



# Lithium Monitoring: Making Patient Safety a Priority

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## Background

Lithium is an agent used to treat mood disorders. It is a high risk medication due to its narrow therapeutic index which increases the risk of toxicity and adverse effects; hence the importance of appropriate monitoring.

## Description

A retrospective audit was conducted to evaluate compliance with recommended monitoring parameters for patients on lithium in accordance with best practice guidelines.

## Action

Across a seven-month period, 118 inpatients prescribed lithium in a specialist psychiatric hospital were identified from the clinical pharmacy management software.

Patients were split into three cohorts: long-term patients, those admitted whilst on lithium and patients commenced on lithium as an inpatient.

Renal function, calcium levels, thyroid function, full blood picture and lithium levels were reviewed, as were documentation of weight and provision of written medication information.

Testing for pregnancy status and electrocardiogram (ECG) monitoring prior to starting lithium were reviewed for patients who met relevant criteria. See table 1 for breakdown of monitoring requirements.

## Results

### Lithium Maintenance (n=5)

Maintenance monitoring was only audited for long term patients due to the timing of the monitoring being at six and twelve month intervals. Compliance rate for relevant monitoring parameters was 92%.

### Admitted on Lithium (n=75)

Documentation of appropriate monitoring was noted in 71% of patients. Figure 1 outlines the breakdown of each parameter and level of compliance.

### Lithium Initiation as Inpatient (n=38)

Documentation of appropriate monitoring was noted in 62% of the cohort. Provision of written lithium information was documented for 32% of patients. Figure 2 outlines the breakdown of each parameter and level of compliance.

An ECG is required prior to initiation for patients younger than 16 years of age or older than 65 years of age. Ten patients met ECG criteria and seven of these had an ECG performed (70%).

Women of child bearing age (considered to be 15-50 years old in this audit) should undergo a pregnancy test prior to commencement of lithium. Pregnancy status was appropriately checked in 10 of the 20 relevant patients (50%).

Monitoring	Maintenance	Initiation	Admitted on lithium	Dose Change
Urea and Electrolytes (U&Es)	Six monthly	Pre-commencement	On admission	-
Full Blood Picture (FBP)	-	Pre-commencement	On admission	-
Thyroid Function Test (TFT)	Annually	Pre-commencement including parathyroid hormone (PTH)	On admission	-
Serum calcium	Annually	Pre-commencement (including ionised calcium)	On admission (including ionised calcium)	-
Serum lithium level	Six monthly	5-7 days after initiation	On admission	5-7 days after dose change
Electrocardiogram (ECG)	-	Baseline for patients below 16 or above 65 years old	-	-
Pregnancy test	-	Pre-commencement for females of child bearing age	-	-
Weight	Annually	Pre-commencement (desirable)	On admission	-
Written information	-	Pre-commencement (including documentation in patient notes)	-	-

Table 1: Monitoring requirements for each patient cohort as per best practice guidelines

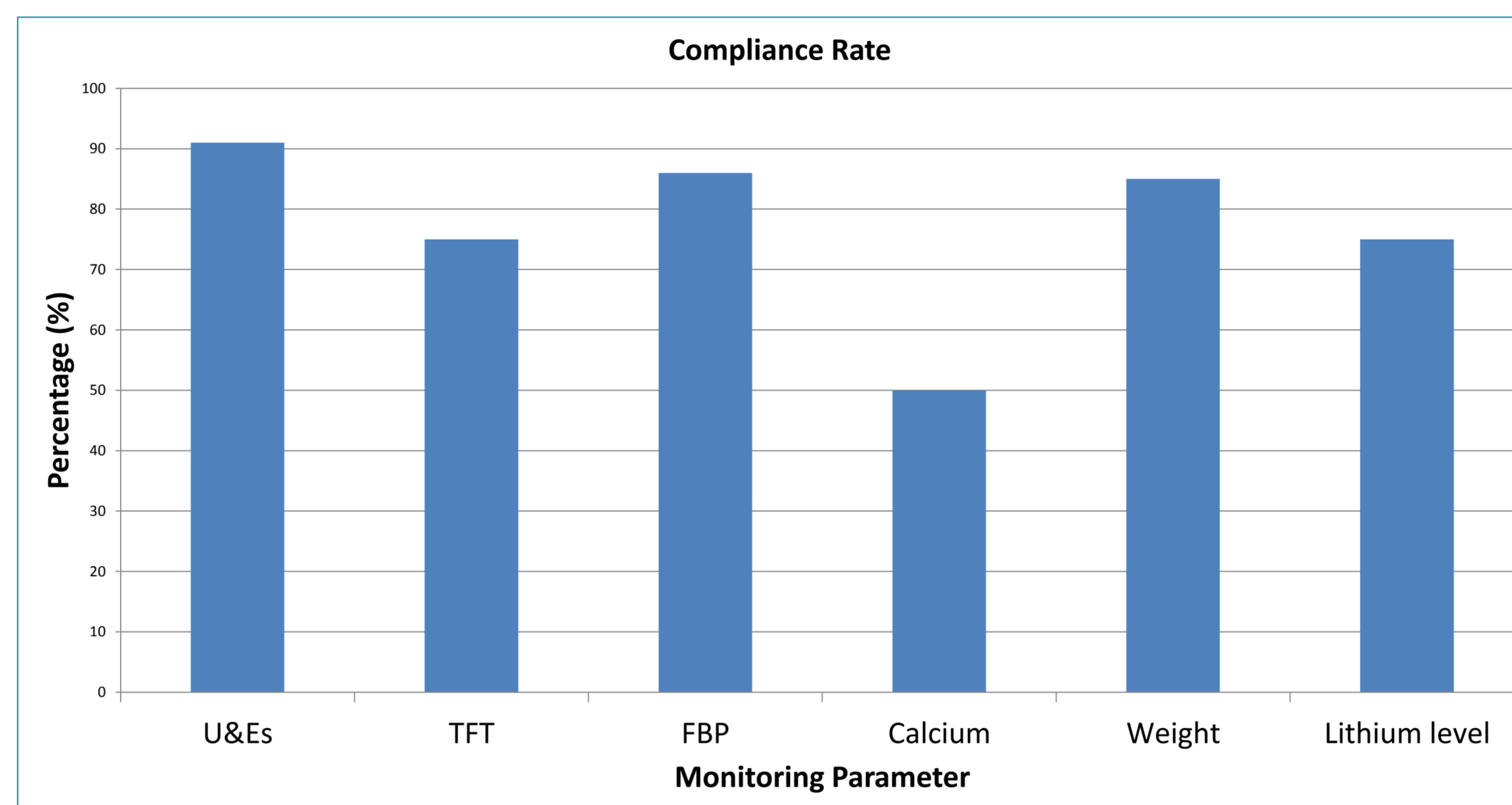


Figure 1: Compliance rate for each monitoring parameter for patients admitted on lithium

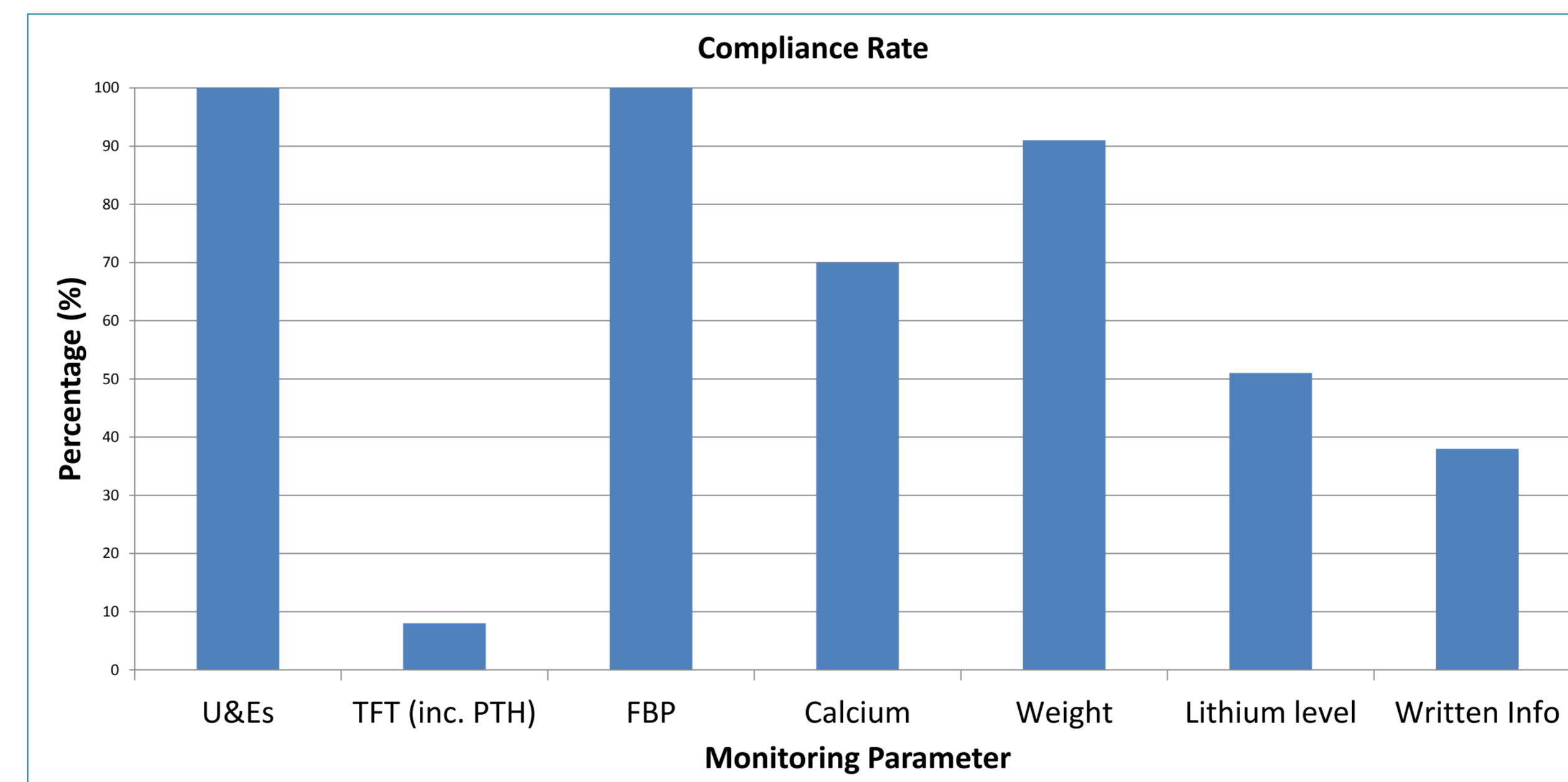
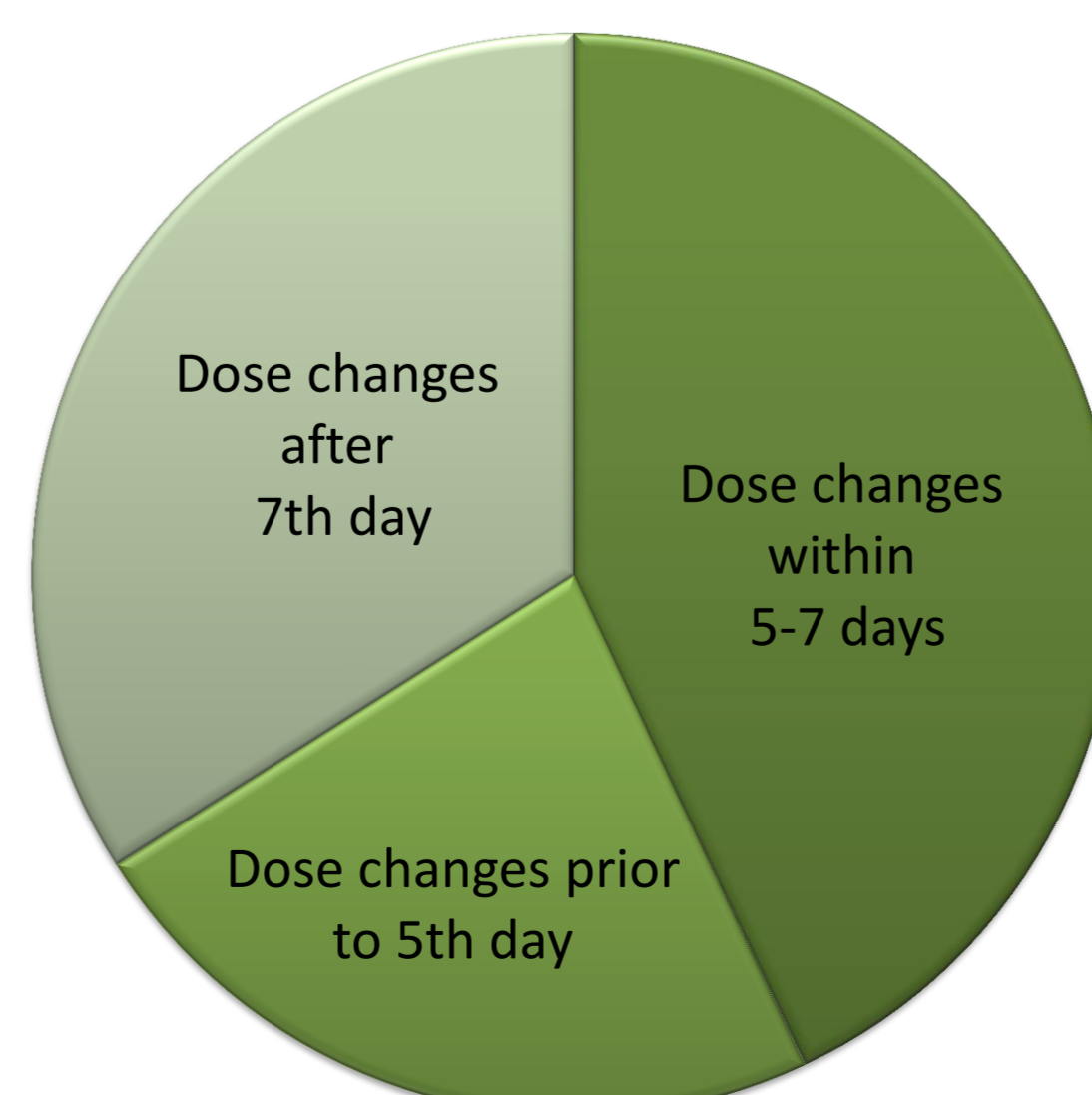


Figure 2: Compliance rate for each monitoring parameter for patients initiated on lithium

## Monitoring of Lithium Levels Post Dose Change

Within the audit period, 105 dose changes occurred with 43% of therapeutic drug monitoring (TDM) occurring within the recommended 5-7 days post dose change. This recommendation allows enough time for lithium levels to reach steady state thus levels taken prior to the 5<sup>th</sup> day will be inaccurate and clinically misleading.

Of the TDM measured outside of the suggested timeframe, 40% occurred prior to the fifth day. Potential reasons for testing levels prior to the 5<sup>th</sup> day include bed pressure or to predict a trend in serum levels before it reaches a toxic range.



## Discussion

Recent changes to the practice guidelines include addition of baseline parathyroid hormone levels for lithium initiation. TFTs were performed for 90% of patients, however only 8% had a PTH level. Requirements for ionised calcium to be included with calcium tests was also a recent addition.

**Recommendation:** Pharmacist education to relevant clinical staff on changes to the local guidelines.

FBP, TFT and U&Es are pathology tests required within 7 days of admission as per hospital policy. Monitoring of these parameters was performed for majority of patients (82%). The remaining pathology tests are lithium specific and thus have reduced compliance.

**Recommendation:** The online Physical Healthcare Management policy should include a hyperlink to the Lithium Prescribing and Management policy. Implement an online blood ordering program to improve compliance with pathology requirements.

Provision of written information by prescriber or pharmacist may be underreported as data was only included if it was documented in patient progress notes as per guideline.

**Recommendation:** Improve documentation practices in patient progress notes.

Pathology data may be underreported as gathering information was difficult for patients who had attended private pathology clinics.

**Recommendation:** Implement a process to improve access of private pathology results and improve documentation of results in pharmacist and prescriber software.

## Implications

The audit identified that monitoring of lithium therapy was suboptimal for certain parameters. There is opportunity for pharmacy intervention to educate clinical staff on the importance of monitoring practices to ensure optimal therapeutic outcomes and reduce the risk of adverse events.

## For further information

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