

STUDY ON LITHIUM MONITORING AMONGST PATIENTS IN A COMMUNITY MENTAL HEALTH AND PRIMARY CARE SETTING IN RURAL ENGLAND

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SUMMARY

Background: Lithium is widely used as a mood stabilizer in managing Bipolar Disorder. It is also licensed as an augmenting agent for recurrent depression and treatment resistant depression. However, it has a narrow therapeutic index with potentially significant side effects and adverse drug interactions. Toxicity is one of the main concerns for prescribers and serum levels should be checked regularly. Also, due to the adverse effects on Kidneys and Thyroid, there are strict guidelines to monitor the kidney as well as thyroid functions periodically. Whilst the need to monitor blood biochemistry is well established, less well recognized is the need to monitor patients' physical health by means of annual checks of Body Mass Index (BMI) and waist circumference.

Aim: The purpose of this study was to investigate compliance against the NICE CG185 guidelines. Hereford is a rural town in England with a population of about 180000. Currently, the Herefordshire part of 2gether Mental Health NHS Foundation Trust does not have clearly agreed shared care protocols for Lithium monitoring. Lithium monitoring is done by GPs as part of QOF targets. As Psychiatrists recommend treatment with lithium, they have the responsibility to have an updated results and act on these appropriately. Therefore, an important aspect of this audit was to identify monitoring gaps that may result from the dual ownership of patient care.

Results: We found that 80% of cases complied with NICE guidance as regards blood monitoring however, only 40% of cases were compliant as regards checks on the physical health parameters of BMI and weight.

Conclusion: The blood biochemistry of patients on lithium is generally well monitored however, physical health assessment is rarely completed with the required annual frequency and, waist circumference is almost never measured; either on initiation of lithium therapy or, on an on-going basis. More needs to be done to promote awareness of the need to monitor the physical health of patients on lithium and, in particular, to ensure that these checks include measurement of waist circumference. We believe that to improve monitoring of patients on lithium, shared care protocols should be developed between mental health services and GP services.

Key words: lithium – audit - patient monitoring - physical health - shared care protocol

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INTRODUCTION

Lithium has been the mainstay of treatment for both the acute phase and prophylaxis of relapses in Bipolar Disorder for decades and its efficacy is increasingly evidenced by recent meta-analyses (Miura 2014). It is also licensed as an augmenting agent for recurrent depression and treatment resistant depression. However, it has a narrow therapeutic index with potentially significant side effects and adverse drug interactions. Toxicity is one of the main concerns for prescribers and serum levels should be checked regularly. Also, due to the adverse effects on Kidneys and Thyroid, there are strict guidelines to monitor the kidney as well as thyroid functions periodically. This explains why its toxicity profile and thus strict monitoring are nevertheless accepted by clinicians. Whilst the need to monitor blood biochemistry is well established, less well recognized is the need to monitor patients' physical health by means of annual checks of Body Mass Index (BMI) and waist circumference.

The side effects of lithium include hypothyroidism, hyperparathyroidism, nephrogenic diabetes insipidus and weight gain. A systematic review on lithium's toxicity profile highlighted the high prevalence of hyperparathyroidism and hence strong evidence for the monitoring of serum calcium levels before and throughout treatment (McKnight 2012). The monitoring of these side effects is best practice as advised by NICE guidance (NICE 2014). A large UK national audit of lithium monitoring by healthcare professionals including psychiatrists and primary care physicians have shown unfavorably low levels of monitoring of physical health parameters and variable consistency in the ownership of monitoring responsibility (Collins 2010).

One study found that baseline measurements of renal and thyroid function were carried out before initiation of lithium in 84% and 82% respectively (Collins 2010). Baseline anthropometric measurements such as body weight were carried out in only 32%. Documentation of the counseling of the patients on side effects was noted in 62% of cases and symptoms of toxicity noted in 45% of patients.

In Herefordshire, patients on lithium are monitored by both primary care (General Practitioners (GPs)) and Psychiatrists with results held on different systems; EMIS for primary care and RiO for secondary care. However, blood test results are accessible through a shared blood sciences laboratory database. Thus testing can be undertaken by either primary or secondary care. However, in the absence of a fully shared care protocol the danger is that both parties can miss testing a patient's physical health or recording outcomes clearly. The Prescribing Observatory for Mental Health found that only 37% of UK NHS Trusts had formally agreed shared-care guidelines for patients managed jointly with primary care (Collins 2010). This study engaged both primary and secondary care systems in Herefordshire to see where data was stored and when tests were delayed or, missed altogether.

AIM

The purpose of this study was to investigate compliance against the NICE CG185 guidelines. Currently, the Herefordshire part of 2gether Mental Health NHS Foundation Trust does not have clearly agreed shared care protocols for Lithium monitoring. Lithium monitoring is done by GPs as part of QOF targets. As Psychiatrists recommend treatment with lithium, they have the responsibility to have an updated results and act on these appropriately. Therefore, an important aspect of this audit was to identify monitoring gaps that may result from the dual ownership of patient care.

METHODOLOGY

10 patients were selected at random from the East Herefordshire region at 6 General Practices (GP). Monitoring parameters as defined by NICE CG 185 were studied. Data was collected both centrally from a secondary care data recording system (RiO) and locally from a paper mail survey sent to GP practices. The data collected were entered into MS Excel for analysis.

The current UK National Institute for Clinical Excellence (NICE) guidelines (NICE CG185) defines the monitoring standards to be applied for patients on Lithium and is detailed in the results section below.

Audit Standard - Summarized NICE GC 185 Guidelines

- In first year of treatment, lithium levels to be checked every 3 months and subsequently every 6 months
- Maintain lithium levels in the therapeutic range (0.4 – 1mmol)
- Check eGFR every 6 months
- Check TFT (Thyroid Function Test) every 6 months
- Annual physical health monitoring check of BMI and waist circumference

Demographics

The patient pool was small but representative of the East Herefordshire region and spread over 6 GP practices. Thus conclusions are likely to be applicable to the county as a whole.

The vast majority (90%) of patients were on Lithium for Bipolar Affective Disorder. One patient was on lithium for a unipolar depression. Physical co-morbidity was common; 70% of patients had at least one physical co-morbidity and 40% had two or more comorbidities (Figure 1-3).

It was noted that 70% of patients had not been advised of the side effects of lithium or its interactions. The data was based on written records and on this basis there was only specific mention of such advice for just 30% of cases, a fact corroborated by the GPs.

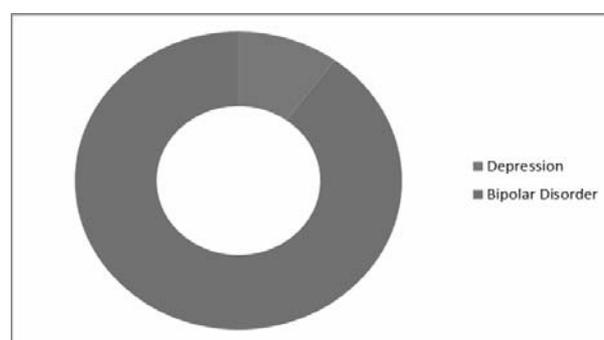


Figure 1. Indications for Lithium Therapy. A chart showing the patients' indications for lithium therapy

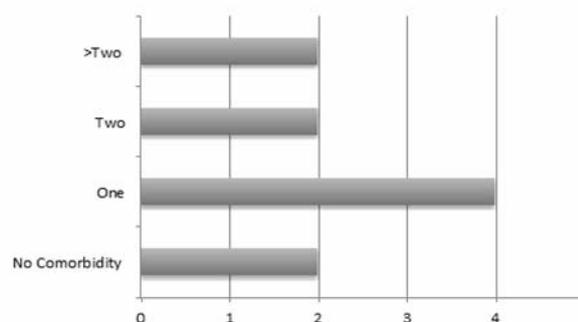


Figure 2. Co-morbidities. A graph showing the number of co-morbidities of the patient group on lithium

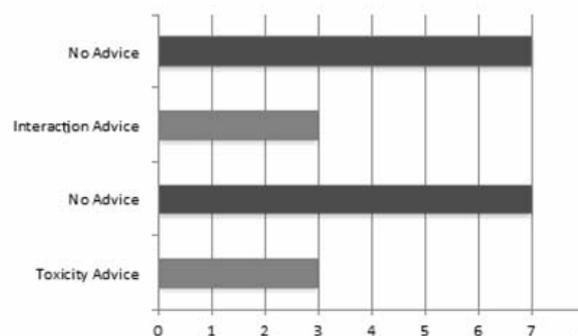


Figure 3. Advice on Interactions and Toxicity. A graph showing documentation of interactions and toxicity advice given to patients

RESULTS

General Theme

There was very good coverage of the NICE guidance as regards blood monitoring and especially for checks of renal and thyroid function. However, measurement of BMI and weight was suboptimal, with only 40% of patients having had these checks in the preceding 12 months whilst just 10% had ever their waist circumference measured.

These findings were concordant with those of Collins et al. 2010 in the UK national lithium audit (Collins 2010). The side effect of weight gain has been shown to be very common (McKnight 2012) and NICE guidance stipulates that measurement of weight and waist circumference should be a monitoring priority (Figure 4).

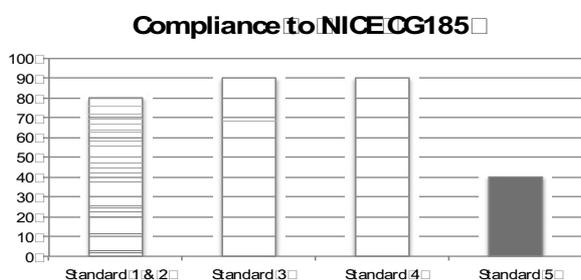


Figure 4. Overall Compliance with NICE CG185. A graph showing the percentage compliance against each of the five criteria for lithium monitoring.

Ownership of Testing

Initiation of Blood Biochemistry Checks

It has been noted how blood monitoring is well enforced. However, it is less consistently documented. A major aspect of this audit was to chart where testing was undertaken, be it in primary care, secondary care or, both.

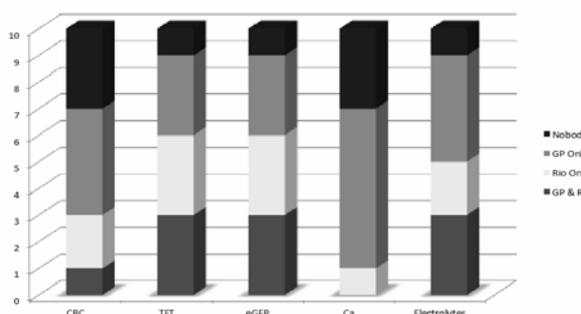


Figure 5. Ownership of Initiation Blood Testing. A stacked histogram representing the ownership of testing by either GPs or psychiatrists, both, or neither

Initial blood sampling should include the tests of CBC (Complete Blood Count), U&E (Urea & Electrolytes) - including Ca (Calcium) as well as TFT (Thyroid) and eGFR (Renal Function). Regarding each parameter, the breakdown of the ownership of testing was as follows (Figure 5).

- **CBC = 70% Completion:** Documented by both primary and secondary care 10%, secondary only 20%, primary only 40%, Unknown or not tested = 30%.
- **U&E = 90% Completion:** Documented by both primary and secondary care 30%, secondary only 20%, primary only 40%, Unknown or not tested = 10%.
- **Ca = 70% Completion:** Documented by both primary and secondary care 0%, secondary only 10%, primary only 60%, Unknown or not tested = 30%.
- **TFT & eGFR = 90% Completion:** Documented by both primary and secondary care 30%, secondary care only 30%, primary only 30% Unknown or not tested = 10%. Interestingly, despite good concordance of renal function, monitoring evidence shows that there is a relatively low prevalence of deterioration in renal function in patients on lithium.

The results above show that testing of the critical parameters set out by NICE CG185 are nearly always being completed – especially the most critical tests of U&E, TFT & eGFR. However, there is clearly a problem about consistency of record keeping and data visibility, which generally still seems to reside within primary care.

At present, less than one third of the data is visible to both primary and secondary care users. This makes it difficult for dose optimization, which may impact patient safety if sudden changes are needed. A shared care protocol would improve this situation.

Initiation of Physical Health Checks

It has been noted how on-going physical health monitoring is an area of weakness at present. However, a more positive picture emerges when patients are initiated on lithium. A full 90% of patients had their weight and BMI checked when they were started on lithium (Figure 6).

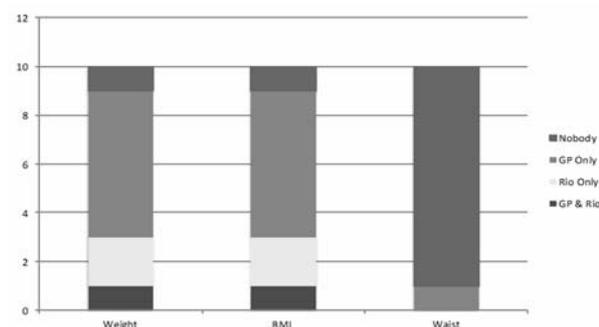


Figure 6. Ownership of initiation Physical Health Testing. A stacked histogram representing the ownership of testing by either GPs or psychiatrists, both, or neither

Even so, the recording of this information is suboptimal. Only 10% of patients were documented on both primary and secondary care systems. The remaining 60% were documented on just primary care systems with the outstanding 20% just documented on the secondary care system.

In summary; physical health checks are being undertaken when patients are started on lithium. However, at present the bulk of this is done by primary care and thus not visible to psychiatrists.

One notable area of all-round weakness is measurement of waist circumference. Only 10% of patients had ever had their waist circumference measured and in this isolated case, the test was done on initiation in primary care.

Monitoring: of Ongoing Blood Checks

Out of our patient pool, only 20% had started lithium in the past year. The remaining 80% had been on lithium for more than a year. Nobody came off lithium in our patient pool. Both patients who started lithium, received the necessary initiation checks and subsequent 3-monthly checks. Regarding the remaining 80%, there was one patient for whom we were unable to collect data. With the exception of one missed 6 monthly check, all the other patients were in compliance with the on-going monitoring requirements (Figure 7).

Year 1?	3/12 Check?	6/12 Check?	Special	3/12 Check?
n/a	n/a	n/a	n/a	n/a
Yes	Yes	Yes	n/a	n/a
n/a	n/a	No	n/a	n/a
n/a	n/a	Yes	n/a	n/a
n/a	n/a	Yes	n/a	n/a
Yes	Yes	n/a	n/a	n/a
n/a	n/a	Yes	Yes	Yes
n/a	n/a	Yes	n/a	n/a
n/a	n/a	Yes	n/a	Yes
n/a	n/a	n/a	Yes	n/a

Figure 7. Ownership of Ongoing Blood Testing. A stacked histogram showing the ownership of blood monitoring after lithium initiated to include GP or psychiatrists, both, or neither

Regarding the documentation of the monitoring, a similar picture emerged. i.e. roughly two thirds of the documentation resided in primary care systems and roughly one third resided in secondary care or both primary and secondary care systems. Perhaps this is because most of the routine monitoring is completed by primary care services. An important consideration to mention that in the UK, primary care practitioners are specifically remunerated for this monitoring under a Quality Outcomes Framework (QOF). QOF points are currently available for checking creatinine, TSH and serum lithium levels for those on lithium therapy (QOF 2016). Future changes to the current arrangements may therefore risk leaving patients on lithium without such assiduous monitoring. The fact that physical health parameters falls outside the QOF (for those on lithium therapy), suggests why it may be poorly monitored at present. This demonstrates the power of QOF in determining patient outcomes.

At present, Calcium monitoring is one monitoring test that seems to be neglected. Calcium monitoring was only documented 60% of the time and then only by primary care.

Monitoring: of Ongoing Physical Health Checks

Once a patient has been started on lithium, the ongoing monitoring of BMI seems to be the unique concern of primary care. Whilst 80% of patients had their BMI checked at some point, just 40% of these had been checked in the previous 12 months (i.e. complying with the NICE standard), and all of those checks were undertaken by primary care. Meanwhile only 10% of patients had had their waist measured and that check was completed in preceding 12 months (Figure 8 and 9).

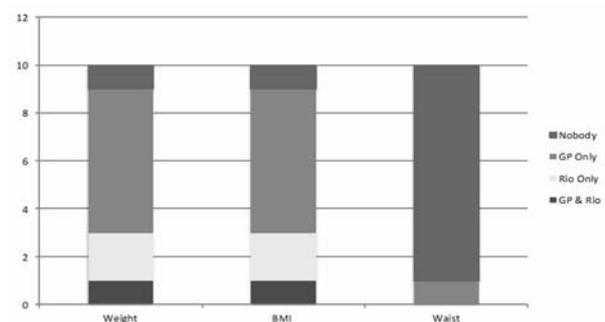


Figure 8. Ownership of Ongoing Physical Health Monitoring. A stacked histogram showing the ownership of physical health monitoring in the previous twelve months demonstrating how all the testing was undertaken in primary care, but in only 40% of instances was this testing done with the required annual frequency

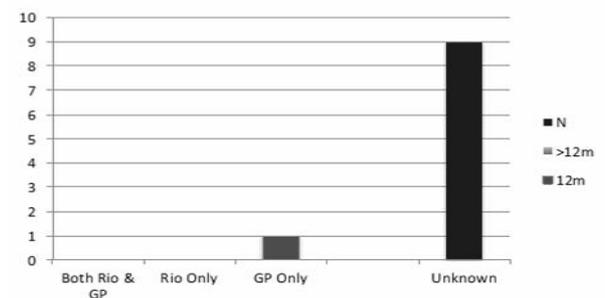


Figure 9. Ownership of Waist Circumference Measurement. A chart showing the measurement of waist circumference at initiation demonstrating that only 10% were measured and only in primary care

Frequency of Monitoring

In addition to carrying out monitoring there is the matter of frequency of monitoring. Reassuringly, all the blood tests were completed with the required frequency. One weak spot is that of calcium level monitoring which, although carried out, is not often done with the required frequency. Although 60% of patients had had a monitoring test, only 20% had done so in the last year. Considering the high prevalence of hyperparathyroidism, which has been evidenced by meta-analysis (McKnight 2012), calcium levels should be monitored closely.

Regarding physical health whilst 80% of patients had had their BMI checked at some point, only 40% had had this done in the past year. Only one patient had had their waist measured in the past year.

It is clear that practitioners need to pay greater attention to the frequency of monitoring of physical health; checks should be done regularly on an annual basis – not just at the start of lithium administration or sporadically.

Outcomes

Perhaps it is self-evident that practitioners prescribe medication to improve the health of patients. However, it is interesting that such improvements are not consistently documented. We looked to see if there was evidence of mood improvement or if side effects or toxicity were documented in the patient records.

Mood

Mood improvement was documented for 80% of patients (50% of the time by primary care and 30% of the time by psychiatrists). There were no cases with documented mood improvement in both secondary care and the primary care system (Figure 10).

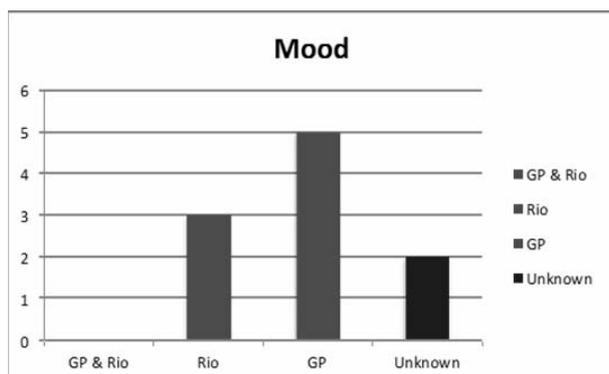


Figure 10. Documentation of Improvement in Mood. A chart showing the ownership of documented mood changes after lithium therapy by GP, Psychiatrists, both or neither

Side Effects and Toxicity

Side effects and toxicity were documented in 50% of patients; 20% of the time by primary care and 30% of the time by psychiatrists. There are two ways to interpret this. Firstly, perhaps practitioners do not feel obliged to record a negative and so the 50% figure may mean that 50% of patients do not experience negative effects of the medications. On the other hand, in 50% of cases, we have no data and thus cannot extrapolate conclusions. As with the documentation of mood, the recording was spilt between systems (30% with primary care, 20% with psychiatrists).

Recording of outcomes is currently suboptimal and hard to access given current arrangements. This can adversely affect patient care when clinicians need to titrate drugs or make changes - often after a patient has been started on

medication. The documentation of outcomes informs future care decisions and is to be encouraged (Figure 11).

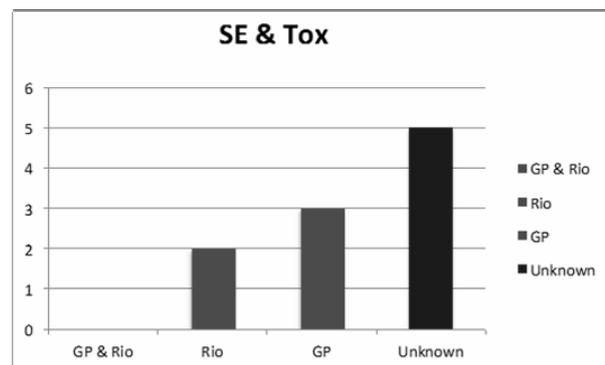


Figure 11. Documentation of Side Effects and Toxicity. A chart showing the ownership of documented mood changes after lithium therapy by GP, Psychiatrists, both or neither

CONCLUSION

We have discussed above how each of the NICE criteria were analyzed and how the results can be interpreted.

Overall, East Herefordshire shows good compliance with CG185 as regards monitoring of blood biochemistry. However, physical health checks are not being undertaken with the appropriate frequency and, in particular, waist circumferences are currently not properly monitored by anyone at all.

We believe that the care of patients on lithium would be improved in by more frequent physical health checks, better documentation of outcomes (both positive and adverse) and the development of records in the form of a fully shared care protocol between primary and secondary care. More needs to be done to promote awareness of the need to monitor the physical health of patients on lithium and, in particular, to ensure that these checks include measurement of waist circumference.

A fully developed shared care protocol remains a challenge and the current good level of compliance with NICE guidelines for blood monitoring of patients on lithium is heavily dependent on primary care services, whose systems remain completely detached from secondary care practitioners. The power of the QOF system in aligning the focus of primary and secondary care is well demonstrated by the fact that physical health monitoring of patients on lithium currently falls outside of the direct focus of QOF and this is reflected in the poor level of compliance noted in this audit.

List of abbreviations:

GP - General Practitioner,
 QOF - Quality Outcomes Framework
 NICE - National Institute for Clinical Excellence.

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Contribution of individual authors:

Nicholas Savage: Data collection, Data analysis and writing the article;

Jessica Green: Data analysis and Writing the article;

Madhavan Seshadri: Audit Design, Supervising the trainee, data analysis and writing the article;

Madhusudan Deepak Thalitaya & Claire Reynolds: writing the article.

References

1. Miura T, Noma H, Furukawa TA, Mitsuyasu H, Tanaka S, Stockton S et al.: Comparative efficacy and tolerability of pharmacological treatments in the maintenance treatment of bipolar disorder: a systematic review and network meta-analysis. *The Lancet Psychiatry* 2014; 1: 351-359
2. McKnight RF, Adida M, Budgee K, Stockton S, Goodwin GM, Geddes, JR: Lithium toxicity profile: a systematic review and meta-analysis. *The Lancet* 2012; 379:721-728,
3. National Institute for Health & Care Excellence (NICE) CG185 Bipolar Disorder: Assessment and Treatment 2014; <https://www.nice.org.uk/guidance/cg185?unlid=8844347832016126152817>.
4. Collins N, Barnes TRE, Shingleton-Smith A, Gerrett D, Paton C; Standards of Lithium Monitoring in Mental Health Trusts in the UK. *BMC Psychiatry* 2010; 10:80
5. Quality Outcomes Framework (QOF) Guidance Documents 2016/17; p21 [http://www.nhsemployers.org/~media/Employers/Documents/Primary care contracts/QOF/201617/201617 QOF guidance documents.pdf](http://www.nhsemployers.org/~media/Employers/Documents/Primary%20care%20contracts/QOF/201617/201617%20QOF%20guidance%20documents.pdf)

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