British Dietetic Association Paediatric Specialist Group

COVID-19 - Guidelines for Remote Dietetic Consultations

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BDA The Association of UK Dietitians Paediatric Specialist Group

Introduction

In response to Covid-19 measures to replace traditional face to face contact with children and their families, remote consultation via video application or phone have been implemented and therefore usual tools to aid information gathering as part of a traditional clinical appointment may not be possible.

Purpose

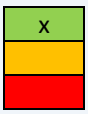
The purpose of this guidance is to provide some practical information and resources which can be used by dietitians in partnership with families to ensure remote dietetic consultations are as effective as possible ensuring, similar principles of assessing nutritional adequacy and response to nutrition interventions e.g. growth remain possible.

Document structure

We recognise that some dietitians will be working from home and may not have remote access to resources and electronic patient records. In this section we have tried to provide links to resources including: links to growth charts, short course, on-line energy requirement calculators, nutrition care plan. This can also be adapted for working with adults or completing remote reviews for ward based patients.

How to use this document

There are two sections – Section 1: (pages 6–21) provide a framework of aspects to consider within a remote nutrition review, and can be used with caregivers or health care professionals on the ward. A RAG (red, amber, green) system has been included which can be marked as the review is completed to provide a quick visual check as to the nutritional status of the child: green being good, amber of concern and red high risk – with some action required.



The second part of the document Section 2: (22-39) provides a checklist in Appendix 1 and some information sheets on measuring anthropometry for caregivers (Appendix 2), which can be printed off and used with each review. Your organisation may have something already in place – this is not meant to replace this, but may be a helpful guide for when the review is being completed.

What makes a successful remote consultation?

If virtual or remote consultations are a new way of working, below is a list of a few tips that may make the consultation a rewarding experience for both you and the family. Depending on the working environment the remote consultation may take place using digital platform or via a telephone [1]. The principles are mainly the same.

Prior to the consultation

- Text or via an encrypted email – let the caregiver know what will happen during the appointment and how long the appointment will last for e.g. 5-10 minutes reviewing growth, 5-10 minutes reviewing recent intake and 5-10 minutes providing advice (Appendix 3)
- Email caregivers clear information on time, date and type of remote consultation:
    - For phone consultation, make it clear who should phone (is it the caregiver that phones in or the dietitian)
    - If you are using a video consultation application, send clear instructions on how to access this and a backup number if they do not manage to log in
- Provide caregivers with clear information on how long the consultation will be to manage expectations and make the remote consultation as effective as possible. The length of the consultation will depend on the purpose of the contact
- Give the caregiver a time for the remote consultation - leave sufficient time between appointments
- Establish how you will be contacting the caregiver e.g. telephone or remote anytime anywhere video contact (there are a number of different platforms)
- Let the caregiver know what information you will be sending before and after the appointment
- Let them know what information they should have ready before the appointment e.g. food diary, anthropometric measurements and feeding information

Tips on information that families ideally should send through prior to the consultation:

- A photo of the growth chart and any measurements prior to the consultation or have them at hand during the consultation
- A photo/s of stools (if relevant) and skin/area of concern if relevant (make it clear that you cannot accept any photos of the child's genital area and any photos that include the face of the child)
- 3-day food diary: 2 week days and 1 weekend day and only 1 day if it's a baby with the same feeding pattern (Appendix 4)
- Ask caregivers to have any other relevant information related to their child at hand during the consultation:
    - Past medical history
    - Any relevant blood test

Tips on communication with families during a remote consultation:

- Caregivers get more out of a consultation when they feel listened too; if the consultation is over the phone providing families the opportunity to feel heard is important
- During this time, caregivers often have other children and family members in the room, which can provide significant background noise. Assure them that this is fine and that you are listening to them as this can often cause a lot of stress
- A good rapport between the dietitian and family is important. Ensure you continue to have open body language and friendly facial expression with a telephone or video consultation; although tempting to multi-task, try not to as your distraction will be seen
- As this may be an unsettling time for many caregivers, part of the consultation may be taken up with concerns around Covid-19 and the implications for the vulnerable child/family - incorporate this into the consultation and empathise with them. Use only official guidance (e.g. NHS/WHO) to guide advice on Covid-19
- Aim for a non-prescriptive approach, guiding rather than instructing, and working with families to set goals and targets.
- Families like working together with a dietitian; most enjoy negotiating nutrition care plans and treating the consultation as a partnership
- If you are providing new information as part of this remote consultation ask the family to repeat it back to you, so you can ensure they have understood
- To provide quick access to any information ask the family member how they would like to receive it; try not to use the post but do remember GDP regulations and data encryption (see below)
- Be clear what type of written advice they would receive following the consultation

Remote working may take many differing forms including:

- Regular phone reviews with families
- Office based ward work
- GDRP approved virtual meeting platforms, amongst others

Ensuring GDPR appropriate recordkeeping

- Set up a clinic list before your consultations so you have an allotted time for each consultation (Appendix 4)
- Follow your hospital guidelines for GDPR recordkeeping
- If you are keeping records at home:
    - Printed records need to be stored securely and need to be returned and added to hospital records once the dietitian is back at work
    - Computer based records should be kept in an encrypted folder
        - https://windowsreport.com/encrypt-files-folders-windows-10/
- When emailing reports, use nhs.net account and encrypt the report (discuss encryption with caregivers and do not send encryption code via email)
- Keep records for all of the consultations made, including any activity you would normally record

Nutrition assessment – the challenge of remote nutrition care plan setting

The assessment of nutritional status is complex and, in practice, doing this systematically will allow you as a dietitian to critically assess each parameter informing a nutritional care plan. As this may not be a usual way of working the checklist below may help to think about questions to cover in a review. These principles can be applied to infants, children and adults in hospital and you at home.

During times of remote working it will still be possible to complete a nutritional assessment; this guideline includes the following sections(Appendix 1) [2]:

- Anthropometric assessment
- Review of biochemical markers
- Clinical assessment
- Dietary review
- Evaluation and plan

Section 1:

Anthropometry

General points to consider:

Ask the caregiver if they have access to digital scales or a tape measure at home. Many caregivers may not have access - see tips below (Page 9).

General procedure prior for anthropometric measurement by caregivers (Appendix 2):

- The room should be warm enough for a naked infant/child with minimal clothing, in particular during cooler days. Ask caregivers to ensure
  - Weighing scales are on a level surface
  - Tape measure for mid upper arm circumference (MUAC) is cleaned with soap and water
  - Length equipment (tape measure if at home) is placed on a level surface and in a safe place for infants/toddlers

Information to get from caregivers prior to the consultation:

- The day/week before the consultation send caregivers information on how to complete the anthropometric measurements so they can give the information at the start of the consultation

If the caregiver does not have any measuring equipment e.g. tape measure or scales:

- Ask them if the child has been failing to gain weight or clothes are looser than they were – or what size of clothing are they wearing
- Consider MUAC as a proxy marker – if they have no tape measure they can ring their forefinger/thumb around the middle of the child's upper arm and complete a circle
- Ask if the child has had a poorer appetite than usual or is tiring more easily during feeds and not finishing milk
- Ask if they are having more frequent vomits/loose stools
- See if other parameters (e.g. biochemistry), food diary and clinic assessment (if available through video) can help you make a proxy assessment on growth
- In children where no growth parameters are available, ensure that these are followed up via phone/video consultation and, once the Covid-19 restrictions are lifted, are measured at their local health centre
- If the growth curve is flattening or is dropping downwards, ask caregivers to share a picture of growth chart and last growth parameters via email so you can assess previous growth

Anthropometric measures by caregivers

- Mid upper arm circumference is a useful measurement in the absence of weight/height and can be used to monitor response to nutrition intervention.
- Send the height information to the caregiver. Ask the caregiver to get a clean tape measure and follow the steps below; you could take a picture of this and send it in a text message to them.
- WHO charts are available https://www.who.int/childgrowth/standards/ac_for_age/en/

Measuring mid upper arm circumference (MUAC):

This is not for routine use and only required if routinely measured as part of a usual clinic/inpatient appointment or if prolonged remote working likely for foreseeable future

- Hold the left upper arm at an angle of 90° with the palm facing inwards
- Mark the middle point between the palpable bump at the top of the shoulder blade and the lowest point of the elbow
- Measure the arm circumference at the middle of the upper arm with the arm hanging relaxed alongside the body (Figure 1) or watch the following video https://www.youtube.com/watch?v=x-YrCiyd9Mk

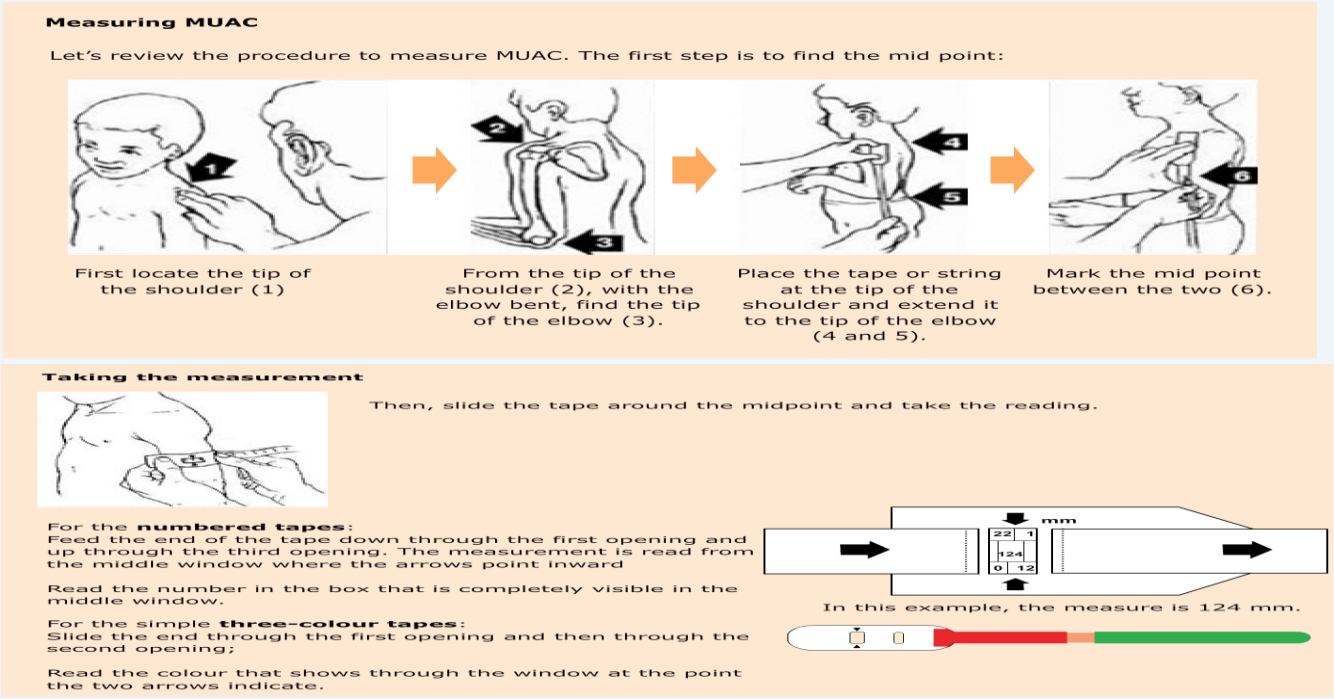


Figure 1: Measuring MUAC

Measuring weight

Children < 2 years of age:

- Before the consultation ask the caregiver to undress the infant/toddler as the measurement will be performed with the infant/toddler being completely naked (no diaper/nappy, no socks, no light clothing). If they have a baby scale ask them to wipe the surface down with a wet wipe, get them to switch the digital scale on and ensure it is "tared" and on zero before commencing the weight procedure.
- The infant should be placed on their back lying down on a baby scale.
- If the caregiver does not have a baby scale, but has a family scale, ask the caregiver to stand on the scale and for a second person to note down the weight measurement. Each time this is done the caregiver should wear the same clothes and take their shoes off.
- The second person should then hand the caregiver on the scale the baby/toddler. Ask the second person to write down the new reading and then subtract one from the other to record the baby's/toddler's weight.
- All the numbers displayed should be written down e.g. weight to the 0.01kg.
- After the weight measurement has been done, the child should be kept naked to prepare for the length measurement which should be done immediately to ensure the child does not get cold.

Children > 2 years of age:

- Before the consultation ask the caregiver to weigh the older child; ensure that the scale has been cleaned with a sterile wipe as they will be standing on it bare foot. Ask the caregiver to remove shoes, socks and weigh in light clothing.
- Ask the caregiver to have the child stand in the middle of the scale, feet slightly apart, and to remain still until the weight appears on the display.
- Ask the caregiver to write the child's weight to the nearest 0.1 kg and repeat the weight. After the weight measurement has been taken the child can get dressed again.

Measuring length in an infant/toddler < 2 years of age

Consider whether measuring length is necessary, if this was done very recently (Table 1). **The following method is not accurate,** but can be used in the absence of anything else. **This is not recommended as routine practice.** A length board can be fashioned using a skirting board and a book – to try and emulate the picture below. Ask the caregiver to do this before the consultation.

To emulate a length board

This method requires two people – one to hold the child's head in the Frankfurt plane against the skirting board and the second to gently flatten the legs and place the book at the end. You can send copies of the figures below (Figure 2 – 4).

- Send the length information to the caregiver before the consultation.
- Ask the caregiver to complete these measurements before the consultation. All children below 2 years of age should have a recumbent length measurement (as on average there is a 0.7cm difference between standing height and recumbent length).
- Ask the caregivers to sellotape a tape measure to a hard floor surface, and place a towel next to it. They will also need a hardcover book or chopping board. Ideally the tape measure should be taped as close to the skirting board as possible (to use this as the head board).
- Perform the length after the weight, as the infant/toddler will already be naked (ideally keep naked for the measurement as a nappy can affect the accuracy).
- Ensure that the infant/toddler has no socks or any covering for the feet and all hair ornaments need to be removed. The infant's/toddler's eyes should be looking straight up towards the ceiling i.e. Frankfurt plane.
- Send the caregiver the measurement procedure prior to the appointment which in brief is as follows:
    - The infant/toddler will need to be placed on towel and one of them can then help to gently hold the infant's/toddler's head in place by the skirting board while the other person gently flattens the legs allowing the feet to rest against the book/chopping board. This person should read the number from the tape measure where the book/board cross e.g. 55cm.

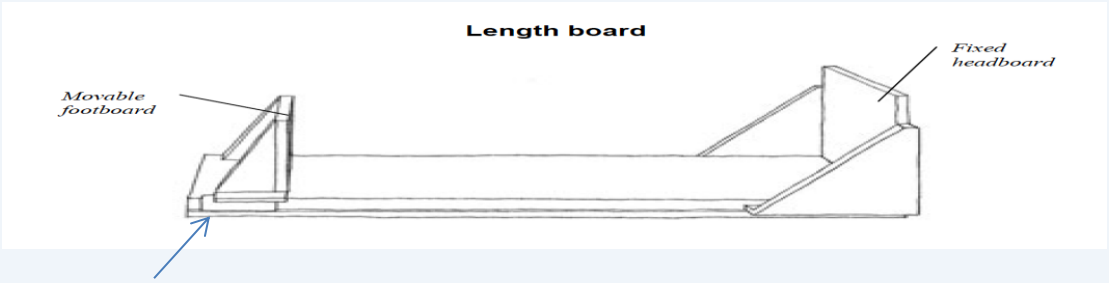


Figure 1: A length board

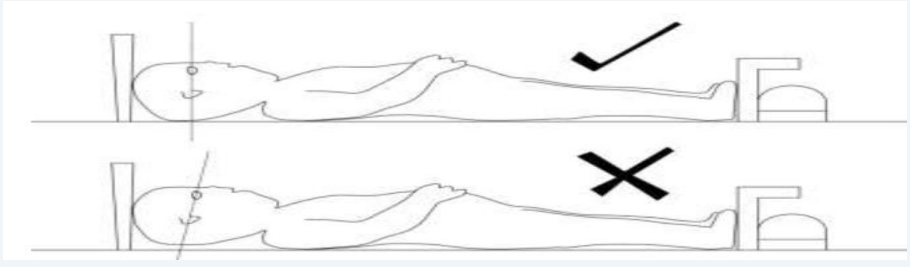
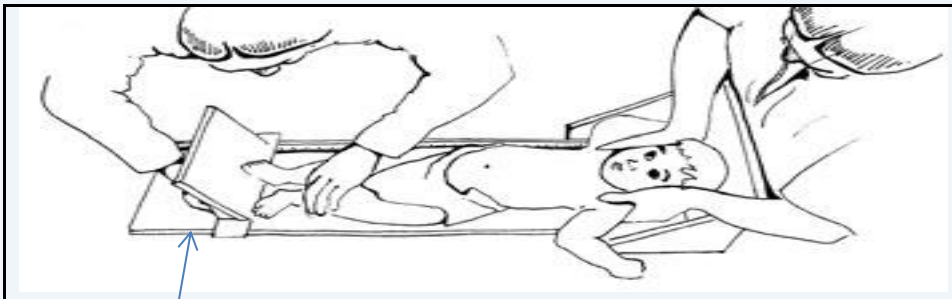


Figure 2: Frankfurt plane



Ask the caregiver to read off the number on the tape measure at the intercept of the board and feet

Figure 3: Positioning of infant or toddler – ask one person to gently hold the head and a second to gently flatten the legs and read off the number on the tape measure

Measuring height in children > 2 years of age

This method is not accurate, but can be used in the absence of anything else. This is not recommended as routine practice. A stadiometer can be fashioned using a tape measure and a book and a tiled wall without a skirting board – to try and emulate the picture below. Stick a piece of paper on the wall behind where the child's head will be.

- Send the height information to the caregiver.
- Ask the caregiver to complete these measurements before the consultation.
- Ask the caregiver to ensure the child will be standing bare foot for a height measurement.
- Check that shoes, socks and all hair ornaments have been removed and the child is in light clothing that will allow you to assess that the shoulders and buttocks are against a wall – ideally a tile wall with no skirting board.
- The caregiver should help the child to stand against the wall. The back of the head, shoulder blades, buttocks, calves and heels should all touch the wall. The child's trunk should be balanced over the waist e.g. not leaning back or forward.
- The caregiver should hold the child's knees and ankles to help keep the legs straight and feet flat, with heels and calves touching the wall. The caregiver should focus the child's attention.
- The caregiver should position the child's head so that a horizontal line from the ear canal to the lower border of the eye socket runs parallel to the baseboard. Still keeping the head in position ask the other person to gently place a hardback book on the child's head.
- The caregiver should mark the paper on the wall and get the child to step away – using the tape measure, measure from this point to the floor (Figure 5). The caregiver should read the measurement and record the child's height in centimetres to the last completed 0.1 cm if possible.

Figure 5: Measuring height in children

How frequently should growth monitoring be completed?

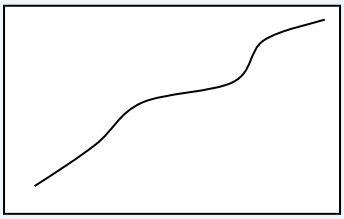
Where there is a concern regarding growth – measurements should be repeated regularly (Table 1)

Table 1: Frequency of anthropometrical measurements where there are growth concerns

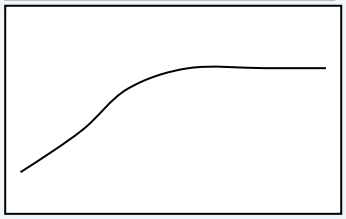
Growth monitoring	Preterm infant ≤37 weeks gestational age	If < than 1 month old	1 – 6 months	6 – 12 months	From 1 year
Weight	2 – 3 x week	2 x week	Weekly	Fortnightly	Monthly
Length	Monthly	Monthly	Monthly	Monthly	3 monthly
Head circumference (up to 2 years of age)	Monthly	Monthly	Monthly	Monthly	Monthly

Once you have asked the caregiver to take the measurements classify the child's growth

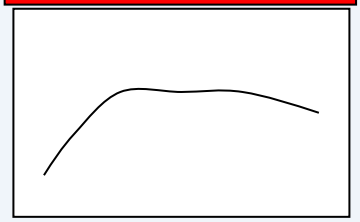
Growing well
(following centiles)



Growing flattening
(crossed 1 centile)



Losing weight
(downward crossing of >2 centiles)



Previous Measurement	Date	Recent Measurement	Date	Comment on growth	Mark (X) as completed
Date of last weight Last Weight (kg)	dd/mm/yy	Date of new weight New weight	dd/mm/yy		
Date of last height/ length Last height (cm)	dd/mm/yy	Date of new height/ length New height (cm)	dd/mm/yy		
Date of last MUAC Last MUAC (mm)	dd/mm/yy	Date of new MUAC New MUAC (mm)	dd/mm/yy		

Resources

- Fanta Book is a useful resources for tips on measuring and growth chart resources: https://www.fantaproject.org/tools/anthropometry-guide
- Access a free short course on plotting/ interpreting anthropometry – log in as a guest https://www.uhs-vle.co.uk/course/search.php?search=Anthro
- Growth charts: https://www.rcpch.ac.uk/resources/growth-charts
- Information for caregivers: https://www.rcpch.ac.uk/resources/growth-charts-information-caregiverscarers

Videos:

- How to measure weight https://www.youtube.com/watch?v=6iJ2jqBO6sU&feature=youtu.be
- How to measure length: https://www.youtube.com/watch?v=_Kx8DgJGuIs&feature=youtu.be
- How to measure height: https://www.youtube.com/watch?v=INgr1__mIfA&feature=youtu.be

Biochemistry

Biochemistry may not be available, however the list of reference ranges for laboratory values in blood can be used below [3-6] specimen: s= serum, p=plasma, w=whole blood

Component (specimen)	**Age group**	**Reference range in conventional unit** (Nelsons Paediatrics – local reference range may vary)	**Reference range in SI unit**
ACTH (p)	Prepubertal Postpubertal	7-28 pg/ml 2-49	1.55-6.2 pmol/l 0.44-10.78
Alanine aminotransferase (ALT, SGPT)) (s)	0-7 days 8-30 days M 8-30 days F 0-1 y 1-13 y 13-19 y	6-40 U/l 10-40 8-32 5-33 9-25 8-22	
Albumin (s)	Premature 1 day Full term < 6 days 8 days-1 y 1-3 y 4-19 Y	1.8-3.0 g/dl 2.5-3.4 1.9-4.9 3.4-4.2 3.5-5.6	18-30 g/l 25-34 19-49 34-42 35-56
Aldosterone (p)	0-3 mo 3 mo-2 y 2-5 y 6-9 y 10-16 y	1000-3500 pmol/l 400-1500 300-1000 400-800 150-450	
Alkaline phosphatase (s)	1-9 y 10-11 y 12-13 y M 12-13 y F 14-15 y M 14-15 F 16-19 y M 16-19 y F	145-420 U/l 140-560 200-495 105-420 130-525 70-230 65-260 50-130	
Ammonia (p)		11-35 µmol/l	
α1-antitrypsin (p)		1.8-4.0 g/l	
Antidiuretic hormone (hADH), vasopressin (p)	Plasma osmolarity (mOsm/kg)	Plasma ADH (pg/ml)	
	270-280 280-285 285-290 290-295 295-300	< 1.5 < 2.5 1-5 2-7 4-12	
Antithrombin (ATIII) (p)		85-130 %	
Aspartate aminotransferase (AST, SGOT)) (s)	0-7 days M 0-7 days F 8-30 days 1-12 mo 1-3 y 3-9 y 10-15 y 16-19 y M 16-19 y F	30-100 U/l 24-95 22-71 22-63 20-60 15-50 10-40 15-45 5-30	
Bilirubin, blood, total (s)	0-15 days 15 days-1 y	0.2-16.6 mg/dl 0.1-0.7	3-284 µmol/l 1-12

	1-9 y 9-12 y 12-15 y 15-19 y	0.1-0.4 0.1-0.6 0.1-0.7 0.1-0.8	1-7 1-9 2-12 2-14
Bilirubin, conjugated (s)	14 days-16 y	0.1	<2
Calcium, total (s)	Cord blood Newborn 3-24 hr 24-48 hr 4-7 days Child Thereafter	9.0-11.5 mg/dl 9.0-10.6 7.0-12.0 9.0-10.9 8.8-10.8 8.4-10.2	2.25-2.88 mmol/l 2.3-2.65 1.75-3.00 2.25-2.73 2.20-2.70 2.10-2.55
Cholesterol, total (p,s)	All ages	< 170 mg/dl	
Cortisol (p)	2-15 days 15 days-1 y 1-9 y 9-14 y 14-17 y 17-19 y	0.47-12.31 µg/dl 0.52-16.6 1.73-10.76 2.19-12.66 2.79-16.4 3.52-18.33	13.1-399.5 nmol/l 14.3-458.1 47.8-297 60.5-349.2 76.9-452.5 97-505.7
C-peptide (s)	0-1 y 1-6 y 6-19 y	0.21-4.39 ng/ml 0.35-4.48 0.78-6.79	70-1448 pmol/l 116-1477 257-2241
C-reactive protein (CRP) (s)	0-90 days M 0-90 days F 91 days-12 mo M 91 days-12 mo F 13 mo-3 y M 13 mo-3 y F 4-10 y M 4-10 y F 11-14 y M 11-14 y F 15-18 y M 15-18 y F	0.08-1.58 mg/dl 0.09-1.58 0.08-1.12 0.05-0.79 0.08-1.12 0.08-0.79 0.06-0.79 0.5-1.0 0.08-0.76 0.06-0.81 0.04-0.79 0.06-0.79	0.8-15.8 mg/l 0.9-15.8 0.8-11.2 0.5-7.9 0.8-11.2 0.8-7.9 0.6-7.9 5-10.0 0.8-7.6 0.6-8.1 0.4-7.9 0.6-7.9
Creatine kinase (CK) (s)	Cord blood 5-8 hr 24-33 hr 72-100 hr	70-380 U/l 214-1,175 130-1,200 87-725	
Creatinine, blood (s,p)	0-4 y 4-7 y 7-10 y 10-14 y > 14 y	0.03-0.50 mg/dl 0.03-0.59 0.22-0.59 0.31-0.88 0.50-1.06	2.65-44.2 µmol/l 2.65-52.2 19.4-52.2 27.4-77.8 44.2-93.7
Creatinine clearance (s or p and 24 h urine)	Newborn < 40 y M < 40 y F	40-65 ml/min/1.73m^2 97-137 88-128 Decreases < 6.5 ml/min/decade	
Eosinophil granulocytes (w)		50-250 %	
Erythrocyte sedimentation rate (w)		< 20 mm/hr	
Ferritin (s)	0-6 wk 7 wk-1 y 1-9 y 10-18 y M 10-18 y F	0-400 ng/ml 10-95 10-60 10-300 10-70	0-400 µg/l 10-95 10-60 10-300 10-70

Fibrinogen (p)		1.5-4.0 g/dl	
Galactose (s)	Normal Galactosaemia	< 5 mg/dl < 300	
Glucose (s)	Cord blood Premature Neonate Newborn 1 day > 1 day Child	45-96 mg/dl 20-60 30-60 40-60 50-90 60-100	2.5-53 mmol/l 1.1-3.3 1.7-3.3 2.2-3.3 2.8-5.0 3.3-5.5
Glucose-6-phosphate dehydrogenase (G6PD) (w)	Adult Newborn	3.4-8.0 U/g Hb 98.6-232 U/1012 RBC 1.16-2.72 U/ml RBC 50% higher	0.22-0.52 mU/mol Hb 0.10-0.23 nU/106 RBC 1.16-2.72 kU/l RBC 50% higher
Growth hormone (s)	0-2 mo 3 mo-2 y 2-7 y 7-12 y 12-14 y 14-19 y M 14-19 y F	0.8-33.5 ng/ml 0.14-6.27 0.05-5.11 0.02-4.76 0.01-6.2 0.02-3.81 0.03-5.22	0.8-33.5 µg/l 0.14-6.27 0.05-5.11 0.02-4.76 0.01-6.2 0.02-3.81 0.03-5.22
HDL cholesterol (p,s)	All ages	> 45 mg/dl	
Hematocrit (Hct) (w)	 0-30 days 1-23 mo 2-9 y 10-17 y M 10-17 y F	% of packet red cells (V red cells / V whole blood cells x 100) 44-70 % 32-42 33-43 36-4 7% 35-45	Volume fraction (V red cells / V whole blood) 0.44-0.70 % 0.32-0.42 0.33-0.43 0.36-0.47 % 0.35-0.45
Hemoglobin in blood (Hb) (w)	0-30 days 1-23 mo 2-9 y 10-17 y M 10-17 y F	15.0-24.0 g/dl 10.5-14.0 11.5-14.5 12.5-16.1 12.0-15.0	2.32-3.72 mmol/l 1.63-2.17 1.78-2.25 1.93-2.50 1.86-2.32
Hemoglobin $A1_C$ ($HbA1_C$) (w)	All ages	4-6 %	20-42 mmol/mol
Homocysteine (p)	5 days-1 y 1-7 y 7-12 y 12-15 y M 12-15 y F 15-19 y M 15-19 y F	0.39-1.35 µg/l 0.37-1.03 0.46-1.14 0.55-1.4 0.64-1.41 0.67-1.61 0.74-1.81	2.87-9.99 µmol/l 2.76-7.62 3.43-8.45 4.71-10.4 4.07-10.36 5.5-13.39 4.92-11.88
Insulin (s,p)	0-1 y 1-6 y 6-19 y	0.96-23.5 µIU/ml 1.31-40.2 2.19-49.7	6.64-163 pmol/l 9.11-279 15.2-345
Immunoglobulin G (s)	Cord blood 1 mo 2-4 mo 5-12 mo 1-5 yr 6-10 yr Adult	636-1,606 mg/dL 251-906 176-601 172-1,069 345-1,236 608-1,572 639-1,349	6.36-16.06 g/l 2.51-9.06 1.76-6.01 1.72-10.69 3.45-12.36 6.08-15.72 6.39-13.49
L-Lactate (w)	1-12 mo 1-7 y 7-15 y	10-21 mg/dl 7-14 5-8	1.1-2.3 mmol/l 0.8-1.5 0.6-0.9

Lactate dehydrogenase (s)	< 1 y 1-9 y 10-19 y	170-580 U/l 150-500 120-330	
LDL cholesterol (p,s)	All ages	< 110 mg/dl	
Lead (w)	Child Toxic	< 5 µg/dl ≥ 70	< 0.0024 mmol/l ≥ 3.38
Leucocyte count (w)	 0-30 days 1-23 mo 2-9 y 10-17 y	x 1,000 cells/mm^3 (µl) 9.1-34.0 6.0-14.0 4.0-12.0 4.0-10.15	x 10^9 cells/l 9.1-34.0 6.0-14.0 4.0-12.0 4.0-10.15
Leucocyte differential (w) Myelocytes Neutrophils ("bands") Neutrophils ("segs") Lymphocytes Monocytes Eosinophils Basophils	 	 0 % 3-5 54-62 25-33 3-7 1-3 0-0.75	 0 Cells/m^3 (µl) 150-400 3,000-5,800 1,500-3,000 285-500 50-250 15-50
Lipase (p,s)	1-18 y	145-216 U/l	
Lipoprotein A1 (Apo A1) (s)	0-15 days M 0-15 days F 15 days-1 y 1-14 y 14-19 y	62-91 mg/dl 71-97 53-175 80-164 72-154	0.62-0.91 g/l 0.71-0.97 0.53-1.75 0.80-1.64 0.72-1.54
Mean corpuscular hemoglobin (MCH) (w)	0-30 days 1-23 mo 2-9 y 10-17 y M 10-17 y F	33-39 pg/cell 24-30 25-31 26-32 26-32	0.51-0.60 fmol/cell 0.37-0.46 0.39-0.48 0.26-0.32 0.26-0.32
Mean corpuscular volume (MCV) (w)	0-30 days 1-23 mo 2-9 y 10-17 y	99-115 $µm^3$ 72-88 76-90 78-95	99-115 fl 72-88 76-90 78-95
Parathyroid hormone (PTH) (p)	6 days-1 y 1-9 y 9-17 y 17-19 y	6.42-88.6 pg/ml 16.2-63 21.9-87.6 16-60.4	0.68-9.39 pmol/l 1.72-6.68 2.32-9.28 1.7-6.4
Prealbumin (s)	0-5 days 1-5 y 6-9 y 10-13 y 14-19 y	6.0-21.0 mg/dl 14.0-30.0 15.0-30.0 20.0-36.0 22.0-45.0	60-210 mg/l 140-300 150-300 200-360 220-450
Prothrombin time (PTT) (p)	preterm babies <37 wk term babies 0-3 months	8.5-17.0 seconds 8.5-14.1 seconds 10-12	
Pyruvate (w)	7-17 y	0.076 ± 0.026 mmol/l	
Reticulocyte count (w)		% of electrolytes	Cells/m^3 (µl)
	1 day 7 days 1-4 wk 5-6 wk 7-8 wk 9-10 wk 11-12 wk	0.4-6.0 <0.1-1.3 <1.0-1.2 <0.1-2.4 0.1-2.9 <0.1-2.6 0.1-1.3	0.004-0.060 <0.001-0.013 <0.001-0,012 <0.001-0.024 0.001-0.029 <0.001-0.026 0.001-0.013
Total protein (s)	Premature	4.3-7.6 g/dl	43-76 g/l

	Newborn 1-7 y 8-12 y 13-19 y	4.6-7.4 6.1-7.9 6.4-8.1 6.6-8.2	46-74 61-79 64-81 66-82
Total iron-binding capacity (TIBC) (s)	Infant Thereafter	100-400 µg/dl 250-400	17.90-71.60 µmol/l 44.75-71.60
Transferrin (p,s)	0-9 wk 9 wk-1 y 1-19 y	104-224 mg/dl 107-324 220-337	1.04-2.24 g/l 1.07-3.24 2.20-3.37
Triglycerides (p,s)	0-9 y 10-19 y	< 75 mg/dl < 90	
Thrombin time (p)		9-15 seconds	
Urea nitrogen (s)	Cord blood Premature (1 wk) Newborn Infant or child Thereafter	21-40 mg/dl 3-25 3-12 5-18 7-18	7.5-14.3 mmol/l 1.1-9.0 1.1-4.3 1.8-6.4 2.5-6.4
Uric acid (s)	1-3 y 4-6 y 7-9 y 10-11 y M 10-11 y F 12-13 y M 14-15 y M 12-15 y F 16-19 y M	1.8-5.0 mg/dl 2.2-4.7 2.0-5.0 2.3-5.4 3.0-4.7 2.7-6.7 2.4-7.8 3.0-5.8 4.0-8.6	100-300 µmol/l 130-280 120-295 135-320 180-280 160-400 140-465 180-345 235-510
Reference ranges for vitamins, minerals and trace elements [3, 5-7]			
Vitamin B_1 (p)		5.3-7.9 µg/ml	
Vitamin B_2 (p)		5.3-7.9 µg/ml	
Vitamin B_3 (p)		3.7-13.7 µg/ml	
Vitamin B_5 (w)	< 1 y 1-10 > 10	3.45-825 ug/l 3.45-229.2 37-147	
Vitamin B_6 (p)		5-50 µg/l	
Folate (s)	Newborn Thereafter	7.0-32 ng/ml 1.8-9.0	15.9-72.4 nmol/l 4.1-20.4
Folate (serum RBC's)	< 1 y 1-11 > 12	74-995 ng/ml 96-332 180-600	340-1,020 nmol/l cells
Vitamin B_{12} (s)	5 days-1 yr 1-9 9-14 14-17 17-19	259-1576 pg/ml 283-1613 252-1125 244-888 203-811	191-1163 pmol/l 209-1190 186-830 180-655 150-599
Vitamin C (s)		26.1-84.6 µmol/l	
Vitamin A (s)	0-1 yr 1-11 11-16 16-19	8-53.6 µg/dl 27.5-44.4 24.9-55 28.7-75.1	0-2 µmol/l 1-2 1-2 1-3
Vitamin D 1,25-dihydroxy 25-hydroxy (s)	0-1 yr 1-3 12-19 y	32.1-196 pg/ml 47.1-151 45-102	77-471 pmol/l 113-363 108-246
Vitamin E (s)	0-1 y 1-19 y	0.2-2.1 mg/dl 0.6-1.4	5-50 µmol/l 14.5-30
Sodium (s)	Newborn	133-146 mmol/l	133-146 mmol/l

	Infant Child Thereafter	134-144 134-143 135-145	134-144 134-143 134-145
Calcium (p,s)	0-1 yr 1-19	8.5-11 mg/dl 9.2-10.5	2.13-2.74 mmol/l 2.29-2.63
Chloride (s)	Cord blood Newborn Thereafter	96-104 mmol/l 97-110 98-106	96-104 mmol/l 97-110 98-106
Copper (s)		12-29 µmol/l	
Iron (p)	All ages	22-184 µg/dl	4-33 µmol/l
Magnesium (p)	0-6 days 7 days-2 y 2-14	1.2-2.6 mg/dl 1.6-2.6 1.5-2.3	0.48-1.05 mmol/l 0.65-1.05 0.60-0.95
Phosphate (s)	0-5 days 1-3 y 4-11 12-15 16-19	4.8-8.2 mg/dl 3.8-6.5 3.7-5.6 2.9-5.4 2.7-4.7	
Potassium (s)	0-1 wk 1 wk-1 mo 1-6 6 mo-1 y > 1	3.2-5.5 mmol/l 3.4-6.0 3.5-5.6 3.5-6.1 3.3-4.6	3.3-5.5 mmol/l 3.4-6.0 3.5-5.6 3.5-6.1 3.3-4.6
Zinc (p)		11-24 µmol/l	

Clinical

Diseases can be acute, acute on chronic and chronic and can impact on homeostasis requiring medical and dietary intervention. This can have a subsequent impact on metabolic function (increase or decrease), physiological function (loss of muscle strength and mobility), psychological and social impact.

Factors to consider as part of a nutrition review are outlined below – and may include issues that you would not normally cover. Caregivers of children with acute and life limiting illness may be feeling more anxious during this time and part of the consultation may be taken up with providing reassurance and listening to anxieties and social factors. It is important to raise concerns with other healthcare professionals usually involved in supporting children and their families (Table 2).

Table 2: Factors to consider as part of a remote nutrition review

Somatic factors	**Functional factors**
• Age • Anthropometry (body weight, head circumference, length/height, BMI) • Appetite • Diagnoses and disease stage/characteristics • Feeding difficulties and swallowing issues • Food and fluid intake • Gastrointestinal issues • Hospital admission/surgery/treatment changes • Laboratory test results • Medication	• Activity pattern • Exercise/sport • Physical development
Psychological factors (parental and child)	**Social factors**
• Anxiety • Aversion • Coping with loss of usual support – social isolation • Depression/psychological disorder • Development /cognitive disorder • Stress • Quality of life	• Child in need foster care • Education level/type school • Family financial difficulties • Household food security • Personal and family situation • Safeguarding issues e.g. abuse/exploitation • Social network during social isolation • Vulnerable young adults

There may be a range of clinical signs and symptoms that are important to note down during the consultation

Other clinical factors are those relating to reduced intake or excess losses

Diarrhoea

- Most diarrhoea amongst young children is an acute episode arising from rotavirus or other pathogenic organism and will be self-limiting.
- During acute episode usual milk feeds or food should be continued as this accelerates recovery from diarrhoea.
- Acute gastroenteritis (AGE) is characterised by the presences of diarrhoea, which is defined as change in stool consistency leading to loose or liquid stools and or an increase in the frequency of evacuations to three or more in 24 hours, with or without fever or vomiting
    - Acute diarrhoea lasting 7 days or less

- Prolonged diarrhoea lasting 8-13 days
- Chronic or persistent diarrhoea lasting 14 days or more

- Children with chronic conditions including food allergies, inflammatory bowel disease amongst others may have the frequent passage of stool – as part of a remote review it is important to determine whether there is a change to the usual pattern and what may need to be recommended as a result e.g. is the child on sorbitol/lactose containing medicine, has a new food been given.
- A stoma output of >30ml/kg is likely to result in dehydration without additional fluid management – make contact with the surgical nurse specialist or child's medical team to seek further advice.

Vomiting

- Vomiting can occur for many different reasons and is common amongst infants/children with congenital heart disease (due to gastric dysmotility), infants with food allergies - as part of a remote review it is important to determine whether there is a change to the usual pattern and what may need to be recommended as a result.
- Does the feeding pattern need to be changed e.g. smaller feeds more often, review of feed/ food being given to ensure it is free of the offending allergen.

Urine

- Infants/children with end stage kidney disease may have poor or no urine output – this may be monitored and included in a review to determine fluid allowance.

Table Characterising losses e.g. vomit, stool and urine

	Frequency	
Vomiting	**Number per day**	
Colour		
Stools	**Number per day**	
Consistency – Bristol type 	**Type**	
Stoma losses	**ml/kg/day**	
Skin – eczema		
Swallowing/ feeding issues e.g. dysphagia – texture modification		
Urine		

Dietary requirements

The resting energy expenditure can be estimated with the use of different predictive equations (see Table 3 - 4). WHO [8] have recently been updated their equations to include equations for breast fed children, however more studies have been performed in clinical paediatric settings using the Schofield equation [9].

Activity factors in paediatrics have been recently adjusted by WHO/EFSA for healthy children and are provided below. Activity factors for illness in hospital have not been well established, but the physical activity (PAL) of healthy children as per WHO/EFSA provides some useful guidance.

Table 3: EFSA uses the following PAL values for the different age groups [10]

1-3 years	1.4 (one activity factor as children at this age have similar activity)
>3-< 10 years	1.4 (low activity) 1.6 (moderate) 1.8 (very active)
10-18 years	1.6 (low activity) 1.8 (moderate activity) 2.0 (very active)

Table 4: FAO/WHO/UNO and Schofield equation for estimating the resting energy expenditure (REE) and total energy expenditure (TEE) of children [8]

Equation	**Age (years)**	**Boys**	**Girls**
FAO/WHO/UNO (in kcal)	TEE <1 year breast fed	-152.0 + 92.8 x weight (kg)	152.0 + 92.8 x weight (kg)
	TEE <1 year formula fed	- 29.0 + 82.6 x weight (kg)	- 29.0 + 82.6 x weight (kg)
	REE 1-3 years	60.9 × weight (kg) – 54	61.0 × weight (kg) - 51
	REE 3-10 years	22.7 × weight (kg) + 495	22.4 × weight (kg) + 499
	REE 10-18 years	12.2 × weight (kg) + 746	17.5 × weight (kg) + 651
Schofield with weight REE (in kcal) (21)	0-3 years	59.5 × weight (kg) - 30.3	58.3 × weight (kg) - 31.1
	3-10 years	22.7 × weight (kg) + 504	20.3 × weight (kg) + 486
	10-18 years	17.7 × weight (kg) + 658	13.4 × weight (kg) + 692
Schofield with weight and height REE (in kcal) (21)	0-3 years	0.167 × weight (kg) + 1516.7 × height (m) - 617.3	16.2 × weight (kg) + 1022.7 × height (m) - 413.3
	3-10 years	19.6 × weight (kg) + 130.2 × height (m) + 414.7	17.0 × weight (kg) + 161.7 × height (m) + 371.0
	10-18 years	16.2 × weight (kg) + 137.1 × height (m) + 515.3	8.4 × weight (kg) + 465.4 × height (m) + 200.0

Protein requirements in different age and patient groups

A child's protein requirement depends on their age, whether growth is still occurring or not, the amount of lean mass, extent and type of physical activity, and the severity of their disease. Tables 5-8 give an overview of the current protein recommendations from the guidelines for children. The limited scientific support for these recommendations is based mainly on nitrogen balance studies and expert opinions.

If inflammation is present, protein catabolism increases; and if inflammation, insulin resistance and limited movement (immobility) are present, protein synthesis decreases. It is commonly accepted that more protein is needed in these situations than in a state of health and that, in adults, this recommendation amounts to at least 1.2 g protein/kg body weight. This is preferably expressed as recommendation per kg lean mass, which comes closer to the actual requirements. The recommendation for ill patients is at least 1.5 g protein/kg lean mass. For protein synthesis, exercise is essential. In 2007 FAO/WHO/UNU revised their requirements for protein of infants and children. The new requirements were calculated on nitrogen equilibrium at an appropriate body composition during energy balance at moderate physical activity, plus the needs associated with the deposition of tissues consistent with good health.

Table 5: Safe level of protein intake for weaned infants and children up to 10 years (sexes combined) (grams of protein/kg body weight/day) [11]

Age (years)	Maintenance requirement	Growth requirement	Average requirement	Safe level (+1.96 SD)
0.5	0.66	0.46	1.12	1.31
1	0.66	0.29	0.95	1.14
1.5	0.66	0.19	0.85	1.03
2	0.66	0.13	0.79	0.97
3	0.66	0.07	0.73	0.90
4	0.66	0.03	0.69	0.86
5	0.66	0.06	0.69	0.85
6	0.66	0.04	0.72	0.89
7	0.66	0.08	0.74	0.91
8	0.66	0.09	0.75	0.92
9	0.66	0.09	0.75	0.92
10	0.66	0.09	0.75	0.91

Table 6: Safe levels of protein intake for adolescent boys and girls (grams of protein/kg body weight/ day) [11]

Age (years)	Maintenance requirement	Growth requirement	Average requirement	Safe level (+1.96 SD)
Girls				
11	0.66	0.07	0.73	0.90
12	0.66	0.06	0.72	1.89
13	0.66	0.05	0.71	1.88
14	0.66	0.04	0.70	0.87
15	0.66	0.03	0.69	0.85
16	0.66	0.02	0.68	0.84
17	0.66	0.01	0.67	0.83
18	0.66	0.00	0.66	0.82
Boys				
11	0.66	0.09	0.75	0.91
12	0.66	0.08	0.74	0.90
13	0.66	0.07	0.73	0.90
14	0.66	0.06	0.72	0.89
15	0.66	0.06	0.72	0.88
16	0.66	0.05	0.71	0.87
17	0.66	0.04	0.70	0.86
18	0.66	0.03	0.69	0.85

To achieve catch up growth the following protein energy ratio should be considered

An ideal protein-energy (PE) ratio for catch up growth with optimal lean body mass accretion, rather than deposition of adipose tissue, has been published by the WHO/FAO/UNO and is suggested to be a PE of 8.9 - 12% (Table 7).

Table 7: Theoretical energy and protein intake for 5, 10 and 20 g/kg/day catch-up growth in malnourished infants [12]

Catch-up Growth	Protein (g/kg/day)	Energy (kcal/kg/day)	Protein/Energy (%)
5g/kg/day	1.82	105	6.9
10g/kg/day	2.82	126	8.9
20g/kg/day	4.82	167	11.5

Resources: The following on line tool is available for energy requirement calculations
https://www.dieteticpocketguide.com/calculations/

Calculate a child's nutritional requirements and formulate a nutrition care plan (Appendix 5 & 6)

Estimated energy requirements:	
Estimated protein requirement:	
PN/Milk/ enteral feed name	
ml/kg/day	
kcal/kg/day	
Protein g/kg/day	

Evaluation – as part of your overall evaluation consider the following questions

Assess nutrition risk – does the child have an acute/chronic illness which will increase their energy requirements?	
Assess and classify child's growth – are they gaining weight/length as expected or is it faltering?	
How does the child eat or drink? Ask the caregiver if the child is eating and drinking an amount that is usual for them? Or do they have a reduced appetite or intake? (Appendix 5)	
What does the child eat or drink? Ask the caregiver if the child has any feed/ food restrictions or eating/drinking less than usual?	
Are there any concerns related to household food security/poverty? Are the family skipping meals/reducing meal size? Is there enough money for food? Can families use foods at home to enrich meals (Table 12)?	
Nutrition care plan – based on all the information gathered document a plan. e.g. are there increased losses, reduced intake, increased requirements	Impression
What nutrition information/resources have been shared with the caregiver?	Information shared with the caregiver
What are the nutrition goals to be achieved for the next review?	Nutrition goals

Section 2

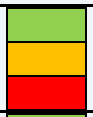
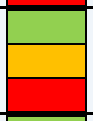
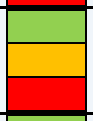
Appendix 1: Checklist for remote consultations (print 1 per patient)

Name:		**Date of birth:**	
Sex		**Age**	
Contact details		**Referral**	
Date of consultation		**Name of dietitian**	

Anthropometry

Previous Measurement	**Date**	**Recent Measurement**	**Date**	**Comment on growth**	**Mark (X) as completed**
Date of last weight Last Weight (kg)	dd/mm/yy	Date of new weight New weight	dd/mm/yy		
Date of last height/ length Last height (cm)	dd/mm/yy	Date of new height/ length New height (cm)	dd/mm/yy		
Date of last MUAC Last MUAC (mm)	dd/mm/yy	Date of new MUAC New MUAC (mm)	dd/mm/yy		

Biochemistry

Previous level	**Date**	**Recent level**	**Date**	**Comment on biochemistry**	**Mark (X) as completed**
					
					
					
					
					
					
					

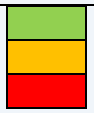
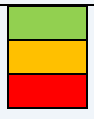
Clinical

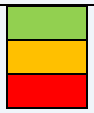
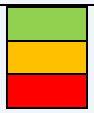
Notes relating to diagnosis – changes/concerns

Characterising losses e.g. vomit, stool and urine

	Frequency	
Vomiting **Colour**	**Number per day**	
Stools **Consistency – Bristol type**  **Stoma losses**	**Number per day** **Type** **ml/kg/day**	
Skin – eczema Scorad score		
Swallowing/ feeding issues e.g. dysphagia – texture modification		
Urine		

Diagnosis		
Co-morbidities		
Potential impact on nutritional status e.g. increased losses, reduced intake, increased requirements		
Other clinical signs and symptoms		

Dietary **Calculate a children energy and protein requirements and formulate a nutrition care plan**		
Estimated energy requirements:		
Estimated protein requirement:		
PN/Milk/ enteral feed name		
ml/kg/day – fluid/ feed	**ml/kg Total Fluid** **ml/kg Total feed**	
kcal/kg/day		
Protein g/kg/day		
Usual medication/ Vitamins/ minerals – names		
Meeting requirements (y/n)		
Food (y/n)		
Food diary – 3 day food diary template (appendix 5)		
Evaluation **As part of your overall evaluation consider the following questions**		
Assess nutrition risk – does the child have an acute/chronic illness which will increase their energy requirements?		
Assess and classify child's growth – are they gaining weight/ length as expected or is it faltering?		
How does the child eat or drink? Ask the caregiver if the child is eating and drinking an amount that is usual for		

them? Or do they have a reduced appetite or intake?		
What does the child eat or drink? Ask the caregiver if the child has any feed/ food restrictions or eating/drinking less than usual?		
Are there any concerns related to household food security/ poverty? Do families have sufficient food? Do families have sufficient money to buy food? Can families use foods at home to enrich meals (Table 12)?		
Nutrition care plan – based on the information gathered document a plan.	**Impression**	
What nutrition information/resources have been shared with the caregiver?	**Information/resources shared with the caregiver**	
What are the nutrition goals to be achieved for the next review?	**Nutrition goals**	
What are the nutrition outcomes?	**Nutrition outcome**	
Date of next review		

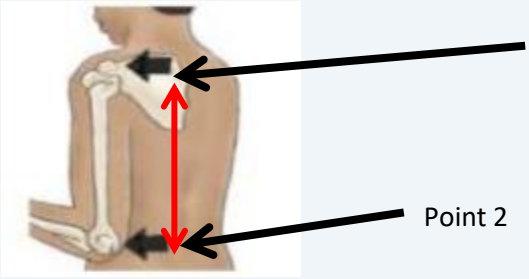
Appendix 2: Anthropometry information sheets for caregivers to use at home

Information sheet: A guide for caregivers as how to measure mid upper arm circumference

1. Two people will be needed to do this measurement in babies/young children.
    a. For this measurement you will need a tape measure, pen and paper.
2. For children > 5 years one person will be required, with the child sitting on a chair.
3. Before you start wash your hands and wipe the tape measure with a clean damp cloth.
4. Explain to the child you will be measuring their left arm.
5. For a baby/young child ask the first person to place them securely on their lap.
6. Ask the first caregiver to hold their left arm bending it at the elbow alongside their body.

Tip: Feel a small indent at the top of the shoulder

7. The 2nd caregiver should feel for the top of the child's shoulder – feel for a little indent.



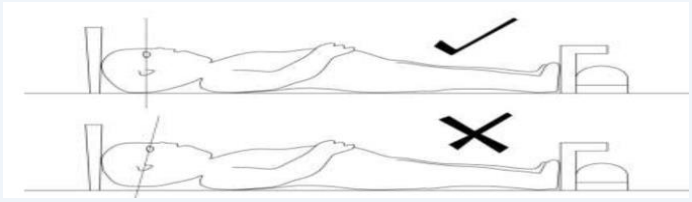
8. Put the tape measure at the top of the arm – ask the second caregiver to hold the arm straight at right angles to the body.
9. Measure the distance between point 1 and point 2 e.g. from the top of the shoulder to the tip of the elbow.
10. Write down the number on the tape measure at the tip of the elbow and work out what half of this number would be e.g. 10cm divided by 2 is 5cm.
11. With the tape measure still in place a small dot of the child's arm at the mid-point e.g. 5cm, using an eye liner or lip liner or pen.
12. Ask the second caregiver to let the arm hang loosely by their side.
13. Gently run the tape measure around the arm at the mid-point and read of the number where the tape measure crosses.

14. Repeat this for a second time and make a note of both measurements, which the dietitian will use to plot on a MUAC chart.

Information sheet: A guide for caregivers as how to measure length in children younger than 2 years of age

1. Two people will be needed to do this measurement in children younger than 2 years of age
    a. For this measurement you will need a tape measure, towel, hard back book or chopping board, pen and paper.
2. As the child may still be naked from being weighed, wrap them in a light blanket to keep them warm.
3. Find a wall (ideally without a skirting board e.g. a bathroom).
4. Clean an area on the floor next to the wall, place a clean towel on the floor and stick a tape measure on the floor with the tip against the wall.
5. Explain to the baby/young child they need to lie on the towel so you can measure how long they are.
6. The first person should gently place the baby's/young child's head against the wall and continue to gently hold the head in place.

Tip: The first person should gently place the head against the wall



7. The baby/young child should have their hair flat against the wall e.g. no ponytail, braids etc.
8. The second person should gently press down on the legs to straighten them – in babies they may not be completely straight.

Tape measure along the side

Tip: Gently press on the knees to straighten them (in babies legs may be slightly bent – this is normal)

9. The second person should then use a hard back book or chopping board as a foot rest – the toes to be pointing up to the ceiling. Mark off where the heel is on the floor on the tape measure.

Tip: The second person should use their finger to mark where bottom of the heel is on the floor – this will be the baby's/young child's length

10. Repeat this for a second time and make a note of both measurements, which the dietitian will use to plot on a growth chart.

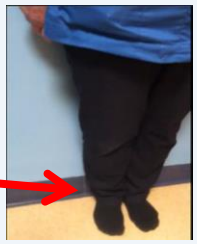
Information sheet: A guide for caregivers as how to measure height in children older than 2 years of age

1. Two people will be needed to do this measurement in children older than 2 years of age.
    a. For this measure you will need a tape measure, hard back book or chopping board, pen and paper.
2. Find a wall (ideally without a skirting board e.g. a bathroom).
3. Next stick a piece of paper on the wall at the height of your child – you are going to use this to make a mark as to where the top of their head is.

Tip: Stick a piece of paper on the wall – to mark the height

4. The child should have no shoes/sandals or slippers on and the hair should be flat as possible on the top of their head e.g. no ponytail, braids etc.
5. Explain to child they will be standing as straight as possible against the wall to measure how tall they are; ensure they are looking straight ahead.
6. The first person should help the child stand against the wall – heels against the wall, knees straight arms by the side.

Heels against the wall

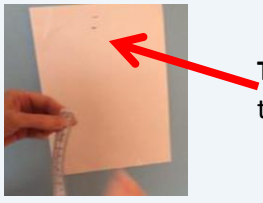


Tip: Help the child stand with their heels against the wall – with the back of the knees touching the wall

7. The first person should gently place a book on the top of the head with the second person making a mark on the piece of paper where the underneath of the book touches the paper. At all times ensure the child is standing still, with the heels against the wall and knees straight.

Tip: Mark the height on a piece of paper

8. Ask the child to step away from the wall. The second person should then take the tape measure and measure the distance from the mark to the floor. Write the number down – this will be the child's height.



Tip: Measure from the mark

Tip: Get down on the floor to read the number

9. Repeat this for a second time and make a note of both measures, which the dietitian will use to plot on a growth chart.

Information sheet: A guide for caregivers as how to measure weight in young children

1. If you normally measure your baby on electronic scales, ensure they are naked (no nappy, socks or clothes).
    a. For this measurement you will need an electronic scale, light blanket, pen and paper.
2. Put the light blanket in the scale cradle, switch the scale on and ensure it is "tared" and on zero before weighing your baby – most baby scales will weigh up to 20kg, but if a child's legs are dangling off the end this will not be accurate.
3. Lay your baby in the scale cradle on their back face upwards – lift your hands away from the baby ensuring you are not leaning on, or touching, the scales. If a baby moves a lot while the scales are stabilising a false reading may be recorded; if this is the case, do the weight gain.
4. Using the pen and paper, write down the number in the digital display ready for the appointment with the dietitian, who will use the measurement to plot on a growth chart.

For children older than 1 year of age and less than 2 years of age

1. Two people will be needed to do this measurement in children younger than 2 years of age.
    a. For this measurement you will need an electronic scale, pen and paper.
2. Switch the flat electronic scales on and wait for them to read zero.

3. The first person should take off their shoes and with only light clothing on stand on the electronic scale.
4. Using the pen and paper, write down the number in the digital display.
5. For children younger than 2 years, they should be weighed naked. For children older than 2 years with minimal clothing only e.g. vest and underwear.
6. The second person should pass the child to the first person who is still standing on the scales. The first person should write down this new weight.
7. Repeat this for a second time and make a note of both before and after weights with and without holding the child.
8. Give all of the measurements to the dietitian will use them to plot on a growth chart.

For children older than 2 years of age

1. One person will be needed to do this measurement in children older than 2 years of age.
    a. For this measurement you will need a scale, pen and paper.
2. Ask the child to stand still on the scale, move slightly away so as not to be touching the scale.
3. Using the pen and paper, write down the number in the digital display.

For children older than 2 years of age – with no electronic scales

1. For children under the age of 2 years it is unlikely to be accurate enough, but your dietitian will let you know.
2. If you do not have an electronic scales, it may be possible to weigh a child over the age of 2 years on bathroom scales.
3. One person will be needed to do this measurement in children older than 2 years of age.
    a. For this measurement you will need a scale, pen and paper.
4. Ask the child to stand on the flat bathroom scale and stand as still as possible.
5. Using the pen and paper, write down the number indicated by the pointer and give the measurement to the dietitian will use to plot on a growth chart.
6. If you need to weigh a younger child with bathroom scales follow the steps described above.

Appendix 3: Template for remote consultation clinic and activity

Date:_____ Dietitian name:_____

Appointment time	Name	Phone number	Email	Notes on info sent/ time recorded
8.30 – 9.15				
9.15 – 10.00				
10.00 – 10.45				
10.45 – 11.30				
11.30 – 12.15				
Lunch				
13.00 – 13.45				
13.45 – 14.30				
14.30 – 15.15				
15.15 – 16.00				

Appendix 4: Caregiver information about the remote consultation (appointment)

Introduction

Your child has been referred too/or normally sees a paediatric dietitian. During this period of social distancing we are offering remote consultations (appointments) instead of face to face consultations. This will either take the form of a video or telephone consultation.

Before the appointment the dietitian will:

- Be in contact beforehand to offer a time for the video/telephone appointment
- If you are doing a video consultation you may have to download some software before the appointment
- Will let you know how long the appointment will last
- Will need a telephone number or email address to use as part of this appointment
- Will ask you to send some information before the appointment e.g. weight/height or food diary

How will the time be spent in this appointment?

Try to be ready for your appointment - the appointment will last around 20–30 minutes – and is likely to cover the following points:

- 5-10 minutes will be spent looking at how well your child is growing
- 5–10 minutes will be spent talking about how and what your child eats
- 5–10 minutes will be spent providing some dietary and feeding advice, as well as discussing any changes to a feeding plan that may already be in place

After the appointment

- You will also receive a letter and maybe some dietary information with advice following the appointment

Appendix 5: Initiation and advancement of enteral feeds for children out of hours or where there is no dietitian on the ward

Feeding mode - enteral feeds can be given either:

- Continuously (usually over 20 hours a day or for 10 hours with 2 x 2 hour feed breaks)
- Boluses (either via a pump over ¾-1½ hours or as a gravity feed)
- Where pumps are not available gravity feeds may be given (Appendix 3)

Table 8: Initiation and advancement rates for enteral feeds for children

Weight	**Initiation rate (ml/hr)**	**Advancement rate Increase every 12 hours (ml/hr)**	**Goal amount of fluid (ml/hr)**
<10kg	5–10	5–10	Refer to table 2 & 3
10-30kg	5–30	5–30	
>30kg	15–30	15–30	

Table 9: Estimated fluid requirements: reference NICE guidelines "Intravenous fluid therapy in children and young people in hospital NICE guidelines [NG29]"

For children under 10 kg	
Term day 1-28 days	• From birth to day 1: 50–60 ml/kg/day. • Day 2: 70–80 ml/kg/day. • Day 3: 80–100 ml/kg/day. • Day 4: 100–120 ml/kg/day. • Days 5–28: 120–150 ml/kg/day.
Over 28 days	100 ml/kg/day
For children over 10kg	
Normal fluid requirements can be calculated using an adaptation of the Holliday-Segar Formula	
Weight	**Fluid**
11 – 20kg	100ml/kg for the first 10kg +50ml/kg for the next 10kg
20kg and above	100ml/kg for the first 10kg +50ml/kg for the next 10kg +20ml/kg thereafter
Example	A child who weighs 22kg 100ml/kg for the first 10kg = 1,000ml 50ml/kg for the next 10kg = 500ml 20ml/kg for the final 2kg = 50ml Total = 1,550ml (70ml/kg)

Table 10: Enteral feeds rates: please note as a guide, older children may not require so much energy – use clinical judgement

Weight (kg)	Feed conc (kcal/ml)	Feed type Dietitian to review feed type	70 kcal/kg (ml x 20 hrs)	80-90kcal/kg (ml x 20 hrs)	90–100kcal/kg (ml x 20 hrs)
2	0.8	Fortified breastmilk or Preterm post discharge milk	6-9	12–13	13–15
3	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	11–16 7–11	18–20 12-14	20-22 14-15
4	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	15–21 10–14	24-27 16-18	27–30 18-20
5	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	19–26 13–18	30-34 20-23	34–37 23-25
6	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	23–31 15–21	36-40 24-27	40–45 27-30
7	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	26–37 18–25	42–47 28-32	47–52 32-35
8	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	30–42 20–28	48–54 32-36	54–60 36-40
9	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	34–47 23–32	54–60 36-41	60–67 41-45
10	0.67 1	Breastmilk/standard formula Nutrient energy dense milk	41–52 25–35	60–67 40-45	67–75 45-50
			50–60 kcal/kg	**65-75kcal/kg**	**80kcal/kg**
11–14	1	Polymeric/peptide enteral feed	28–42	35-52	44–56
			50–60 kcal/kg	**65-70kcal/kg**	**75kcal/kg**
15-19	1	Polymeric/peptide enteral feed	38–57	49-66	70
			40–45kcal/kg	**60-65 kcal/kg**	**70kcal/kg**
20–24	1	Polymeric/peptide enteral feed	40–54	60-78	84
25-29	1	Polymeric/peptide enteral feed	50–65	60-94	100
			30-35 kcal/kg	**35-40kcal/kg**	**45kcal/kg**
30-39	1	Polymeric/peptide enteral feed	45–68	45-78	88
40–49	1	Polymeric/peptide enteral feed	60–86	70-98	110
			20 - 25kcal/kg	**30kcal/kg**	**35kcal/kg**
50-59	1	Polymeric/peptide enteral feed	50-63	75	88
60-69	1	Polymeric/peptide enteral feed	60-75	90	120
>70	1	Polymeric/peptide enteral feed	70–88	105	122

Notes: Feeds may be given as boluses e.g. 40ml x 20 = 800ml – 3 hourly feeds would equate to 100ml x 8

Table 11: Initial feed choice when starting enteral feeding

Age range	Type of feed
< 12 months old	• Up to 150ml/kg expressed maternal breast milk • Up to 150ml/kg standard infant formula • < 130ml/kg energy-nutrient dense formula
1 – 10 years of age	• Paediatric polymeric/ peptide enteral • As a continuous feed over 20 hours or bolus feeds or gravity drip feed
>10 years age	• Adult polymeric/ peptide enteral • As a continuous feed over 20 hours or bolus feeds or gravity drip feed

Appendix 6: Gravity feeding: How to determine a flow rate

Introduction

During this period most children who require enteral feeds at home will continue to have enteral feeds delivered via an enteral feeding pump or bolus gravity feeds. If, for some reason this is not possible, it may be necessary to provide gravity feeds. Gravity feeding is a method of feeding where enteral feed flows out of a giving set into an enteral feeding tube the aid of gravity. The rate, or speed, at which the enteral feed is delivered through the giving set tubing is controlled by a roller clamp and may vary depend on the tubing calibre, type and viscosity of the feed [13, 14].

Nutrition requirements

A dietitian will calculate an individual requirements providing a feeding plan consisting of the

- Type of enteral feed
- Rate – ml/hour
- Dose – amount per day
- Time – duration over which the feed should be administered

Calculating the drip rate for gravity feeds

- For gravity bolus enteral feeds to ensure the flow rate is correct, the number of drops of enteral dispensed per minute should be calculated (known as the drip rate).
- Open the roller clamp and set the flow rate by counting the drops per minute.
- As a guide, 20 drops of standard feed is approximately 1ml – this will vary depending on energy density and feed viscosity.
- Open and close the roller clamp until the desired drip rate is set correctly.
- Check the drip rate regularly to ensure the feed is still running at the required rate.

Calculation Steps

1. Dose / Feeding time (hours) x Drop factor (20 drops / 1 ml*) = Number of drops per hour
2. Number of drops per hour / 60 minutes per hour = Number of drops per minute
3. Number of drops per minute/ 60 seconds per minute = Number of drops per second
4. Number of drops per second x 15 = Number of drops per 15 seconds

Example Feeding Plan and Calculations:

Dose of enteral feed: 2000ml over 20 hours

1. 2000 ml / 20 hours x 20 = 2,000 drops per hour
2. 2,000 drops per hour / 60 minutes per hour = 33 drops per minute*
3. 33 drops per minute / 60 seconds per minute = 0.55 drops per second*
4. 0.55 x 15 = 8 drops per 15 seconds*

   *Always round up to the nearest whole number

Gravity Feeding Drip Rate Chart
1 mL = 20 drops

Prescribe enteral feed rate (mL per hour)	How many drips are needed in 1 minute	How many drips are needed in 15 seconds
25	8	2
30	10	3
35	12	3
40	13	3
45	15	4
50	17	4
55	18	5
60	20	5
65	22	5
70	23	6
75	25	6
80	27	7
85	28	7
90	30	8
95	32	8
100	33	8
105	35	9
110	37	9
115	38	10
120	40	10
125	42	10
130	43	11
135	45	11
140	47	12
145	48	12
150	50	12
155	52	13
160	53	13
165	55	14
170	57	14
175	58	15
180	60	15
185	62	15
190	63	16
195	65	17
200	67	17
205	68	18
210	70	18
215	72	18
220	73	19
225	75	19
230	77	19
235	78	20
240	80	20
245	82	20
250	83	21

Appendix 7: Making the most out of every mouthful

If individuals are trying to gain weight, aim to have an extra 500–1000kcal every day of nutrient dense foods. Some ideas of how this can be achieved are found below.

Table 12: Foods which can be used for extra calories and protein

Food Item	Amount	Energy (kcal)	Protein (g)	Food Item	Amount	Energy (kcal)	Protein (g)
< 50 kcal							
1 teaspoon chocolate spread	5g	15	0.8	1 teaspoon peanut butter	5g	29	1.2
1 heaped teaspoon cream cheese	10g	34	0.6	Cheese (pinch)	10g	35	2
50-100 kcal							
2 teaspoons smooth peanut butter	10g	58	2.4	Egg, boiled	60g	88	7.6
Bacon – lean rasher	40g	69	12.9	Raisins – small box	27g	88	0.86
Fruit smoothie – lighter	340ml	220	9	Banana	100g	92	1.3
1 tablespoon Marvelous nut dust	15g	100	2.3	Olives	10	60	<0.5
100-150 kcal							
Egg, (1) scrambled with milk	60g	105	6.2	Meatball, small	60g	125	16
Chicken, drumstick	40g	110	11	Milk, full cream	200ml	125	6.4
Cubes of cheese	45g	150	10	Baked beans	125g	116	6
150-200 kcal							
Avocado, half	75g	183	1	Yogurt, full fat	175ml	180	7.7
200-250 kcal							
Wholemeal wrap	1 small	215	7.6	Small bacon sandwich	1 slice 2 rashers	228	21.6
250-300 kcal							
Peanuts or tree nuts	50g	291	13.2	Cereal bar	50g	250	3.8
300-350 kcal							
Milkshake	330ml	300	12	Bread & peanut butter	2 slices & 2 tablespoons	321	8.1
350-400 kcal							
Chapatti/Tortilla & melted cheese	80g 50g	357	15	Scone, jam & cream	Medium	372	6.5
400-500 kcal				**500-600 kcal**			
Fruit smoothie	340ml	450	16	Cheese & tomato sandwiches x 2	4 slices	520	24
Egg mayonnaise sandwich & yogurt	2 slices & 1 pot yogurt	406	19.3				
> 500 kcal							
Peanuts or tree nuts	100g	582	26.2	Falafel wrap with hummus	150g	602	15.4

Where appropriate ask the caregiver to complete a 3-day food diary of current intake before the consultation

Day 1 Date:			
Time	**Meal** Detail here all food, fluids taken	**Quantity** Note in grams/oz/mL or household measures the volume of food or fluid consumed	**Comments** List here any brand names, further details of mealtime or if you noted any symptoms
On waking Time: _____			
Breakfast Time: _____			
Mid Morning Time: _____			
Lunch Time: _____			
Mid Afternoon Time: _____			
Evening Meal Time: _____			
Before Bed Time: _____			
Overnight Time: _____			

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