

## Lester Adaptation of Cardio Metabolic Measurements: An Inpatient Interventional Framework for Women with Mental Illness

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### Abstract

**Aims of the study:** To assess the prevalence of metabolic syndrome and implement a framework for screening and management of cardio metabolic risks in women on psychiatric in-patient wards.

**Background:** An estimated 29-48% of psychiatric in-patients have metabolic syndrome. Severe mood disorders and psychotic illnesses are independent risk factors. 20-25% of the world's adult population have metabolic syndrome and they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with people without the syndrome. This study gives an overview of the application of Lester Tool on busy in-patient units and interventional approaches adapted by the team.

**Method:** 46 admissions between April to July 2015 were included in Phase 1. Information on physical health medication and menopausal status was recorded in addition to metabolic syndrome parameters. Data on 47 admissions in Phase 2 between March to May 2016 was obtained. Advice on healthy lifestyle, diet, medication and smoking cessation was offered as routine.

**Results: Phase 1:** Of the total 46 patients, 38 (82.60%) were on antipsychotics, 6 (13.04%) had metabolic syndrome and 14 (30.43%) did not and data was not available on 26 (56.52%). Most frequently missing criteria were waist circumference and triglyceride measurements.

**Phase 2:** Of the total 45 patients, 14 (31.1%) had metabolic syndrome, 12 (26.6%) did not and data was unknown in 13 (28.8%). 2/3<sup>rd</sup> of admissions were compliant with investigations, as opposed to 1/3<sup>rd</sup> in Phase 1. 86.6% compliance was achieved in BMI checks. 20% were prescribed anti-hypertensive or anti-diabetic medication during admission and were referred to the dietician and diabetes clinic.

**Conclusion:** Clinical identification and management of metabolic syndrome is essential and preventative measures by referral to specialist services or use of 3DFD model could be implemented. Lester Adaptation has been an effective tool for recording cardio metabolic risks; but in reality an effective interventional process could prove hard to achieve in mental health settings.

**Keywords:** Metabolic syndrome; Cardio metabolic risks; Diabetes; Insulin resistance; Diet

### Introduction

Metabolic syndrome is a cluster of biochemical and physiological abnormalities associated with development of cardiovascular disease and diabetes. It is estimated that around 20-25% of the world's adult population have Metabolic Syndrome and they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with people without the syndrome [1]. Sedentary lifestyle, poor dietary awareness or unhealthy eating choices, lack of exercise, smoking and substance abuse are associated with high morbidity and mortality [2]. The landmark CATIE study and several others support a link between antipsychotic use and metabolic syndrome [3-5]. A number of studies indicate a substantial increase in prevalence of metabolic syndrome in women compared with men [6-10].

The study defined metabolic syndrome based on IDF criteria [1] (International Diabetes Federation) (Table 1), using the Lester Tool [11] to obtain data from all female patients admitted to the in-patient ward. This study gives an overview of the application of Lester Tool on busy in-patient units and interventional approaches adapted by the team.

### Aims of the Study

The aim of the study was to assess the prevalence of metabolic syndrome and implement a framework for the screening and management of cardio metabolic risks in women on psychiatric in-patient wards.

### Background

The concept of metabolic syndrome has existed for several decades. In 1897 Sir Henry Maudsley (1835-1918) wrote: 'Diabetes is a disease

which often shows itself in families in which insanity prevails'. This risk is independent of antipsychotic usage.

It has been reported that psychiatric patients with severe chronic illnesses have higher prevalence. An estimated prevalence of 29-48% in psychiatric in-patients has been reported by studies conducted in various parts of the world [12,13]. Severe mood disorders and psychotic illnesses are independent risk factors. A mortality gap of over 10 years exists between those with and without psychiatric disorders [14]. Type 2 diabetes is associated with a two-fold increase in mortality in Schizophrenia [15]. A Danish study compared the overall and cause specific mortality in individuals with serious mental illness and diabetes and those of the general population. The study concluded that among patients suffering with both illnesses nearly a third of natural death were attributed to diabetes and about 14% of natural deaths were attributed to a combination of SMI and diabetes [16].

Prevalence of metabolic syndrome is high among post-menopausal women and cross sectional studies have shown an increased risk in post-menopausal women ranging between 32.6% to 41.5% [17,18]. Based on the NCEP ATP III criteria the prevalence of metabolic syndrome varies between 8%-43% in men and from 7%-56% in women around the world [19]. The CLAMORS Study assessed patients for coronary heart disease (CHD) and metabolic syndrome and concluded that those on antipsychotics had prevalence in the same range as the general population 10-15 years older [5].

The Lester UK Adaptation: Positive cardio metabolic resource [11] supports the recommendations relating to physical health in the NICE guidelines on psychosis and Schizophrenia [20]. The parameters set out in the Lester Tool are in keeping with the CQUIN targets [21] which aim to improve effective and collaborative monitoring of patients physical health. A number of cardiovascular risk scoring systems are available that could give a 10 year projected view of an individual's likelihood of developing a cardiovascular disease or event. For example, the Framingham risk score gives an indication of the

benefits of prevention and is useful for both the clinician and the individual patient to help decide a suitable course of action such as lifestyle modification or preventative medical treatment [22].

## Materials and Methods

For diagnosing metabolic syndrome was followed for Phase 1 of the study (Table 1) WHO criteria [23]. Data on 46 admissions to the female in-patient unit between April 2015 to July 2015 were included in the data collection. Metabolic parameters assessed included weight, BMI, waist circumference, blood pressure, random blood glucose level and lipid profile. In addition to standards criteria we recorded information on anti-diabetic treatment, anti-hypertensive, oral contraception and pre or post-menopausal status. The nursing staff was informed of the data collection and a nursing lead was appointed for purposes of the study.

Findings from Phase 1 of the study were discussed with the in-patient team followed by a ward based teaching session. Findings from the study were further disseminated to the physical care committee and discussed at the trainee's local teaching programme.

Phase 2 of the study involved data collection in line with the Lester Tool parameters [11] which were in keeping with the diagnostic criteria for metabolic syndrome and CQUIN targets [21]. Data on 45 admissions to the female unit between March 2016 to May 2016 were included in the study. The team recorded findings at admission (or up to one week following admission), at one month and at 3 months or discharge (whichever was earlier). Patients whose BMI was 30 or more were referred to the dietician for dietary advice and attendance at the gym, in accordance with a health clearance assigned by the ward doctors. In both phases of the study discussions on healthy lifestyle, side effects of medication and smoking cessation advice were offered as routine practice.

Clinical measures	WHO [23]	EGIR [24]	ATPIII [25]	AACE [26]	IDF [27]
Insulin resistance	IGT, IFG, T2DM, or lowered insulin Sensitivity plus any 2 of the following	Plasma insulin >75 <sup>th</sup> percentile	None, but any 3 of the following 5 features	IGT or IFG plus any of the following based on the clinical judgment	None
Body weight	Men: waist-to-hip ratio >0.90; women: waist-to-hip ratio >0.85 and/or BM >30 kg/m <sup>2</sup>	WC ≥ 94 cm in men or ≥ 80 cm in women	WC ≥ 102 cm in men or ≥ 88 cm in women	BMI ≥ 25 kg/m <sup>2</sup>	Increased WC (population specific)
Lipids	TGs ≥ 150 mg/dl and/or HDL-C < 35 mg/dl in men or <39 mg/dl in women	TGs ≥ 150 mg/dl and/or HDL-C <39 mg/dl in men or women	TGs ≥ 150 mg/dl HDL-C <40 mg/dl in men or <50 mg/dl in women	TGs ≥ 150 mg/dl and HDL-C <40 mg/dl in men or <50 mg/dl in women	TGs ≥ 150 mg/dl or on TGs Rx. HDL-C <40 mg/dl in men or <50 mg/dl in women or on HDL-C Rx
Blood pressure	≥ 140/90 mmHg	≥ 140/90 mmHg or on hypertension Rx	≥ 130/85 mmHg	≥ 130/85 mmHg	≥ 130 mmHg systolic or ≥ 85 mm Hg diastolic or on hypertension Rx
Glucose	IGT, IFG, or T2DM	IGT or IFG (but not diabetes)	110 mg/dl (includes diabetes)	IGT or IFG (but not diabetes)	≥ 100 mg/dl (includes diabetes) <sup>b</sup>
Other	Microalbuminuria: Urinary excretion rate of >20 mg/min or albumin: creatinine ratio of >30 mg/g.			Other features of insulin resistance <sup>c</sup>	

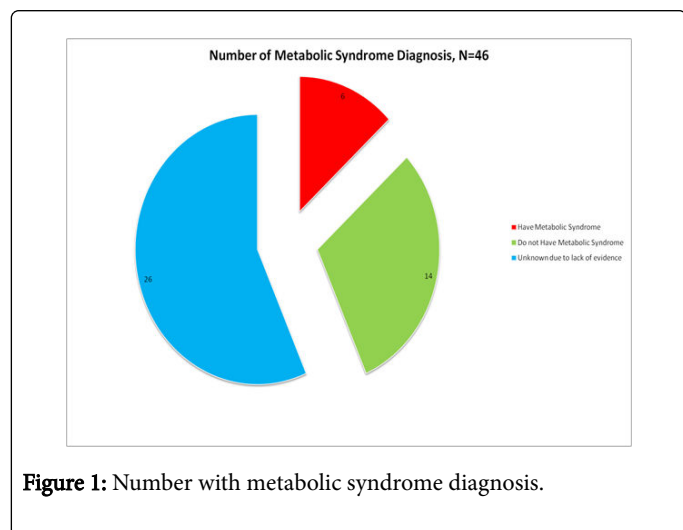
**Table 1:** Diagnostic criteria proposed for the clinical diagnosis of the MetS (Cardiology Research and Practice).

Insulin sensitivity measured under hyperinsulinemic euglycemic conditions, glucose uptake below lowest quartile for background population under investigation.

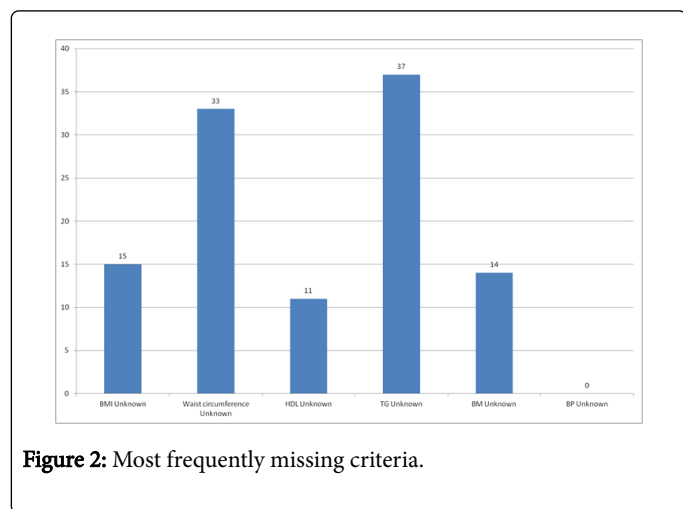
In 2003, the American Diabetes Association (ADA) changed the criteria for IFG tolerance from >110 mg/dl to >100 mg/dl. Includes family history of type 2 diabetes mellitus, polycystic ovary syndrome, sedentary lifestyle, advancing age, and ethnic groups susceptible to type 2 diabetes mellitus.

## Results

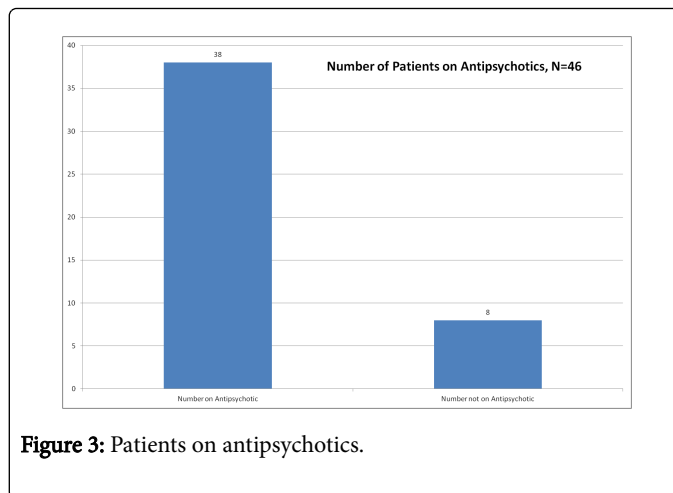
**Phase 1:** 6 of 46 (13.04%) patients had diagnosable metabolic syndrome (Figure 1). 14 of 46 (30.43%) patients did not have metabolic syndrome. Data on 26 of 46 (56.52%) patients was not available to confidently diagnose metabolic syndrome. Most frequently missing criteria were waist circumference and triglyceride measurements (Figure 2). About a third of patients (approximately 32%) complied with weight checks and random blood sugar measurements. 100% compliance was achieved on blood pressure measurements. 38 of 46 (82.60%) were on antipsychotic treatment and 8 of 46 (17.39%) were not on antipsychotic treatment (Figure 3). All of the patients with diagnosable metabolic syndrome were on antipsychotics.



**Figure 1:** Number with metabolic syndrome diagnosis.



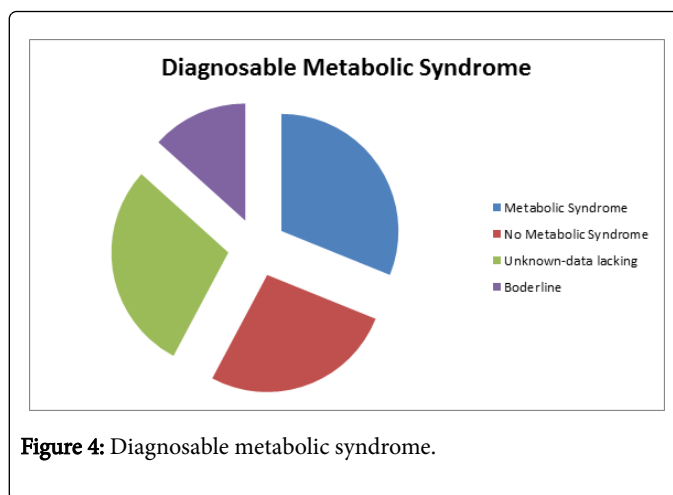
**Figure 2:** Most frequently missing criteria.



**Figure 3:** Patients on antipsychotics.

**Phase 2:** Data was obtained on 45 patients admitted between March and May 2016. 14 out of 45 patients (31.1%) had diagnosable metabolic syndrome and 12 of 45 (26.6%) did not. Due to patients declining one or more investigations data was unknown in 13 of 45 patients (28.8%) (Figure 4). 6 of 45 patients (13.3%) had 'borderline' results (Figure 4); i.e. fulfilling at least two IDF criteria but borderline results for other cardio metabolic parameters. Approximately 2/3<sup>rd</sup> of the admissions were compliant with investigations in Phase 2 of the study, as opposed to 1/3<sup>rd</sup> in Phase 1 (Figure 5). Likewise, 86.6% compliance was achieved in weight and BMI checks conducted on the ward. Only one patient did not have any intervention due to transfer to another ward soon after admission.

All patients included in the study were on psychotropic. As part of the intervention 9 of 45 patients (20%) were either commenced on or had dose changes made to their anti-hypertensive and or anti-diabetic medication during their admission.



**Figure 4:** Diagnosable metabolic syndrome.

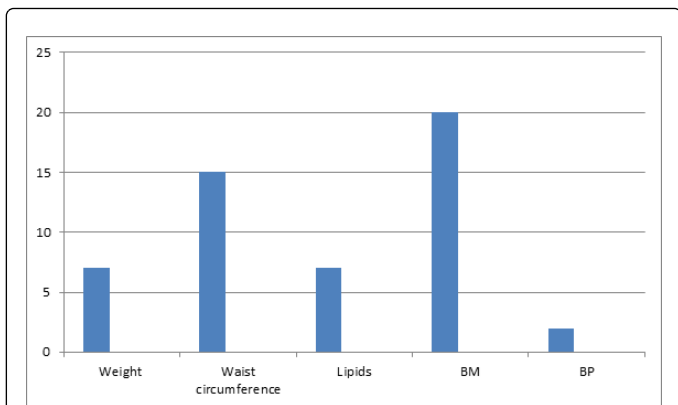


Figure 5: Most frequently missing measurements.

## Limitations

Antipsychotic usage is associated with metabolic syndrome; however one cannot assume that there is an independent link between antipsychotic use and development of metabolic syndrome in the cohort of patients considered in this study. Confounders such as age related metabolic changes, ethnicity, genetic predisposition, over or under nutrition due to socioeconomic status, use of oral contraceptive pills, menopause and pregnancy have been acknowledged but not been explored further. Accounting for these confounders was not considered to be feasible nor within the scope of the aims set out for the study, which was to establish a framework for screening and management of cardio metabolic risks.

Accurate and timely recording all of the metabolic syndrome parameters as suggested in the Lester Tool was not always possible. These limitations reflect difficulties encountered by the team at the time of monitoring, such acuity of patient's illness at the time of presentation to services and patients refusal to engage in specific measurements such as waist circumference or weight checks. It was the team's view that measurements of such parameters could become a sensitive issue particularly for women. However, the team acknowledges that views on nature of demographics of this patient cohort are debatable.

Findings of Phase 1 of the Study were discussed at various forums including local teaching programme, physical care committee and the ward based team. The team discussed ways to ensure timely and accurate recording and monitoring of metabolic parameters. Such monitoring could become challenging on busy in-patient environments and certain cohort of patients could be missed, particularly those who decline measurements at the point of admission. Clinician factors contributing to limited recording of metabolic parameters were considered. For example, male nurses and male healthcare assistants might not feel entirely comfortable measuring waist circumference of women or could perceive women patients to not feel comfortable about them recording such measurements. Unlike other parameters such as blood pressure, pulse, temperature, respiratory rate and oxygen saturation, recording of waist measurements was not part of routine monitoring prior to this study and was hence easily overlooked in Phase 1. Likewise, the team had to specifically request the laboratory to comment on triglycerides, LDL, HDL and total cholesterol (rather than simply stating 'lipid profile') and the same was requested when completing blood forms. These

inconsistencies reflected infrequent or sporadic use of the Lester tool which was adapted by the Royal College of Psychiatrists in 2014.

The challenges highlighted in Phase 1 of the study were overcome by use of a single data entry form (Figure 6) that captured all of the information required for recording of metabolic parameters. All patients with a BMI of 30 or more were automatically referred to the dietician in keeping with Trust guidance and further consideration made for referral to specialist services [28].

Figure 6: The challenges highlighted in Phase 1 of the study were overcome by use of a single data entry form.

The average length of stay was between 3-6 weeks (excluding individuals awaiting longer term placements). Therefore, although initial monitoring of metabolic factors was completed, it hasn't been possible for the in-patient team to follow through any monitoring required at intervals between 3 months to 1 year. However, in-patient discharge summaries have suggested and requested patients GPs to monitor metabolic risks in conjunction with NICE guidance on antipsychotic monitoring.

## Discussion

The study highlights challenges encountered on busy in-patient settings whilst attempting to maintain parity of esteem between physical and mental health. Clinically risky patients could intermittently demand a large proportion of clinician's time on in-patient units, therefore leaving less time to monitor aspects of physical health. A consistent persuasive approach could help overcome some of these challenges.

Metabolic syndrome itself is not entirely a robust risk assessment measure. However, monitoring and assessment of cardio metabolic parameters should compel clinicians to explore and manage shorter-term risks. This includes advice on smoking cessation, dietary interventions, lifestyle changes and effective management of diabetes and hypertension alongside appropriate referrals to services. A shared care approach for effective longer term intervention should be explored. Our study demonstrates that short term interventions to tackle physical health complications and improve wellbeing can be

effective. In light of these improvements and achievements the team has been liaising with local charities to explore in-reach services they could offer to acute wards. This would include exercise, relaxation groups and live music and possibly cater to those patients unable to access periods of leave off the ward.

Evidence indicates that metabolic profile of antipsychotics varies, therefore resulting in some having greater propensity than others to cause hyperglycemia [29,30]. However, clinicians need to consider the overall wellbeing of an individual and finely balance out improvements in mental health against physical health complications. Pharmacological interventions to aid weight loss, achieve glycemic control and improve lipid profiles could reduce cardio metabolic risks. The 3 Dimensions of Care for Diabetes (3DFD) model [31] could be regarded as a favorable shared care approach, but this has not been trialed in the organization.

## Conclusion

Clinical identification and management of patients with metabolic syndrome is essential in order to prevent the development of disease complications. The study acknowledges and recognizes the difficulties in treating the syndrome as a whole. Hence, tackling each aspect of the syndrome separately could be deemed as clinically appropriate or preferred. Likewise, referral to appropriate specialist services should be considered where deemed necessary. Preventative measures include lifestyle modifications, exercise, diet and weight loss in discussion and agreement with a dietician, smoking cessation and appropriate pharmacological interventions. We acknowledge that constraints on resources and time and variations in clinical activity can have an impact on adequate and timely monitoring of physical health on inpatient settings. Lester Adaptation has been an effective tool for recording cardio metabolic risks; but in reality an effective interventional process could prove hard to achieve in mental health settings.

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