages on neurology continuum
1. Unstable neurological state, requiring continuous monitoring.
2. Potentially unstable neurological state, requiring frequent monitoring.
3. Potentially unstable neurological state, requiring monitoring.
4. Stable neurological state, requiring monitoring to detect/prevent deterioration.
5. No assistance required to maintain neurological state.

OREM'S SELF-CARE MODEL

The self-care model of nursing was developed by Dorothea Orem (between 1959 and 2001) with the aim of helping the patient and family achieve self-care (Walsh 1998). The Orem model is based on the premise that individuals have self-care needs which they themselves have an ability and right to meet except when their ability to do so has been compromised (Pearson et al. 2005). When undertaking a comprehensive assessment this, self-care model identifies what care the patient or family can do for themselves (Nevin et al. 2010). The model has three key concepts: self-care, self-care deficit and nursing systems. Self-care concerns the various activities individuals carry out on their own behalf in maintaining life, health, and wellbeing, which Orem (1995) categorises as universal self-care requisites, developmental self-care requisites, and health deviation self-care requisites (Table 1.3), and also identifies actions for meeting the universal self-care requisites. According to Orem the person best placed to meet these requisites is the individual themselves, whom she calls the self-care agent. In the case of an infant and child this would be the parents; Orem identifies this as dependent care (Orem 1995). When in an individual or, in the case of a child, a parent demand for self-care is greater than the individual or parent's ability to meet it then a self-care deficit occurs and nursing may then be required.

Orem (1991) identifies four goals of nursing:

- Reducing the self-care demand to a level whereby the individual or parent is able to meet the demand independently.
- Increasing the individual or parent's capacity or ability to meet the demand independently.
- Enabling the individual or parents (or significant others) to give dependent care when self-care is impossible for the individual or parent.
- The nurse meets the individual or parent's self-care demand directly.
- Orem (1995) also refers to the role of the nurse within nursing systems, which are carried out on one of three levels:
- Total compensatory system – the nurse provides all the patient care.

Table 1.3 Self-care requisites (Orem 1995).

Universal self-care requisites
Universal self-care requisites are associated with the maintenance of human functioning and serve as a framework for assessment (Cutliff et al. 2010): • The maintenance of sufficient intake of air. • The maintenance of sufficient intake of water. • The maintenance of sufficient intake of food. • The provision of care associated with elimination processes and excrements. • The maintenance of a balance between activity and rest. • The maintenance of a balance between solitude and social interaction. • The prevention of hazards to human life, human functioning, and human wellbeing. • The promotion of human functioning and development within social groups in accordance with human potential, known human limitations, and the human desire to be 'normal'. Orem calls this 'normalcy' (see Chapter 21).
Developmental self-care requisites
Developmental self-care requisites are related to developmental processes throughout the life cycle and can include physical, social or psychological changes, that is, adolescence or social life changes such as bereavement.
Health deviation self-care requisites
Arise out of ill health or injury and are associated with the effect and changes of disease or trauma on the individual.

- Partial compensatory system – nurse assists with care of patient.
- Educative/supportive system – patient has control over their health.

Although the children's nurse may find this self-care theory process time consuming, the overall aim is that the young person or parent is able to meet most of their needs with supportive education. Therefore, the nurse's role is one of teaching and supporting in order to meet the self-care need.

NEUMAN'S SYSTEMS MODEL

Betty Neuman, an American nurse devised this theoretical model of nursing which places great emphasis on prevention (primary, secondary, and tertiary), interventions and a systems approach to holistic wellness (Neuman & Young 1972). The overall focus of this model is the total wellness of the person in attaining and maintaining health to a maximum level. Neuman's model identifies three types of stressors (intrapersonal, interpersonal, and extrapersonal) that act on five individual variables, namely physiological, psychological, socio – cultural, spiritual, and developmental aspects, which interrelate with each other. This model is easily adapted to the community setting where the wider contextual (environmental) factors affecting individual health need consideration, and are fundamental to service provision. When used in conjunction with the nursing process this model aims to support the stability of the person. For further discussion, please see Chapter 17.

ADVANCED CARE PLANNING

End of life treatment tends to be discussed following the initiation of advanced care planning, which gives parents the opportunity to discuss decisions and their wishes, though parents of life-threatened children have reported that discussions were not always aligned to the dynamics of their family life (Carr et al. 2022). When caring for children with life-limiting conditions, parents will need time and help to accept the end of their child's life is near. A trusting relationship has been identified within research as necessary for parents to participate within these palliative care planning discussions (Mitchell et al. 2020).

SUMMARY

The authors of this first chapter have shared accessible and flexible education, by attempting to outline some of the nursing models in contemporary practice within children's nursing, which will be applied to clinically based care planning scenarios within this book. These nursing models have been summarised in Chapters 1–10 and then analysed within care planning scenarios (Chapters 12 – 39) with emphasis on assessing the individual needs of infants, children, and young people. The children's nurse has also been introduced to several reflective activities and online resources. An appreciation of the PACE framework (NIPEC 2017), other nursing models such as the Nottingham model (Smith 1995) and their application in clinical practice, is encouraged, to help enhance knowledge and a deeper understanding of care planning.

CARE OF THE CHILD AND FAMILY DURING ILLNESS: STUDENT/STAFF NURSE PERSPECTIVE

Scenario

Ollie Love (a pseudonym), aged four months, was taken this afternoon to his GP by his parents, with a history of being unwell for the past 24 hours with a troublesome cough and difficulty with breathing. The GP diagnosed Ollie as suffering from croup, so he was quickly referred to the children's medical ward for admission and further management. On arrival at hospital, Ollie was accompanied by his six-year-old sister and anxious parents. Whilst establishing Ollie's clinical observations the children's nurse noted sudden deterioration in his condition.

Proposed care plan

Using the care plan sheets provided, *two* key activities of living (A/L) requiring *immediate* attention were selected by the nursing student and goals identified. A plan of care for Ollie and his family was constructed, supported with rationale, relating to the nursing process and Roper et al. (1985) model of nursing, incorporating a family-centred approach to care and reference to literature.

Sample care plan

Child's Name: Ollie Love DOB: **8th April 2022**

(Continued)

Date and time	A/L No	Potential/ actual problems	Nursing objectives/ outcomes/ goals	Nursing care plan (actions with rationale)	Review dates	Nurse's signature
03/08/22 16.00 h	No.3	**Ollie** has been admitted to the ward with a troublesome cough and difficulty with his breathing – differential diagnosis is croup.	Ensure **Ollie** is nursed safely and effectively to maintain patency of his airway, relieve cough, and return breathing pattern to within normal limits.	Approach **Ollie** and his family in a calm and friendly manner; introduce them to the ward, try to reassure parents and keep them informed.		**Staff Nurse Lisa Hughes**
				Gain consent for nursing intervention.		
				Nurse Ollie upright, prop with pillows to increase his lung capacity and beside working oxygen and suction in case of an emergency situation.		
				If Ollie is unsettled his mum may nurse him on her lap, though handling should be avoided.		
				Use the ABC approach (Resuscitation Council UK 2021).		
				Assess Oliver's respiratory function – initially assess patency of his airway using look, listen, and feel approach; gently check for any obstruction or signs of inflammation and distress.		
				Next assess Ollie's breathing – record and monitor his respiratory rate, rhythm and depth of breaths; note respiratory effort, e.g. if indrawing, nasal flaring or tracheal tug.		
				Important to assess Ollie's cough, recording frequency and effects it has on Ollie's breathing (Holland et al. 2018).		
				Check Ollie's oxygen saturations – if less than 92% consult doctor and administer humidified oxygen at a rate of 5 litres per minute initially, record response and adjust accordingly (BNFC 2020–2021).		Staff Nurse Lisa Hughes
				Assess Ollie's circulation – check and monitor his capillary refill time. Note any signs of cyanosis, e.g. mottled skin appearance and check body temperature. Record and report accordingly (NMC 2009).		
				Administer medication (e.g. adrenaline or steroid via nebuliser) as prescribed by doctor and as per ward policy – check against six rights of administration (Olsen et al. 2010) and medicine guidelines.		Staff Nurse Lisa Hughes
				Carry out oral and nasal hygiene as and when required – should Ollie produce secretions obtain a specimen and send to laboratory for culture and sensitivity.		
03/08/2022 16.00 h	No.2	Ollie's parents are very anxious about his condition.	Ensure Ollie's parents are well informed about his condition, in order to reduce their fears and anxieties.	Welcome Ollie and his parents to the ward. Introduce Ollie and his parents to their primary nurse who will show them the facilities available and inform them of visiting times for extended family.		Staff Nurse Lisa Hughes
				Accompany doctor when he explains to parents the effects croup will have on Ollie and be aware that his parents may want answers to questions.		
				Provide Ollie's parents with both written and verbal information on croup – encourage parents to participate in Ollie's care.		
				Establish a therapeutic relationship with Ollie and his parents, work in partnership to help meet holistic needs (Casey 1995).		
				Ollie is in the sensorimotor stage of development, so the children's nurse needs to be aware of his needs throughout hospitalisation (Bee & Boyd 2013).		Staff Nurse Lisa Hughes
				Contact play therapist who can provide suitable toys for Ollie during his stay in hospital.		
				Complete a detailed history from Ollie's parents, in order to accurately assess and develop a plan of care and aid diagnosis.		

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1 Assessment of the child and young person

Figure 1.1 Assessment of the child and young person.

Assessment is the gathering of information and formulation of judgements in partnership with the child and family. It is a continuous, dynamic process and includes the physiological, physical, psychological, social, and spiritual aspects of the child and the effect that their health problem is having on their development and family life. Accurate assessment of the infant or child is essential to the delivery of safe and effective care. Depending on the child's presenting condition, a focused assessment may be required in the case of the seriously ill child, necessitating prioritization of care until the child's condition is stable.

Assessment leads to the identification of health problems and the development of care plans.

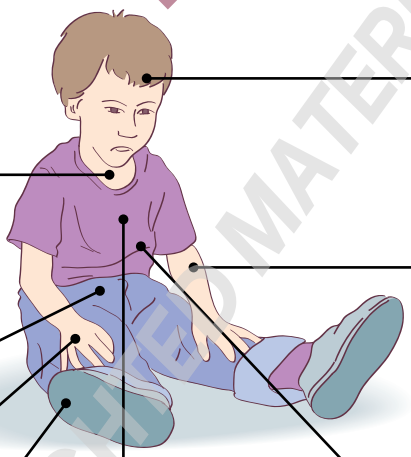
The **aim** of assessment is to obtain information about the child that will form a baseline on which to plan care and initiate treatment

Systematic assessment is a rigorous approach to the collection of subjective and objective data. It entails examination and review of the systems of the body

Assessment is undertaken by:
- Observation
- Measurement
- Interviewing

Subjective data:
Subjective data are ascertained from talking to the child and parent or carer

Objective data:
Objective data come from the findings of auscultation, vital sign recordings, inspection, percussion, and palpation



Level of consciousness

A – alert
V – responds to voice
P – responds to pain
U – unresponsive

Rapid assessment

A – airway
B – breathing
C – circulation
D – disability
E – exposure

Blood pressure

70+ (age × 2)
lower limit of normal

90+ (age × 2)
upper limit of normal

Urinalysis

Capillary refill time

Normal <2 seconds

Weight
Length/height
Head circumference
in the under 1 year age group

Heart rate normal value

Age	Awake	Deep sleep
Newborn–3 mths	85–205	80–140
3 mths–2 yrs	100–180	75–160
2–10 yrs	60–140	60–90
>10 yrs	60–100	50–90

Respiratory rate normal value

Age (years)	Respiratory rate (breaths per min)
<1	30–40
1–2	26–34
2–5	24–30
5–12	20–24

Box 1.1 HEADSSS tool

HEADSSS is an interview prompt tool used specifically to assess the health needs of young people. It may be used as a self-assessment tool as well as by healthcare professionals. It has been successful in identifying concerns that require further interventions. The acronym stands for:
H – home
E – education and employment
A – activities
D – drugs/drink
S – sex
S – self-harm, depression, and suicide
S – safety (relationships**, online)**

Key points

- Use a recognized framework when assessing the child or young person, as this will enable a systematic and thorough approach.
- Assessment is an ongoing process and will take place at many points in the child's or young person's clinical journey.
- Age- and development-appropriate questions and tools should be used.

Children and Young People's Nursing at a Glance, Second Edition. Edited by Elizabeth Gormley-Fleming and Sheila Roberts.

Introduction

Assessment is a key component of nursing practice and is required for planning and implementing child- and family-centred care (Figure 1.1). Registered nurses must be proficient in assessment at the point of registration. They need to be able to prioritize the physical, social, behavioural, cognitive, spiritual, and mental health needs of the child/young person. Partnership working with the child and family is required as their needs and preferences must be given due regard. The nurse needs to utilize this information when prioritizing and planning child-centred evidence-based care to meet the patient's needs. Assessment is the collection of data, both subjective and objective, which aims to achieve a complete picture of the child's health status. Good assessment is a combination of the interpretation of physical data and the information gained from observation of the child and family and from listening to them. Assessment tools may be used for aspects of the assessment, such as pain, nutrition, or wound assessment.

Interviewing – history taking

Gaining the trust of the child and family is an essential element in developing an effective therapeutic relationship. Introducing yourself to the child and family with explanations of expected outcomes will put the child and family at ease. Age-appropriate language should be used. Questions should be directed at both the child and the parent. Young people should have an opportunity to talk in private if they wish and the HEADSSS tool is commonly used when history taking in this age group (Box 1.1).

When taking a history, a structured approach should be used. This needs to include:

- Presenting complaint.
- History of presenting complaint.
- Past medical history (birth and neonatal history in infants and young children), immunizations, illnesses, and hospitalizations.
- Allergies.
- Current medication.
- Developmental history.
- Family history.
- Social history – nursery, school, HEADSSS tool.

Observation – subjective data

Subjective data are what the child and parent say along with the visual information gained from the initial encounter with the child and family or while obtaining objective data (physical examination and recording of vital signs). This includes noting:

- Their colour: are they pale, mottled, cyanosed, jaundiced, flushed.
- Behaviour: alert, crying, agitated, combative, lethargic, drowsy, distressed.
- Mental health and wellbeing status, HEADSSS assessment for young people (Box 1.1).
- Interaction with parents/carers/strangers.
- Interaction with environment, wanting to play or sleepy.
- Position: normal, floppy, or stiff.
- The general appearance of the child, e.g. unkempt or clean.
- Obvious birthmarks, bruises, or rashes.
- Dysmorphic features.

Measuring – objective data

All infants, children, and young people require a baseline physical assessment. This is a multifaceted process and some aspects are common to all children who require assessment of their health status. The physical assessment is concerned with the analysis and interpretation of data. Privacy and dignity should be maintained during this process. Consent should be obtained prior to undertaking a physical assessment.

Physical assessment includes:

- Basic physical recordings of temperature, pulse rate, respiratory rate, oxygen saturation, and blood pressure.
- Respiratory assessment, rate of breathing, depth of breathing, noise of breathing, presence of cough, chest movement, nasal flaring, use of other accessory muscles, child's colour, ability to speak/feed, position of the child, peak flow, and oxygen saturation level.
- Heart rate including pulse volume.
- Capillary refill time.
- Neurological status using Glasgow Coma Scale or AVPU (Alert, Voice, Pain, Unresponsive).
- Level of hydration: obvious signs of dehydration include sunken anterior fontanelle, dull sunken eyes, dry oral mucosa, lethargy, weak cry, decreased urinary output.
- Weight.
- Height/length.
- Head circumference.
- Skin assessment using recognized pressure risk assessment tool.
- Urinalysis.
- Blood glucose if required.

All findings need to be documented, as they are a legal record of the nursing assessment, the foundation on which care is planned and the basis of communication with the multidisciplinary team. A more focused nursing assessment may be required of a specific body system relating to the presenting problem or other concerns noted. This may be uni- or multisystem. Clinical judgement will determine where the focus of assessment will be.

Approach to assessment

The approach taken to assessment will impact on the success and ease of actually undertaking the physical assessment. The children's nurse should consider the following:

- Age and development stage of the child.
- Undertaking examination of the least intrusive areas first and painful, sensitive areas last.
- Their own behaviour and showing respect for the child's culture and personal preference.
- Clustering their assessment with other areas of care so as to avoid unnecessary disruption, but also being aware of the clinical needs of the child against their need to rest.
- Identifying what parts of the assessment should be carried out before the child is likely to become upset and cry, e.g. chest auscultation, heart sounds.
- Encouraging the child and family to voice any concerns or questions.

Evaluation

Evaluation requires the children's nurse to ensure the correct information has been collected, and that it is accurate and documented. Abnormal findings should be acted on straightaway. The children's nurse will need to process the information, both objective and subjective, and utilize this to draw on their problem-solving and critical thinking skills to plan person-centred, evidence-based nursing interventions.

Summary

Assessment is a dynamic, continuous process that needs to include the child's and parent or caregiver's perspectives. Evidence-based and best practice approaches should always be used when assessing the child or young person. Observation is as essential as physical assessment, and good communication skills are important too.

Chapter 1

The Evolution of Current Practices

> *Conceptual frameworks are easy to ignore. Like the air we breathe, their presence is everywhere once they are looked for. Yet, they are often taken for granted, under-estimated and under-examined. One way to reveal the influence of frameworks today is to study their use in unfamiliar contexts. For example, an examination of past practices of speech therapists raises questions about what practitioners did then as well as how and why they did it. Such an investigation creates the distance needed for clinicians to apprehend aspects of their own practice that are ordinarily taken for granted.*
>
> Duchan, 2006a, p. 736

Historians are uncommon in SLP/SLT circles, so we are fortunate to have the handful of people who have documented the profession's development, notably: Linda Armstrong, Judith Felsen Duchan, Margaret Eldridge, and Jois Stansfield who is dual qualified as an SLT and as a historian (Stansfield, 2022). Some oral historians have focused on specific topics within SLP/SLT, for example, Denyse Rockey (1980) concentrated on stuttering, and Alison McDougall (2006) explored the development of Speech Pathology in Australia. Other detailed professional association histories have been compiled: Robertson et al. (1995), and Stansfield (2020a, 2020b), on the RCSLT; Malloy (2021) on the NZSTA; and Leahy et al. (2021) on the growth of SLT and the IASLT in the Republic of Ireland. Linda Armstrong and Jois Stansfield contribute amply to the University of Strathclyde's Archives and Special Collections which houses the RCSLT's historical papers; see https://guides.lib.strath.ac.uk/archives/slt

Duchan (2001 to date) believes too little work has been done on the evolution of current practices. She observes that most histories of the origins of speech pathology in the United States consider organisational matters and place the profession's genesis in about 1925, when people interested in speech disorders and speech correction established professional associations. This institutional emphasis is observed in the chronologies by Margaret Eldridge, recording the development of speech therapy in Australia (Eldridge, 1965) and worldwide (Eldridge, 1968a, 1968b). By contrast, Duchan (2001 to date) has produced and maintains a lively web-based history,

Children's Speech Sound Disorders, Third Edition. Caroline Bowen.

augmented by journal articles (e.g., Duchan, 2002, 2006b, 2010; Duchan & Hewett, 2023) and book chapters, (e.g., Duchan, 2009; Duchan & Felsenfeld, 2021). Duchan's contribution is broad in scope and distinctive because it includes systematic records of the science and ideas underlying practice.

Aside from brief biographies in textbooks, autobiographical statements are unusual in SLP/SLT. But remarkably, McDougall (2006) and Stansfield (2020a) took fresh approaches by using an oral history methodology to explore the life stories of early members of the profession in Australia and in the UK, respectively. McDougall's account included interviews, conducted in 2002 by oral historian Jo Wills, tracing the history of the profession in Australia from 1929 to 2004. Stansfield interviewed 19 women who qualified in Britain between 1945 and 1968, to provide unique insights into challenges and changes in the UK profession as reported by post-WW2 practitioners.

Much of the memoir by Leahy et al. (2021) is based on the experiences of the class of 1969 at Trinity College Dublin. It contains reminiscences of the roles of carbon paper, typewriters, a Black & Decker Language Master that proclaimed that 'Dougal had lots of work to do at his party', temperamental photocopiers that unreliably spat out expensive photocopies, contact paper—the laminator's sticky antecedent—and bespoke therapy materials conceived, designed, and executed by resourceful SLTs.

> *Resources were largely of the DIY variety—literally cut and paste! They were the pen and paper days—you drew a picture and labelled it and that's what it became for the child in your clinic (it didn't have to resemble the actual object much!)*
>
> Leahy et al., p. 12

> *Given few specialised therapy materials in the early days, the quality and scope of resources was dependant on the ingenuity, talents, and creative ability of each individual SLT. As with assessments, any clinical equipment was supplemented with everyday objects, toys, colouring pencils, and copybooks. The earliest cohorts of students were offered optional drawing classes as part of their curriculum.*
>
> Leahy et al., p. 30

An innovative historical standout is Armstrong et al.'s (2017) history of speech and language therapy traced through 50 years' professional publications in the RCSLT's *International Journal of Language & Communication Disorders* (IJLCD) and its predecessors. Their study provides an in-depth content analysis of the IJLCD from 1966 to 2015, illuminating shifts in clinical and research priorities, and the increased complexities of the profession's practice.

Unlike the rich histories cited above, the timeline in Table 1.1 provides just a glimpse of the notable SLP/SLT and linguistics influences on contemporary child speech practice, from the 1930s to the 2020s, set against key professional association milestones. Striving to dodge the trap of presentism (Meyerowitz, 2020) which is what historians call the practice of evaluating past events, and people's attitudes, values, and motivations by present-day criteria, in the subsequent sections, connections are made between our histories of practice and practice today.

Early Conceptualisations of 'Normal' and 'Deviant' Speech

The book *Speech Pathology: A Dynamic Neurological Treatment of Normal Speech and Speech Deviations* (Travis, 1931) was written by an SLP professor whose passion was stuttering. It contained just one paragraph on articulation therapy and an appendix containing a list of initial–medial–final-sound production practice words and was warmly welcomed by reviewers (e.g., Buswell, 1932). His next book, *The Handbook of Speech Pathology* (Travis, 1957), or 'the Travis Handbook', as it was affectionately called, also offered a tiny contribution to articulation assessment and therapy. Nonetheless, it was highly regarded as a standard text, providing outlines of the neurophysiological bases and clinical subtypes of fluency, articulation and voice disorders, and aphasia.

Uninfluenced by linguistics theory of the day – the Linguistic Society of America was founded in 1924 – Travis presented a view of disorders that had the speech sound (phone) as the basic unit of

Table 1.1 Timeline 1924—2025: Milestones in the history of SLP/SLT management for children's speech sound disorders set against selected key developments in the MRA signatories' professional associations

1924	IALP formed	International Association of Logopedics and Phoniatrics
1924	LSA founded	Linguistic Society of America
1925	AASC formed	American Academy of Speech Correction
1926	An early use of the term speech therapy	Winifred Kingdon Ward appointed Director of Speech Therapy, West End Hospital for Nervous Diseases (London)
1927	ASSDS formed	American Society for the Study of Disorders of Speech
1931	Lee Edward Travis	*Speech Pathology: A Dynamic Neurological Treatment of Normal Speech and Speech Deviations* (Book)
1933	Ruth Lewis, Toronto's first qualified Speech Therapist	Lewis was a Canadian psychologist interested in children's speech problems who studied Speech Therapy in England
1934	Irene Poole	Produced a schedule for 'normal' articulatory proficiency
1934	ASSDS became ASCA	American Speech Correction Association
1934	Irene Poole	Created a developmental schedule for 'normal' articulation.
1934	ATSD (Remedial) formed	Association of Teachers of Speech and Drama (UK)
1935	BSST formed	British Society for Speech Therapists
1937	Robert West	*The Rehabilitation of Speech* (Book)
1937	Samuel T. Orton	*Reading, Writing and Speech Problems in Children* (Book)
1938	Stinchfield and Young	Developed a motor-kinesthetic therapy for speech defects
1939	Charles Van Riper	Proposed a social theory of speech acquisition
1940	Grant Fairbanks	Wrote a voice/articulation drill book with minimal pairs
1940	Theory–Therapy Gap and Research–Practice Gap	It was becoming evident that the principles of practice were often at odds with theory and research
1941	Roman Jakobson	Developed a linguistics theory of phonological universals
1943	Berry & Eisenson	Mildred Berry and Jon Eisenson linked a linguistic-mentalist acquisition theory with articulatory-motor therapy
1939–45	World War II Veterans needed SLP/SLT services	Education, neurology, physiology, psychology, and psychiatry (but not linguistics) informed SLP/SLT practice
1945	ATST and BSST merged	College of Speech Therapists (CST) founded in the UK
1946	NZSTA formed	New Zealand Speech Therapy Association
1947	ASCA became ASHA	American Speech and Hearing Association
1948	Kurt Goldstein	Discussed symbol formation, heralding 'Psycholinguistics'
1949	ACST inaugurated	Australian College of Speech Therapists (ACST)
1954	ACST incorporated	ACST was incorporated. Its name changed in 1975 and 1996
1957	Lee Edward Travis	*The Handbook of Speech Pathology* (Book)
1965	NZSTA was incorporated	NZSTA (Inc) became an incorporated society
1952	Helmer R. Myklebust	Used the same term symbol formation
1957	Charles Osgood	Talked about mediation/psycho-linguistic processing
1957	Mildred Templin	*Certain Language Skills in Children* (Book)
1959	CST defined 'dyslalia'	Dyslalia included in CST *Terminology for Speech Pathology*
1959	Margaret Hall Powers	Powers defined functional articulation disorder
1964	CSHA formed	Canadian Speech and Hearing Association
1965	NZSTA incorporated	New Zealand Speech Therapy Association Inc
1966	Catherine Easton Renfrew	Wrote about 'the persistence of the open syllable' in JSHR
1968	*The Sound Pattern of English* (SPE) published	Linguists, Noam Chomsky, and Morris Halle elaborated generative phonology and distinctive features theory (Book)

(Continued)

Table 1.1 (*Continued*)

1968	Jon Eisenson	Discussed symbol formation
1968	Charles Ferguson	Developed contrastive (phonological) analysis
1969–92	CST accreditation in Ireland	CST (later RCSLT) accredited ST education in Ireland
1970s	American behaviourism	3-position testing and traditional 'artic' therapy dominated
1971	IAST	The Irish Association of Speech Therapists (IAST) founded|
1972	Muriel Morley	Saw no neuromotor basis for functional articulation disorder
1972	Catherine Easton Renfrew	Published *Speech Disorders in Children*
1973	David Stampe	Explicated natural phonology and phonological processes
1975	Pamela Grunwell	Showed the relevance to SLP/SLT of clinical linguistics
1975	AASH	Australian Association of Speech and Hearing
1976	David Ingram seminal book	*Phonological Disability in Children* evoked a paradigm shift
1978	ASHA's name changed	American Speech-Language-Hearing Association
1979	Frederick Weiner	*Phonological Process Analysis*
1979	David Stampe	Expounded natural phonology and phonological processes
1980	Barbara Hodson	*The Assessment of Phonological Processes*
1980	Shriberg & Kwiatkowski	*Natural Process Analysis*
1981	Frederick Weiner	Presented an account of conventional minimal pairs therapy
1981	David Ingram	*Procedures for the Phonological Analysis of Child Speech*
1982	Stephen E. Blache	Applied distinctive features theory to child speech practice
1983	Hodson & Paden's impactful (especially in the United States) book	*Targeting Intelligible Speech* by Barbara Williams Hodson and Elaine Pagel Paden about cycles/patterns intervention
1984	Dana Monahan	Published (perhaps the first) assessment/therapy package/kit
1985b	Pamela Grunwell	*Phonological Assessment of Child Speech*: *PACS*
1985	Marc Fey	Published the formative 'Inextricable constructs' article
1985	Carol Stoel-Gammon and Carla Dunn	Published the scholarly and accessible (to clinicians) *Normal and Disordered Phonology in Children*
1985	CASHA renamed CASLPA	Canadian Association of Speech-Language Pathologists and Audiologists
1986	Dean and Howell	Published on linguistic awareness, heralding *Metaphon*
1986	Elbert and Gierut	*Handbook of Clinical Phonology (*Book)
1988	CPLOL	The Comité Permanent de Liason des Orthophonists-Logopèdes de l'UE (CPLOL) formed
1989	Lancaster and Pope	Developed and described auditory input therapy for under 3s
1990	Dean, Howell, Hill, Waters	Published the *Metaphon Resource Pack* (Intervention kit)
1992	Marc Fey	Headed up a challenging LSHSS clinical forum
1993	Lawrence Shriberg	Published the early, middle, and late 8 acquired consonants
1993	IAST became IASLT	IAST added 'language' to its title
1995	RCSLT Royal patronage	The Royal College of Speech and Language Therapists
1996	AASH became SPA	Speech Pathology Australia
1997	Ball and Kent	*The New Phonologies* for clinicians and linguists (Book)
1997	Joy Stackhouse and Bill Wells	Published the first volume of an influential series on the psycholinguistic framework (Books)

Table 1.1 (*Continued*)

1998–9	B. May Bernhardt and Joseph Stemberger	Developed clinical applications of non-liner phonology, including assessment and intervention resources
2001	WHO—children and youth classification	International Classification of Functioning, Disability and Health ICF-CY
2004	MRA between ASHA, RCSLT, SAC, and SPA	The International Mutual Recognition Agreement (of credentials) between four associations was inaugurated
2008	IASLT and NZSTA	Ireland and New Zealand became MRA signatories
2012	International Expert Panel on Multilingual Children's Speech (IEPMCS)	IEPMCS, led by Sharynne McLeod, published the *Multilingual Children with Speech Sound Disorders: Position Paper*
2014	CASLPA renamed SAC	Speech-Language and Audiology Canada
2014	IASLT and CORU	Registration of the SLT profession with CORU established
2018	McLeod & Crowe	Published updated the 'norms' for articulatory acquisition
2019	Telehealth/Telepractice	Telepractice burgeoned due to, the COVID-19 pandemic
2020	Online conferences/meetings	Upsurge in hybrid and online conferences due to COVID
2021	Williams, McLeod & McCauley published	*Interventions for Speech Sound Disorders in Children, 2nd edition* (Book)
2021	CPLOL became ESLA	European Speech and Language Therapy Association
2024	IALP's Centenary	International Association of Logopedics and Phoniatrics
2025	ASHA's Centenary	American Speech-Language-Hearing Association

speech. There was a hopeful sign that more was to come when Wellman et al. (1931) reported on the development of 'speech sounds' in young children. Publications by other American SLPs followed, with such revealing titles as: *The Rehabilitation of Speech* (West et al., 1937), *Reading, Writing and Speech Problems in Children* (Orton, 1937), and *Children with Delayed or Defective Speech: Motor-Kinesthetic Factors in Their Training* (Stinchfield & Young, 1938). Robert West wrote the first section of West et al. (1937) covering articulation difficulties due to 'oral deformities' and hearing impairment. Speech remediation suggestions in the book's second half included muscle relaxation, non-speech oral motor exercises: NS-OME (Lof, A24), phonetic placement strategies (Bleile, A36), and drill.

Another flurry of influential 'child speech' publications between 1939 and 1943 started with *Speech Correction: Principles and Methods* (Van Riper, 1939). This monumental work endured for nine editions (C. Van Riper & Erickson, 1996) a feat only matched by Bernthal et al. (2022) in their *Speech Sound Disorders in Children: Articulation & Phonological Disorders*. The SLP/SLT community was deeply saddened when its first author, John E. Bernthal died on July 25, 2021. A steadfast ally of countless practitioners and researchers in child speech worldwide, Dr. Bernthal was a contributor to the first two editions of this book and the third co-author—since their sixth edition—Peter Flipsen Jr., has contributed to all three. Back to Van Riper.

Van Riper's Legacy

Charles Van Riper (1905–1994), who had a doctorate in clinical psychology and no formal SLP qualification, emphasised the significance of social context on the day-to-day experience of speech-impaired individuals, with portents of the ICF-CY (McLeod, A2). His social perspective is revealed in his famous definition:

> *Speech is defective when it deviates so far from the speech of other people in the group that it calls attention to itself, interferes with communication, or causes its possessor to be maladjusted to his environment.*
>
> Van Riper, 1939, p. 51

Van Riper's cultural sensitivity and matchless insight into what he called the 'penalties' of communication impairment may have stemmed from his intrapersonal and interpersonal experiences of

stuttering. Discussing what people with communication 'differences' might make of their social situations, and what they might perceive others to read into their symptoms, he wrote – long before person first language was a thing – '*The difference in itself was not so important as its interpretation by the speech defective's associates*' (p. 66). He reflected sourly on the likely reactions of the said associates, writing: '*Personality is not merely individuality but evaluated individuality*' (p. 67). So intensely important was the social level for him that he recommend trainee speech correctionists undertake assignments, such as lisping for a day, to develop empathy for individuals with speech difficulties and a sensitivity to their emotional landscapes. The social aspect was present in his intervention advice, too, when he suggested that correctionists should work with *teachers and parents* in pursuing therapy goals.

The original phonetically oriented approaches to articulation disorders were described by Gutzmann (1895) and Kussmaul (1885) in Europe, Ward (1923) in the UK, and in the United States, Mosher (1929), Nemoy and Davis (1937), Scripture and Jackson (1919), and West et al. (1937). These authors progressively modified and elaborated earlier methodologies, but the text that is usually credited with popularizing their phonetic, sound-by-sound techniques is Van Riper's *Speech Correction*, published in 1939.

Paradoxically, although Van Riper espoused a sincerely held social view of speech impairment and disability, his speech intervention approach—classically referred to as 'Traditional Articulation Therapy' or, slightly tongue-in-cheek, 'Van Riper Therapy'—was not communication focused. Like his predecessors, he combined disparate elements in an atomistic array of peripheral procedures, including stimulus–response routines; sensory training (called auditory stimulation) comprising auditory discrimination, 'ear training' and auditory sequencing; and production drill. These became part of an auditory–phonetic (or sensory–motor) therapy that is still implemented.

In the same productive period, practical manuals, books of exercises, source books, and workbooks for speech correctionists appeared, replete with word and sentence lists for production practice, listening lists, rhymes, and stories alongside therapy tips, advice, ideas, techniques, and activities for use in speech lessons (e.g., Fairbanks, 1940; Nemoy & Davis, 1937; Twitmeyer & Nathanson, 1932).

Among the techniques that Van Riper did *not* incorporate into intervention, but which were gaining in popularity, were motorkinesthetic (or motokinesthetic) tactile manoeuvres. In keeping with his grumpy reputation (John E. Bernthal 1997, personal correspondence) Van Riper (1939, pp. 198–201) describes them with heavy sarcasm.

> *We have previously mentioned the Motokinesthetic Method invented by Edna Hill Young as one of the approaches used in teaching a child with delayed speech to talk. It has also been used in the elimination of misarticulations. Essentially, this method is based upon intensive stimulation; however, the stimulation is not confined to sound alone but to tactile and kinesthetic sensations as well. The therapist, by manipulation and stroking and pressing the child's face and body as she utters the stimulus syllable, helps him recognize the place of articulation, the direction of movements, the amount of air pressure, and so on. Watching an expert motokinesthetic therapist at work on a lisper is like attending a show put on by a magician. The case lies on a table with the therapist bending over him. First, she presses on his abdomen to initiate breathing as she strongly makes the s sound; then to produce a syllable from the patient, her fingers fly swiftly to close his jaws, spread the lips, and tap a front tooth, thereby signaling a narrow groove of the tongue or the focus of the airstream. Then her magical fingers squeeze together to draw out the sibilant hiss as a continuant.*
>
> *One therapist, when working with a child, used to 'draw out' the s, wind it around the child's head three times then insert it into her ear, thus insuring that it would be prolonged enough to be felt. Each sound has its own unique set of deft manipulations, and considerable skill is required to administer motokinesthetic therapy effectively.*
>
> *Viewed by the cold eye of the modern speech scientist, many of the motokinesthetic cues seem inappropriate; and a therapist would need sixty fingers and thirty arms to provide sufficient cues to take care of the necessary integration and coarticulation. Moreover, much of our research has indicated that standard sounds are produced*

in different ways by different people, and that their positioning vary widely with differing phonetic contexts. We suspect that much of the effectiveness of this method is due to its powerful suggestion (the laying on of hands), to its accompanying auditory stimulation, or to the novelty to the situation, which may free the case to try new articulatory patterns. We have used it successfully with some very refractory cases, but we always have felt a bit uncomfortable when doing so, as though we were the Magical Monarch of Mo in the Land of Hocus Pocus.

Disparities between Theory, Therapy and Practice

The release of *The Defective in Speech* (Berry & Eisenson, 1942, and see, Berry & Eisenson, 1956) provided an alternative interpretation of what might improve children's speech production. They guided a swing away from Van Riper's auditory perceptual training, refocusing on auditory memory span and the motor execution component of speech output, in treatment that saw the therapist administering general bodily relaxation procedures and speech musculature exercises. Today, these are generally referred to synonymously as non-speech oral motor exercises (NS-OME), oral motor therapy, oral motor treatment, or oromotor exercises (the more prominent UK term, sometimes called oromotor work). Apparently ignoring the social context of and consequences for the client of his or her communication impairment, Berry and Eisenson wrote about the mechanism of first-language learning for the first time in the speech pathology literature. They embraced the associative—imitative model (Allport, 1924) from psychology theory, conceptualising speech in linguistic–mentalist terms. But again, these insights were not reflected in their intervention suggestions. Like Van Riper's, their therapy belied any appreciation of language, and they proceeded from bottom up, starting with tongue, lip, and jaw exercises, with stimulation of individual phones, and using phonetic placement techniques and repetitive motor drill.

In her analysis of these inconsistencies, Duchan (2001 to date) highlights the genesis of 'a familiar trait in our professional development, the theory–therapy gap', also commenting that 'a second identifiable gap was between research findings and therapy practices', pointing to an evident interdisciplinary gap that saw speech pathologists failing to take much advantage of the developmental psychology research that flourished from the 1920s to the 1950s—a reminder of historian Peter Burke. 'Knowledges' makes me flinch slightly, but following Foucault, Burke sees knowledge or knowledge traditions as plural. He wrote:

> *It takes a polymath to 'mind the gap' and draw attention to the knowledges that may otherwise disappear into the spaces between disciplines, as they are currently defined and organized.*
>
> Burke, 2012

Dyslalia, Functional Articulation Disorder, and 'Patterns'

SLP/SLT was still a young profession when speech sound disorders in children were called 'dyslalia' or 'functional articulation disorders.' In its *Terminology for Speech Pathology*, the College of Speech Therapists (1959) defined dyslalia as: '*Defects of articulation, or slow development of articulatory* ***patterns****, including: substitutions, distortions, omissions and transpositions of the sounds of speech*.' Contemporaneously in the United States, Powers (1959, p. 711) defined it, with a different name, using the word 'functional' in its medical pathology connotation 'of currently unknown origin' or 'involving functions rather than a physiological or structural cause'. If Powers entertained the idea of introducing the acronym 'SODA' (for [S] substitution, [O] omission, [D] distortion, and [A] addition) she did not mention it. What she *said* was,

> *…the term functional articulation disorder encompasses a wide variety of deviate speech* ***patterns****. These can be described in terms of four possible types of acoustic deviations in the individual speech sounds: omissions, substitutions, distortions, and additions. An individual may show one or any combination of these deviations.*

How interesting it is to find that as early as 1959 SLTs in Britain and SLPs in the United States had an agreed definition and terminology and included the notion of speech *patterns* when they described speech development and disorders. Nonetheless, it is noted that they did so without considering speech sounds' organisation and representation, cognitively. The 'phoneme', and abstract theoretical constructs like it, were the domain of clinical linguistics, and it would not be until 20 years or more after the formulation of the British and American definitions that the beginnings of practical 'assessment connections' and 'therapy connections' (Grunwell, 1975; Ingram, 1976) would be forged between phonological theory and SLP/SLT practice.

In the UK and Australia, the name 'dyslalia' remained in vogue until the 1960s when the preferred US term, 'functional articulation disorder', gained currency. The preoccupation of therapists, in the 1960s through to the mid-1970s, with individual sounds in the so-called 'three positions' (i.e., the initial, medial, and final positions of sounds in words, e.g., for /f/ in *phone*, *sofa*, and *laugh* respectively), still constituted a strictly phonetic, sound-by-sound approach to the problem, somehow isolating the linguistic function of speech from the mechanics or motoric aspects of speech. It is enlightening to return to Grunwell's 1975 critique of contemporary practice and her proposal for a more linguistically principled approach to assessment and remediation than those that evolved from practice in the 1930s.

Functional articulation disorders were graded (subjectively) in severity as mild, moderate, or severe. In the severe category were the children with 'multiple dyslalia' or 'multiple misarticulations' whose speech was generally unintelligible to people outside of their immediate families. It was readily acknowledged that children with severe functional articulation disorders could usually imitate or quickly be taught how to produce most speech sounds (Morley, 1972). In other words, the supposed motor execution problem or 'articulation' disorder appeared to reside in the children's difficulty in employing speech sounds for word production, which they *could* produce in isolation. Intervention concentrated on the mechanical aspects of establishing the production of individual phonemes, one at a time, context by context.

By defining the problem in articulatory terms and focussing in therapy on accurate production, SLPs/SLTs failed to consider something that they already knew—that speech serves as the spoken medium of language in a system of contrasts and combinations that signal meaning–differences. That is, while children acquire the pronunciation patterns of a language and learn the correspondences between articulatory *movements* and sounds, they also discover relationships between *meanings* and sounds.

Linguistic Theory and Sound Patterns

In the 1940s and beyond, linguistics theory blossomed in the hands of Jakobson (1941/1968), who studied child language, aphasia, and phonological universals; Velten (1943), who investigated in the growth of phonemic and lexical patterns in infants; and Leopold (1947), who explored sound learning in the first two years of life. These linguistics developments eventually proved highly relevant to practice, but, in and around the World War II period, the profession tended towards neurology, physiology, psychology, and psychiatry for elucidation, and not linguistics or education. By the 1950s, however, the literature revealed that scholars knew something more was going on in speech besides auditory, visual, and tactile perception and motor execution of sounds. The idea of an inner process or underlying representation as a clinical construct was imminent. Eisenson (1968) talked about symbol formation; Goldstein (1948) and Myklebust (1952) alluded to inner language; and Osgood (1957) used two terms: mediation and psycholinguistic processing.

The linguistic linkage that enticed speech-language clinicians to consider speech disorders in terms of sound systems or patterns came when generative linguists Chomsky and Halle (1968), expounded distinctive features theory in *The Sound Patterns of English*, a book so influential in linguistic circles that it is commonly referred to as SPE (see, Zsiga, 2020, pp. 53–86 for details). Contemporaneously, Ferguson (1968) looked at contrastive speech analysis and phonological development (see also, Ferguson, 1978; C. Ferguson & Farwell, 1975; Ferguson et al., 1973). Stampe (1973, 1979) forged another link, but this time in

natural phonology, leading most saliently for SLP/SLT to Ingram's innovative work (Ingram, 1974, 1976) uniquely dedicated to the understanding of disordered speech, and to Grunwell (1975, 1981) who was similarly motivated.

Clinical Phonology

The application of phonological theory to child speech practice has a chequered history. From her 2020 vantage point, Stansfield in the UK recalls:

> *Many older SLTs speak of being trained mainly to work with 'articulation' difficulties, and it was not until the late 1960s that linguistics raised its head in the speech therapy world, with pragmatics coming later still. On my own course, we had only one hour a week of linguistics for three terms. My 'finals' case book from 1972 described 13 'patients' in detail (present-day students take note, 13!). There is little evidence anywhere in the case book that this linguistic theory was put into practice, although language tests were reported … as was working with people to increase language, and articulation, voice, and fluency skills.*
>
> Stansfield, 2020a

In the 1970s, linguists and SLPs/SLTs were talking to each other about language in general and clinical phonology particularly. Finally, what SLPs/SLTs had perceived as multiple individual errors were seen as sound class problems, involving multiple members of those classes.

Two phonologists, Pamela Grunwell, and David Ingram were on a mission to help SLPs/SLTs apply phonological principles (see Chapter 4) to treating children with 'phonological disability'; and many clinicians, myself included, devoured everything they wrote! Clinical phonology, according to Grunwell (1987), a British linguist working in the UK, was the clinical application of linguistics at the phonological level. Ingram (1989a), an American working at the University of British Columbia at the time, said phonology embraced the study of: (1) the nature of the underlying representations of speech sounds (how they are stored in the mind); (2) the nature of the phonetic representations (how the sounds are articulated); and (3) phonological rules or processes (the mapping rules that connect the two) as shown in Figures i3 and i4. In the United States, Elbert and Gierut (1986) and Stoel-Gammon and Dunn (1985) provided further theoretically principled guidance in books about assessment and intervention.

The most radical aspect of the new principles was the concept of changing phonological patterns by stimulating children's underlying systems for phoneme use. Sections of the clinical community were apprehensive. Would the theoretical paradigm shift bring big changes to familiar therapy approaches, goals, procedures, and activities? Mark Fey mitigated these uncertainties in a reassuring article, in which he wrote:

> *. . . . adopting a phonological approach to dealing with speech sound disorders does not necessitate the rejection of the well-established principles underlying traditional approaches to articulation disorders. To the contrary, articulation must be recognized as a critical aspect of speech sound development under any theory. Consequently, phonological principles should be viewed as adding new dimensions and new perspectives to an old problem, not simply as refuting established principles. These new principles have resulted in the development of several procedures that differ in many respects from old procedures yet are highly similar in others.*
>
> Fey, 1985, p. 255

In their response to Q3., Nicole Müller and Martin Ball, both linguists, explore the development of the application of linguistic sciences to speech SLP/SLT practice.

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Q3. Nicole Müller and Martin J. Ball: Application of Linguistic Sciences

Crystal (2001) defined clinical linguistics, which originated in the 1970s, as 'the application of the linguistic sciences to the study of language disability in all its forms'. It has become an independent discipline, with its own scholarly association and a peer-reviewed journal, as well as being a core curriculum subject in the education of SLPs/SLTs. On one hand, it informs SLP/SLT assessment, target selection, and intervention practices, and on the other, it provides a tool for the critical evaluation of competing linguistic theories and methodologies. In the process, each discipline impacts the other. How did these two-way influences evolve, and what, in your estimation, are the contributions of clinical linguistics to SLP/SLT practice and vice versa? Since the previous editions of this book, there has been an increase in therapists working with children with speech sound disorders in the predominantly English-speaking, industrialized world. More recently, there has been a striking and necessary rise in telepractice (Williams, Thomas, & Caballero, A46.). Have these changes brought with them new roles and research directions for clinical linguists?

A3. Nicole Müller and Martin J. Ball: Clinical Linguistics (and Phonetics)

Students of speech-language pathology/therapy (SLP/SLT) at times find it difficult to understand why we burden them with the study of linguistic (and phonetic) theory. To clinical linguists and phoneticians, the motivation is obvious: To us, doing SLP/SLT without a thorough grounding in linguistic and phonetics is like doing engineering without physics: One (physics, or linguistics/phonetics) provides a conceptual basis, and indeed a language and analytical tools, to be able to talk about and do the practical work associated with the other.

The term clinical linguistics gained currency in SLP/SLT and linguistics in the wake of David Crystal's publication of a book with that title in 1981. Crystal defined clinical linguistics as the 'application of linguistic science to the study of communication ability, as encountered in clinical situations' (Crystal, 1981, p. 1) and expanded on this definition later: '[C]linical linguistics is the application of the theories, methods, and findings of linguistics (including phonetics) to the study of those situations where language handicaps are diagnosed and treated' (Crystal, 1984, p. 31). In other words, clinical linguistics provides the theoretical backbone to develop tools for use in SLP/SLT. Other linguists have used a wider definition and include, under the umbrella term clinical linguistics, research that uses data gathered from participants with a variety of language disorders to test hypotheses and models formed based on typical language, or more often, based on native speaker intuition and introspection of how language works (see for example, Ball & Kent, 1987; Müller & Ball, 2013, for further discussion).

Like other scientists and philosophers, linguists construct categories and build models that aid them in thinking about phenomena they encounter in the real world. In other words, they build theories to understand the world we live in. The theories and interpretive categories we use to analyse language produced by people

with a variety of language disorders, to develop assessment and diagnostic procedures, and to better understand the defining characteristics of language disorders are imports into the clinical domain: There are no linguistic theories applied to disordered language that don't start out as theories of typical language. Most modern linguistic frameworks, including phonological theories, have been applied in the clinical context. Some aspiring or practising clinicians may, on reading this, think, 'but I'm not interested in all this theorizing. I want to know which tools to use in practice.' We need to keep in mind, though, that we can't think without theorizing, and categorizing: Thinking, talking about, and striving to understand any phenomenon necessarily involves building models and theories. The labels and categories that SLPs/SLTs use to analyse the characteristics of disordered language (or speech) rest on a set of assumptions about the nature of the phenomena analysed, and these assumptions can differ dramatically between different theories of language. Further, when we use categories and labels provided by linguistic theories, we also need to ask ourselves whether we use them as descriptive and analytical devices only, or whether we assume that the categories we use represent psychological or mental realities.

Generative Theory

There is a sizeable body of work that applies Chomskyan generative linguistics, in its various versions, to the study of impaired language, including phonology. Some key assumptions in generative theory are that language is a modular cognitive system that is independent of other cognitive systems, and that it is a complex of mental representation with a grammar at its core. Modular systems have distinct, clearly separable components (e.g., lexicon, phonology, morphology, and syntax in language). From such a perspective, language impairments are viewed as selective deficits within the mental grammar of a speaker (see for example, Clahsen, 2008; Schulz & Friedmann, 2011). The aim of the linguist working within a Chomskyan generative model is to build a generative account of mental categories and operations. Language use, in the generative tradition of clinical linguistics, is of interest only insofar as it can give insight into the mental representations that give rise to it. This means that for the generative linguist, it is not an object of investigation in and of itself.

Usage-Based Approaches

In contrast, usage-based approaches to language theorize that grammar emerges from general cognitive abilities, and that language learning uses the same cognitive abilities as other types of learning, for instance, the ability to make inferences, categorization, memory, and motoric abilities (see, M. Barlow & Kemmer, 2000, for an overview of usage-based models; Vogel Sosa & Bybee, 2008, on cognitive phonology; Martínez-Ferreiro et al., 2020 for a recent review of usage-based and functional approaches in aphasia). A usage-based approach to language learning gives a crucial role to language use in a continuous process of modifying and building a child's language, which in turn is seen as a dynamic, emergent system. This is very different from considering the role of input as that of a mere trigger for the setting of a finite number of pre-determined parameters in a child's internal grammar (as in the principles and parameters account of generative linguistics).

Implications For SLP/SLT Practice

Why do such differences matter in clinical practice? And why does it matter whether we consider models as aids to our thinking, or as representing mental or psychological reality? Let us consider a concept all SLPs/SLTs have learned about at some point, namely the phoneme. It is typically defined as the smallest unit of sound in any one language that can bring about a change in meaning between words (which gives us the clinically useful notion of the minimal pair or minimal group). Phonemes represent contrastivity in spoken language. If we treat phonemes as entities that have a reality as mental representations in the Chomskyan generative tradition, then we will most likely conceptualize them

as made up of distinctive features, and think of language use, or input, as a trigger for the setting of feature specifications. From this theoretical perspective, it should be immaterial whether an SLP/SLT targets phonemic contrasts in intervention using many different examples of minimal pairs or only a few, since any one minimal pair could serve as a sufficient representation of a target contrast. On the other hand, we can use the term phoneme as a descriptive summary: certain minimal differences between otherwise similar sequences of articulator configurations result in output that represents different meanings. Thus, the syllables /dɪp/ and /tɪp/ illustrate that fortis and lenis plosives in English represent different phonemes. The term phoneme summarizes a complex of cognitive as well as physical processes that link the meanings of words with sound production, hearing, and perception. In other words, the symbols /t/ and /d/ are a very economical way of representing that a fortis versus a lenis alveolar plosive, in an otherwise identical syllable structure, is 'different enough' in English to represent different words with distinct meanings. We can further note that this difference is expressed in word-initial position typically by an aspirated voiceless plosive [tʰ] versus a partially devoiced plosive [d̥], and to these latter categories we typically refer as allophones of their respective phonemes. This way of thinking, in our view, aligns well with usage-based theories of language: From this perspective, phonology is considered as an emergent property of vocabulary learning. In terms of intervention, it would therefore make the most sense to use many different exemplars in input and output to facilitate the emergence of the target contrast.

Communication in Real Life

SLPs/SLTs need linguistics (including phonetics) because linguistic frameworks provide tools to discover patterns in the language (and speech) produced by adults and children with language, speech (or other) impairments, which in turn can contribute to understanding communication successes and breakdowns and inform intervention. We believe that is it most useful to take models as aids to thinking, and a further important assumption that we make about a clinically useful linguistics is that it should be data driven; in other words, the starting point should always be language used in context. This means, in turn, that we need to contextualize theoretical notions by reference to communication in real life: To return to our earlier example, we represent the English phonemes /t/ and /d/ by IPA symbols for static articulatory configurations. However, speech is about movement, coordination, precision, and timing, and about context, and goal setting and intervention must take this into consideration.

A large proportion of clinical linguistic research is, still, on monolingual English speakers. Increasing linguistic diversity in majority English-speaking countries, and the reality of working with multilingual clients represent a significant opportunity for clinical linguists. There are well-established traditions of multilingualism research in sociolinguistics and speech and language development that can inform work in the clinical realm investigating the nature of multilingual language systems, language use (code-switching, for instance), and indeed language and speech norms, which in some multilingual context can be very fluid (see for example, McLeod & Goldstein, 2012, on speech sound disorders; Babatsouli et al., 2017, on language acquisition; Müller et al., 2019, on bilingualism) in the context of rapid language change; (see Pascoe, A39. on the development of speech assessments, normative data, and interventions for children acquiring the languages of Southern Africa).

There is also a well-established linguistic tradition of analysing language use in interaction, for instance, within Systemic Functional Linguistics (see for example, Hersh et al., 2018). The analytical categories used in this tradition, for instance, speech function and exchange structures, will lend themselves to analysing remote therapeutic interaction via telehealth platforms. Remote service delivery and communication with clients have become the norm rather than the exception for many students and clinicians in the wake of the COVID-19 pandemic, and while face-to-face work will remain crucial for many clients, we can confidently predict that telehealth will remain an important mode of communication in SLP/SLT, and thus it represents an important analytic focus for clinical linguists.

Articulation Development

In work whose impact was far-reaching, Irene Poole, a speech teacher at the University Elementary School in Ann Arbor, Michigan, who was pursuing a doctorate, produced a developmental schedule for phonetic development (Poole, 1934). This was consistent with the prevailing, and persisting, view that intervention for speech impairment should be based on typical developmental expectations of 'articulatory proficiency'. Other accounts of phonetic mastery criteria have followed, up to the time of writing. They include (Arlt & Goodban, 1976; Kilminster & Laird, 1978; Prather et al., 1975; Sander, 1972; Smit et al., 1990; Templin, 1957); and, through to more up-to-date, peer-reviewed accounts of acquisition by Crowe and McLeod (2020), McLeod (2022, pp. 57–108), and McLeod and Crowe (2018).

A study of phonetic age-norms by Kilminster and Laird (1978) involved single-word citation naming by children aged 3;0–8;6 (years;months) in Queensland, Australia, with the aim of determining the ages, in years and months, by which 75% of children had mastered 24 English phones. Most developmental profiles of phonetic acquisition are similarly structured, but Shriberg (1993) took a fresh approach when he produced a clinically useful breakdown of the 'early-8', 'middle-8' and 'late-8' acquired sounds, based on monosyllabic words in conversational speech samples: reflecting the approximate *order* of acquisition rather than approximate *ages* of acquisition. The norms provided by Kilminster and Laird, and Shriberg's early-, middle- and late-8 are contrasted in Table 1.2, together with a more recent study (McLeod & Crowe, 2018).

It is common for SLPs/SLTs to show parents a consonant acquisition chart in explaining their child's speech development progress. When this relates, for example, to a five-year-old who is essentially on-track with just /ʤ, ʧ, ʃ and ʒ/ missing or erred this can be helpful and potentially reassuring for the parent in the sense of the difficulty being mild or moderate, with not much delay in development. The clinician might then show them the McLeod and Crowe (2018) order of acquisition, explaining reassuringly that the child '*has all her four- to five-year-old sounds except /ʤ/ and /ʧ/ and all her five- to seven-year-old sounds except, /ʃ/ and /ʒ/*'. On the other hand, if the child is a 12-year-old with an intellectual impairment and a limited phonetic inventory, it is somehow less dispiriting for parents if the therapist focuses on *order* rather than *age* of acquisition, by saying something like, '*she's conquered all 13 of the early sounds and /v/ from the middle sounds, so she's over halfway there, with 10 sounds to go*'.

McLeod and Crowe's 'new norms', especially for /ɹ/, flagged a potential impact on service eligibility and funding for students within US schools (Storkel, 2019) triggering a social media kerfuffle (Harold, 2018; updated 2019, 2020), among US

Table 1.2 Developmental schedules for phonetic development of English-speaking children in Australia (1978), the United States (1993), and internationally (2018)

Age of acquisition **Kilminster & Laird, 1978**[a] **Australian children**	**Order of acquisition** **Shriberg, 1993**[b] **United States children**	**Order of acquisition*** **McLeod & Crowe, 2018**[c] **English-speaking children**
3;0 p b t d k g m ŋ w j h	Early 8	Early 2;0–3;11
3;6 f	m n j b w d p h	p, b, m, d, n, h, t, k, g, w, ŋ, f, j
4;0 l ʃ ʧ		
4;6 s z ʤ	Middle 8	Middle 4;0–4;11
5;0 ɹ	t ŋ k g v ʧ ʤ	l, ʤ, ʧ, s, v, ʃ, z
6;0 v		
8;0 ð	Late 8	Late 5;0–6;11
8;6 θ	ʃ ʒ l ɹ s z ð θ	ɹ, ʒ, ð, θ

*McLeod & Crowe list consonants in age of acquisition order, from youngest to oldest.
[a]Data source: single-word citation naming of picture stimuli.
[b]Data source: monosyllabic words in conversational speech samples.
[c]Data source: single words; 90–100% acquisition criteria averaged across eight studies.

SLPs. Many were applying the Smit et al. (1990) norm of 8;0–8;11 for /ɹ/ far later than McLeod and Crowe's (A42) 5;0–5;11.

Regarding /r/ and /ɹ/, in phonetics /r/ is the voiced alveolar trill that is present, for example, in Scottish English and Spanish. The R-sound we hear from most English speakers is the voiced, alveolar (or postalveolar) approximant /ɹ/. In the SLP/SLT literature, particularly in older US publications, /ɹ/ and [ɹ] are (incorrectly) rendered as /r/ and [r]. Speakers of rhotic varieties of English pronounce the 'R' as /ɹ/ in words like *red* [ɹɛd] and *barrow* [ˈbæɹoʊ], and as the rhotic vowels /ɝ/ or /ɚ/ in words such as *butterfly* [ˈbʌtɚˈflaɪ], *dollar* [ˈdɑlɚ], *cracker* [ˈkɹækɚ], *first* [fɝst], *turning* [ˈtɝnɪŋ], terse [tɝs] and *church* [ʧɝʧ]. Most people in the United States speak a rhotic variety of English, so the 'R-norms' for that language group cover /ɹ/ and the rhotic vowels /ɝ/ and /ɚ/. For more on American phonetics, refer to Shriberg et al. (2018) and see Flipsen Jr. A37 on treating R-errors.

Entertaining the *possibility* that consonant acquisition data drawn from children in the United States might differ from English-speaking children's speech data from elsewhere due to differences between word position, transcription, and analysis conventions, Crowe and McLeod (2020) reviewed age of acquisition information specifically intended to guide SLPs working with US children acquiring English. Their study, which included English consonant acquisition data from close to 19,000 children living in the United States (see Table 1.3), echoed their 2018 cross-linguistic findings. It is pleasing that Crowe and McLeod (2020), McLeod and Crowe (2018), and Storkel (2019) are openly accessible; 'pleasing' because,

> *These data inform SLPs' clinical decision making and consideration of eligibility for services to support best practice to enhance children's communicative competence.*
>
> Crowe & McLeod, 2020, p. 2167

Clinically relevant normative data began emerging in the 1970s when practice was heavily influenced by the medical model and American behaviourism; 'SODA' articulation analysis of errors of (S) substitution, (O) omission, (D) distortion and (A) addition; and 'Traditional Articulation Therapy'

Table 1.3 Developmental schedule for phonetic development of English-speaking children in the United States (2020)

Order of acquisition*
Crowe & McLeod, 2020[a]
United States children
Early 2;0–3;11
b, n, m, p, h, w, d, g, k, f, t, ŋ, j (all stops, nasals, and glides)
Middle 4;0–4;11
v, ʤ, s, ʧ, l, ʃ, z
Late 5;0–6;11
ɹ, ð, ʒ, θ

*Consonants are listed in order of age of acquisition from youngest to oldest.

[a]Data source: single words; 90% acquisition criteria across 15 studies of typical speech

(Van Riper, 1978; C. Van Riper & Erickson, 1996). Van Riper Therapy, or at least close variations of it, continued, and continues to be widely implemented.

> *Any contemporary view of treatment needs to stress what is new. Thus, non- contemporary roots might cause clinicians to not take traditional motor approaches seriously. In addition, after so much emphasis has been placed on analyzing our clients' phonemic systems, clinicians wonder whether a traditional phonetic approach should still be used. It should be; there is definitely a place for these methods in our contemporary understanding of speech sound disorders and their remediation. These procedures are certainly used as a part of many phonological treatment procedures. … there might be a time in the course of every treatment, for articulation or phonological disorders, when these principles could be used briefly to obtain a specific sound.*
>
> Bauman-Waengler, 2020, p. 271

When Brumbaugh and Smit (2013) surveyed 2,084 US clinicians working with 3–6-year-olds, they mustered 489 usable responses. Of the 489, 49% *often* or *always* used traditional intervention with children with SSD, and 33% *sometimes* did. These findings were like those of Joffe and Pring (2008) in the UK; Pascoe et al. (2010) in South

Africa; McLeod and Baker (2014) in Australia; Oliveira et al. (2015) in Portugal; Hegarty et al. (2018) in the UK; Hegarty et al. (2020) in Northern Ireland; and L. M. Furlong et al. (2021) in Victoria, Australia.

Traditional Articulation Therapy and Eclectic Practice

Eclectic or hybrid approaches (Lancaster et al., 2010; Joffe, A23; McLeod & Baker, 2014) may see SLPs/SLTs:

- Mismatching assessment and intervention processes, e.g., using a 3-position articulation test to determine treatment targets for a phonological intervention such as Multiple Oppositions Intervention (Williams, A19).
- Mingling interventions, e.g., administering a mix of *Metaphon* (E. C. Dean et al., 1995) and Core Vocabulary Therapy (Dodd, 2005).
- Combining *components* of different approaches that are associated with reasonable levels of evidence when administered as part of a 'package', according to an empirically validated protocol. Such amalgamations might include delivering aspects of the Nuffield Dyspraxia Programme (Williams A33) with aspects of Language-Based Intervention for Speech and Language Disorders (Tyler, 2002).
- Cherry-picking screening, assessment, and intervention processes that they 'like', or that the client will at least tolerate, or at best enjoy, to devise their preferred blend of assessment and intervention approaches, procedures, and activities.

As Wren et al. (2018, p. 417) sniped, *clinicians tend to favour the use of just two or three named approaches, often combined into one eclectic package, presumably with the expectation that one of the elements within the package will target the child's specific needs*.

L. M. Furlong et al. (2021) described their exploration, via guided interviews, of the *intervention processes* that 11 Australian SLPs working in the state of Victoria used to treat children with SSDs, defining *intervention processes* as

> *…the series of therapeutic actions and steps directed toward remediation of an SSD. These therapeutic actions and steps broadly relate to target selection, selection of a therapy approach, and the structural and procedural aspects of therapy sessions.*
>
> L. M. Furlong et al., 2021, p. 3

They found that SLPs frequently worked eclectically, employing a mixture of four intervention procedures: minimal pair activities, traditional articulation approaches, auditory discrimination, and *Cued Articulation* (Passy, 2010).

Cued Speech was developed by R. Orin Cornett (b. 1913 d. 2002) in 1966 as a visual system of communication used with and among deaf or hard-of-hearing people. By contrast, *Cued Articulation* is a system of logical hand cues, and colour-coded letters (e.g., green for /s/ and /z/, pink for /f/ and /v/, purple for / tʃ/ and /ʤ/). It was first published in 1986, to aid in teaching children to say 26 consonants and 23 vowels. It remains popular among SLPs in Queensland, and in Victoria where SLP Jane Passy devised it while working with children with severe speech and language problems. Teachers trained in the technique applied it in literacy classes. Passy also ran training courses for teachers in the UK where Joffe and Pring (2008) found that 30.6% of the British SLTs they surveyed used *Cued Articulation* for speech intervention often/always; 26% sometimes; and 42% rarely/never. Helen Botham continues Passy's work, focusing on literacy, particularly phonological awareness (PA) and improving teacher knowledge of the links between PA and reading. (Botham, 2020). An innovation was a *Cued Articulation App* for iPad and Android tablets (Passy et al., 2014).

L. M. Furlong et al. (2021) further found that SLPs based their choices of initial therapy targets on typical order of acquisition criteria, or child or family preferences as to 'what to work on', prioritising clients' needs in choosing therapy targets, and in their choices of therapy approaches.

The eclecticism story recurs internationally. For example, Joffe and Pring (2008) surveyed UK SLTs, and reported that they combined three 'therapies': auditory discrimination, meaningful minimal contrast, and phonological awareness that addressed

different levels of input and output processing (see Schäfer & Fricke A21). Also in the UK, Lancaster et al. (2010) combined perceptual processing (e.g., phonological awareness), and production tasks. Pascoe et al. (2010) in culturally and linguistically diverse (CALD) Western Cape, South Africa found that their 28 survey participants used a wide variety of therapies, eclectically with few adhering to a single approach to treating SSD. They deemed this appropriate in their local context, given their CALD demographic and the frequent need for clinicians to improvise (e.g., by administering informal assessments only). They ranked the therapies participants implemented, in most to least popular order as: 1. Auditory discrimination, 2. Phonological awareness (Gillon, 2000), 3. Parent-based programs, 4. Articulation work/motor-skills training (Van Riper & Emerick, 1984), 5. Core vocabulary (Dodd, 2005), 6. Meaningful minimal-contrast pairs (Weiner, 1981a, 1981b), 7. Cued articulation (Passy, 1990) and 8. Whole language approach (Hoffman et al., 1990), followed by seven that were less popular.

In Portugal, Oliveira et al. (2015) built on Lousada et al. (2013) and found that therapists combined phonological awareness, auditory discrimination, and meaningful minimal contrast therapy. They commented that '*The great majority of SLTs combined several approaches in their intervention. There was also a high percentage of SLTs that used articulation-based approaches, namely articulation work (31%) in cases of phonologically based disorders*.' (p. 182).

In Britain, Hegarty et al. (2018) revealed a similar but more arresting example of 'articulation work' as the fourth most popular approach for phonological impairment, which they called 'phonological SSD' in their survey, reflecting its cognitive-linguistic basis. They conducted a UK-wide survey of 166 therapists' management of children with phonological impairment, which included inconsistent speech disorder (Dodd, 2005). Disappointingly, they found that close to half of their respondents '*always or often used traditional articulation therapy to remediate phonological impairment, even though this approach has been found to be less effective for this difficulty*' (p. 995). The SLTs used speech discrimination (79.5%), conventional minimal pairs (77.3%), phonological awareness therapy (75.6%), and traditional articulation therapy (48.4%).

Following Hegarty et al. (2018), Hegarty et al. (2020) concluded, from focus groups and interviews with SLTs in Northern Ireland, that '*There is a research-practice gap in which SLPs' current practices are driven by organisational factors, their own preferences and child-specific factors*.' Their participants suggested that the development of time-saving, evidence-based tools might help address this gap.

In their 2021 article, Furlong et al. considered eclecticism problematic, because

1. Implementation fidelity (Baker A26.) for both content and dose of the various therapy elements is difficult to replicate and measure; and
2. the therapies often used within eclectic frameworks may only be supported by evidence for their isolated use, not in combination with other therapies.

Revolution?

Did the hackneyed term 'paradigm shift' (Kuhn, 1962) exaggerate what happened? *Was* there a phonological revolution? *Did* the new principles change practice? Certainly, there were changes in the way some SLPs/SLTs understood phonological *theory* and chose *assessments* (e.g., Grunwell, 1975, 1985a; Hodson, 1980; Hodson & Paden, 1981; Ingram, 1981; Shriberg & Kwiatkowski, 1980; Weiner, 1979), but did the *intervention* work of Elbert, Dunn, Gierut, Grunwell, Hodson, Ingram, Paden, Stoel-Gammon, and others alter what happened in therapy? The answer probably must be, 'not much'.

Indeed, Barbara Williams Hodson, co-developer with Elaine Pagel Paden of patterns/cycles therapy (Hodson & Paden 1983, Hodson & Paden, 1991), bemoaned SLPs' devotion to sound-by-sound therapy in 2004. Interviewed by Thinking Publications (2004), for their website, she said, '*The one thing I wish most is that SLPs would work on patterns when serving an unintelligible child, rather than to focus on teaching isolated sounds to a criterion*'. Apparently, little had changed by 2013, when Brumbaugh and Smit reported that 33% of their American respondents frequently used the cycles phonological patterns approach and suggested that '*SLPs who treated preschoolers were using hybrid interventions, influenced primarily by traditional intervention, but also by minimal pairs and cycles approaches*' (p. 316).

Where the questions in this book are directed to more than one author, thumbnail biographies appear before their Q&A in the order in which they appear on the piece. The only exception is Q5/A5, where Dr. Hodson's bio appears first, as a courtesy and to reflect her high standing within the profession.

Dr. Barbara Williams Hodson is a Professor Emerita at Wichita State University. Dr. Hodson has published two phonology tests (one in Spanish), a computer software program, and three books, which include *Evaluating and Enhancing Children's Phonological Systems: Research and Theory to Practice*, research articles in scholarly national and international journals, and numerous textbook chapters. She has delivered clinical phonology presentations nationally and internationally. Her major professional goal has been to develop more effective assessment and remediation procedures for children with highly unintelligible speech. Dr. Hodson has been recognized by peers with, among other tributes, the American Speech-Language-Hearing Foundation's Frank R. Kleffner Lifetime Clinical Career Award (2004), the Wichita State University's (WSU) Excellence in Research Award (2008), and the highest award of the profession in the United States, ASHA Honors (2009). Dr. Hodson established the Barbara Williams Hodson Scholarship in Communication Sciences and Disorders in 2012 to recognize and reward outstanding researchers in the WSU College of Health Professions.

Dr. Raul F. Prezas is an Associate Professor in the Department of Speech and Hearing Sciences at Lamar University in Texas. He has over 15 years' of clinical experience in university, public school, and home health settings; particularly working with culturally and linguistically diverse populations. His interests include speech disorders, phonological development, bilingual/multicultural assessment, and treatment, working with children with highly unintelligible speech, and phonological treatment models and outcomes. In addition to publications in several journals, including the *American Journal of Speech-Language Pathology*, he has written several book chapters and articles related to his interest areas. He served on the International Expert Panel on Multilingual Children's Speech, which included efforts to establish international screening tools and guidelines for speech sound assessment and treatment in various populations. He is a member of ASHA's Continuing Education Board. Dr. Prezas has been invited to present his research and share his experiences at numerous workshops, webinars, and conventions throughout the United States and its unincorporated territory Puerto Rico; and Canada, Chile, England, Scotland, and Wales.

Dr. Lesley C. Magnus is a Professor in the Department of Communication Sciences and Disorders at Minot State University in North Dakota. She has worked in the field for more than 35 years as a clinician, teacher, and mentor. After 10 years of clinical work in Paediatric SLP, Dr. Magnus returned to Wichita State University to complete her Doctor of Philosophy in Communication Disorders and Sciences under Dr. Barbara Hodson. Magnus' professional interests and work lie in the areas of phonology, speech sound disorders, working with children with highly unintelligible speech, cleft lip and palate, and early language disorders in children. Dr. Magnus has co-authored book chapters and articles related to her interest areas. Dr. Magnus is a certified S-LP(C) and SLP in Canada and the United States, respectively. In addition, she is past president of the Saskatchewan Association of Speech Language Pathologists and Audiologists. At her university, Dr. Magnus won The Most Dedicated Advisor in 2015 and the Academic Advisor of the year in 2021. She presents locally, nationally, and internationally on the topics of Phonological Intervention.

Q5. Raul Prezas, Lesley Magnus, and Barbara Hodson: A Phonological Patterns Focus

Professor Hodson, a clinical phonology pioneer and household name in SLP/SLT circles, has pursued at least three long-standing clinical interests. First, helping children with difficult-to-understand speech to achieve intelligibility. Second, the initial and ongoing expansion of the Cycles Phonological Pattern Approach (CPPA) and within that, the role of metaphonology. And third, implementation of CPPA with multilingual populations.

In previous editions of this book, she discussed some possible reasons why many clinicians in the United States still focus on mastering phonemes one-at-a-time until a pre-specified criterion is reached, even when working with children who have highly unintelligible speech. For the third edition, I put the following questions to Dr. Hodson and her co-authors, Drs Prezas and Magnus.

Does the apparent resistance to working 'phonologically' and focusing on speech patterns persist, and if so, why might that be? Do SLPs/SLTs have other concerns about CPPA's implementation? What is 'metaphonology' and why is it integral to CPPA? What recommendations are there for applying CPPA when working with bilingual children at the severe end of the phonological disorder scale, including Spanish-speaking children and others with culturally and linguistically diverse (CALD) backgrounds?

A5. Raul Prezas, Lesley Magnus, and Barbara Williams Hodson: The Cycles Phonological Pattern Approach: Expediting Intelligibility

In our experience, there is an increasing body of clinicians who understand that children with highly unintelligible speech require intervention that goes beyond the traditional phoneme-oriented approach. Social media has been helpful in conveying this message and clinical researchers (e.g., Dr. Kelly Farquharson Bevens on Instagram @classlab_fsu) and clinicians (e.g., Amy Graham, also on Instagram @grahamspeechtherapy) and others, use social media platforms to impress on their followers that a *phonological* intervention is essential for many children. While clinicians are now more inclined to focus on phonological patterns there remains a need for further clarification of the 'what', 'when', and 'how' of specific treatment targets to use. Furthermore, graduate students' and practitioners' effectiveness as interventionists is heightened when they are imbued with the principle that target selection for this highly unintelligible population involves a careful, individualized process of balancing complex sounds (within the child's Zone of Proximal Development; Vygotsky, 1962) and earlier developing sounds in a theoretically sound framework.

Expediting intelligibility in highly unintelligible children remains a central undertaking for SLP/SLT practitioners. Drawing on our experience of delivering CPPA workshops in the United States, the UK, and New Zealand, we perceive that choosing appropriate targets, and not clinicians' resistance to a phonological approach, is now the main concern. Unfortunately, many recently qualified US SLPs still report that while they learned about various phonological interventions as graduate students, they are not taught either in classes or in clinics *how* to provide pattern-oriented treatment. Accordingly, they are often astounded in our workshops at the gains in clients' intelligibility with one hour per week of patterns-oriented intervention over 24 months, or fewer.

The CPPA

The *Cycles Phonological Pattern Approach: CPPA* (Hodson, 2010; Prezas et al., 2021) is based on several decades of clinical practice and research and is designed specifically for children 2;5 to 14;0 with highly unintelligible speech (in the severe to profound range, with a score of 101–150 or >151 respectively on the 2004 *Hodson Assessment of Phonological Patterns-3* (HAPP-3)). The HAPP-3 is a pattern-oriented assessment that helps to identify major phonological error patterns requiring intervention. It employs object and picture stimuli to collect a 50-single-word sample. Major error patterns are classified as omissions of sound segments, major substitutions, major assimilations, syllable-structure/context-related changes, voicing alternations, and other deviations/distortions.

CPPA offers a model with clear target pattern guidelines that eliminate guesswork in determining which patterns to target and when. Initiated in 1975 in an experimental clinic for young children, aged 3;6 to 8;10 with highly unintelligible speech, CPPA was a response to the observation that some children required years of intervention to 'master' all the sounds and word structures (see Hodson & Paden, 1991). Clearly, an alternative approach was needed and, in the mid 1970s, Grunwell (1975) and Ingram (1976) helped practitioners and researchers see beyond individual phonemes. When broad patterns were targeted via CPPA, children's intelligibility gains were enhanced, and progress occurred more rapidly than was typical with a sound-by-sound approach.

Practical guidance for clinicians has arisen from CPPA's implementation over the years. First, for example, singleton /s/ and even /f/ are often mistakenly targeted initially with highly unintelligible clients who 'stop' fricatives (e.g., replacing /s/ and /f/ with [t]). When such children attempt to produce word initial /s/, they may produce /s/ accurately, but then insert /t/, so that *sun* becomes *stun*. Once children have been taught to delete /t/ and can say *sun*, words with /s/+stop clusters are produced with /s/ singletons (e.g., *stun* becomes *sun*). Therefore, it was hypothesised that targeting /s/ clusters before /s/ singletons might be more expedient for this client population. Moreover, as children start incorporating /s/ clusters into conversational speech, their intelligibility improves (e.g., Gordon-Brannan et al., 1992).

Second, children with highly unintelligible speech need practice with all their error types. Targeting phonological patterns in cycles, in time periods varying from 5 to 16 hours depending on each child's needs, was explored at the first experimental phonology clinic (Hodson & Paden, 1991) and adjusted frequently to establish appropriate frequency and duration of treatment cycles.

Typically, a consonant phoneme or two-element consonant cluster (e.g., /st/) is targeted for 1 hour per week, in one 60-minute session, two 30-minute sessions, or three 20-minute sessions, with each pattern usually targeted from 2 to 5 hours in aggregate per cycle. This timeframe is increased to 120 minutes per target for children with cognitive delays (Berman, 2001). Thus, targets for the CPPA are Phonological Patterns (e.g., syllables or 'syllableness'; final consonants). Training individual phones in particular word positions (e.g., initial /b/) may be done as an intermediary step but not as a goal.

Some SLPs/SLTs may consider CPPA and think, 'wait a minute, why am I targeting /b/, I thought this was a patterns approach?' By way of explanation, it can be beneficial to introduce a placeholder sound, that a child can produce well, for certain phonological patterns (e.g., initial consonants; final consonants). Therefore, in this case, /b/ is targeted as a 'placeholder' for word-initial consonants. This provides them with accurate kinaesthetic feedback for the sound, correctly produced in a real word and in a position of the word where an error pattern is occurring. This in turn provides them with a kinaesthetic image, where the term 'kinaesthetic image' refers to the brain's perception of relative movements and positions of body parts (see the servomechanism explanation by Fairbanks, 1954). To introduce a placeholder for /b/ you might choose 'buy' (if the child says it correctly) and do activities around 'buy' in the session. Placeholder sounds often, but not necessarily, involve the early developing /p, b, m, or w/ (noting that /w/ does not occur in same languages).

Theoretical and Underlying Concepts of CPPA

The CPPA is based on developmental phonology theories, cognitive psychology principles, and ongoing clinical phonology research. It is aligned most closely with two theories: Gestural Phonology (Browman & Goldstein, 1986, pp. 219–252; Prezas et al., 2021) and Dynamic Systems (De Bot et al., 2007; Rvachew & Bernhardt, 2010). It is based on eight underlying concepts, listed in Table A5.1 (Hodson, 2010; Hodson & Paden, 1991).

It is important to note that articulatory difficulty is increased gradually throughout the CPPA so that the child is optimally challenged but successful in producing target words from the outset. Most children between the ages of 3;0 and 5;0 with initial intelligibility below 20% have become essentially intelligible within 3 to 4 cycles (i.e., approximately 30 to 40 contact hours) and simultaneously demonstrated significantly improved phonological systems (e.g., Gordon-Brannan et al., 1992).

CPPA addresses a combination of earlier developing sounds and complex patterns and aligns with Vygotsky's Zone of Proximal Development (ZPD; Vygotsky, 1962). Following ZPD, later developing sounds (e.g., liquids) and sound combinations (clusters) are combined with earlier developing sounds

Table A5.1 Underlying concepts

1	Children with 'normal' hearing typically acquire the adult sound system primarily by *listening*.
2	Phonological acquisition is a *gradual* process.
3	*Phonetic environment* in words can facilitate or inhibit correct sound productions.
4	Children associate *auditory* and *kinaesthetic* sensations that enable later *self-monitoring*.
5	Children *generalise* new speech production skills to other targets
6	An optimal '*match*' facilitates learning.
7	Children learn best when they are *actively involved/engaged* in phonological remediation.
8	Enhancing child's *metaphonological* skills enhances the child's speech and early literacy skills.

Source: Adapted from Hodson (2010)

(Prezas et al., 2021). This creates a balance between more stimulable patterns and complex and later developing targets at an optimal moment within a child's ZPD.

Non-stimulable sounds should be addressed to *make* them stimulable, but not targeted for production practice until the child produces them correctly, noting that stimulable sounds and patterns show greater generalization than those that are non-stimulable (Rudolf & Wendt, 2014).

Targeting Phonological Patterns

Typically, a phoneme (e.g., a stop such as final /k/), cluster (e.g., an initial /s/ cluster), or syllable structure (e.g., final consonants) is targeted for 1 hour per week. At least two exemplars (e.g., initial /sp/ and /st/) of the current target are presented before moving to another sound class (e.g., velars, liquids), cluster (e.g., final /st/), or syllable structure (e.g., weak, or unstressed syllables) within the cycle.

Most target patterns are recycled one or more times with gradually increased articulatory difficulty in each successive cycle. Table A5.2 provides information about the typical CPPA session structure.

Ongoing clinical research has seen phonological patterns classified as *Primary* (those targeted first and recycled as needed until they began emerging in conversational speech) and *Secondary* (see Figure A5.1).

Stimulability, Amplification, and Imagery

It is critical that the child be *stimulable* for their targets, and this may require tactile cues and amplification at first. Once stimulable, the child begins to develop an accurate kinaesthetic image. Continued use of amplification aids in this process. We use a small portable battery-operated amplifier and child-sized headphones and have elicited sounds with the amplifier that had remained non-stimulable when other methods were employed. Sounds that are initially non-stimulable (e.g., /k/) are worked on ('facilitated') for a few minutes each session and are targeted when the child achieves stimulability. If non-stimulable sounds are targeted, repeated incorrect production can be counterproductive because they reinforce the inaccurate kinaesthetic image (Prezas et al., 2021).

Metaphonology as an Integral Component of CPPA

Learning to read and spell an alphabetic language requires children to understand that sounds in spoken words can be represented by letters on a page (Hodson, 2010). This is called sound-symbol association or phoneme-grapheme correspondence and is an aspect of metaphonological awareness. It is critical for literacy acquisition because it underpins children's ability to make phoneme-grapheme connections rather than attempting to memorize whole words. Children who can make such connections are primed to use these strategies in reading, written expression, and spelling.

Table A5.2 Typical Clinical Session Structure

1	**Review**	Child produces practice words (depicted on large index cards) from the previous treatment session.
2	**Listening Activity**	Clinician reads approximately 20 words using slight amplification (this takes 30 seconds). Child then says new production-practice words for the day while still wearing amplifier headset.
3	**Experiential-play motivational production-practice activities**	Child says practice word by naming picture or object with correct production of the target pattern for the session before 'taking a turn'. Clinician provides assists (e.g., modelling, tactile cue) as needed so that the child achieves 100% 'correctness' for the target pattern in the practice words.
4	**Metaphonological Activity**	Incorporation of a metaphonological activity: (e.g., rhyming, syllable segmentation).
5	**Probing**	Probing by clinician to determine optimal target (e.g., singleton phoneme, consonant cluster) for next session's target pattern.
6	**Listening Activity**	Second reading of week's listening list with slight amplification (by parent if possible).
7	**Home Program**	Parents/caregivers are given the following from this day's session to practice with their child for 2 minutes every day. (a) week's listening list to read to their child, (b) week's production-practice word (picture) cards for child to name, (c) metaphonological activity (e.g., folder with 4-line rhyme, syllable segmentation)

Children with highly unintelligible speech are predisposed to concomitant deficits in metaphonological awareness and literacy (Prezas et al., 2021). The Critical Age Hypothesis (Bishop & Adams, 1990) tells us that children must be intelligible by the age of 5;6, especially if they also have semantic and syntactic difficulties, or their literacy acquisition may be compromised (Zajdó, A43).

School-age children with moderate to severe phonological impairment, with scores of 50–100 and 101–150 respectively on the HAPP-3, perform poorly on metaphonological tasks (Hodson, 2010). Clinical research findings support the use of metaphonological awareness activities with children who are highly unintelligible (Gillon, 2017, p. 139).

Metaphonological awareness tasks, integrated with phonological intervention, may help children's literacy and aspects of speech (e.g., by working on final consonants *after* focusing on rimes in rhyming activities; Hodson, 2010).

Metaphonological awareness tasks include explicitly identifying graphemes and phonemes, and riming tasks such as nursery rhymes or songs with repetition, syllable segmentation, and alliteration tasks for preschoolers. School-age children can continue these tasks, adding final phoneme identity, blending of syllables and/or phonemes, segmentation of syllables and/or phonemes, and manipulation of phonemes.

CPPA and Multilingual Children with Severe SSD

The CPPA can be adapted to meet the needs of multilingual children with highly unintelligible speech. The eight underlying concepts of CPPA displayed in Table A5.1 are universal and a framework for a Spanish-English CPPA is available (see, Prezas et al., 2021). The primary recommended targets of CPPA align with most languages (e.g., shared versus unshared sounds; see, Kester, 2014). Sounds shared across languages should be targeted first, followed by unshared sounds. Careful selection of targets for multilingual children, taking dialect and language of intervention into account, is needed to preserve the unique linguistic characteristics of CLD children (Prezas et al., 2021). By targeting shared sounds first, clinicians who do not speak the child's L1 (e.g., Spanish) can feel more confident about targeting sounds in the child's L2 (e.g., English) as targeting a shared sound in one language may generalize to the other (Paradis, 2001).

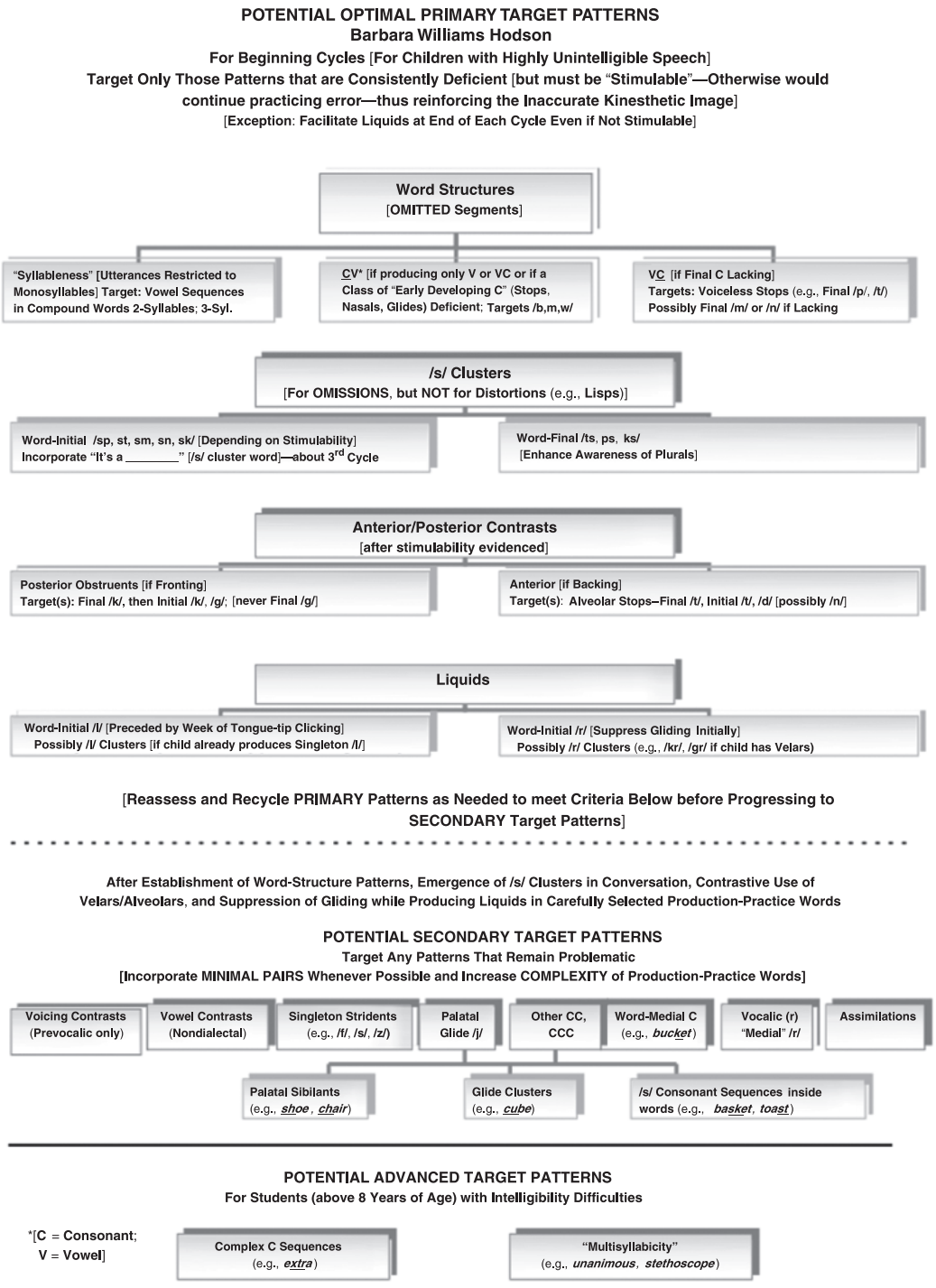

Figure A5.1 Potential optimal primary patterns. (adapted from Hodson, 2010).

Implementing a Bilingual CPPA

The implementation of a bilingual CPPA requires exploration of sounds shared between languages initially, following the CPPA framework in English (see, Figure A5.1).

Begin with shared sounds and then move to unshared sounds in English, assuming English is the child's L2 and SLPs'/SLTs' L1. Note that anterior/posterior contrasts should be targeted with multilinguals before /s/ clusters if there are no /s/ clusters in the L1 (e.g., in Japanese). Many languages have multisyllabic words. Thus, the CPPA concept of 'syllableness' can be targeted in therapy. The term 'syllableness' was coined by Hodson and means the production of the correct number of syllables in multisyllabic words, with the emphasis on including the correct number of syllables and not the phonemic errors (Hodson, 2010).

Singleton Consonants and Anterior/Posterior Contrasts

Many languages have shared phonemes that are phonemes used in *CPPA*. These include: /p/ /b/ /m/ /w/ /t/ /d/ /k/ /g/. Many other languages share these phonemes, or almost do with slight variations in place and/or manner of articulation. Those that correspond fully with the CPPA consonant inventory include most varieties of English, French, Japanese, Tagalog, Bengali (Barman, 2009), and Welsh (S. Munro et al., 2005). Spanish almost corresponds except for /t/ which is dentalised (Prezas et al., 2021) as it is in Vietnamese. In German, /w/ only occurs in loan words. There is no /w/ in Russian either, and /t/ and /d/ are dentalised (Kester, 2014). In the Mahji dialect of Punjabi there is no /w/, and stops may be aspirated (Chohan & García, 2019). Urdu has no /w/, /t/ and /d/ are dentalised and, in some cases, stops are aspirated (Ranjha, 2014). There are slight variations with /t/ and /d/ in Polish (Schwartz, 2019)**.** Singleton consonants can be addressed in the initial position primarily and, in some cases, final position depending on the language. Anterior and posterior contrasts can also be addressed with the languages listed above.

Clusters with /s/, Liquid /l/, Trilled /r/, and Retroflex/Tapped /ɾ/

Clusters and sequences involving /s/ occur in the following languages among others: Welsh has /sb/, /sd/, /sg/ (S. M. Munro et al., 2007), and so does Polish (Schwartz et al., 2019). French and Russian have initial /s/ clusters and so does German with initial /sp/ and /st/ as well as final /st/ (Kester, 2014). The /sm/ occurs in Urdu (Ranjha, 2014). Spanish has /s/ sequences (Prezas et al., 2021).

Liquid /l/ is also shared in other languages (with allophonic variations occurring in some languages). These languages include Spanish, Vietnamese, German, French, Tagalog, Russian (palatal /l/), Polish (lingual dental), Bengali, Urdu, and Welsh. Trilled /r/ and retroflex/tapped /ɾ/ (where noted) occur in Spanish (includes retroflex), Punjabi (includes retroflex), Tagalog (includes retroflex), Bengali, Urdu, and Japanese.

Other Considerations for Multilingual Children

The language abilities of multilingual children (e.g., language strengths and weaknesses) should be monitored in therapy and considered when making clinical decisions about targets for therapy. Communicate with multilingual parents and other family and community members where relevant, speak the language of kindness, honour their names, and encourage families to continue to speak to their children in their home, more dominant language (Goldstein, A41.; Palafox, 2019). Monolingual English-speaking SLPs/SLTs should be familiar with best practices for bilingual assessment and intervention, including what to target in therapy. Work closely with interpreters and colleagues to provide appropriate services and always exert your good-faith effort to meet the needs of multilingual and culturally and linguistically diverse children.

Models of Phonological Acquisition

It is axiomatic in the literature to say that, because so little is known about normal phonological development, a cohesive linguistic theory of phonological disorders has yet to be formulated. Ingram (1989a) examined various bids in the field of linguistics to construct a phonological theory that covered normal *and* disordered phonological acquisition, indicating that the most likely sources of elucidation of *normal* acquisition might be universalist/structuralist theory (Jakobson, 1941/1968), natural phonology theory (Stampe, 1969), or the Stanford cognitive model (Macken & Ferguson, 1983). Of them, only Stampe's was directly tied to a phonological theory.

Behaviourist Model

The behaviourist model dominated linguistics from the 1950s to the early 1970s. It applied a psychological theory of learning to explain how children came to distinguish and produce the sound system of the ambient language. Its adherents included Mowrer (1952, 1960), Murai (1963), and Olmstead (1971). They recognised the role of contingent reinforcement in gradually 'shaping' a child's babbling into meaningful adult forms through classical conditioning. A key aspect of the model was the emphasis on continuity between babbling and early speech. Behaviourists believed that the infant associated the vocalisations of the mother (usually) with primary reinforcements, such as food and nurture, with the vocalisations assuming secondary reinforcement status.

Eventually, the infant's vocalisations became secondary reinforcers (providing self-reinforcement) due to their similarity to adult models. From this point, the caregiver could refine the sound repertoire of the infant through selective reinforcement. The behaviourist framework did not presuppose, or show any interest in, an innate order of speech sound acquisition. The sounds acquired depended on the reinforcement obtained from the linguistic environment.

Structuralist Model

The structuralist model (Jakobson, 1941/1968), stemmed from structuralist linguistic theory, and it proposed *discontinuity* between babbling and speech. In addition, the structuralists postulated an innate, universal order of acquisition, with distinctive features emerging hierarchically and predictably. Jakobson regarded babbling as a random activity virtually unrelated to the development of the sound system. Evidence of regularities in prelinguistic vocal patterns (C. A. Ferguson & Macken, 1980; Oller et al., 1976) has, however, weakened this position. As well, mid-1970s research challenged Jakobson's hypothesis of a sequence of phonemic oppositions as the basis for the earliest stages of phonological development. Kiparsky and Menn (1977) demonstrated that the child's word count is too small to provide objective evidence of the distinctive features 'unfolding' in the way proposed by Jakobson. Really, the developmental order of phonemic oppositions has proved difficult to ascertain, because analysis must take account of the adult targets attempted as well as the child's phonetic repertoire. To complicate matters, children seem to selectively *avoid* saying words containing certain consonants that are difficult for them to produce (C. Ferguson & Farwell, 1975; Schwartz & Leonard, 1982). Evidence of lexical avoidance (or 'lexical selection') lent weight to the theory that, in the first-fifty-words-stage, children target whole words (Ingram, 1989a, pp. 17–22). The phonetic variability readily observed in children in the 9- to 18-month-age range may also provide evidence against a universal order of phoneme acquisition. Irrespective of such shortcomings, Jakobson's views exerted a strong, enduring influence on linguist thought. Ingram (1989a p. 162) counted the structuralist model as one of the 'most likely candidates' for a theory of normal phonological acquisition. He talks about this in A4 and addresses the topic of whole word measures of correct speech production in A11 in the following chapter.

Dr. David Ingram received his PhD from Stanford University in 1970, where he studied language universals under Professor Joseph

Greenberg and phonological acquisition in children under Professor Charles Ferguson. His interest in language disorders was developed during two subsequent years as a Research Associate at the Scottish Rite Institute for Childhood Aphasia. He was a professor at the University of British Columbia from 1972 to 1998 and a professor at Arizona State University where he retired in 2018. His research is on language acquisition in typically developing children and children with language and phonological disorders. The focus is on both English-speaking children and children acquiring other languages. The language areas of primary interest to him are phonological, morphological, and syntactic acquisition. He has published over 100 articles and is particularly known for his seminal work, *Phonological Disability in Children* (Ingram, 1976, 1989a), and his comprehensive textbook, *First Language Acquisition* (Ingram, 1989a).

Q4. David Ingram: Theory and Speech Sound Disorders

Do you continue to regard the structuralist model as a front runner in the formulation of a theory of normal acquisition (Ingram, 1989a) and what are the other contenders? How do you see a theory of acquisition informing the development of theories of disorder and intervention, and now can clinicians use this information?

A4. David Ingram: The Role of Theory In SSD

The effort to determine a theoretical account of children's SSD has a long history of moving from simpler to more complex explanations. Originally, SLP/SLT began with little if any theory, treating speech sound errors as errors with individual sounds, and subsequent treatments based on the intuitively reasonable assumption that improvement would result from drill and repetition. These early efforts were supported by subsequent acceptance in many circles of behaviourism, a movement clearly described in the present book.

With what appeared to me to be the demise of behaviourism (Chomsky, 1959), a new era of linguistic explanations emerged, with the result over time being a daunting range of possible theoretical accounts (cf. summaries in Ball & Kent, 1997). In the 1970s, the field of SLP/SLT was sympathetic to these efforts, and the proposals have constituted sections of most textbooks since (e.g., Bauman-Waengler, 2020; Stoel-Gammon & Dunn, 1985; Williams et al., 2021). At least two potential problems arose with these efforts at theoretical explanation. For one, phonological theories became more and more complex and abstract, and de facto harder to assimilate and make clinically relevant. Second, no clear theoretical approach won out, in the sense of demonstrating it is, without argument, the best and clinically most relevant account. The positive from all this is the impression that a range of intervention approaches 'work' (with some debate whether one or another might be even more effective). This results from: (1) that many theories have shown success, and (2) that children with a range of speech sound problems respond to different approaches. This leads the authors to the intuitively reasonable conclusion that specific theories, and their subsequent treatment approaches, may work better for some disorders than others.

Like behaviourism, however, this intuitively reasonable assumption is problematic. It can be challenged on both the side of treatment and the side of theory. It is certainly good news that a range of treatment approaches work, and good news that SLPs/SLTs know them. There is the implication that a reasonable arsenal of treatment approaches is sufficient to treat SSD. A range of available treatment approaches, however, is no guarantee of future success without some theoretical grounding. There is no foundation for the prediction that what worked with one child will work with another child, just because

the two children appear to be similar based on some assessment. Nor does it make sense simply to run a child through the approaches until one 'clicks'. We need to understand the disorders better than that, and a better understanding can only come from some theoretical approach.

Let's say I am a practicing SLP/SLT with excellent skills in two quite different treatment approaches. On the one hand, I am very experienced in using a cycles approach (in a group setting) with target selection based on using developmentally appropriate sounds. At the same time, I am also well informed in using a maximal contrast approach, involving intense one-on-one intervention with target sounds well beyond the child's current developmental level. I evaluate two children: Barbara and Judy. I conclude from my clinical intuitions that Barbara will benefit from a cycles model, whereas Judy will be best served with maximal oppositions intervention.

At one level, this is evidence-based practice. When I meet with Barbara's parents, I will discuss the cycles approach and refer to Hodson (2004, 2015) and other references as needed. When meeting with Judy's parents, however, my justification will be through discussing work by Gierut (2001) and Morrisette (2021) and the references therein. I will move past the idea that 'one theory fits all'. I also have an additional option. If one or neither child responds to my treatment choices, I can just switch them to the other approach. Or, if I get to attend a national convention in the interim, I can bring home a new approach I might learn at a workshop there. I also don't need to worry much about theories throughout the whole process.

Is what I have just described 'best' practice? I don't know. I am inclined, however, not to give up seeking a single theoretical basis for these decisions. In Ingram and Ingram (2001), we discuss a situation like the one above. We offer the hypothesis that there may be two subgroups of children with SSD: one with poor whole-word skills and one with good whole-word skills. The former group will be children with poor intelligibility, who are having difficulties matching their speech sounds to the target models. The latter group, on the other hand, are matching the target words relatively well (over 50% of the segments) but are possibly delayed in terms of their speech. We go on to suggest that the former children are candidates for a developmental approach, such as the one described for Barbara. The latter children, however, with good matching skills, may respond well to the maximal contrast approach as mentioned for Judy. Importantly, these decisions follow a single theory, a theory that incorporates whole-word abilities into our account of how children acquire their phonological systems. Within this theory, it makes more sense to select the treatments as mentioned, and less sense to do it the opposite way.

Here is another example. In Ingram (1989a), I contrast two theories of language acquisition: a maturational approach and a constructionist (Piagetian) approach. These theories make very different claims about how language is acquired. It is known that certain syntactic constructions are acquired late, for example, more complex forms of passive sentences. A maturational account would say that this is because the grammatical principles needed to form passive sentences do not mature until later, say age 6. A constructionist approach would predict that these sentences could be acquired earlier through the right combination of exposure to them and internal developments of the child's language acquisition. Can these theories co-exist?

We know that children acquire certain English sounds late, such as the dental fricatives, /θ/ and / ð/. Let us say I assess two four-year-old children both of whom are struggling in the production of fricatives and are being considered for intervention. I reach the following conclusions. One child, Dan, strikes me as very constructionist in his learning, whereas the other child, Tom, appears maturational. My recommendations are as follows. Dan will start an intervention program where we will use auditory bombardment (or what Hodson, 2015 called focused auditory input) to stimu-

late his acquisition of the dental fricatives. We will work on a selective vocabulary with these sounds, which in turn may lead to internal gains in his language knowledge. Tom, however, cannot learn to articulate these sounds yet because his speech development needs to mature. No amount of intervention will help Tom, who will be left alone to acquire these sounds at age six when his maturation is complete. This choice of intervention does not make sense to me. It would be based on what I see as a misunderstanding that somehow theories can co-exist.

Here is one further example. Let us consider a theory of phonological acquisition that proposes children use phonological processes to simplify speech. This theory has many processes, including Fronting (which changes k to t, e.g., 'key' is [ti]), and Backing (which changes t to k, e.g., 'tea' is [ki]). Another theory, NeoJakobson Theory, says that children's productions reflect their underlying distinctive features. This theory allows Fronting, but not Backing, as a natural process. On Thursday, I assess two children: one who shows Fronting (David) and one who is doing Backing (Caroline). My conclusions are that David is using the phonological process theory to acquire his speech sounds, whereas Caroline is using the NeoJakobson theory. The problem with the phonological process theory (as stated) is that it makes up any process it needs and is therefore too powerful. By explaining everything, it explains nothing. The more restricted theory is to be preferred. How then, can the NeoJakobson Theory account for our data? The theory states that children's first feature distinction is between a labial consonant and a non-labial consonant. The first non-labial consonant can either be a [t]or a [k]. Most children will opt for the [t], a more common sound in early productions, and this choice is the predicted, or unmarked, sound. Some children, however, may select to produce [k] instead, since it still has the same underlying value of the [t], that is, both being non-labial. This becomes, therefore, the less common, or more marked, choice. It is not always easy to evaluate theories and decide that one is more explanatory than the other, but the bottom line is that such evaluations are the way theories are assessed, not by saying they all happily coexist.

If I am to stand by and defend the simplistic view that one theory fits all, then I should provide some suggestions on what this theory might look like. In Ingram (1997), I outline the basic properties of such a theory. The first point to make is that our theory for SSD has, in the short term, different goals from phonological theory. The latter has as its goal the characterization of the phonological systems of the thousands of languages that exist in the world. Our goal is to have a theoretical account of the phonological systems of children's first words, often fewer than a thousand in number. This goal does not require the extent of theorisation or formalism needed in linguistic theory. As suggested in Ingram (1997), it is possible to isolate the shared assumptions of phonological theory in general to form the basis of our theory of SSD. Here are some of those shared characteristics: the acquisition of an early lexicon involves the acquisition of phonological representations; these early representations, like adult representations, consist of phonological features; the early representations of children are underspecified, that is, they do not contain the full range of features of those for adult speakers; children first acquire a subset of the features underlying all languages; my research leads me to suggest these early features are consonantal, sonorant, labial, dorsal, continuant, voice; the child's productions are speech sounds that have one or more of these features; the first syllables are constructed from a small set, that is, CV, CVC, VC, CVCV, CVCVC; children's productions attempt to match the adult models, in typical development around 70%.

So yes, I support a structuralist approach as asked. I'll finish with one of my favourite quotes: 'Theory without practice is speculation, practice without theory is dangerous'.[1]

[1] Source lost in time.

Biological Model

Locke (1983a; 1983b, 1993c) stressed universality in his proposal of a biological model of phonological development. However, Locke emphasised *biological* constraints rather than linguistic ones. Rejecting Jakobson's idea of discontinuity between babbling and speech, Locke postulated relatively rigid maturational control over the capabilities of the speech production mechanism. For Locke, phonology began before 12 months of age with the pragmatic stage when certain babbled utterances gained communicative intent. At the same time, the phonetic repertoire was essentially 'universal', constrained by the anatomical characteristics of the vocal tract. During the 'cognitive stage' that followed, the biological constraints persisted while the child learned to store and retrieve relatively stable forms of phonemes learned from adult language models. At 18 months, in the 'systemic stage', biologically determined babbling production patterns gave way to more adult-like speech. These speech attempts reflected phonologically the target language. Patterns found *only* in adult speech were acquired and patterns not contained in it were 'lost'.

Natural Phonology Model

Meanwhile, Stampe (1969) proposed his natural phonology model of phonological acquisition. He posited that children come innately equipped with a universal repertoire of phonological processes: stopping, fronting, cluster reduction, and so on. These processes were 'mental operations' that change or delete phonological units, reflecting the natural limitations and capacities of speech production and perception. In Stampe's view, natural processes amounted to articulatory restrictions, which came into play *like* reflexes. Note that this is a simile and does not imply reflexes in the physiological 'knee jerk' sense. The effect of these 'reflexes' was to prevent accurate production of sound differences. This occurred despite the sounds being perceived correctly auditorily and stored as 'correct' adult phonemic contrasts in the linguistic mechanism in the brain. The processes operated to constrain and restrict the speech mechanism *per se*. Stampe held that these universal, innate simplifications of speech output involved children's cognitive, perceptual, and production domains. He believed that the processes simplified speaking in three possible ways. Given a potential phonological contrast, a process favoured the member of the opposition that was the:

1. least complex to produce,
2. least complex to perceive; or,
3. least complex to produce and perceive.

For instance, given the choice of saying /d/ or /ð/, the assumption was that /d/ was easier, because, in typical development, it was acquired earlier (see Table 1.2); for example, *this* (/ðɪs/) is often realised by young children as [dɪs] (an example of Stopping).

The child's developmental task was to suppress the natural phonological processes to achieve full productive control of the phonemes of the ambient language. Stampe also believed that, from the onset of meaningful speech, children possessed a fully developed, adult-like, phonological perceptual system. Thus, while they exhibited natural processes in output, they already had an underlying representation (a mental image or internal knowledge of the lexical items) of the appropriate adult target form (so 'this' would be /ðɪs/ underlyingly and [dɪs] on the surface). Stampe relied heavily on a deterministic explanation of phonological change. He maintained that children 'used' processes for the phonological act of simplifying pronunciation.

The progression to adult-like productions (for instance, the use of consonant clusters) represented mastery of increased constraints (upon output phonology). This development occurred through the suppression of natural processes and consequent revision of the universal system. Change occurred through a passive mechanism of suppression as part of maturation. Stampe did not consider cognitive constraints related to the pragmatics of communication, or of the active learning of a language-specific phonology through problem solving, as in the cognitive model. Possibly the most contentious aspect of Stampe's interpretation of Natural Phonology was his (unsupported) claim that the processes were psychologically real, with Neil Smith (Smith, 1973, 1978) concluding that there was no psychological reality to the child's system

because there was no evidence for the 'reflex mechanism' proposed by Stampe in applying, or rather 'using', phonological processes.

Prosodic Model

The prosodic model of Waterson (1971, 1981) introduced another novel theoretical construct. It involved a perceptual schema in which '*a child perceives only certain of the features of the adult utterance and reproduces only those he is able to cope with*' (Waterson, 1971, p. 181) in the early stages of word production. Waterson (1971), Braine (1974), Macken (1980), and Maxwell (1984) asserted that, in infants, both perception and production are incomplete at first. Both developed and changed before they could become adult like. Unlike the more generally applied phonological process-based (segmental) descriptions, Waterson's schema provided a gestalt of child production rather than a segment-by-segment comparison with the adult target. Waterson's approach is useful in describing the word productions of toddlers and may explain those that are not obvious reductions of adult forms.

Cognitive/Stanford Model

The Stanford or cognitive model of phonological development (Ferguson, 1968; Kiparsky & Menn, 1977; Macken & Ferguson, 1983), and Menn's (1976) 'interactionist discovery model', construed the child as *Little Linguist*, a captivating idea that dates back at least as far as Comenius (1659). Comenius insisted that, for a child, language learning was never an end but rather a means of finding out about the world and forming new concepts and associations. In problem-solving mode, the child met successions of challenges and mastered them, thereby gradually acquiring the adult sound system.

Because the child was involved actively and 'cognitively' in the construction of his or her phonology, the term cognitive model was used. Phonological development was an individual, gradual, and creative process (Ferguson, 1978). The Stanford team proposed that the strategies engaged in the active construction of phonology were individual for each child and influenced by internal factors: the characteristics and predispositions of the child, and external factors: the characteristics of the environment. The external factors might include the child's ordinal position in the family, family size, child-rearing practices, and interactional style of the adults close to the child.

Levels of Representation

Both David Stampe and Neil Smith recognised only two levels of representation. Stampe saw phonological processes as mapping from the underlying representation to the surface phonetic representation, whereas Smith (1973) saw realisation rules assuming this function. Stampe and Smith insisted that the child's phonological rules or processes were innate or learned extremely early. Then, Ingram (1974) coined the term 'organisational level' to connote a third, intervening component, related to, but distinct from, the child's perceptual representation of the adult word. A similar three-level arrangement, implicit in Jakobson's distinctive features theory, was central to cognitive or Stanford theory.

Smith rejected the hypothesis that each child has a unique system and assumed full, accurate perception and storage of adult speech targets. He proposed a set of ordered and universal phonological tendencies and realisation rules. Realisation rules were physical expressions of abstract linguistic units. Any underlying form had a corresponding realisation in substance. In this instance, phonemes were 'realised' or manifested in 'phonic substance' as phones (whereby meanings were transmitted). Smith's understanding was that the processes acted as a filter between the correctly stored adult word and the set of sounds produced by the child. Again, the problem arose of the child being perceived as passively allowing the realisation rules to 'apply' in reflecting the adult word.

Theories of Development, Disorder, and Intervention

The theoretical assumptions upon which any speech-intervention approach is based are derived first from a **theory development**, or how children

normally learn the speech sound system through a combination of maturation and learning. Exploring this idea, Stoel-Gammon and Dunn (1985) posited four basic interacting components necessary for the formulation of a model of phonological development:

1. An auditory–perceptual component, encompassing the ability to attend to and perceive linguistic input.
2. A cognitive component, encompassing the ability to recognise, store and retrieve input and to compare input with output.
3. A phonological component, encompassing the ability to use sounds contrastively and to match the phonological distinctions of the adult language.
4. A neuromotor component, encompassing the ability to plan and execute the articulatory movements underlying speech.

From the practitioner's beliefs and assumptions about *normal* development comes a theory of *abnormal* phonological development: that is, a **theory of disorders** that explains why some children do not acquire their phonology along typical lines. Then, from the theories of normal and abnormal acquisition, and their formalisms, a **theory of intervention** can evolve. A theory of intervention (or **theory of therapy**) depends on how the individual clinician understands, interprets, incorporates, adapts, and modifies knowledge of normal and abnormal acquisition, and what theoretical assumptions are made in the process. Michie and Abraham (2004) suggested that intervening *without* a theory of therapy could lead to '*reinventing the wheel rather than re-applying it*'. They explained that, if we can isolate which parts of a treatment are doing the work (the 'active ingredients') of facilitating desired goals, it is possible to 'finetune' therapy to maximise effective components and reduce components that do not exert much effect on outcomes.

A theory of intervention, or how best to improve the speech of a child with SSD beyond the progress expected with age must logically rely on *assessment procedures* that are congruent with the SLP's/SLT's theories of development, disorders, and intervention (Fey, 1992a, 1992b; Ingram, A4). In this connection, Table 1.1 shows increasing availability of speech assessments based around Natural Phonology and emphasising phonological process analysis. These included Weiner (1979), Hodson (1980), Shriberg and Kwiatkowski (1980), Ingram (1981), and L. Khan and Lewis (1983); L. M. L. Khan & Lewis (2002); Grunwell (1985b), and E. Dean et al. (1990). Phonological process analysis introduced the concept of an abstract level of knowledge. This was revolutionary in its time and was the phonological version of syntactic deep structure.

The first intervention inspired by Natural Phonology appeared in the literature when Frederick Weiner had a novel idea. Calling it 'the method of meaningful contrast' (Weiner, 1981a), he described what is sometimes called the 'conventional' (J. A. Barlow & Gierut, 2002) minimal pair approach. In rapid succession, Blache (1982) presented a systematic approach to minimal pairs and distinctive feature training; Hodson and Paden (1983) wrote the first edition of *Targeting Intelligible Speech*, describing their 'patterns' approach, popularly called 'cycles therapy', and rebadged by Hodson as the *Cycles Phonological Pattern Approach: CPPA* (Prezas et al., A5); Monahan (1984, 1986) devised a therapy kit called *Remediation of Common Phonological Processes*; and Elbert and Gierut (1986) wrote the *Handbook of Clinical Phonology*. While these achievements occurred in the United States, Grunwell (1983, 1985b) provided intervention guidance; Dean and Howell (1986) wrote an inspiring article about the metalinguistic aspect of therapy with portents of the (now out of print) *Metaphon Resource Pack* (E. Dean et al., 1990); and Lancaster and Pope (1989) developed a practical manual, *Working with Children's Phonology*, focusing on an auditory input therapy (a naturalistic recast approach) approach for very young children and older children with cognitive challenges. Still in the UK, the first in a book series (Stackhouse & Wells, 1997) on assessment and intervention within a psycholinguistic framework appeared (Schäfer & Fricke, A6).

A clinical forum on phonological assessment and treatment, edited by Marc Fey, was published in 1992 in ASHA's *Language, Speech, and Hearing Services in Schools*. Other forums followed in 2001, 2002, 2004, and 2006, but this one, with articles by Edwards (1992), Elbert (1992), Fey (1985, 1992a, 1992b), Hodson (1992), Hoffman (1992), Kamhi

(1992) and Schwartz (1992), remains extraordinarily helpful as an introduction.

Fey (1992b) captured the clear distinction between intervention approaches, intervention procedures, and intervention activities when he described and applied a structural plan for analysing the form of language interventions, such as phonological therapies. This hierarchical plan (displayed in Table 1.4) was adapted from Fey (1986) by Bowen (1996) and discussed in Bowen and Cupples (1999a) and Bowen (2010)

For clinicians, one good reason for *knowing*, or *deducing* the theoretical underpinnings of the interventions in their repertoire is that it helps in choosing which to use, or how to combine them, or aspects of them, according to client needs. On '*deduction'* Duchan (personal correspondence 2008) wrote, '*I feel that we can look at any intervention and deduce its theoretical underpinnings or at least the assumptions it is based on, even if the clinician cannot articulate them. For example, drill relies on an assumption, or theory that learning is like exercise, the more you practice saying a sound or word, the better you "know" or can say it next time'*.

Fey's useful 1986 hierarchy covered the steps in modifying and adapting theoretical principles into a practicable intervention. It shows the progression

Table 1.4 Fey's (1986) theory-to-intervention hierarchy applied to clinical phonology

1. PHONOLOGICAL THEORY
THE CLINICIAN'S OWN
THEORY OF DEVELOPMENT,
THEORY OF DISORDERS, and
THEORY OF INTERVENTION
that are CONGRUENT WITH each other, and CONGRUENT WITH:

↑↓
2. PHONOLOGICAL ASSESSMENT APPROACHES
↑↓
CONGRUENT WITH
3. PHONOLOGICAL INTERVENTION APPROACHES
INCORPORATING GOAL SELECTION AND GOAL ATTACK VIA
3 LEVELS OF INTERVENTION GOALS

LEVEL 1: BASIC INTERVENTION GOALS
(1) To facilitate cognitive reorganisation of the child's phonological system, and phonologically oriented processing strategies;
(2) to improve the child's intelligibility.

LEVEL 2: INTERMEDIATE INTERVENTION GOALS
To target *groups* of sounds related by an organising principle
(e.g., phonological processes / patterns / rules; or phoneme collapses)

LEVEL 3: SPECIFIC INTERVENTION GOALS
To target a sound, sounds or structure, using vertical strategies, e.g., working on it until a criterion is reached, then moving to a new goal; or horizontal strategies, e.g., targeting several sounds within a process, and/or targeting more than one process simultaneously, and/or targeting syllable structures, metrical stress, etc. simultaneously with another target; or cyclical strategies, e.g., addressing several goals cyclically, focusing on only one goal per treatment session.
↓
4. INTERVENTION PROCEDURES
e.g., stimulability training, or phonetic production
↓
5. INTERVENTION ACTIVITIES
Contexts and events, such as games and tasks

Source: Available from: www.speech-language-therapy.com/images/14.png.

from (1) a given **phonological theory** (e.g., Natural Phonology) to (2) a **phonological analysis** that is congruent with the theory of development (e.g., Independent and Relational Analyses) to (3) the **phonological therapy approach** under consideration (e.g., Conventional Minimal Pairs Therapy), informed by (1) and (2). It then allows description of three levels of intervention goals—basic goals, intermediate goals, and specific goals—with goal-selection and goal-attack as critical components. From these arise (4) the intervention procedures of choice within the selected therapy model or a coherent combination of models and (5) intervention activities that are both consistent with the preceding four levels and suitable for a particular client.

The 'other' clinical forums, so useful to clinicians, referred to above include those edited by Barlow (2001, 2002); Helm-Estabrooks et al. (2002); Williams (2002a, 2002b); Bernhardt (2004); McLeod (2006). Clinical forums dealing with discrete approaches are also available to guide the clinician. For example, one on *Metaphon* (E. C. Dean et al., 1995) and one on *Parents and Children Together: PACT* (Bowen & Cupples, 1999a, 1999b). More recently we have seen an outstanding 2022 forum: Innovations in Treatments for Children with Speech Sound Disorders which begins with Farquharson and Tambyraja (2022).

Table 1.1 takes us on a century-long excursion from the formation of the International Association of Logopedics and Phoniatrics in 1924 to ASHA's centenary in 2025, via the Travis articulation paragraph in 1931, the impact of phonology in the 1970s, the ICF-CY view of speech impairment post 2001, and the rise and rise of telepractice from the early 2020s. The influence of clinical linguistics on child speech *theory* and its increasing presence in textbooks, journal articles, and university curricula are unmissable. But a commensurate manifestation of linguistics in everyday clinical practice is harder to detect.

Theory and Practice Now, and in the Future

Is linguistic theory exhausted as a source of ideas and insights about the prevention, assessment, and treatment of SSD, like behavioural psychology that ran out of puff in the 1970s? Will new progress come via information-processing models like the psycholinguistic model of speech processing and production (Schäfer & Fricke, A6; Stackhouse & Wells, 1997, 2001); or advances in neurophysiological processing of phonological information (Gerwin et al., 2021); or studies of the neurophysiological underpinnings of linguistic processing and representation (Froud & Randazzo, A51); or cognitive psychology investigations of key domain-general cognitive processes (e.g., Waring & Dodd, A7)? Will big new insights come from biology, particularly developmental neurology, and genetics? Or, is progress largely dependent on research and funding and the economics of clinical service provision? What would happen if every child with an SSD had enough affordable, accessible intervention in the care of clinicians with manageable caseload numbers?

These tantalising questions notwithstanding, we clinicians should be well acquainted with certain linguistic principles because they can help us devise evidence-based therapies that are conducive to treatment efficacy (Ingram, A4; Müller & Ball, A5).

Terminology

A Dictionary of Terms Dealing with Disorders of Speech was published in 1929 and its second revision was in 1946. Commenting on the review process, a Nomenclature Committee member declared:

> *…speech rehabilitation has remained in a state of suspended, pre-scientific adolescence' and that 'it is impossible to talk about a problem, much less develop a theory, without a specialized, orderly nomenclature.*
>
> Wise, 1946, p. 327

Fast forward six decades, through a motherlode of publications—and conversations in classrooms, clinics, and research labs—expounding similar views, to find McNeilly et al. (2007) who told IALP world conference delegates that:

> *…terminology in communication sciences and disorders 'presents a significant barrier to the profession's advancement in research, clinical effectiveness, public image, and political profile;*

> *adding influencing attitudes and understanding about something as fundamental and closely tied to one's professional identity as terminology is no small task.*

More recently, Diepeveen et al. (2020) amplified the message:

> *Our findings show that there is no consensus on terminology of the different SSDs and that there are a lot of idiosyncrasies in the diagnostic labels that are used. This makes it difficult to communicate among SLPs, let alone communicate well with other disciplines and parents.*

Terminology, nomenclature, and taxonomies (Baker et al., 2018) form an integral and discordant feature of our history and identities as SLPs/SLTs. Seemingly forever, individuals, panels, and committees have worked to streamline the terminology for voice, speech, language, fluency, and literacy, attempting to make it more 'international' and consistent across jurisdictions. The result is the profession's increased awareness that our terminology is unwieldy, and that change is desirable. Implementing change, however, is disappointingly slow and difficult, often with inconclusive outcomes. Conceding that there is a (terminological) elephant-in-the-room the tenor of our history, with the diligent work of our founders, was forward-thinking, optimistic, compassionate, and constructive. Against the historical background, Chapter 2 focuses on children's speech covering current classification, description, and assessment of SSD, and inevitably, terminology.

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