Support materials

TRAINING COURSE ON THE MANAGEMENT OF SEVERE MALNUTRITION

WORLD HEALTH ORGANIZATION
DEPARTMENT OF NUTRITION FOR HEALTH AND DEVELOPMENT

Annex B: Weight-for-Length Reference Card[a]

Boys' weight (kg)					Length[b]	Girls' weight (kg)				
-4 SD	-3 SD	-2 SD	-1 SD	Median	(cm)	Median	-1 SD	-2 SD	-3 SD	-4 SD
1.7	1.9	2.0	2.2	2.4	45	2.5	2.3	2.1	1.9	1.7
1.8	2.0	2.2	2.4	2.6	46	2.6	2.4	2.2	2.0	1.9
2.0	2.1	2.3	2.5	2.8	47	2.8	2.6	2.4	2.2	2.0
2.1	2.3	2.5	2.7	2.9	48	3.0	2.7	2.5	2.3	2.1
2.2	2.4	2.6	2.9	3.1	49	3.2	2.9	2.6	2.4	2.2
2.4	2.6	2.8	3.0	3.3	50	3.4	3.1	2.8	2.6	2.4
2.5	2.7	3.0	3.2	3.5	51	3.6	3.3	3.0	2.8	2.5
2.7	2.9	3.2	3.5	3.8	52	3.8	3.5	3.2	2.9	2.7
2.9	3.1	3.4	3.7	4.0	53	4.0	3.7	3.4	3.1	2.8
3.1	3.3	3.6	3.9	4.3	54	4.3	3.9	3.6	3.3	3.0
3.3	3.6	3.8	4.2	4.5	55	4.5	4.2	3.8	3.5	3.2
3.5	3.8	4.1	4.4	4.8	56	4.8	4.4	4.0	3.7	3.4
3.7	4.0	4.3	4.7	5.1	57	5.1	4.6	4.3	3.9	3.6
3.9	4.3	4.6	5.0	5.4	58	5.4	4.9	4.5	4.1	3.8
4.1	4.5	4.8	5.3	5.7	59	5.6	5.1	4.7	4.3	3.9
4.3	4.7	5.1	5.5	6.0	60	5.9	5.4	4.9	4.5	4.1
4.5	4.9	5.3	5.8	6.3	61	6.1	5.6	5.1	4.7	4.3
4.7	5.1	5.6	6.0	6.5	62	6.4	5.8	5.3	4.9	4.5
4.9	5.3	5.8	6.2	6.8	63	6.6	6.0	5.5	5.1	4.7
5.1	5.5	6.0	6.5	7.0	64	6.9	6.3	5.7	5.3	4.8
5.3	5.7	6.2	6.7	7.3	65	7.1	6.5	5.9	5.5	5.0
5.5	5.9	6.4	6.9	7.5	66	7.3	6.7	6.1	5.6	5.1
5.6	6.1	6.6	7.1	7.7	67	7.5	6.9	6.3	5.8	5.3
5.8	6.3	6.8	7.3	8.0	68	7.7	7.1	6.5	6.0	5.5
6.0	6.5	7.0	7.6	8.2	69	8.0	7.3	6.7	6.1	5.6
6.1	6.6	7.2	7.8	8.4	70	8.2	7.5	6.9	6.3	5.8
6.3	6.8	7.4	8.0	8.6	71	8.4	7.7	7.0	6.5	5.9
6.4	7.0	7.6	8.2	8.9	72	8.6	7.8	7.2	6.6	6.0
6.6	7.2	7.7	8.4	9.1	73	8.8	8.0	7.4	6.8	6.2
6.7	7.3	7.9	8.6	9.3	74	9.0	8.2	7.5	6.9	6.3
6.9	7.5	8.1	8.8	9.5	75	9.1	8.4	7.7	7.1	6.5
7.0	7.6	8.3	8.9	9.7	76	9.3	8.5	7.8	7.2	6.6
7.2	7.8	8.4	9.1	9.9	77	9.5	8.7	8.0	7.4	6.7
7.3	7.9	8.6	9.3	10.1	78	9.7	8.9	8.2	7.5	6.9
7.4	8.1	8.7	9.5	10.3	79	9.9	9.1	8.3	7.7	7.0
7.6	8.2	8.9	9.6	10.4	80	10.1	9.2	8.5	7.8	7.1
7.7	8.4	9.1	9.8	10.6	81	10.3	9.4	8.7	8.0	7.3
7.9	8.5	9.2	10.0	10.8	82	10.5	9.6	8.8	8.1	7.5
8.0	8.7	9.4	10.2	11.0	83	10.7	9.8	9.0	8.3	7.6
8.2	8.9	9.6	10.4	11.3	84	11.0	10.1	9.2	8.5	7.8
8.4	9.1	9.8	10.6	11.5	85	11.2	10.3	9.4	8.7	8.0
8.6	9.3	10.0	10.8	11.7	86	11.5	10.5	9.7	8.9	8.1
8.7	9.5	10.2	11.1	12.0	87	11.7	10.7	9.9	9.1	8.3
8.9	9.7	10.5	11.3	12.2	88	12.0	11.0	10.1	9.3	8.5
9.1	9.9	10.7	11.5	12.5	89	12.2	11.2	10.3	9.5	8.7
9.3	10.1	10.9	11.8	12.7	90	12.5	11.4	10.5	9.7	8.8
9.5	10.3	11.1	12.0	13.0	91	12.7	11.7	10.7	9.9	9.0
9.7	10.5	11.3	12.2	13.2	92	13.0	11.9	10.9	10.1	9.2
9.8	10.7	11.5	12.4	13.4	93	13.2	12.1	11.1	10.2	9.4
10.0	10.8	11.7	12.6	13.7	94	13.5	12.3	11.3	10.4	9.5
10.2	11.0	11.9	12.8	13.9	95	13.7	12.6	11.5	10.6	9.7
10.3	11.2	12.1	13.1	14.1	96	14.0	12.8	11.7	10.8	9.9
10.5	11.4	12.3	13.3	14.4	97	14.2	13.0	12.0	11.0	10.1
10.7	11.6	12.5	13.5	14.6	98	14.5	13.3	12.2	11.2	10.2
10.8	11.8	12.7	13.7	14.9	99	14.8	13.5	12.4	11.4	10.4
11.0	12.0	12.9	14.0	15.2	100	15.0	13.7	12.6	11.6	10.6

[a] A more detailed table is available on http://www.who.int/childgrowth/standards/weight_for_length/en/index.html [b] Length is measured for children below 2 years or, if age is not known, below 87 cm. For children 2 years and above (or, if age is not known, 87 cm or more), height is measured (see following table). Recumbent length is on average 0.7 cm greater than standing height; although the difference is of no importance to individual children, a correction may be made by adding 0.7 cm to the height if the child is less than 2 years (or below 87 cm if age not known) when recumbent length can not be measured.

Weight-for-Height Reference Card[a]

Boys' weight (kg)					Height[b] (cm)	Girls' weight (kg)				
-4 ET	-3 ET	-2 ET	-1 ET	Median		Median	-1 ET	-2 ET	-3 ET	-4 ET
5.4	5.9	6.3	6.9	7.4	65	7.2	6.6	6.1	5.6	5.1
5.6	6.1	6.5	7.1	7.7	66	7.5	6.8	6.3	5.8	5.3
5.7	6.2	6.7	7.3	7.9	67	7.7	7.0	6.4	5.9	5.4
5.9	6.4	6.9	7.5	8.1	68	7.9	7.2	6.6	6.1	5.6
6.1	6.6	7.1	7.7	8.4	69	8.1	7.4	6.8	6.3	5.7
6.2	6.8	7.3	7.9	8.6	70	8.3	7.6	7.0	6.4	5.9
6.4	6.9	7.5	8.1	8.8	71	8.5	7.8	7.1	6.6	6.0
6.5	7.1	7.7	8.3	9.0	72	8.7	8.0	7.3	6.7	6.1
6.7	7.3	7.9	8.5	9.2	73	8.9	8.1	7.5	6.9	6.3
6.8	7.4	8.0	8.7	9.4	74	9.1	8.3	7.6	7.0	6.4
7.0	7.6	8.2	8.9	9.6	75	9.3	8.5	7.8	7.2	6.6
7.1	7.7	8.4	9.1	9.8	76	9.5	8.7	8.0	7.3	6.7
7.3	7.9	8.5	9.2	10.0	77	9.6	8.8	8.1	7.5	6.8
7.4	8.0	8.7	9.4	10.2	78	9.8	9.0	8.3	7.6	7.0
7.5	8.2	8.8	9.6	10.4	79	10.0	9.2	8.4	7.8	7.1
7.7	8.3	9.0	9.7	10.6	80	10.2	9.4	8.6	7.9	7.2
7.8	8.5	9.2	9.9	10.8	81	10.4	9.6	8.8	8.1	7.4
8.0	8.7	9.3	10.1	11.0	82	10.7	9.8	9.0	8.3	7.6
8.1	8.8	9.5	10.3	11.2	83	10.9	10.0	9.2	8.5	7.7
8.3	9.0	9.7	10.5	11.4	84	11.1	10.2	9.4	8.6	7.9
8.5	9.2	10.0	10.8	11.7	85	11.4	10.4	9.6	8.8	8.1
8.7	9.4	10.2	11.0	11.9	86	11.6	10.7	9.8	9.0	8.3
8.9	9.6	10.4	11.2	12.2	87	11.9	10.9	10.0	9.2	8.4
9.1	9.8	10.6	11.5	12.4	88	12.1	11.1	10.2	9.4	8.6
9.3	10.0	10.8	11.7	12.6	89	12.4	11.4	10.4	9.6	8.8
9.4	10.2	11.0	11.9	12.9	90	12.6	11.6	10.6	9.8	9.0
9.6	10.4	11.2	12.1	13.1	91	12.9	11.8	10.9	10.0	9.1
9.8	10.6	11.4	12.3	13.4	92	13.1	12.0	11.1	10.2	9.3
9.9	10.8	11.6	12.6	13.6	93	13.4	12.3	11.3	10.4	9.5
10.1	11.0	11.8	12.8	13.8	94	13.6	12.5	11.5	10.6	9.7
10.3	11.1	12.0	13.0	14.1	95	13.9	12.7	11.7	10.8	9.8
10.4	11.3	12.2	13.2	14.3	96	14.1	12.9	11.9	10.9	10.0
10.6	11.5	12.4	13.4	14.6	97	14.4	13.2	12.1	11.1	10.2
10.8	11.7	12.6	13.7	14.8	98	14.7	13.4	12.3	11.3	10.4
11.0	11.9	12.9	13.9	15.1	99	14.9	13.7	12.5	11.5	10.5
11.2	12.1	13.1	14.2	15.4	100	15.2	13.9	12.8	11.7	10.7
11.3	12.3	13.3	14.4	15.6	101	15.5	14.2	13.0	12.0	10.9
11.5	12.5	13.6	14.7	15.9	102	15.8	14.5	13.3	12.2	11.1
11.7	12.8	13.8	14.9	16.2	103	16.1	14.7	13.5	12.4	11.3
11.9	13.0	14.0	15.2	16.5	104	16.4	15.0	13.8	12.6	11.5
12.1	13.2	14.3	15.5	16.8	105	16.8	15.3	14.0	12.9	11.8
12.3	13.4	14.5	15.8	17.2	106	17.1	15.6	14.3	13.1	12.0
12.5	13.7	14.8	16.1	17.5	107	17.5	15.9	14.6	13.4	12.2
12.7	13.9	15.1	16.4	17.8	108	17.8	16.3	14.9	13.7	12.4
12.9	14.1	15.3	16.7	18.2	109	18.2	16.6	15.2	13.9	12.7
13.2	14.4	15.6	17.0	18.5	110	18.6	17.0	15.5	14.2	12.9
13.4	14.6	15.9	17.3	18.9	111	19.0	17.3	15.8	14.5	13.2
13.6	14.9	16.2	17.6	19.2	112	19.4	17.7	16.2	14.8	13.5
13.8	15.2	16.5	18.0	19.6	113	19.8	18.0	16.5	15.1	13.7
14.1	15.4	16.8	18.3	20.0	114	20.2	18.4	16.8	15.4	14.0
14.3	15.7	17.1	18.6	20.4	115	20.7	18.8	17.2	15.7	14.3
14.6	16.0	17.4	19.0	20.8	116	21.1	19.2	17.5	16.0	14.5
14.8	16.2	17.7	19.3	21.2	117	21.5	19.6	17.8	16.3	14.8
15.0	16.5	18.0	19.7	21.6	118	22.0	19.9	18.2	16.6	15.1
15.3	16.8	18.3	20.0	22.0	119	22.4	20.3	18.5	16.9	15.4
15.5	17.1	18.6	20.4	22.4	120	22.8	20.7	18.9	17.3	15.6

[a] A more detailed table is available on http://www.who.int/childgrowth/standards/weight_for_height/en/index.html.

[b] For children 2 years and above (or, if age not known, 87 cm or more), height is measured. Recumbent length is on average 0.7 cm greater than standing height; although the difference is of no importance to individual children, a correction may be made by subtracting 0.7cm from the lengths if the child is 2 years or more or above 86.9 cm when standing height can not be measured.

F-75 Reference Card

Volume of F-75 to give for children of different weights

See reverse for adjusted amounts for children with severe (+++) oedema.

Weight of child (kg)	Volume of F-75 per feed (ml)[a]			Daily total (130 ml/kg)	80% of daily total [a] (minimum)
	Every 2 hours[b] (12 feeds)	Every 3 hours[c] (8 feeds)	Every 4 hours (6 feeds)		
2.0	20	30	45	260	210
2.2	25	35	50	286	230
2.4	25	40	55	312	250
2.6	30	45	55	338	265
2.8	30	45	60	364	290
3.0	35	50	65	390	310
3.2	35	55	70	416	335
3.4	35	55	75	442	355
3.6	40	60	80	468	375
3.8	40	60	85	494	395
4.0	45	65	90	520	415
4.2	45	70	90	546	435
4.4	50	70	95	572	460
4.6	50	75	100	598	480
4.8	55	80	105	624	500
5.0	55	80	110	650	520
5.2	55	85	115	676	540
5.4	60	90	120	702	560
5.6	60	90	125	728	580
5.8	65	95	130	754	605
6.0	65	100	130	780	625
6.2	70	100	135	806	645
6.4	70	105	140	832	665
6.6	75	110	145	858	685
6.8	75	110	150	884	705
7.0	75	115	155	910	730
7.2	80	120	160	936	750
7.4	80	120	160	962	770
7.6	85	125	165	988	790
7.8	85	130	170	1014	810
8.0	90	130	175	1040	830
8.2	90	135	180	1066	855
8.4	90	140	185	1092	875
8.6	95	140	190	1118	895
8.8	95	145	195	1144	915
9.0	100	145	200	1170	935
9.2	100	150	200	1196	960
9.4	105	155	205	1222	980
9.6	105	155	210	1248	1000
9.8	110	160	215	1274	1020
10.0	110	160	220	1300	1040

[a]Volumes in these columns are rounded to the nearest 5 ml.
[b] Feed 2-hourly for at least the first day. Then, when little or no vomiting, modest diarrhoea (<5 watery stools per day), and finishing most feeds, change to 3-hourly feeds.
[c]After a day on 3-hourly feeds: If no vomiting, less diarrhoea, and finishing most feeds, change to 4-hourly feeds.

Volume of F-75 for Children with Severe (+++) Oedema

Weight with +++ oedema (kg)	Volume of F-75 per feed (ml)[a]			Daily total (100 ml/kg)	80% of daily total[a] (minimum)
	Every 2 hours[b] (12 feeds)	Every 3 hours[c] (8 feeds)	Every 4 hours (6 feeds)		
3.0	25	40	50	300	240
3.2	25	40	55	320	255
3.4	30	45	60	340	270
3.6	30	45	60	360	290
3.8	30	50	65	380	305
4.0	35	50	65	400	320
4.2	35	55	70	420	335
4.4	35	55	75	440	350
4.6	40	60	75	460	370
4.8	40	60	80	480	385
5.0	40	65	85	500	400
5.2	45	65	85	520	415
5.4	45	70	90	540	430
5.6	45	70	95	560	450
5.8	50	75	95	580	465
6.0	50	75	100	600	480
6.2	50	80	105	620	495
6.4	55	80	105	640	510
6.6	55	85	110	660	530
6.8	55	85	115	680	545
7.0	60	90	115	700	560
7.2	60	90	120	720	575
7.4	60	95	125	740	590
7.6	65	95	125	760	610
7.8	65	100	130	780	625
8.0	65	100	135	800	640
8.2	70	105	135	820	655
8.4	70	105	140	840	670
8.6	70	110	145	860	690
8.8	75	110	145	880	705
9.0	75	115	150	900	720
9.2	75	115	155	920	735
9.4	80	120	155	940	750
9.6	80	120	160	960	770
9.8	80	125	165	980	785
10.0	85	125	165	1000	800
10.2	85	130	170	1020	815
10.4	85	130	175	1040	830
10.6	90	135	175	1060	850
10.8	90	135	180	1080	865
11.0	90	140	185	1100	880
11.2	95	140	185	1120	895
11.4	95	145	190	1140	910
11.6	95	145	195	1160	930
11.8	100	150	195	1180	945
12.0	100	150	200	1200	960

[a]Volumes in these columns are rounded to the nearest 5 ml.
[b] Feed 2-hourly for at least the first day. Then, when little or no vomiting, modest diarrhoea (<5 watery stools per day), and finishing most feeds, change to 3-hourly feeds.
[c]After a day on 3-hourly feeds: If no vomiting, less diarrhoea, and finishing most feeds, change to 4-hourly feeds.

F-100 Reference Card

Range of Volumes for Free-Feeding with F-100

Weight of Child (kg)	Range of volumes per 4-hourly feed of F-100 (6 feeds daily)		Range of daily volumes of F-100	
	Minimum (ml)	Maximum (ml) [a]	Minimum (150 ml/kg/day)	Maximum (220 ml/kg/day)
2.0	50	75	300	440
2.2	55	80	330	484
2.4	60	90	360	528
2.6	65	95	390	572
2.8	70	105	420	616
3.0	75	110	450	660
3.2	80	115	480	704
3.4	85	125	510	748
3.6	90	130	540	792
3.8	95	140	570	836
4.0	100	145	600	880
4.2	105	155	630	924
4.4	110	160	660	968
4.6	115	170	690	1012
4.8	120	175	720	1056
5.0	125	185	750	1100
5.2	130	190	780	1144
5.4	135	200	810	1188
5.6	140	205	840	1232
5.8	145	215	870	1276
6.0	150	220	900	1320
6.2	155	230	930	1364
6.4	160	235	960	1408
6.6	165	240	990	1452
6.8	170	250	1020	1496
7.0	175	255	1050	1540
7.2	180	265	1080	1588
7.4	185	270	1110	1628
7.6	190	280	1140	1672
7.8	195	285	1170	1716
8.0	200	295	1200	1760
8.2	205	300	1230	1804
8.4	210	310	1260	1848
8.6	215	315	1290	1892
8.8	220	325	1320	1936
9.0	225	330	1350	1980
9.2	230	335	1380	2024
9.4	235	345	1410	2068
9.6	240	350	1440	2112
9.8	245	360	1470	2156
10.0	250	365	1500	2200

[a] Volumes per feed are rounded to the nearest 5 ml.

Danger Signs

Danger Signs Related to Pulse, Respirations, and Temperature *Alert a physician if these occur.*		
	Danger sign:	**Suggests:**
Pulse and Respirations	Confirmed increase in pulse rate of 25 or more beats per minute, **along with** Confirmed increase in respiratory rate of 5 or more breaths per minute	Infection or Heart failure (possibly from overhydration due to feeding or rehydrating too fast)
Respirations only	Fast breathing: • 50 breaths/minute or more in child 2 months up to 12 months old* • 40 breaths/ minute or more in child 12 months up to 5 years	Pneumonia
Temperature	Any sudden increase or decrease Rectal temperature below 35.5°C (95.9°F)	Infection Hypothermia (possibly due to infection, a missed feed, or child being uncovered)

In addition to watching for increasing pulse or respirations and changes in temperature, watch for other danger signs such as:

- anorexia (loss of appetite)
- change in mental state (e.g., becomes lethargic)
- jaundice (yellowish skin or eyes)
- cyanosis (tongue/lips turning blue from lack of oxygen)
- difficult breathing
- difficulty feeding or waking (drowsy)
- abdominal distention
- new oedema
- large weight changes
- increased vomiting
- petechiae (bruising)

Normal ranges of pulse and respiratory rates:

Age	**Normal ranges (per minute):**	
	Pulse	**Respirations**
2 months up to 12 months	80 up to 160	20 up to 60*
12 months up to 60 months (5 years)	80 up to 140	20 up to 40

**Some children age 2 months up to 12 months will normally breathe fast (i.e. 50 – 60 breaths per minute) without having pneumonia. However, unless the child's normal respiratory rate is known to be high, he should be assumed to have either overhydration or pneumonia. Careful evaluation, taking into account prior fluid administration, will help differentiate the two conditions and plan appropriate treatment.*

Antibiotics Reference Card

Summary: Antibiotics for Severely Malnourished Children

IF:	GIVE:	
NO COMPLICATIONS	**Cotrimoxazole** Oral (25 mg sulfamethoxazole + 5 mg trimethoprim / kg) every 12 hours for 5 days	
COMPLICATIONS (shock, hypoglycaemia, hypothermia, dermatosis with raw skin/fissures, respiratory or urinary tract infections, or lethargic/sickly appearance)	**Gentamicin**[1] IV or IM (7.5 mg/kg), once daily for 7 days, **plus:**	
	Ampicillin IV or IM (50 mg/kg), every 6 hours for 2 days	Followed by: **Amoxicillin**[2] Oral (15 mg/kg), every 8 hours for 5 days
If child fails to improve within 48 hours, ADD:	**Chloramphenicol** IV or IM (25 mg/kg), every 8 hours for 5 days (Give every 6 hours if suspect meningitis.)	
If a specific infection requires an additional antibiotic, ALSO GIVE:	**Specific antibiotic** as directed on pages 30 – 33 of the manual *Management of Severe Malnutrition*	

[1]If the child is not passing urine, gentamicin may accumulate in the body and cause deafness. Do not give the second dose until the child is passing urine.
[2]If amoxicillin is not available, give ampicillin, 50 mg/kg orally every 6 hours for 5 days.

Doses for Specific Formulations and Body Weight Ranges

ANTIBIOTIC	ROUTE / DOSE/ FREQUENCY/ DURATION	FORMULATION	DOSE ACCORDING TO CHILD'S WEIGHT		
			3 up to 6 kg	6 up to 8 kg	8 up to 10 kg
Amoxicillin	Oral: 15 mg/kg every 8 hours for 5 days	Tablet, 250 mg	¼ tablet	½ tablet	½ tablet
		Syrup, 125 mg/5ml	2.5 ml	5 ml	5 ml
		Syrup, 250 mg/5ml	1.5 ml	2 ml	2.5 ml
Ampicillin	Oral: 50 mg/kg every 6 hours for 5 days	Tablet, 250 mg	1 tablet	1½ tablet	2 tablets
	IV/IM: 50 mg/kg every 6 hours for 2 days	Vial of 500 mg mixed with 2.1 ml sterile water to give 500 mg /2.5 ml	1 ml	1.75 ml	2.25 ml
Cotrimoxazole sulfamethoxazole + trimethoprim, SMX + TMP	Oral: 25 mg SMX + 5 mg TMP /kg every 12 hours for 5 days	Tablet, 100 mg SMX + 20 mg TMP	1 tablet	1½ tablet	2 tablets
		Syrup, 200 mg SMX + 40 mg TMP per 5 ml	2.5 ml	4 ml	5 ml
Metronidazole	Oral: 7.5 mg/kg every 8 hours for 7 days	Suspension, 200 mg / 5 ml	1 ml	1.25 ml	1.5 ml
Nalidixic Acid	Oral: 15 mg/kg every 6 hours for 5 days	Tablet, 250 mg	¼ tablet	½ tablet	½ tablet
Benzylpenicillin	IV or IM: 50 000 units / kg every 6 hours for 5 days	IV: vial of 600 mg mixed with 9.6 ml sterile water to give 1 000 000 units /10 ml	2 ml	3.5 ml	4.5 ml
		IM: vial of 600 mg mixed with 1.6 ml sterile water to give 1 000 000 units /2ml	0.4 ml	0.7 ml	0.9 ml

Doses for Selected Antibiotics, for Specific Formulations and Body Weights

ANTIBIOTIC	ROUTE / DOSE FREQUENCY/ DURATION	FORMULATION	DOSES FOR SPECIFIC BODY WEIGHTS *(Use closest weight)*									
			3 kg	**4 kg**	**5 kg**	**6 kg**	**7 kg**	**8 kg**	**9 kg**	**10 kg**	**11 kg**	**12 kg**
Chloramphenicol	IV or IM: 25 mg/kg every 8 hours (or every 6 hours if suspect meningitis) for 5 days	IV: vial of 1 g mixed with 9.2 ml sterile water to give 1g/10 ml	0.75 ml	1 ml	1.25 ml	1.5 ml	1.75 ml	2 ml	2.25 ml	2.5 ml	2.75 ml	3 ml
		IM: vial of 1 g mixed with 3.2 ml sterile water to give 1g/4ml	0.3 ml	0.4 ml	0.5 ml	0.6 ml	0.7 ml	0.8 ml	0.9 ml	1 ml	1.1 ml	1.2 ml
Gentamicin	IV or IM: 7.5 mg/kg once daily for 7 days	IV/IM: vial containing 20 mg (2 ml at 10mg/ml), undiluted	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml) mixed with 6 ml sterile water to give 80 mg/ 8 ml	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml), undiluted	0.5 ml	0.75 ml	0.9 ml	1.1 ml	1.3 ml	1.5 ml	1.7 ml	1.9 ml	2 ml	2.25 ml

Doses of Iron Syrup for a Common Formulation

Weight of child	**Dose of Iron Syrup**: Ferrous Fumerate 100 mg per 5 ml (20 mg elemental iron per ml)
3 up to 6 kg	0.5 ml
6 up to 10 kg	0.75 ml
10 up to 15 kg	1 ml

CRITICAL CARE PATHWAY (CCP) — SEVERE MALNUTRITION WARD

NAME_____ M F DATE OF BIRTH OR AGE_____ DATE OF ADMISSION_____ TIME_____ HOSP. ID NUMBER_____

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given: _____

SIGNS OF SEVERE MALNUTRITION	Severe wasting? Yes No
Oedema? 0 + ++ +++	
Dermatosis? 0 + ++ +++ (raw skin, fissures)	
Weight(kg):	Height/length (cm):
SD score:	or % of median:

TEMPERATURE _____°C rectal axillary

If rectal <35.5°C (95.9°F), or axillary<35°C (95°F), actively warm child. Check temperature every 30 minutes.

BLOOD GLUCOSE (mmol/l):

If <3mmol/l and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NG). If <3 mmol/l and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x ___ kg (child's wt) = ____ml *Then give 50 ml bolus NG.*

Time glucose given: Oral NG IV

HAEMOGLOBIN (Hb) (g/l): or Packed cell vol (PCV): Blood type:

If Hb <40 g/l or PCV<12%, transfuse 10 ml/kg whole fresh blood (or 5-7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:

EYE SIGNS None Left Right MEASLES Yes No

Bitot's spots Pus/Inflammation Corneal clouding Corneal ulceration

If ulceration, give vitamin A & atropine immediately. Record on Daily Care page.

Oral doses vitamin A:	<6 months	50 000 IU
	6 - 12 months	100 000 IU
	>12 months	200 000 IU

FEEDING *Begin feeding with F-75 as soon as possible. (If child is rehydrated, reweigh before determining amount to feed. New weight: _____ kg)*

Amount for 2-hourly feedings: _____ ml F-75* Time first fed: _____

* *If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/l.*

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK None Lethargic/unconsious Cold hand Slow capillary refill(>3 seconds) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, give oxygen. Give IV glucose as described under Blood Glucose (left). Then give IV fluids:

Amount IV fluids per hour: 15 ml x ____ kg (child's wt) = _____ml

	Start:	Monitor every 10 minutes					*2nd hr:	Monitor every 10 minutes				
Time							*					
Resp. rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right part of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See left, Haemoglobin.)*

DIARRHOEA Watery diarrhoea? Yes No
Blood in stool? Yes No
Vomiting? Yes No

If diarrhoea, circle signs present: Skin pinch goes back slowly; Restless/irritable; Lethargic; Thirsty; Sunken eyes; Dry mouth/tongue; No tears

*If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:**
5 ml x ____ kg (child's wt) = ____ ml ReSoMal

*For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:**
5 to 10 ml x ____ kg (child's wt) = _____ to _____ ml ReSoMal

	Start:													
Time														
Resp. rate														
Pulse rate														
Passed urine? Y N														
Number stools														
Number vomits														
Hydration signs														
Amount taken (ml)							F-75		F-75		F-75		F-75	F-75

**Stop ReSoMal if:* Increase in pulse & resp. rates Jugular veins engorged Increasing oedema, e.g., puffy eyelids

ANTIBIOTICS *(All receive)* Drug / Route	Dose / Frequency / Duration	Time of 1st dose

DAILY CARE

	Week 1							Week 2							Week 3						
DAYS IN HOSPITAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Date																					
Daily weight (kg)																					
Weight gain (g/kg)	*Calculate daily after on F-100.*																				
Oedema 0 + ++ +++																					
Diarrhoea/vomit 0 D V																					
FEED PLAN: Type feed																					
# feeds daily																					
Total volume taken (ml)																					
ANTIBIOTICS	*List prescribed antibiotics in left column. Allow one row for each daily dose. Draw a box around days/times that each drug should be given. Initial when given.*																				
FOLIC ACID	5mg	1mgÕ																			
VITAMIN A	*		*Give Day 1 routinely unless evidence of dose in past month & no eye sign. Give Day 2 & Day 15 if													child admitted with eye sign or recent measles.						
Multivitamin (if not in feed)																					
Drug for worms (Note type of worm)																					
IRON 2 X daily	*Begin iron after 2 days on F-100.*																				
FOR EYE PROBLEMS:											*After 7-10 days, when eye drops are no longer needed, shade boxes for eye drops.*										
Tetracycline or Chloramphenicol 1 drop 4 X daily																					
Atropine 1 drop 3 X daily																					
Dermatosis 0 + ++ +++																					
Bathing, 1% permanganate																					
OTHER																					

MONITORING RECORD

Monitor respiratory rate, pulse rate, and temperature 4-hourly until after transition to F-100 and patient is stable. Then monitoring may be less frequent (e.g., twice daaily).

Respiratory rate

Breaths/ minute

Pulse rate

Beats/ minute

Temperature

39.0

38.5

38.0

37.5

37.0

36.5

36.0

35.5

35.0

34.5

Date/time:

Danger Signs: Watch for increasing pulse and respirations, fast or difficult breathing, sudden increase or decrease in temperature, rectal temperature below 35.5°C, and other changes in condition. See Danger Signs listed on back of F-100 Reference Card. Normal ranges of pulse and respiratory rates are also listed on back of F-100 Reference Card.

WEIGHT CHART

Name: _____

Weight on admission: _____kg

Height / length: _____cm

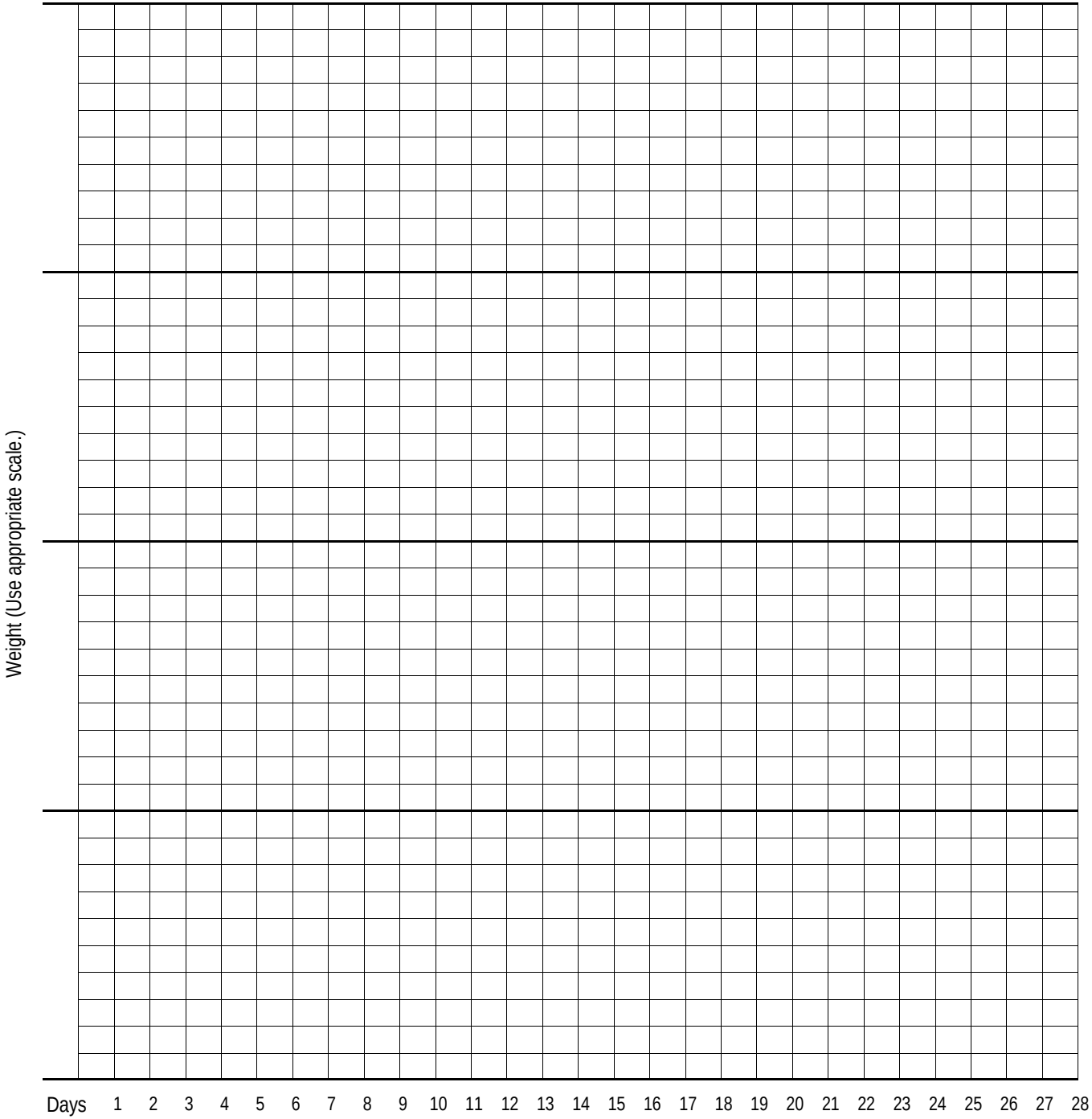
Oedema on admission: 0 + ++ +++

Desired weight at discharge
(-1SD, 90% weight for height): _____kg

Actual weight at discharge: _____kg

Enter likely range of weights on the vertical axis in an appropriate scale (e.g., each row representing 0.1 kg). Allow rows below the starting weight in case weight decreases; weight may decrease by as much as 30% if the child has severe oedema.

Draw a bold horizontal line across the graph to show the desired discharge weight.



COMMENTS / OUTCOME

COMMENTS:
TRAINING GIVEN TO PARENTS / CAREGIVERS:

SPECIAL DISCHARGE AND FOLLOW-UP INSTRUCTIONS:

IMMUNIZATIONS Immunization card? Yes No *Circle immunizations already given. Initial and date by any given in hospital.*

Immunization	First	Second	Third	Booster
BCG	At birth	Optional: >6 months	—	—
Polio	At birth	2 months	3 months	12 months
DPT	3 months	4 months	5 months	12 months
Measles	6 or 9 months	—	—	—

PATIENT OUTCOME		
Circle outcome:	DATE	CIRCUMSTANCES / COMMENTS
Discharge at –1SD (90% weight for height)		
Early departure (against advice)		SD score (or %): _____
Early discharge		SD score (or %): _____
Referral		SD score (or %): _____
Death		Number of days after admission (circle): <24 hrs 1-3 days 4-7 days >7 days Approximate time of death: Day Night
		Apparent cause(s): Had child received IV fluids? Yes No

24-HOUR FOOD INTAKE CHART

Complete one chart for every 24-hour period.

Name:_____ Hospital ID number:_____ Admission weight (kg): _____ Today's weight (kg): _____

DATE:		**TYPE OF FEED:**	**GIVE: _____ feeds of _____ml**			
Time	a. Amount offered (ml)	b. Amount left in cup (ml)	c. Amount taken orally (a – b)	d. Amount taken by NG, if needed (ml)	e. Estimated amount vomited (ml)	f. Watery diarrhoea (if present, yes)
Column totals			c.	d.	e.	Total yes:

Total volume taken over 24 hours = amount taken orally (c) + amount taken by NG (d) – total amount vomited (e) = _____ml

DAILY WARD FEED CHART

DATE:_____ WARD: _____

Name of Child	F-75			F-100		
	Number feeds	Amount/ feed (ml)	Total (ml)	Number feeds	Amount/ feed (ml)	Total (ml)
F-75 (total ml) needed for 24 hours				*F-100 (total ml) needed for 24 hrs*		
*Amount needed for __ hours**				*Amount needed for __ hours**		
Amount to prepare (round up to whole litre)				*Amount to prepare (round up to whole litre)*		

*Divide daily amount by the number of times food is prepared each day. For example, if feeds are prepared every 12 hours, divide daily amount by 2.

WEIGHT GAIN TALLY SHEET FOR WARD

Week of:	Good weight gain ≥ 10 g/kg/day	Moderate weight gain 5 up to 10 g/kg/day	Poor weight gain < 5 g/kg/day
Number of children on F-100 for entire week:			
Totals			
% of children on F-100 in ward			

CHECKLIST FOR MONITORING FOOD PREPARATION

OBSERVE:	YES	NO	COMMENTS
Are ingredients for the recipes available?			
Is the correct recipe used for the ingredients that are available?			
Are ingredients stored appropriately and discarded at appropriate times?			
Are containers and utensils kept clean?			
Do kitchen staff (or those preparing feeds) wash hands with soap before preparing food?			
Are the recipes for F-75 and F-100 followed exactly? (If changes are made due to lack of ingredients, are these changes appropriate?)			
Are measurements made exactly with proper measuring utensils (e.g., correct scoops)?			
Are ingredients thoroughly mixed (and cooked, if necessary)?			
Is the appropriate amount of oil mixed in (i.e., not left stuck in the measuring container)?			
Is mineral mix added correctly?			
Is correct amount of water added to make up a litre of formula? (Staff should not add a litre of water, but just enough to make a litre of formula.)			
Is food served at an appropriate temperature?			
Is the food consistently mixed when served (i.e., oil is mixed in, not separated)?			
Are correct amounts put in the dish for each child?			
Is leftover prepared food discarded promptly?			
Other:			

CHECKLIST FOR MONITORING WARD PROCEDURES

OBSERVE:	YES	NO	COMMENTS
Feeding			
Are correct feeds served in correct amounts?			
Are feeds given at the prescribed times, even on nights and weekends?			
Are children held and encouraged to eat (never left alone to feed)?			
Are children fed with a cup (never a bottle)?			
Is food intake (and any vomiting/diarrhoea) recorded correctly after each feed?			
Are leftovers recorded accurately?			
Are amounts of F-75 kept the same throughout the initial phase, even if weight is lost?			
After transition, are amounts of F-100 given freely and increased as the child gains weight?			
Warming			
Is the room kept between 25° - 30° C (to the extent possible)?			
Are blankets provided and children kept covered at night?			
Are safe measures used for re-warming children?			
Are temperatures taken and recorded correctly?			
Weighing			
Are scales functioning correctly?			
Are scales standardized weekly?			
Are children weighed at about the same time each day?			
Are they weighed about one hour before a feed (to the extent possible)?			
Do staff adjust the scale to zero before weighing?			
Are children consistently weighed without clothes?			
Do staff correctly read weight to the nearest division of the scale?			
Do staff immediately record weights on the child's CCP?			
Are weights correctly plotted on the Weight Chart?			

CHECKLIST FOR MONITORING WARD PROCEDURES, continued

Giving antibiotics, medications, supplements			
Are antibiotics given as prescribed (correct dose at correct time)?			
When antibiotics are given, do staff immediately make a notation on the CCP?			
Is folic acid given daily and recorded on the CCP?			
Is vitamin A given according to schedule?			
Is a multivitamin given daily and recorded on the CCP?			
After children are on F-100 for 2 days, is the correct dose of iron given twice daily and recorded on the CCP?			
Ward environment			
Are surroundings welcoming and cheerful?			
Are mothers offered a place to sit and sleep?			
Are mothers taught/ encouraged to be involved in care?			
Are staff consistently courteous?			
As children recover, are they stimulated and encouraged to move and play?			

CHECKLIST FOR MONITORING HYGIENE

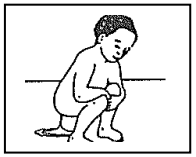
OBSERVE:	YES	NO	COMMENTS
Handwashing			
Are there working handwashing facilities in the ward?			
Do staff consistently wash hands thoroughly with soap?			
Are their nails clean?			
Do they wash hands before handling food?			
Do they wash hands between each patient?			
Mothers' cleanliness			
Do mothers have a place to bathe, and do they use it?			
Do mothers wash hands with soap after using the toilet or changing diapers?			
Do mothers wash hands before feeding children?			
Bedding and laundry			
Is bedding changed every day or when soiled/wet?			
Are diapers, soiled towels and rags, etc. stored in bag, then washed or disposed of properly?			
Is there a place for mothers to do laundry?			
Is laundry done in hot water?			
General maintenance			
Are floors swept?			
Is trash disposed of properly?			
Is the ward kept as free as possible of insects and rodents?			
Food storage			
Are ingredients and food kept covered and stored at the proper temperature?			
Are leftovers discarded?			
Dishwashing			
Are dishes washed after each meal?			
Are they washed in hot water with soap?			
Toys			
Are toys washable?			
Are toys washed regularly, and after each child uses them?			

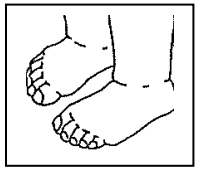
Danger Signs – Bring Child for Immediate Care if:

Not able to drink or breastfeed
Stops feeding

Diarrhoea more than 1 day
or blood in stool

Swelling in feet,
hands, legs, or arms

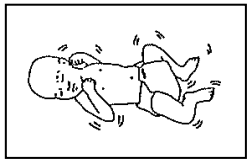




Fever (feels hot)

Convulsion (fits)

Fast or difficult breathing



Come for Scheduled Follow-Up Visits

Next Planned Follow-Up:		Record of Visits:			
Date	Place	Date	Ht/length	Weight	% wt-for ht

Vitamin A – Bring Child for a Dose Every Six Months

Next Dose Vitamin A :		Record of Doses Received:	
Date	Place	Date	Dose

Immunizations Given

Tick or record date given:

☐ BCG	☐ DPT 1	☐ DPT 2	☐ DPT 3
☐ OPV 0	☐ OPV 2	☐ OPV 2	☐ OPV 3
			☐ Measles

Next Immunization

Date	Dose(s) needed

DISCHARGE CARD

For Child Recovering from Severe Malnutrition
Hospital Name

Child's name: _____ M F Date of birth:_____
Address:_____

	Date:	Weight (kg)	Ht./length (cm)	% weight-for- height
Admission				
Discharge				

Instructions for Feeding at Home

What to feed? (Include recipe if needed) _____
_____
_____
_____
_____
_____

How much and how often? _____
_____
_____
_____
_____

Medications and Supplements

Give _____ drops _____(*multivitamin preparation)* with food once daily.

Give 1 tablet folic acid once daily for _____ days.

Give _____iron twice daily for 1 month.

Other: _____
_____
_____
_____
_____

Recommendations for Feeding During Sickness and Health*

A good daily diet should be adequate in quantity and include an energy-rich food (for example, thick cereal with added oil); meat, fish, eggs, or pulses; and fruits and vegetables.

Up to 6 Months of Age**

- Breastfeed as often as the child wants, day and night, at least 8 times in 24 hours.
- Breastfeed when the child shows signs of hunger: beginning to fuss, sucking fingers, or moving the lips.
- Do not give other foods or fluids.
- Only if the child:
  - appears hungry after breastfeeding, or
  - is not gaining weight adequately,

  add complementary foods (listed under 6 months up to 12 months).

  Give these foods 1 or 2 times per day after breastfeeding.

6 Months up to 12 Months

- Breastfeed as often as the child wants.
- Give adequate servings of:

  _____
  _____
  _____

  - 3 times per day if breastfed;
  - 5 times per day if not breastfed.
  - add nutritious snacks

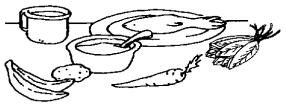
- Give small chewable items to eat with fingers. Let the child try to feed self, but provide help.

12 Months up to 2 Years

- Breastfeed as often as the child wants.
- Give adequate servings of:

  _____
  _____
  _____
  _____*

  or family foods 5 times per day.

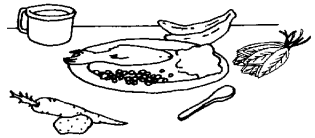


- Continue to actively help the child to eat.

2 Years and Older

- Give family foods at 3 meals each day. Also, twice daily, give nutritious food between meals, such as:

  _____
  _____
  _____
  –



- Offer a variety of foods. If a new food is refused, offer “tastes” several times. Show that you like the food.

Up to 4 months of age

- *Play:* Provide ways for the child to see, hear, feel, and move.

- *Communicate:* Look into your child's eyes and smile at him or her. When you are breastfeeding is a good time.

4 months up to 6 months

- *Play:* Provide ways for the child to see, hear, feel, and move.

- *Communicate:* Look into your child's eyes and smile at him or her. When you are breastfeeding is a good time.

- *Play:* Give your child clean, safe household things to handle, bang and drop.

- *Communicate:* Respond to your child’s sounds and interests. Tell the child the names of things and people.

- *Play*: Give your child things to stack up, and to put into containers and take out.

- *Communicate:* Ask your child simple questions. Respond to your child’s attempts to talk. Play games with people like “bye.”.

- *Play:* Help your child count, name, and compare things. Make simple toys for your child.

- *Communicate:* Encourage your child to talk. Answer your child’s questions. Teach your child stories, songs and games.

** These recommendations are consistent with current WHO infant feeding policy.*

***The decision when precisely to begin complementary feeding should be made in consultation with a health worker, based on the individual infant's specific growth and development needs.*

Feeding Recommendations for a Child Who Has PERSISTENT DIARRHOEA

- If still breastfeeding, give more frequent, longer breastfeeds, day and night.
- If taking other milk:
  - replace with increased breastfeeding OR
  - replace with fermented milk products, such as yoghurt OR
  - replace half the milk with nutrient-rich semisolid food,
- For other foods, follow feeding recommendations for the child’s age.

TRAINING COURSE ON THE MANAGEMENT OF SEVERE MALNUTRITION

ANSWER SHEETS

FOR EXERCISES IN MODULES

World Health Organization
Department of Nutrition for Health and Development

Training Course on the Management of Severe Malnutrition

was prepared by the

World Health Organization
Department of Nutrition for Health and Development (NHD), Geneva, Switzerland, and
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in cooperation with the

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London School of Hygiene and Tropical Medicine, London, UK

through a contract with

ACT International, Atlanta, Georgia, USA.

ANSWER SHEETS:

PRINCIPLES OF CARE

Possible Answers to Exercise A, Principles of Care, page 5

Photo 1: Moderate oedema (++) seen in feet and lower legs.
Severe wasting of upper arms. Ribs and collar bones clearly show.

Photo 2: Severe dermatosis (+++). Note fissure on lower thigh.
Moderate oedema (++) at least. Feet, legs, hands and lower arms appear swollen. The child's face is not fully shown in the photo, but the eyes may also be puffy, in which case the oedema would be severe (+++).

Photos 3 and 4: These show the front and back of the same child. The child has severe wasting. From the front, the ribs show, and there is loose skin on the arms and thighs. The bones of the face clearly show. From the back, the ribs and spine show; folds of skin on the buttocks and thighs look like "baggy pants."

Photo 5: Generalized oedema (+++). Feet, legs, hands, arms, and face appear swollen.
Probably moderate dermatosis (++). Several patches are visible, but you would have to undress the child to see if there are more patches or any fissures. There may be a fissure on the child's ankle, but it is difficult to tell.

Photo 6: Severe wasting. The child looks like "skin and bones." Ribs clearly show. The child's upper arms are extremely thin with loose skin. *(Also note the sunken eyes, a possible sign of dehydration, which will be discussed later.)*
There is some discoloration on the abdomen which may be mild dermatosis; it is difficult to tell from the photo.

Photo 7: Mild dermatosis (+). This child has skin discoloration, often an early skin change in malnutrition. There is some wasting of the upper arms, and the shoulder blades show, but wasting does not appear severe.

Photo 8: Pus, a sign of eye infection

Photo 9: Corneal clouding, a sign of vitamin A deficiency

Photo 10: Bitot's spot, a sign of vitamin A deficiency
Inflammation (redness), a sign of infection

Photo 11: Corneal clouding, a sign of vitamin A deficiency. The irregularity in the surface suggests that this eye almost has an ulcer.

Photo 12: Corneal ulcer (indicated by arrow), emergency sign of vitamin A deficiency. If not treated immediately with vitamin A and atropine, the lens of the eye may push out and cause blindness.
This photo also shows inflammation, a sign of infection.

Answers to Exercise A, Principles of Care, continued

Photo 13: Since only the legs are visible, we cannot tell the extent of oedema. Both feet and legs are swollen, so it is at least ++. Notice the "pitting" oedema in lower legs

Photo 14: Moderate (++) dermatosis. Note patches on hands and thigh. You would have to undress the child to see how extensive the dermatosis is.
Generalized oedema (+++). Legs, hands, arms and face appear swollen.

Photo 15: Severe (+++) dermatosis and wasting (upper arms). Moderate (++) oedema (both feet), lower legs, possibly hands.

Additional photos discussed in relation to eye signs:

Photo 16 shows a photophobic child; his eyes cannot tolerate light due to vitamin A deficiency. The child's eyes must be opened gently for examination. He is likely to have corneal clouding as in Photo 9.

For contrast, Photo 17 shows a baby with healthy, clear eyes.

Answers to Exercise B, Principles of Care, page 13

1. Shana: –2 SD

2. Rico: –3 SD

3. Tonya: < –2 (SD-score between –3 and –2)

4. Kareem: < –3 (SD-score between –4 and –3)

   All children with a score less than – 3 SD are considered severely malnourished.

Answers to Exercise C, Principles of Care, page 15

Photo 18: This child should be admitted. Her weight-for-length is above –3 SD, but she has oedema of both feet, as well as lower legs (at least moderate ++ oedema).

Photo 19: This child should not be admitted to the severe malnutrition ward. Her weight-for length is above –3 SD, and there is no apparent oedema.

Note: If you were to look on a weight-for-age chart, you would find that this child's weight-for-age is very low. This child is stunted. She is small for her age but adequate weight-for-length.

Photo 20: This child should be admitted. He is less than –3 SD. *Note*: It will be important to remove his shirt to examine him. Notice that the mother in this photo is also extremely thin.

ANSWER SHEETS:

INITIAL MANAGEMENT

Answers to Exercise A, Initial Management, page 15

Case 1 – Tina

1a. Tina's SD score is between –2 and –3. Her score may be written:
< –2 SD.

1b. Yes, Tina should be admitted since she has oedema of both feet. (Without the extra weight from oedema, Tina's weight might be less than –3 SD.)

1c. Tina is not hypothermic because her temperature is not less than 35.5°C.

1d. Tina is not hypoglycaemic since her blood sugar is above 3 mmol.

1e. Tina does not have severe anaemia since her haemoglobin is well above 40 g/l.

1f. Tina is not in shock. She is not lethargic or unconscious, and she does not have cold hands.

1g. Two things that should be done for Tina immediately:

- Keep her warm to prevent hypothermia
- Start F-75; give 70 ml every 2 hours

Note: Experienced participants may also mention antibiotics. Antibiotics are needed and will be discussed later in the module.

Case 2 – Kalpana

2a. Give a 50 ml bolus of 10% glucose or sucrose. Since she can drink, give it orally.

2b. Begin F-75 half an hour after giving glucose. Every half-hour for 2 hours, give ¼ of the recommended 2-hourly amount (which is 90 ml for an 8 kg child).

¼ × 90 ml = 22.25 ml

So the amount to give every half-hour is about 22 ml.
(Round amounts to the nearest ml.)

2c. Yes, Kalpana has very severe anaemia since her haemoglobin is 39 g/l.
She needs a blood transfusion. Since Kalpana has no signs of congestive heart failure, she can be given whole fresh blood. Stop all oral intake during the transfusion. Give a diuretic and then transfuse 80 ml whole fresh blood slowly over 3 hours. (10 ml × 8 kg = 80 ml)

Answers to Exercise A, Initial Management, continued

Case 3 -- John

3a. Four treatments that John needs immediately:

- Oxygen
- 5 ml/kg sterile 10% glucose by IV
- IV fluids
- Active re-warming (kangaroo technique or heater/lamp)

Note: Experienced participants may mention the need for antibiotics. Antibiotics are needed and will be discussed later in the module.

3b. Give 29 ml sterile 10% glucose by IV. (5 ml × 5.8 kg = 29.0 ml, calculated under Blood Glucose on the CCP).

Note: Since John will receive IV fluids containing glucose, there is no need to follow his 10% IV glucose with a 50 ml bolus by NG tube.

3c. Give 87 ml IV fluids in first hour. This amount is calculated as on the CCP:

15 ml × 5.8 kg = 87 ml

3d. Repeat the same amount of IV fluids (87 ml) for next hour.

3e. ReSoMal and F-75 in alternate hours

3f. F-75: 65 ml

Answers to Exercise B, Initial Management, page 25

Ramesh

1a. 5 ml × 7.3 kg = 36.5 ml, rounded to 37 ml ReSoMal every 30 minutes for 2 hours

1b. Least amount: 5 ml × 7.3 kg = 36.5 ml, rounded to 37 ml ReSoMal.

1c. Greatest amount: 10 ml × 7.3 kg = 73 ml ReSoMal.

Note that 36.5 ml is rounded up to 37 ml.

Sula

2a. 5 ml × 11.6 kg = 58 ml ReSoMal every 30 minutes for 2 hours

2b. 5 ml × 11.6 kg = 58 ml ReSoMal is the least amount

2c. 10 ml × 11.6 kg = 116 ml ReSoMal is the greatest amount

Answers to Exercise C, Initial Management, page 28

Case 1 – Marwan

1a. Three things that should be done immediately for Marwan:

- Give 50 ml bolus of 10% glucose orally
- Give 100 000 IU vitamin A and atropine eye drops immediately
- Actively re-warm him (kangaroo technique or heater/lamp)

Note: Experienced participants may mention the need for antibiotics. Antibiotics are needed and will be discussed later in the module.

1b. In a half-hour, give F-75. Give ¼ of 2-hourly amount for a 6.2 kg child:

¼ × 70 ml = 17.5 ml (Round up to 18 ml.)

Case 2 – Ram

2a – 2c. Answers are given on the CCP for Ram.

2d. Signs of overhydration:

- Increase in pulse and respiratory rates (both)
- Jugular veins engorged
- Increasing oedema, e.g., puffy eyelids

2e. Answers are given on the CCP for Ram.

2f. Signs of improving hydration:

- He has passed urine (recorded at 10:30 monitoring)
- He is no longer thirsty
- He has a moist mouth and tears
- His skin pinch is normal

2g. Stop offering ReSoMal routinely in alternate hours since he has more than 3 signs of improving hydration. (Give ReSoMal after each loose stool instead.)

2h. Give F-75. Give 50 ml (based on new weight of 4.5 kg)

2i. Since Ram is less than 2 years old, he should be given 50 – 100 ml ReSoMal after each loose stool to replace stool losses.

CRITICAL CARE PATHWAY (CCP) — SEVERE MALNUTRITION WARD

NAME Ram (M) F DATE OF BIRTH OR AGE 9 mos DATE OF ADMISSION _____ TIME _____ HOSP. ID NUMBER _____

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given: _____

SIGNS OF SEVERE MALNUTRITION Severe wasting? (Yes) No

Oedema? (0) + ++ +++

Dermatosis? 0 (+) ++ +++ (raw skin, fissures)

Weight(kg): 4.4 kg Height/length (cm): 64 cm

SD score: < -3 or % of median:

TEMPERATURE 38 °C (rectal) axillary

If rectal < 35.5°C (95.9°F), or axillary < 35°C (95°F), actively warm child. Check temperature every 30 minutes.

BLOOD GLUCOSE (mmol/l): 5 mmol / l

If < 3mmol/l and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NG). If < 3 mmol/l and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x ___ kg (child's wt) = ____ ml *Then give 50 ml bolus NG.*

Time glucose given: Oral NG IV

HAEMOGLOBIN (Hb) (g/l): 120 or Packed cell vol (PCV): Blood type:

If Hb < 40 g/l or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5-7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:

EYE SIGNS (None) Left Right **MEASLES** Yes (No)

Bitot's spots Pus/Inflammation Corneal clouding Corneal ulceration

If ulceration, give vitamin A & atropine immediately. Record on Daily Care page.

Oral doses vitamin A:	
< 6 months	50 000 IU
6 - 12 months	100 000 IU
> 12 months	200 000 IU

FEEDING *Begin feeding with F-75 as soon as possible. (If child is rehydrated, reweigh before determining amount to feed. New weight:* 4.5 *kg)*

Amount for 2-hourly feedings: 50 **ml F-75*** **Time first fed:** _____

** If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/l.*

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK (None) Lethargic/unconsious Cold hand Slow capillary refill(>3 seconds) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, *give oxygen. Give IV glucose as described under Blood Glucose (left). Then give IV fluids:*

Amount IV fluids per hour: 15 ml x ____ kg (child's wt) = _____ ml

	Start:	Monitor every 10 minutes					*2nd hr:	Monitor every 10 minutes				
Time							*					
Resp. rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right part of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See left, Haemoglobin.)*

DIARRHOEA Watery diarrhoea? (Yes) No
Blood in stool? Yes (No)
Vomiting? (Yes) No

If diarrhoea, circle signs present: (Skin pinch goes back slowly) Restless/irritable Lethargic (Thirsty) Sunken eyes (Dry mouth/tongue) (No tears)

If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:*
5 ml x 4.4 kg (child's wt) = 22 ml ReSoMal

For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:*
5 to 10 ml x 4.4 kg (child's wt) = 22 to 44 ml ReSoMal

Time	Start: 9:00	9:30	10:00	10:30	11:00	12:00								
Resp. rate	28	28	28	25	25	25								
Pulse rate	105	105	105	100	100	100								
Passed urine? Y N		N	N	Y	N	N								
Number stools		1	0	0	1	0								
Number vomits		0	1	0	0	0								
Hydration signs		same	same	moist mouth	not thirsty	tears, pinch OK								
Amount taken (ml)	22	22	22	22	44	F-75		F-75		F-75		F-75		F-75

Stop ReSoMal if: Increase in pulse & resp. rates Jugular veins engorged Increasing oedema, e.g., puffy eyelids

ANTIBIOTICS *(All receive)* **Drug / Route**	**Dose / Frequency / Duration**	**Time of 1st dose**

Answers to Exercise C, Initial Management, continued

Case 3 -- Irena

3a. Answers are given on the CCP for Irena.

3b. Irena is not hypoglycaemic.
Irena is not hypothermic.

3c. Yes, she needs vitamin A, as do almost all severely malnourished children, but it is not necessary immediately. It can wait until later in the day.

3d. Irena is lethargic, has cold hands, and has slow capillary refill and fast pulse.

Give 5 ml/kg sterile 10% glucose by IV. (5 ml × 6.1 kg = 30.5 ml)

Note: Since Irena will receive IV fluids containing glucose, there is no need to follow her IV 10% glucose with a 50 ml bolus by NG.

Give 15 ml × 6.1 kg = 91.5 ml IV fluids in the first hour.

3e. See monitoring data on CCP. Irena should be given the same amount of IV fluids over the next hour.

3f. See second hour of IV section of Irena's CCP.

3g. At 12:30 she needs ReSoMal. Calculate range of amounts as follows:

5 – 10 ml × 6.2 kg = 31 – 62 ml ReSoMal per hour

This range of amounts should be entered on the CCP.

3h. See Diarrhoea section of Irena's CCP.

3i. See Diarrhoea section of Irena's CCP.

3j. 70 ml F-75. (This amount should be recorded in the Feeding section of the first page of the CCP.)

3k. She should be offered 62 ml ReSoMal at 2:30.

3l. Since Irena is 25 months old, she needs 100 – 200 ml ReSoMal after each loose stool.

CRITICAL CARE PATHWAY (CCP) — SEVERE MALNUTRITION WARD

NAME Irena M (F) DATE OF BIRTH OR AGE 25 mos DATE OF ADMISSION March 3 TIME 10:00 HOSP. ID NUMBER _____

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given: _____

SIGNS OF SEVERE MALNUTRITION Severe wasting? (Yes) No

Oedema?	(0)	+	++	+++
Dermatosis?	(0)	+	++	+++ (raw skin, fissures)
Weight(kg):	6.1 kg	Height/length (cm):	74 cm	
SD score:	< -3	or % of median:		

TEMPERATURE 36 °C (rectal) axillary

If rectal < 35.5°C (95.9°F), or axillary < 35°C (95°F), actively warm child. Check temperature every 30 minutes.

BLOOD GLUCOSE (mmol/l): 4 mmol / l

If < 3mmol/l and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NG). If < 3 mmol/l and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x 6.1 kg (child's wt) = 30.5 ml *Then give 50 ml bolus NG.*

Time glucose given: 10:30 Oral NG (IV)

HAEMOGLOBIN (Hb) (g/l): or Packed cell vol (PCV): Blood type:

If Hb < 40 g/l or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5-7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:

EYE SIGNS None Left (Right) **MEASLES** Yes (No)

Bitot's spots (Pus) Inflammation Corneal clouding Corneal ulceration

If ulceration, give vitamin A & atropine immediately. Record on Daily Care page.

Oral doses vitamin A:	
< 6 months	50 000 IU
6 - 12 months	100 000 IU
> 12 months	200 000 IU

FEEDING *Begin feeding with F-75 as soon as possible. (If child is rehydrated, reweigh before determining amount to feed. New weight:* 6.2 *kg)*

Amount for 2-hourly feedings: 70 **ml F-75*** **Time first fed:** 1:30

** If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/l.*

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK None (Lethargic/unconsious) (Cold hand) (Slow capillary refill(> 3 seconds)) Weak/fast pulse

***If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse,** give oxygen. Give IV glucose as described under Blood Glucose (left). Then give IV fluids:*

Amount IV fluids per hour: 15 ml x 6.1 kg (child's wt) = 91.5 ml

	Start:	Monitor every 10 minutes					*2nd hr:	Monitor every 10 minutes				
Time	10:30	10:40	10:50	11:00	11:10	11:20	*11:30	11:40	11:50	12:00	12:10	12:20
Resp. rate	40	38	36	35	33	32	* 30	30	30	30	30	30
Pulse rate	140	130	120	100	90	85	*80	80	80	80	80	80

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right part of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See left, Haemoglobin.)*

DIARRHOEA Watery diarrhoea? (Yes) No
Blood in stool? Yes (No)
Vomiting? (Yes) No

If diarrhoea, circle signs present: (Skin pinch goes back slowly) Restless/irritable (Lethargic) Thirsty (Sunken eyes) (Dry mouth/tongue) No tears

If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:*
5 ml x ____ kg (child's wt) = ____ ml ReSoMal

For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:*
5 to 10 ml x 6.2 kg (child's wt) = 31 to 62 ml ReSoMal

Time	Start:				12:30	1:30								
Resp. rate					30	30								
Pulse rate					80	80								
Passed urine? Y N					N	N								
Number stools					1	1								
Number vomits					0	0								
Hydration signs					alert	Pinch OK								
Amount taken (ml)					62	F-75		F-75		F-75		F-75		F-75

***Stop ReSoMal if:** Increase in pulse & resp. rates Jugular veins engorged Increasing oedema, e.g., puffy eyelids

ANTIBIOTICS *(All receive)* **Drug / Route**	**Dose / Frequency / Duration**	**Time of 1st dose**

Answers to Exercise D, Initial Management, page 37

Case 1 – Pershant

1a. cotrimoxazole, oral

1b. Answers will vary. The formulation should be one of the following:

Paediatric tablet, 100 mg SMX + 20 mg TMP
Syrup, 200 mg SMX + 40 mg TMP

1c. If tablet is given, give two tablets.
If syrup is given, give 5 ml.

(Notice that the 8.0 kg child is included in the highest weight range given. The middle range includes children up to but not including 8.0 kg.)

1d.

Drug	Route	Dose	Frequency	Duration
cotrimoxazole	*oral*	*2 tablets (or 5 ml syrup)*	*every 12 hours*	*5 days*

Case 2 -- Ana

2a. gentamicin and ampicillin

2b. IV or IM

2c. IV, using butterfly needle. Since Ana would need to receive 5 IM injections daily (1 injection gentamicin, and 4 of ampicillin) for the first two days, it is preferable to use a butterfly needle to keep a vein open for injecting drugs.

2d. Ampicillin: Vial of 500 mg mixed with 2.1 sterile water to give 500 mg/2.5 ml

For gentamicin, three choices are possible:

a. Vial containing 20 mg (2 ml at 10 mg/ml), undiluted
b. Vial containing 80 mg (2 ml at 40 mg/ml) mixed with 6 ml sterile water to give 80 mg/8 ml
c. Vial containing 80 mg (2 ml at 40 mg/ml), undiluted

2e. Ampicillin: Give 1.75 ml

Gentamicin:
If formulation a above, give 4.5 ml
If formulation b above, give 4.5 ml
If formulation c above, give 1.1 ml

Answers to Exercise D, Initial Management, continued

2f.

Drug	Route	Dose	Frequency	Duration
gentamicin	*IV*	*4.5 ml or 1.1 ml (see above in 2e)*	*once daily*	*7 days*
ampicillin	*IV*	*1.75 ml*	*every 6 hours*	*2 days*

2f. Stop IV ampicillin and give oral amoxicillin for next 5 days. (Continue gentamicin during this time. Since only one injection of gentamicin is required daily, it may be given by IM injection.)

2g. Answers will vary. Possible answers are:

Tablet, 250 mg
Syrup, 125 mg/5 ml
Syrup, 250 mg/5

2h. If 250 mg tablet, dose is ½ tablet
If 125 mg syrup, dose is 5 ml
If 250 mg syrup, dose is 2 ml.

2i.

Drug	Route	Dose	Frequency	Duration
amoxicillin	*oral*	*½ tablet, 5 ml syrup, or 2 ml syrup (see above)*	*every 8 hours*	*5 days*

Case 3 – Dipti (optional)

3a. benzylpenicillin

3b. Only one formulation is given for IM injection. The dose is 0.7 ml.

3c.

Drug	Route	Dose	Frequency	Duration
benzylpenicillin	*IM*	*0.7 ml*	*every 6 hours*	*5 days*

3d. oral ampicillin or oral amoxicillin

Answers to Exercise D, Initial Management, continued

3e. *Note: Particpants will do the rest of the exercise for either ampicillin or amoxicillin.*

Only one formulation is given for oral ampicillin: 250 mg tablet

Possible formulations of oral amoxicillin are:

Tablet, 250 mg
Syrup, 125 mg/5 ml
Syrup, 250 mg/5

3f. If ampicillin was chosen, 1½ tablets.

If amoxicillin was chosen, answers will vary:

If 250 mg tablet, give ½ tablet
If 125 mg syrup, give 5 ml
If 250 mg syrup, give 2 ml

3g. If ampicillin was chosen:

Drug	Route	Dose	Frequency	Duration
ampicillin	*oral*	*1½ tablets*	*every 6 hours*	*5 days*

If amoxicillin was chosen:

Drug	Route	Dose	Frequency	Duration
amoxicillin	*oral*	*½ tablet, 5 ml or 2 ml syrup (see above)*	*every 8 hours*	*5 days*

Answers to Exercise E, Initial Management, page 41

1. A copy of a completed first page of the CCP for Rayna is on the next page.

2. Some examples of key points to discuss with the head nurse might be:

   - Keep Rayna covered and warm at all times, especially at night
   - Watch her carefully
   - Starting now, feed her 70 ml of F-75 every 2 hours, even at night
   - Give 200 000 IU vitamin A today as soon as convenient
   - Give cotrimoxazole (specify dose) every 12 hours. Give her the first dose now
   - Call me if she seems worse, or if her temperature increases or decreases, or pulse and respiratory rates increase.

3. Some examples of possible questions are:

   - We are short of staff tonight. Can we feed Rayna every 3 or 4 hours tonight if we give her more?
   - If she is asleep, should we wake her to feed her?
   - What should I do if she vomits?

CRITICAL CARE PATHWAY (CCP) — SEVERE MALNUTRITION WARD

NAME Rayna M (F) DATE OF BIRTH OR AGE 13 mos DATE OF ADMISSION October 3 TIME 9:00am HOSP. ID NUMBER _____

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given: _____

SIGNS OF SEVERE MALNUTRITION Severe wasting? (Yes) No

Oedema? (0) + ++ +++

Dermatosis? (0) + ++ +++ (raw skin, fissures)

Weight(kg): 6.3 kg Height/length (cm): 72 cm

SD score: < -3 or % of median:

TEMPERATURE 36.8 °C (rectal) axillary

If rectal < 35.5°C (95.9°F), or axillary < 35°C (95°F), actively warm child. Check temperature every 30 minutes.

BLOOD GLUCOSE (mmol/l): 3-4 mmol/l

If < 3mmol/l and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NG). If < 3 mmol/l and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x ___ kg (child's wt) = ___ ml *Then give 50 ml bolus NG.*

Time glucose given: Oral NG IV

HAEMOGLOBIN (Hb) (g/l): 95 or Packed cell vol (PCV): Blood type:

If Hb < 40 g/l or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5-7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:

EYE SIGNS (None) Left Right **MEASLES** Yes (No)

Bitot's spots Pus/Inflammation Corneal clouding Corneal ulceration

If ulceration, give vitamin A & atropine immediately. Record on Daily Care page.

Oral doses vitamin A:	
< 6 months	50 000 IU
6 - 12 months	100 000 IU
> 12 months	200 000 IU

FEEDING *Begin feeding with F-75 as soon as possible. (If child is rehydrated, reweigh before determining amount to feed. New weight: _____ kg)*

Amount for 2-hourly feedings: 70 **ml F-75*** **Time first fed:** 9:15

** If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/l.*

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK (None) Lethargic/unconsious Cold hand Slow capillary refill(> 3 seconds) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, *give oxygen. Give IV glucose as described under Blood Glucose (left). Then give IV fluids:*

Amount IV fluids per hour: 15 ml x ____ kg (child's wt) = _____ ml

	Start:	Monitor every 10 minutes					*2nd hr:	Monitor every 10 minutes				
Time							*					
Resp. rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right part of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See left, Haemoglobin.)*

DIARRHOEA Watery diarrhoea? Yes (No) → *If diarrhoea, circle signs present:* Skin pinch goes back slowly

Blood in stool? Yes (No) Restless/irritable Lethargic Thirsty

Vomiting? Yes (No) Sunken eyes Dry mouth/tongue No tears

If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:*

5 ml x ____ kg (child's wt) = ____ ml ReSoMal

For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:*

5 to 10 ml x ____ kg (child's wt) = _____ to _____ ml ReSoMal

	Start:													
Time														
Resp. rate														
Pulse rate														
Passed urine? Y N														
Number stools														
Number vomits														
Hydration signs														
Amount taken (ml)						F-75		F-75		F-75		F-75		F-75

***Stop ReSoMal if:** Increase in pulse & resp. rates Jugular veins engorged Increasing oedema, e.g., puffy eyelids

ANTIBIOTICS *(All receive)* **Drug / Route**	**Dose / Frequency / Duration**	**Time of 1st dose**
cotrimoxazole - oral	1½ tablets every 12 hours for 5 days	9:15
	(or 4ml syrup)	

ANSWER SHEETS:

FEEDING

Answers to Exercise B, Feeding, page 17

Case 1—Delroy

1a. Yes, he took all of each feeding.

1b. Yes. He has had no vomiting, only modest diarrhoea, and he finished all of his feeds, so he is ready to change to 3-hourly feeding.

1c.

DATE: *5/12/01* TYPE OF FEED: *F-75* GIVE: *8* feeds of *60* ml

1d. 8:00, 11:00, 14:00, 17:00, 20:00, 23:00, 2:00, 5:00

Note: In these modules a 24-hour clock will be used, but participants may use a.m. and p.m. if they are more accustomed to that.

1e.

	Week 1							Week 2	
DAYS IN HOSPITAL	1	2	3	4	5	6	7	8	9
Date	*4/12*	*5/12*							
Daily weight (kg)	*3.8*	*3.8*							
Weight gain (g/kg)	*Calculate daily after on F-100.*								
Oedema 0 + ++ +++	*0*	*0*							
Diarrhoea/vomit 0 D V	*D*	*D*							
FEED PLAN: Type feed	*F-75*	*F-75*							
# feeds daily	*10*	*8*							
Total volume taken (ml)	*400*	*460*							

Case 2 – Pedro

2a. Pedro took 530 ml on Day 2. The table shows that 80% of the expected daily total is 500 ml, so yes, Pedro took more than that.

2b. Because he vomited his last feed and is a reluctant eater, Pedro should stay on 3-hourly feeds.

2c.

DATE: *7/12/01* TYPE OF FEED: *F-75* GIVE: *8* feeds of *80* ml

Answers to Exercise B, Feeding

Case 3 – Rositha

3a. 16:00 on Day 3

3b. Yes, because she has taken more than 2 consecutive feeds completely by mouth.

3c. Rositha should change to 3-hourly feedings because she is finishing her feeds and has only moderate diarrhoea (that is, less than 5 watery stools per day).

3d.

DATE: *9/02/01*	TYPE OF FEED: *F-75*	GIVE: *8* feeds of *80* ml

Note: When a child starts with severe oedema, continue using the F-75 table for severe oedema throughout the initial feeding days on F-75, even if the child's oedema goes away. The amount given at the beginning is the right amount for the child's "true" weight. For example, the amounts given for Rositha's starting weight of 6.4 kg correspond approximately to those that would be given for a "true" weight of 4.9 kg.

Case 4 – Suraiya

4a. 20:00

4b. They should have put in an NG tube at 22:00 or 24:00 when she fed poorly at a second or third consecutive feeding.

4c. Suraiya could have died during the night. Alert the doctor. Put in an NG tube to be used to complete feedings if she will not take food orally. Check for hypoglycaemia which may have developed during the night.

4d.

DATE: *15/03/01*	TYPE OF FEED: *F-75*	GIVE: *12* feeds of *60* ml

Suraiya will continue on the same plan as the day before, but will be fed by NG tube as needed.

Answers to Exercise C, Feeding, page 29

Case 1 – Delroy

1a. 125 ml *(The amount is increased by 10 ml since Delroy completed the last feeding. 125 ml should be entered in the column headed "*a. Amount Offered" *for the 4:00 feeding.)*

1b. For the 4:00 feeding, 10 ml was left, so the amount taken orally was 115 ml. These amounts should be entered in columns b and c:

b. Amount left n cup (ml): 10 ml
c. Amount taken orally (ml): 115 ml

At the bottom of the form, the following should be entered:

Total c. Amount taken orally: 630 ml
Total d. Amount taken by NG: 0
Total e. Amount vomited: 0
Total yes: 0

Total volume taken over 24 hours: 630 ml

1c. On the CCP, in the column for Day 6, should be added:

Diarrhoea/vomit: 0
Total volume taken (ml): 630

Case 2 – Pedro

2a. No, he must stay at the same amount for the first two days of transition.

2b. The nurse should explain that it is important to be cautious while Pedro's body adjusts to more food. It is good that Pedro is hungry; that is a sign of improvement. However, too much food too quickly would be dangerous. On Day 7 (the third day of transition) he will gradually be given more F-100. The mother should be encouraged to breastfeed Pedro between feeds of F-100.

Answers to Exercise C, Feeding

Case 3 – Rositha

3a. Yes, she is ready for transition. Her oedema appears to be gone, and she eagerly finished all of her 4-hourly feedings of F-75 on Day 6.

3b. Day 7, first day of transition -- Give same amount of F-100 as was given of F-75 on previous day:

DATE:	TYPE OF FEED:	GIVE:	feeds of	ml
12/02/01	F-100	6	105	

3c. Day 8, second day of transition – Stay with same amount of F-100:

DATE:	TYPE OF FEED:	GIVE:	feeds of	ml
02/01	F-100	6	105	

3d. Day 9, third day of transition – Increase by 10 ml per feed as long as she takes all:

DATE:	TYPE OF FEED:	GIVE:	feeds of	ml
14/02/01	F-100	6	115↑	

Answers to Exercise D, Feeding, page 36

Case 1 -- Delroy

1a. 135 ml

1b. 105 ml – 155 ml

1c. 135 ml

1d. Increase by 10 ml if finishing feeds. Do not exceed 155 ml.

1e. 160 ml is the starting amount. It should not be increased on Day 9, as 160 ml is the maximum amount for a child weighing 4.4 kg. (When his weight increases on subsequent days, he may have more.)

Case 2 – Pedro

2a. Since Pedro weighs 5.05 kg, his appropriate range of daily volume is 750 –1100 ml of F-100. He took 900 ml, which is in this range.

2b. There is no cause for concern since Pedro ate in his range and is gaining weight. His weight gain in g/kg has been good most days since he started F-100, and he had an excellent gain between Days 7 and 8.

2c.

DATE: 14/12/01

TYPE OF FEED: F-100 GIVE: 6 feeds of 160↑ ml

Do not exceed 185 ml

Case 3 – Rositha

3a. 570 ml

3b. 780 – 1144 ml No, she did not take a total amount within this range.

3c. Rositha may have an infection causing her temperature to increase and causing her to eat less.

3d. ✓ Both of the above.

Answers to Exercise F, Feeding, page 50

DAILY WARD FEED CHART

DATE: 17/05/01 WARD: Severe Malnutrition

Name of Child	F-75			F-100		
	Number feeds	Amount/ feed (ml)	Total (ml)	Number feeds	Amount/ feed (ml)	Total (ml)
Meena				6	250	1500
Tara	12	50	600			
Abul				6	180	1080
Maya				6	160	960
Nisha	12	65	780			
Kapur				6	200	1200
Haruu				6	220	1320
Bahadur	8	115	920			
Lama				6	200	1200
Prakesh	6	130	780			
Vera				6	160	960
Sami				6	190	1140
F-75 (total ml) needed for 24 hours			3080	*F-100 (total ml) needed for 24 hrs*		9360
*Amount needed for 12 hours**			1540	*Amount needed for 12 hours**		4680
Amount to prepare (round up to whole litre)			2 litres	*Amount to prepare (round up to whole litre)*		5 litres

*Divide daily amount by the number of times food is prepared each day. For example, if feeds are prepared every 12 hours, divide daily amount by 2.

ANSWER SHEETS:

DAILY CARE

Answers to Exercise A, Daily Care, page 14

1. Photo 8:

   Vitamin A – Days 1, 2, and 15
   Chloramphenicol or tetracycline eye drops only
   (Pus may hide signs of vitamin A deficiency, so additional doses of vitamin A are given on Days 2 and 15 to be on the safe side.)

2. Photo 9:

   Vitamin A – Days 1, 2, and 15
   Chloramphenicol or tetracycline eye drops and
   Atropine eye drops

3. Photo 10:

   Vitamin A – Days 1, 2, and 15
   Chloramphenicol or tetracycline eye drops only

   Note: Although Bitot's spots alone do not require eye drops, inflammation suggests infection and requires chloramphenicol or tetracycline drops.

4. Vitamin A – Day 1 and 15 *(Do not give on Day 2 since he had a dose yesterday.)*
   Chloramphenicol or tetracycline eye drops only

5. Vitamin A – Days 1, 2, and 15 *(because he had measles within the past 3 months)*
   No eye drops

6. Vitamin A – Day 1 only
   No eye drops

7. Photo 12:

   Vitamin A – Days 1, 2, and 15
   Chloramphenicol or tetracycline eye drops and
   Atropine eye drops.

DAILY CARE

Week 1 LANI | Week 2 | Week 3

DAYS IN HOSPITAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Date	14/2																				
Daily weight (kg)	7.0																				
Weight gain (g/kg)	*Calculate daily after on F-100.*																				
Oedema 0 + ++ +++	+																				
Diarrhoea/vomit 0 D V	0																				
FEED PLAN: Type feed	F-75																				
# feeds daily	12																				
Total volume taken (ml)																					
ANTIBIOTICS	*List prescribed antibiotics in left column. Allow one row for each daily dose. Draw a box around days/times that each drug should be given. Initial when given.*																				
Gentamicin 8:00																					
IV 1.3 ml																					
Ampicillin 8:00																					
1.75 ml 14:00																					
IV cannula 20:00																					
2:00																					
Amoxicillin 8:00																					
2ml syrup 16:00																					
24:00																					
FOLIC ACID 8:00	5mg	1mg→																			
VITAMIN A 200000 IU	*		**Give Day 1 routinely unless evidence of dose in past month & no eye sign. Give Day 2 & Day 15 if*													*child admitted with eye sign or recent measles.*					
Multivitamin (if not in feed)																					
Drug for worms (Note type of worm) NONE																					
IRON 2 X daily	*Begin iron after 2 days on F-100.*																				
FOR EYE PROBLEMS: 8:00											*After 7-10 days, when eye drops are no longer needed, shade boxes for eye drops.*										
(Tetracycline) or 14:00																					
~~Chloramphenicol~~ 20:00																					
1 drop 4 X daily 2:00																					
Atropine 8:00																					
1 drop Left eye 14:00																					
3 X daily 20:00																					
Dermatosis 0 + ++ (+++)	+++																				
Bathing, (1% permanganate)																					
OTHER Wick ear 8:00																					
20:00																					

DAILY CARE Week 1 LANI Week 2 Week 3

DAYS IN HOSPITAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Date	14/2																				
Daily weight (kg)	7.0																				
Weight gain (g/kg)	*Calculate daily after an F-100.*																				
Oedema 0 + ++ +++	+																				
Diarrhoea/vomit 0 D V	0																				
FEED PLAN: Type feed	F-75																				
# feeds daily	12																				
Total volume taken (ml)																					
ANTIBIOTICS	*List prescribed antibiotics in left column. Allow one row for each daily dose. Draw a box around days/times that each drug should be given. Initial when given.*																				
Gentamicin 8:00	JG																				
IV 1.3 ml																					
Ampicillin 8:00	JG																				
1.95 ml 14:00	JG																				
IV cannula 20:00																					
2:00																					
Amoxicillin 8:00	////	////																			
2ml syrup 16:00																					
24:00																					
FOLIC ACID 8:00	JG																				
VITAMIN A 200 000 IU	JG		*Give Day 1 routinely unless evidence of dose in past month & no eye sign. Give Day 2 & Day 15 if*													*child admitted with eye sign or recent measles.*						
Multivitamin (if not in feed)	JG																				
Drug for worms (Note type of worm) NONE																					
IRON 2 X daily	*Begin iron after 2 days on F-100.*																				
FOR EYE PROBLEMS: 8:00	JG										*After 7-10 days, when eye drops are no longer needed, shade boxes for eye drops.*										
(Tetracycline) or 14:00	JG																				
~~Chloramphenicol~~ 20:00																					
1 drop 4 X daily 2:00																					
Atropine 8:00	JG																				
1 drop Left eye 14:00	JG																				
3 X daily 20:00																					
Dermatosis 0 + ++ (+++)	+++																				
Bathing (1% permanganate)	baked on																				
OTHER Wick ear 8:00	JG																				
20:00																					

MONITORING RECORD LANI

page ___ of ___

Monitor respiratory rate, pulse rate, and temperature 4-hourly until after transition to F-100 and patient is stable. Then monitoring may be less frequent (e.g., twice daily).

Respiratory rate

Breaths/ minute: 35 35 35

Pulse rate

Beats/ minute: 100 105 110

Temperature

39.0
38.5
38.0
37.5
37.0
36.5
36.0
35.5
35.0
34.5

Date/time: 9:00 13 17

Day 1

***Danger Signs:** Watch for increasing pulse and respirations, fast or difficult breathing, sudden increase or decrease in temperature, rectal temperature below 35.5°C, and other changes in condition. See Danger Signs listed on back of F-100 Reference Card. Normal ranges of pulse and respiratory rates are also listed on back of F-100 Reference Card.*

Answers to Exercise C, Daily Care, continued

1. Ampicillin (through IV cannula) and tetracycline and atropine eye drops.

2. 21:00

3. Ampicillin (through IV cannula) and tetracycline eye drop in left eye.

Answers to Exercise D, Daily Care, page 26

Case 1 – Lani

1. Her temperature drops suddenly to 35.7°C.

2. Yes, a sudden drop in temperature is a danger sign. Lani is approaching hypothermia.

3. It is possible that Lani became uncovered during the night or missed a feed, either of which can lead to hypothermia.

   Lani is already being treated with antibiotics for infection, so it is less likely that infection is a cause of the decrease in temperature. However, there may be a hidden infection that is not responding to the antibiotics that she has been given.

4. No, Lani's pulse and respirations remain fairly steady.

5. Cover Lani to keep her warm. Check to see if she took her last feeding. Check whether antibiotics have been given on schedule. Alert the doctor.

Case 2 – Carla

1. No, Carla's temperature remains steady and normal.

2. Yes, Carla's respiratory rate increased by 5 and pulse rate increased by 25 beats per minute between 2:00 and 6:00 on Day 2.

3. Re-check both respiratory and pulse rates.

4. Alert the doctor immediately. Do not give any more food or fluids until the doctor has examined the child.

5. Carla shows signs of possible heart failure. She may have taken too much ReSoMal along with the F-75 being given by NG. Or there may be a hidden, non-responding infection (with supressed fever).

Case 3 – Bijouli

1. His temperature increases from 37.1°C to 38.5°C. Yes, this is a danger sign.

2. No, there is no increase of 25 beats/minute or more.

3. Yes, 40 beats per minute is considered fast breathing in a 2-year-old. Bijouli has had fast breathing since 22:00 on Day 2.

4. Yes, the doctor should be alerted.

5. Fast breathing and chest indrawing are signs of pneumonia (severe pneumonia). This was not apparent on admission and is not responding to cotrimoxazole. Bijouli should be given benzylpenicillin, 50 000 IU/kg IM four times daily for at least five days.

Answers to Exercise E, Daily Care, page 36

1. Daniel's desired discharge weight is 11.5 kg. It is entered on the Weight Chart on the following page.

2. Allow for a 1 kg weight loss. (So 9.0 kg should be the bottom weight on the vertical axis.)

Answers to 3 –5 are entered on the following Weight Chart.

6. For the first 6 days, Daniel lost oedema fluid. Then, starting on Day 8, after two days of transition to F-100, he gained weight steadily on F-100.

7. No, it is only a small loss, and he gains on the next day. There could be many possible causes, e.g., less intake or just stable intake, or a mistake in weighing or recording the weight.

WEIGHT CHART

Name: Daniel

Weight on admission: 10.1 kg

Height / length: 87 cm

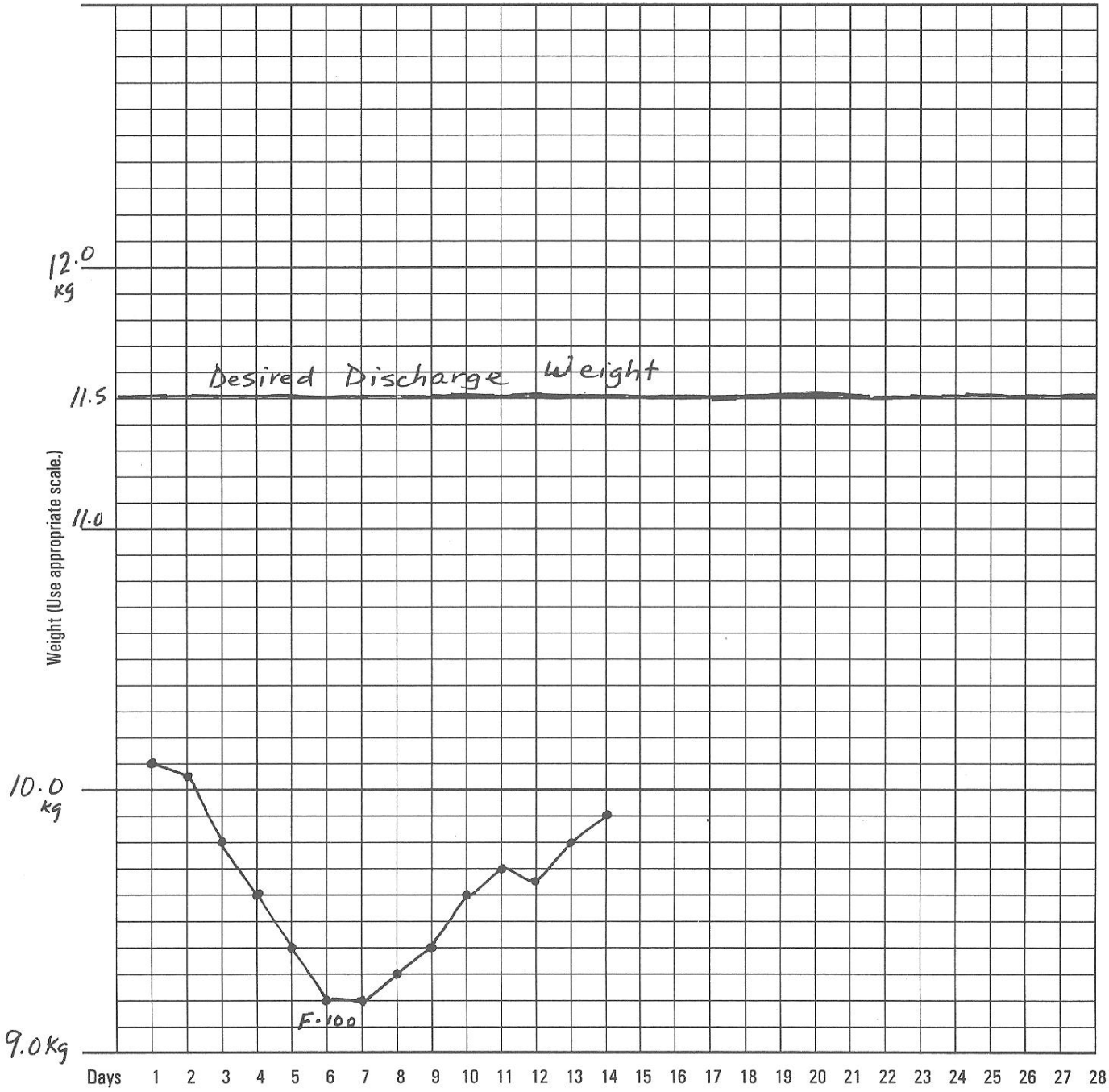
Oedema on admission: 0 (+) ++ +++

Desired weight at discharge
(-1SD, 90% weight for height): 11.5 kg

Actual weight at discharge: _____ kg

Enter likely range of weights on the vertical axis in an appropriate scale (e.g., each row representing 0.1 kg). Allow rows below the starting weight in case weight decreases; weight may decrease by as much as 30% if the child has severe oedema.

Draw a bold horizontal line across the graph to show the desired discharge weight.



ANSWER SHEETS:

MONITORING AND PROBLEM SOLVING

Answers to Exercise A, Monitoring and Problem Solving, page 10

Case 1 – Ceri

1a. Ceri is not making much progress. The only progress evident is that her diarrhoea has stopped.

1b. Yes, there are problems. On Day 5 Ceri has still not started to lose her oedema, and she is not eating well. (She leaves some at every feeding; she missed a night feeding.)

Case 2 – Lennox

2a. Lennox had no weight gain (0 g /kg/day).

2b. Yes, in some ways Lennox has made progress. He has lost his oedema. He no longer has dermatosis. His diarrhoea has stopped. He is now on F-100.

2c. Yes, there are problems. Lennox has not gained weight for 4 days on F-100 in spite of eating well. Lennox's fever continues and is at 38°C.

Possible Answers to Exercise B, Monitoring and Problem Solving, page 23

Case 1 – Ceri

These are possible answers to the questions in the exercise. Participants may mention some of these answers during the discussion. Other answers may also be correct.

1a. Possible causes of Ceri's failure to respond:

- She missed a night feed; perhaps she is not being fed well at night.
- Perhaps she is not being encouraged to eat.
- Perhaps she has an unrecognized infection, or her antibiotic is not effective.
- Perhaps her food is not being prepared correctly. (This would affect other children as well.)
- Mineral mix may not have been added to the feed. (Potassium and magnesium are very important for loss of oedema.)
- Ceri has not been given folic acid or a multivitamin for 3 days.

1b. Possible ways to investigate causes:

- Observe feedings in the ward; watch carefully how Ceri is fed.
- Ask nurses why folic acid and multivitamin have not been given. Also check supplies of folic acid and multivitamins.
- Look for a possible infection.
- Look for signs of ruminating (e.g., smell on clothes).
- Review Ceri's 24-Hour Food Intake Charts from earlier days.
- Observe food preparation.

1c. Possibly the nurses thought that Ceri was better off, so they paid less attention to her. They did not spend the time necessary to encourage her to eat.

1d. Talk to the staff about Ceri's needs and make her the focus of attention. Also teach Ceri's mother or caretaker how to hold Ceri and feed her with encouragement.

Case 2 – Lennox

2a. Yes, Lennox is taking enough F-100. The recommended daily range for his weight of 8.0 kg is 1200 - 1760 ml, and he took 1400 ml.

2b. Benzylpenicillin has not taken care of Lennox's infection.
Lennox may have tuberculosis (TB).

Answers to Exercise C, Monitoring and Problem Solving, page 27

Aruni

Aruni's average daily weight gain from 13/4 to 19/4 was 11.06 g/kg:

77.4 ÷ 7 = 11.06 g/kg

This is a good average daily weight gain, so Aruni's name should be listed in the **good** column of the Weight Gain Tally sheet.

Kodeh

Kodeh's average daily weight gain from 13/4 to 19/4 was 4.66 g/kg:

32.6 ÷ 7 = 4.66 g/kg

This is a poor average daily weight gain, so Kodeh's name should be listed in the **poor** column of the Weight Gain Tally sheet.

Sohna

Sohna's average daily weight gain from 13/4 to 19/4 was 6.15 g/kg:

43.07 ÷ 7 = 6.15 g/kg

This is a moderate average daily weight gain, so Sohna's name should be listed in the **moderate** column of the Weight Gain Tally sheet.

Answers to questions for discussion

1. If 10% of children on a ward have poor weight gain, there is a problem. On this ward, 20% of the children (4 out of 20) have poor weight gain. So yes, there is a problem with weight gain on this ward.

2. Common factor: 3 of the 4 children with poor weight gain are not with a mother.

3. 20% of the children (4 out of 20) on the ward have poor weight gain (< 5 g/kg/day). 3 of these 4 have no caregiver at the hospital with them.

4. The common factors do suggest a possible cause. Without special attention from a mother or caregiver, these children may not be encouraged to eat. To investigate the cause, it will be important to observe feedings on the ward. It would also be a good idea to see if all of the children with moderate or good weight gain have caretakers with them, and it the caretakers help with feeding.

   A separate problem investigation should be done for Lalita.

Answers to Exercise D,
Monitoring and Problem Solving, page 33

Possible answers to questions for discussion

1. **Kofi** – Kofi died about 19:00 on his first day in the hospital. This time is quite possibly during a shift change. Kofi had been in the hospital less than 24 hours. The cause of death is recorded as unknown. However, at his last monitoring, his breathing rate and pulse rate had increased dangerously, probably due to overhydration. Kofi had been given normal saline IV in the emergency room (incorrect and dangerous case management). The IV was continued for 6 hours.

   Vijay – In emergency Vijay was given IV albumin and a diuretic for low albumin and oedema (incorrect and dangerous case management). Vijay died 23 hours after admission. At death, his potassium level was low, his albumin high, and his oedema had increased from ++ to +++.

   Luca -- Luca was found dead at 4:00 in the morning on Day 3. Milk curds were coming out of her mouth. She had been vomiting during the day. Possibly she choked on her vomit.

2. In the cases of Kofi and Vijay there are common factors. Both cases received incorrect initial case management, particularly in the emergency room. Kofi should not have been given an IV at all since he was not in shock; if he had needed IV fluids, he should have been given one recommended for severely malnourished children for only 2 hours, and he should have been monitored every 10 minutes. The normal saline IV given to Kofi for 6 hours may have caused heart failure due to overhydration.

   Vijay should not have been given IV albumin or a diuretic. Since Vijay is very malnourished, we can assume he is deficient in potassium. Giving a diuretic will make this deficiency worse, as potassium is lost in the urine. (This could explain why his oedema got worse.)

   Neither Kofi nor Vijay was given an antibiotic. Both needed antibiotic.

   Luca's case appears to be different and unrelated to emergency room practices. Her death may be due to lack of attentiveness of the staff at night. Also, Luca still had diarrhoea and vomiting on her third day in the ward, and it is not known whether she continued to receive ReSoMal after each loose stool.

3. Monitor initial case management practices, particularly in the emergency room. Pay special attention to incorrect use of IV fluids, albumin, and diurectics. Monitor to ensure that antibiotics are being prescribed.

   Investigate night staffing and ward procedures at night. Investigate whether Luca continued to receive ReSoMal after each loose stool.