

Expanding the utility of MUAC tapes

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Dear Editor

MUAC (mid-upper arm circumference) has been used for years in malnutrition. Its most practical use in South Sudan has been determining which children or mothers will qualify for nutritional supplementation through groups like WFP and UNICEF. The tapes are cheap, instructions in their use are simple and quickly mastered. Emmanuel Gai and I have raised the question of what the appropriate cutoffs for children are,^[1] particularly those aged 3-5 years, which I continue to believe are among the most vulnerable years for malnutrition and have the potential for the greatest impact in education and development if the malnutrition is not appreciated and addressed.

However, we are missing a lot if those tapes are only relegated to the nutrition and antenatal clinics. In the Medical Ward at Mary Immaculate Hospital in Mapuordit, we use MUAC on rounds daily. I firmly believe measuring the MUAC should be part of the routine physical examination, even if informally. When I circle my thumb to the third finger around an arm, it comes out around 17.5 cm. I think that all clinicians should know roughly how large their circle is. From there, it does not take much extrapolation to guess the patient's MUAC. If the patient has a smaller than normal MUAC, then there is a likelihood of a wasting disease underlying his current condition, and so should raise our suspicion. Often, patients present with symptoms of an acute common illness, such as malaria but a more serious underlying condition may be missed. Here we have the opportunity to diagnose and prevent another disease becoming advanced. There are three conditions where I think MUAC is vitally helpful in adult medicine.

First is the suspicion of HIV (human immunodeficiency virus). South Sudan is one of the leading countries in the world for the incidence of HIV.^[2] Though there are those suffering from HIV who have a normal MUAC (for women, I use 23.5 cm, drawn from the inclusion criteria in WFP grants, and in men, I use 24 cm), when I examine a patient with a chronic cough or chronic diarrhoea, and they

have a MUAC less than the above, my antennae go up. Of course, we test all pregnant women who come to us in antenatal clinics (ANC), but our experience suggests there is a shortage of proper testing kits in South Sudan, so we need to be a bit selective. If a patient comes with diarrhoea of more than two weeks duration and the MUAC is low, I am thinking of *Cryptosporidium*, and I send the patient for HIV testing, even repeating it if I remain unconvinced. *Cryptosporidium* will not respond to the usual antibiotics used to treat prolonged diarrhoea; it requires a high dose of Co-trimoxazole.

The second is evaluating the patient with a chronic cough. In the patient with a normal MUAC and no localizing signs (the findings are diffuse in the lungs), I feel comfortable diagnosing asthma. If the patient has a low MUAC, I become more suspicious. Though the adequacy of our data reporting is suspect, it is clear that South Sudan continues to be one of the world leaders in the incidence of *Mycobacterium tuberculosis* (TB).^[2] If the patient has a low MUAC and the cough has been present for over two weeks, I listen for signs of TB, and I order a complete Blood count (CBC) with ESR (erythrocyte sedimentation rate), sputum for AFB, and often a CXR. Positive sputum makes the diagnosis simple, but the combination of the low MUAC, high ESR, and abnormal CXR, particularly if the abnormalities are not limited to one lobe, is generally sufficient to make a presumptive diagnosis. The presence of HIV adds to the certainty.

The third area is diabetes mellitus (DM). Frequent nocturnal urination is another common complaint we clinicians hear. If the complaint is for a short period, we should think of urinary tract infection (UTI) or prostatitis in older men, but prolonged frequent (> 3/night) urination should cause us to think of DM and order a blood glucose level. When I was in medical school in the late 1970's, diabetes mellitus was classified as Juvenile Onset or Maturity Onset. Much has changed since those days. Though there are other groups (gestational diabetes, diabetes from chronic pancreatitis), the two major groups now are IDDM (insulin-dependent DM) and T2DM (Type 2 DM). In the US, close to 95% of the patients with DM are T2DM.^[3] That is not the case in South Sudan.

Although I cannot get any reliable statistics on this question, my observations are that about 70% of DM patients in the Lakes State have IDDM and probably more than 50% in Central Equatoria State. Both types of DM respond to insulin, but only T2DM patients respond to oral hypoglycaemic drugs, such as metformin.^[4] Again, the MUAC helps differentiate the two distinct disorders

with the same name. It is my conviction that the vast majority, if not all, T2DM are obese. IDDM patients may be obese, but the majority are not. If an adult has hyperglycaemia and a MUAC above 26 cm, my working diagnosis is T2DM. If the MUAC is under 24 cm, the patient will likely be IDDM. If the patient does not have dangerously high levels of glucose (above 30 mm/dl), a trial with metformin may be justified, even in a patient with a low MUAC. Still, I have seen several patients with IDDM continue on metformin as they waste away.

If you choose to make the trial of metformin in a patient with a low MUAC, you should look for objective signs of improvement, such as a significant reduction in night time urination and random glucose measurements, before settling on the diagnosis of T2DM. If there is no significant improvement, particularly if the MUAC is < 24 cm, consider the probability that this patient has IDDM. Either give him a trial of insulin (we use Mixtard Insulin) or refer him to a centre that can supply the insulin.

The utility of MUAC comes up in other areas, such as fever of unknown origin (chronic fevers) and chronic anaemia (could this be an underlying malignancy?). The tapes are cheap and easy to use. And your fingers are always with you. MUAC is also helpful in following the patient's response to therapy. MUAC is the gold standard in nutrition, but it should become part of the astute clinician's usual examination.

References

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