**Web supplement**

**Reliability of anthropometric measurements in children with special needs**

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**Table S1. Duration (seconds) of obtaining measurements in children with special needs.**

|  |  |  |
| --- | --- | --- |
| Measurement | Non-standers  (n=30) | Standers  (n=23) |
|  | Median (IQR) | Median (IQR) |
| Supine length or height | 42 (30 to 76) | 29 (18 to 40) |
| Tibial length | 23 (18 to 64) | - |
| Upper arm length | 29 (20 to 42) | - |
| Knee height | 47 (20 to 54) | - |
| Subscapular skinfold thickness | 29 (17 to 34) | 48 (29 to 72) |
| Triceps skinfold thickness  Biceps skinfold thickness  Supra-iliac skinfold thickness  Mid upper arm circumference  True waist circumference  Umbilical waist circumference | 27 (23 to 36)  36 ( 25 to 57)  -  34 (30 to 56)  39 ( 20 to 85)  26 ( 18 to 47) | 34 (25 to 41)  37 ( 34 to 41)  48 (31 to 85)  73 ( 60 to 85)  63 (48 to 95)  58 (35 to 93) |
| Weight | 70 ( 48 to 87) | 20 ( 10 to 39) |
| Bioimpedance analysis | 294 (216-342) | 113\* |

IQR – interquartile range; \*Only one measurement was timed.

**Table S2. Percentage of successful first measurements in standers and non-standers.**

|  |  |  |
| --- | --- | --- |
| **Measurement** | **Non-stander (n=30)** | **Stander (n=23)** |
|  | % (n) of successful first measurements | % (n) of successful first measurements |
| Supine length or height | 93 (28) | 100 (23) |
| Tibial length | 100 (30) | - |
| Upper arm length | 90 (27) | - |
| Knee height | 90 (27) | - |
| Weight | 97 (29) | 100 (23) |
| True waist circumference | 93 (28) | 83 (19) |
| Umbilical waist circumference | 87 (26) | 74 (17) |
| Mid-upper arm circumference | 93 (28) | 100 (23) |
| Triceps skinfold thickness | 90 (27) | 78 (18) |
| Biceps skinfold thickness | 87 (26) | 78 (18) |
| Subscapular skinfold thickness | 90 (27) | 61 (14) |
| Supra-iliac skinfold thickness | Not possible | 43 (10) |
| Bioimpedance | 83 (25) | 74 (17) |

Table S3. Reasons for difficulty in obtaining segmental measurements and supine length in non-standers.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Supine length | Upper arm length | Tibial length | Knee height |
| Not possible to obtain measurement | n= 4 | n=5 (one child only had measurement at second visit) | n = 1 (one child only had measurement at second visit) | n = 1 |
| *Reason(s)* | *Couldn’t lie still too distressed (n=2); Couldn’t*  *lie straight (n=1); Plaster cast in situ*  *(n=1)* | *Moved during measurement*  *(n=3); Very distressed and vision poor (n= 1); Too distressed (n=1)* | *Plaster in situ (n=1)* | *Very distressed and poor vision (n=1)* |
| Possible to obtain measurements but challenging | n=6 | n=3 | n=1 | n=3 |
| *Reason(s)* | *Couldn’t straighten leg (n=4); Fixed deformity at knee due to spina bifida (n=1); Dislocated hip (n=1); Dystonic movements (n=1)* | *Fixed contracture at elbow (n=1); Dystonic movements (n=2)* | *Landmarks difficult to find (n=1)* | *Dystonic movements (n=2); Equinovarus*  *deformity at ankle (n=1)* |

**Table S4. Reasons for difficulty in obtaining waist circumferences, weight and bioimpedance in non-standers.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | True waist | Umbilical waist | Bioimpedance | Weight |
| Not possible to obtain measurement | n=4 | n=2 | n=5 | n=2 |
| *Reason(s)* | *Spinal brace in situ (n=1); Uncooperative and poor vision (n=1); Did not co-operate for a 2nd measurement (n=1); Ileal conduit in place, not possible to find landmark (n=11)* | *Spinal brace in situ (n=1); Uncooperative and poor vision (n=1)* | *Moved too much (n=1); Won’t lie supine (n=1); Uncooperative and poor vision (n=1); Uncooperative, pulled electrodes off (n=1); Vagal nerve stimulator in place - contraindicated (n=1)* | *Uncooperative and poor vision (n=1); Cooperated for one weight only and wouldn’t stay still (n=1)* |
| Possible to obtain measurements but challenging | n=8 | n=3 | n=3 | n=0 |
| *Reason(s)* | *Landmarks difficult to find (n=2); Landmarks close together (n=1); Landmarks difficult due to scoliosis / kyphosis (n=3); Landmarks difficult for skinfolds due to obesity (n=1); Landmarks difficult due to ileal conduit bag and belt (n=1)* | *Landmarks difficult on one occasion due to spina bifida and scoliosis (n=1); Landmarks difficult for abdominal skinfoldsdue to obesity (n=1); Landmarks difficult due to ileal conduit bag and belt (n=1)* | *Moved (n=2); Moved taking time to settle – battery died (n=1)* |  |

**Table S5. Reasons for difficulty in obtaining skinfold measurements in standers.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Triceps | Biceps | Subscapular | Supra-iliac |
| Not possible to obtain measurement | n=2 | n=5 | n=6 | n=12 |
| *Reason(s)* | *Uncooperative (n=2)* | *Uncooperative (n=2);Very distressed (n=1); Wary of of calipers (n=2)* | Uncooperative (n=3); Very distressed (n=1); Wary of calipers (n=2) | Refused (n=5); Uncooperative (n=3); Very distressed (n=1); Wary of calipers (n=1); Difficulty in finding landmarks (n=2) |
| Possible to obtain measurements but challenging | n=1 | n=0 | n=3 | n=2 |
| *Reason(s)* | *Refused 2nd measurement* (n=1) |  | *Wouldn’t allow calipers touch the child (n=1); Uncooperative for one of two measurements (n=2)* | *Uncooperative for one of two measurements (n=2)* |

**Table S6. Reasons for difficulty in obtaining waist measurements and bioimpedance in standers**.

|  |  |  |  |
| --- | --- | --- | --- |
|  | True waist | Umbilical waist | Bioimpedance |
| Not possible to obtain measurement | n=3 | n=2 | n=5 |
| *Reason(s)* | *Refused (n=2); Very distressed (n=1)* | *Uncooperative (n=1); Very distressed (n=1)* | *Refused (n=1); Pulled off stickers or leads (n=2); Wouldn’t lie still (n=1); Uncooperative n=1)* |
| Possible to obtain measurements but challenging | n=4 | n=3 | n=1 |
| *Reason(s)* | *Refused one of two measurements (n=2); Giggling too much on one occasion (n=1); Only with T-shirt on one occasion (n=1)* | *Refused one of two measurements (n=3)* | *Refused one of two measurements (n=1)* |