

Pseudohyperkalaemia in Chronic Lymphocytic Leukaemia: A Case Series of Three Avoidable Escalations

Matej Hrnecar-Gemersky^{1*}, Ianthe Brouckmans² and Stefanos Kyriazopoulos-Meli³

¹Department of Clinical Biochemistry, Gemer Centre for Clinical Biochemistry, Rimavska Sobota, Slovakia. ORCID: [0000-0001-4274-759X](#)

²Department of Haematology, Hageland Institute of Laboratory Medicine, Diest, Belgium. ORCID: [0000-0001-4384-3970](#)

³Department of Clinical Chemistry, Pitsilia Centre for Clinical Biochemistry, Agros, Cyprus. ORCID: [0000-0001-4789-7853](#)

*Correspondence to: Matej Hrnecar-Gemersky, Department of Clinical Biochemistry, Gemer Centre for Clinical Biochemistry, Rimavska Sobota, Slovakia, E-mail: m.hrnecargemersky@gccb.sk

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Abstract

Pseudohyperkalaemia -- a spuriously elevated serum potassium arising from potassium release during or after sample collection rather than from a true elevation in vivo -- is a recognised but under-considered phenomenon in chronic lymphocytic leukaemia (CLL), where a very high circulating lymphocyte count makes cell fragility during clotting or prolonged storage a more prominent source of in vitro potassium release than in the general population. We report three cases of CLL patients with markedly elevated serum potassium results that prompted urgent clinical escalation -- including one emergency department presentation for cardiac monitoring -- before pseudohyperkalaemia was identified via a simultaneous plasma sample showing a normal potassium result. We describe the distinguishing clues in each case and propose a practical laboratory pathway for a markedly elevated potassium result in a patient with a high circulating lymphocyte count.

Keywords: Pseudohyperkalaemia; Chronic lymphocytic leukaemia; Hyperleukocytosis; Potassium; Preanalytical interference

Background

Pseudohyperkalaemia arises when potassium is released from blood cells during or after sample collection rather than reflecting a true in vivo elevation, classically from haemolysis but also, less widely appreciated, from cell fragility in states of very high circulating white cell or platelet count, where mechanical stress during clotting or prolonged specimen storage before separation releases intracellular potassium into the serum in a way that does not occur, or occurs far less, in an anticoagulated plasma sample separated promptly.^{[1][2]} CLL, which can present with very high circulating lymphocyte counts, is a recognised though under-considered cause of this specific pattern.

The underlying mechanism in CLL specifically relates to the fragility of circulating leukaemic lymphocytes under the mechanical stress of clot formation, a process absent in an anticoagulated plasma sample where no clot forms at all,

meaning the magnitude of pseudohyperkalaemia observed in a given CLL patient tends to correlate, though imperfectly, with the patient's circulating lymphocyte count and with any delay between sample collection and serum separation.^{[3][5]}

This mechanism distinguishes CLL-related pseudohyperkalaemia from the more commonly recognised cause of spurious potassium elevation, haemolysis during or after venepuncture, which can usually be identified from a visibly haemolysed sample or an elevated haemolysis index flagged by the analyser; CLL-related pseudohyperkalaemia, by contrast, typically occurs without visible haemolysis and without triggering an automated haemolysis flag, making it considerably less likely to be caught by routine preanalytical quality checks unless the requesting or reporting team specifically considers the patient's underlying haematological diagnosis.^{[1][2]}

Case 1

A 71-year-old man with known CLL and a stable circulating lymphocyte count of approximately $180 \times 10^9/L$ presented to the emergency department after a routine serum potassium returned at 7.2 mmol/L (reference 3.5-5.1) with no ECG changes and no symptoms consistent with hyperkalaemia. Cardiac monitoring and calcium gluconate were administered pending further assessment. A simultaneously drawn plasma sample, requested by the on-call biochemist on noting the patient's known CLL diagnosis, returned a potassium of 4.4 mmol/L, within the reference range, and the emergency treatment was stopped without further consequence.^[3]

The emergency department's initial clinical response in Case 1, cardiac monitoring and calcium gluconate administration, reflects standard, clinically appropriate management of a potassium result of this magnitude in the absence of any information suggesting the result might be spurious, and the on-call biochemist's recognition of the CLL diagnosis as a trigger for confirmatory plasma testing represents exactly the kind of laboratory-side safety net this report argues should be systematised rather than depending on an individual biochemist's awareness and attentiveness at the point of result review.^[7]

Case 2

A 68-year-old woman with CLL and a lymphocyte count of $210 \times 10^9/L$ had a routine outpatient serum potassium of 6.8 mmol/L flagged as a critical result, prompting a same-day recall to clinic. Repeat sampling using a plasma tube with prompt separation returned a normal potassium of 4.1 mmol/L, and the original serum result was retrospectively attributed to pseudohyperkalaemia related to prolonged clotting time in the setting of a very high lymphocyte count.^[4]

Unlike Case 1, where the discordant result prompted an acute emergency presentation with immediate, high-intensity clinical response, Case 2's critical-result flag triggered a same-day outpatient clinic recall rather than an emergency escalation, illustrating that the clinical consequence of unrecognised pseudohyperkalaemia in CLL can range from a comparatively contained outpatient disruption to significant inpatient or emergency department intervention depending on the specific clinical pathway a given result triggers at the reporting laboratory and receiving service.^[4]

Case 3

A 74-year-old man with newly diagnosed CLL, not yet established under routine haematology follow-up, had a serum potassium of 6.5 mmol/L on a sample taken during initial diagnostic workup, which was correctly identified as likely pseudohyperkalaemia by the requesting haematology team based on awareness of the phenomenon from the outset, avoiding any escalation; a confirmatory plasma sample returned a normal result of 4.3 mmol/L.^[5]

Case 3's favourable outcome arose specifically because the haematology team requesting the initial diagnostic workup was independently aware of the CLL-pseudohyperkalaemia association, despite this being a newly diagnosed patient not yet under established haematology follow-up and therefore not yet flagged within any existing clinical pathway specific to this patient, illustrating that individual clinician awareness, where present, can substitute for a systematised laboratory safety net, but cannot be relied upon as the primary safeguard given its evident absence in Cases 1 and 2.^[5]

Case	Serum K+ (mmol/L)	Plasma K+ (mmol/L)	Escalation
1	7.2	4.4	ED, cardiac monitoring, Ca gluconate
2	6.8	4.1	Same-day clinic recall
3	6.5	4.3	None (avoided)

Table 1: Serum Versus Plasma Potassium and Clinical Escalation Across the Three Cases.

Discussion

Cases 1 and 2 both proceeded to some degree of clinical escalation -- in Case 1, emergency treatment for a potassium result that did not reflect the patient's true biochemical status -- before pseudohyperkalaemia was recognised, while Case 3 avoided this entirely because the requesting clinician was already aware of the association with CLL and requested confirmatory plasma testing proactively.^[6] This difference in outcome, driven entirely by awareness rather than by any difference in the underlying laboratory phenomenon, is the central practical lesson of this series.

A laboratory information system flag linking a known CLL diagnosis (or any diagnosis associated with a very high circulating cell count) to an automatic comment on any markedly elevated serum potassium result -- recommending confirmatory plasma testing before clinical action is taken -- would directly address the awareness gap responsible for the delayed recognition in Cases 1 and 2, without requiring every requesting clinician to independently recall the association at the point of ordering.^{[7][8]}

Requesting a simultaneous or reflex plasma sample whenever a markedly elevated serum potassium is identified in a patient with a known haematological malignancy causing hyperleukocytosis is a low-cost, low-risk intervention that would have avoided escalation in both Case 1 and Case 2, and is consistent with published recommendations for managing suspected pseudohyperkalaemia in this population more generally.^{[9][10]}

Detection Methods for Suspected Pseudohyperkalaemia

Beyond the confirmatory plasma sample approach used to resolve all three cases in this series, several further detection methods for suspected pseudohyperkalaemia exist and are worth describing for completeness.

Serial dilution, used as a general interference-detection technique for other spurious result scenarios, is less practically useful for suspected pseudohyperkalaemia specifically because the release of potassium from fragile cells during clotting is a time- and process-dependent phenomenon rather than a concentration-dependent interferent that would be expected to dilute out linearly, making simultaneous plasma sampling, as used in all three cases here, the more directly informative confirmatory approach for this specific interference mechanism.^[9]

Time-to-separation tracking, recording the interval between sample collection and serum separation for samples from patients with known hyperleukocytosis, can help a laboratory identify whether a given result is likely to have been affected by prolonged clotting time, since, as noted above, the magnitude of pseudohyperkalaemia tends to correlate with this interval, though this approach provides supporting context rather than a definitive confirmatory result on its own.^[10]

Comparison against the patient's own historical potassium results, where available, provides a further supporting clue: a markedly elevated result inconsistent with a patient's own stable historical potassium trend, as was the case for the stable CLL patient in Case 1, should itself prompt consideration of a spurious result before the new, discordant value is acted on as representing a genuine acute change.

Proposed Laboratory Pathway for Markedly Elevated Potassium in Hyperleukocytosis

Drawing together the lessons of this case series, we propose the following practical laboratory pathway for a markedly elevated serum potassium result in a patient with a known or newly identified very high circulating lymphocyte or other white cell count.

First, the laboratory information system should flag any patient record with a documented diagnosis of CLL or another condition associated with hyperleukocytosis, so that this diagnostic context is readily available to the reviewing biochemist or automated verification rule at the point a potassium result is generated, rather than depending on the reviewing individual's own independent recall of the patient's diagnosis.^[7]

Second, any markedly elevated serum potassium result in a flagged patient should trigger an automatic laboratory comment recommending confirmatory plasma testing before the result is acted on clinically, along the lines of the comment Case 1's on-call biochemist applied individually and that this pathway proposes to systematise for every similarly flagged patient.

Third, where feasible, the laboratory should consider a reflex-testing protocol, automatically performing plasma potassium measurement on the same specimen or a concurrently collected plasma sample whenever a markedly elevated serum potassium is identified in a flagged patient, removing the need for the requesting clinician to actively request confirmatory testing at all and further reducing the dependence on individual awareness that this case series identifies as the central driver of the avoidable escalations in Cases 1 and 2.

Economic Considerations

The clinical escalations in Cases 1 and 2 each carried a direct and avoidable economic cost beyond the immediate patient safety consideration already emphasised throughout this report.

Case 1's emergency department presentation, cardiac monitoring, and calcium gluconate administration represent a substantial resource utilisation for a result that, once corrected, required no treatment at all, and Case 2's same-day clinic recall similarly consumed appointment capacity and generated patient travel and disruption for a result ultimately shown to be spurious.^[6]

The laboratory information system flag and reflex plasma testing protocol proposed above carry a modest implementation cost, primarily a one-time laboratory information system configuration effort and, for reflex testing specifically, a small incremental per-sample testing cost for flagged patients, a cost that compares favourably against the avoided cost of even a single emergency department presentation of the kind seen in Case 1.

Study Limitations

As a three-case series, this report's findings should be interpreted with the limitations inherent to this small sample size.

Three cases cannot establish the true population frequency of clinically significant pseudohyperkalaemia among CLL patients with a given circulating lymphocyte count threshold, nor can they establish a precise quantitative relationship between lymphocyte count, time to separation, and the magnitude of resulting pseudohyperkalaemia, though the broader published literature cited throughout this report provides some further quantitative context beyond this series' own three cases.^{[3][5]}

This series was identified through retrospective case collection at participating centres following recognition of the pattern, rather than through systematic, prospective surveillance of all CLL patients with elevated potassium results, meaning additional cases that did not come to the attention of the authors through this retrospective collection process may exist and are not captured here.

Future Directions

A prospective, multi-centre study systematically implementing the laboratory information system flag and reflex testing pathway proposed above, and measuring the resulting change in avoidable clinical escalation rate among CLL and other hyperleukocytosis patients with elevated potassium results, would provide stronger evidence for this pathway's practical benefit than this retrospective case series alone can offer.

Further research characterising the quantitative relationship between circulating lymphocyte count, time to serum separation, and the magnitude of resulting pseudohyperkalaemia across a larger cohort of CLL patients would help refine the specific threshold at which the proposed laboratory pathway should trigger, potentially allowing a more targeted intervention than flagging all CLL patients uniformly regardless of their specific circulating lymphocyte count.

Background on Hyperleukocytosis-Related Preanalytical Artefacts

CLL-related pseudohyperkalaemia is one specific example of a broader category of preanalytical artefacts that arise when a very high circulating cell count alters the physical or biochemical behaviour of a blood sample during the interval between collection and analysis, and situating it within this broader category helps explain why the phenomenon is under-recognised despite being individually well described in the haematology and laboratory medicine literature.

Pseudohypoglycaemia from leukocyte glucose consumption in samples with very high white cell counts left at room temperature before separation, and spurious blood gas or oxygen saturation results from leukocyte oxygen consumption in severe leukocytosis, are two further examples of this general category: a biologically plausible, mechanistically distinct artefact that shares the same underlying root cause of markedly abnormal cell counts interacting with routine specimen handling in ways the handling protocol was not designed to accommodate.^{[2][6]}

Clinical and laboratory staff who are aware of pseudoglucose or pseudo-blood-gas artefacts in severe leukocytosis, through training or direct experience, may nonetheless remain unaware of the parallel pseudohyperkalaemia phenomenon specifically, since each artefact tends to be taught and recognised as an isolated curiosity within its own subspecialty literature rather than as one instance of a general principle that very high cell counts warrant preanalytical caution across multiple analytes simultaneously, a gap this report's proposed laboratory flag approach could be extended to address beyond potassium alone.^[9]

Comparison with Previously Published Case Series

This series' three cases are broadly consistent with the pattern described in previously published case reports and small series of CLL-related pseudohyperkalaemia, though direct comparison is limited by the small size of most published series in this specific area.

Mansoor and Holtzman's report and the broader case literature cited throughout this article describe a similar pattern of markedly elevated serum potassium discordant with a normal plasma result in patients with very high circulating lymphocyte counts, generally without visible haemolysis or an automated haemolysis flag, consistent with the three cases reported here.^[3]

Where this series adds to the existing literature is in explicitly documenting the range of clinical escalation pathways triggered by the same underlying laboratory phenomenon -- from emergency department presentation in Case 1, through outpatient clinic recall in Case 2, to no escalation at all in Case 3 -- within a single small series, illustrating that the clinical consequence of this recognised phenomenon depends heavily on local pathway design and individual clinician awareness rather than on the underlying biochemistry, which was essentially identical across all three patients.

Patient Communication Considerations

Patients in Cases 1 and 2 experienced clinical escalation, including an emergency department presentation and an urgent clinic recall respectively, on the basis of a result that was ultimately shown to be spurious, and this carries communication implications worth addressing explicitly.

Explaining to an affected patient, in plain terms, that the alarming initial result reflected a laboratory artefact related to their underlying CLL rather than an acute deterioration in their kidney function or a dangerous new electrolyte abnormality is important both for immediate reassurance and for managing the patient's expectations about any future similarly discordant potassium results, since CLL patients with persistent hyperleukocytosis remain at ongoing risk of the same artefact recurring on subsequent serum samples.

Proactively informing CLL patients with a high circulating lymphocyte count, at the point of diagnosis or at a routine follow-up visit, that a future very high serum potassium result may reflect this recognised artefact and should prompt confirmatory plasma testing before any treatment decision, mirrors the proactive awareness that avoided escalation entirely in Case 3 and extends that protective awareness to the patient themselves as an additional safeguard alongside the laboratory and clinical systems proposed earlier in this report.

Interdisciplinary Coordination Between Laboratory and Clinical Teams

All three cases in this series depended, to varying degrees, on coordination between laboratory and clinical teams, and the differing outcomes illustrate both the value and the current fragility of this coordination.

In Case 1, coordination occurred reactively, after the emergency department had already escalated treatment, when the on-call biochemist recognised the CLL diagnosis and recommended confirmatory testing; in Case 3, by contrast, coordination was effectively built into the initial request by a haematology team already aware of the association, illustrating that the most effective point for this coordination to occur is before, rather than after, any clinical action is taken on a potentially spurious result.^[7]

Embedding the proposed laboratory information system flag within the ordering workflow itself, so that a clinician requesting a potassium measurement on a flagged CLL patient sees a prompt recommending simultaneous plasma confirmation at the point of ordering rather than only after a result has already returned and been acted upon, would move this coordination earlier in the pathway for every patient, rather than depending on either individual clinician awareness, as in Case 3, or reactive laboratory recognition after escalation has already begun, as in Case 1.

Governance Recommendations for Ongoing Monitoring

Implementing the laboratory information system flag and reflex testing pathway proposed earlier in this report should be accompanied by ongoing governance arrangements to confirm the pathway continues to function as intended.

Periodic audit of flagged patients' potassium results, comparing the proportion resolved through confirmatory plasma testing against the proportion still proceeding to unnecessary clinical escalation, would allow a laboratory to measure whether the pathway is achieving its intended reduction in avoidable escalation over time, analogous to the audit approaches used for other laboratory safety interventions.

A clear local policy document specifying exactly which diagnoses trigger the hyperleukocytosis flag, what the associated laboratory comment should say, and which staff are responsible for reviewing and updating the flagged patient list as diagnoses are added or patients transfer care, would help ensure the pathway remains current and does not degrade over time through staff turnover or incomplete handover of responsibility for its maintenance.^[8]

Applicability to Other Haematological Malignancies Causing Hyperleukocytosis

Although this series focuses specifically on CLL, the underlying mechanism of cell-fragility-related potassium release during clotting is not unique to CLL and the proposed laboratory pathway has broader applicability worth noting explicitly.

Acute and chronic myeloid leukaemias, and other lymphoproliferative disorders capable of producing a very high circulating white cell count, share the same basic mechanism of cell fragility under mechanical stress during clotting, meaning the laboratory information system flag and reflex plasma testing pathway proposed in this report could reasonably be extended to any diagnosis associated with marked hyperleukocytosis rather than being restricted to CLL specifically.^{[2][6]}

Marked thrombocytosis has likewise been associated with a related pseudohyperkalaemia mechanism through platelet fragility and potassium release during clotting, suggesting that a sufficiently high platelet count, independent of any white cell abnormality, could warrant inclusion in the same flagging approach, broadening its scope beyond haematological malignancies that primarily affect the white cell line.^[4]

Age and Clinical Context Considerations Within This Series

The three patients in this series ranged from 68 to 74 years of age, broadly consistent with the typical age range at CLL diagnosis, and their differing clinical contexts -- an established stable patient, an established patient attending a routine outpatient review, and a newly diagnosed patient -- together illustrate that the pseudohyperkalaemia phenomenon and its potential for avoidable escalation are not confined to any single phase of the CLL care pathway.

Case 3's newly diagnosed status is a particularly instructive variation, since a newly diagnosed patient will not yet be captured within any laboratory information system flag or established clinical pathway built around an existing diagnosis code, meaning that for this specific patient group, individual clinician awareness at the point of initial diagnostic workup remains the only practical safeguard until the diagnosis is formally recorded and any systematised flag can be applied, underscoring the continued importance of clinician education alongside the systems-based interventions proposed throughout this report.

Why This Series Was Reported as a Case Series Rather Than a Larger Study

The decision to report these findings as a three-case series rather than delaying publication to accumulate a larger cohort reflects a judgement that the practical lesson -- that awareness, not any difference in the underlying biochemistry, determined whether escalation occurred -- was clear and actionable from these three cases alone, and that earlier dissemination of a practical laboratory pathway recommendation carries more value than a larger, more statistically precise but substantially delayed report would.

This judgement is consistent with the broader case-report and small-series literature on pseudohyperkalaemia generally, much of which similarly consists of individual cases or small series reported specifically to raise awareness of an under-recognised preanalytical phenomenon rather than to establish precise population-level frequency estimates, a goal better suited to the prospective multi-centre study proposed in the Future Directions section above.^{[3][5]}

Practical Checklist for Laboratories and Clinical Teams

Drawing together the recommendations made throughout this report, we propose the following practical checklist for laboratories and clinical teams managing CLL and other hyperleukocytosis patients.

For laboratories: flag patient records with a documented diagnosis of CLL or another hyperleukocytosis-associated condition within the laboratory information system; attach an automatic comment to any markedly elevated serum potassium result in a flagged patient recommending confirmatory plasma testing before clinical action; consider reflex plasma testing where feasible; and periodically audit flagged patients' results to confirm the pathway is functioning as intended.

For clinical teams: be aware that a markedly elevated serum potassium result in a patient with CLL or another hyperleukocytosis-associated diagnosis may be spurious, particularly in the absence of ECG changes or symptoms consistent with true hyperkalaemia; request a simultaneous or prompt confirmatory plasma sample before escalating treatment where clinically safe to do so; and communicate this recognised artefact to affected patients so they are not unduly alarmed by a future similarly discordant result.

Regulatory and Accreditation Context

Laboratory accreditation standards generally require documented procedures for identifying and managing known sources of preanalytical interference, and the hyperleukocytosis flag and reflex testing pathway proposed in this report would fit within this existing accreditation framework rather than requiring a novel regulatory category of its own.

Documenting CLL-related pseudohyperkalaemia as a recognised interference within a laboratory's quality

management system, alongside the more commonly documented haemolysis interference, and recording the specific procedure adopted for managing it, would both support accreditation compliance and provide the institutional memory needed to sustain the pathway through staff turnover, directly addressing the governance concern raised earlier in this report.^{[8][10]}

Differential Diagnosis Considerations in Markedly Elevated Potassium

Before attributing a markedly elevated serum potassium result in a CLL patient to pseudohyperkalaemia, clinicians and laboratory staff should still consider the broader differential diagnosis for true hyperkalaemia, since CLL patients are not protected from the usual causes of genuine potassium elevation simply by virtue of also being susceptible to this specific preanalytical artefact.

Renal impairment, whether pre-existing or related to CLL treatment nephrotoxicity, medication effects such as potassium-sparing diuretics or renin-angiotensin system inhibitors, tumour lysis syndrome in the setting of bulky or rapidly progressing disease, and adrenal insufficiency all remain plausible causes of a genuinely elevated potassium in a CLL patient, and the confirmatory plasma sample strategy recommended throughout this report is specifically intended to distinguish spurious from true elevation rather than to pre-emptively assume every elevated result in a CLL patient is necessarily artefactual.^{[6][9]}

None of the three patients in this series had clinical, medication, or renal function findings suggestive of an alternative true cause of hyperkalaemia, and in each case the normal plasma potassium result, combined with the absence of ECG changes or hyperkalaemia-consistent symptoms despite the markedly elevated serum value, supported the pseudohyperkalaemia attribution; a patient with genuine clinical or biochemical features suggestive of true hyperkalaemia alongside a high lymphocyte count would warrant a more cautious diagnostic approach than the straightforward confirmatory-plasma-sample pathway described here.

Role of the Treating Haematology Team in Sustaining Awareness

Beyond the laboratory-side systems interventions proposed throughout this report, the treating haematology team has an ongoing role in sustaining patient- and clinician-level awareness of the pseudohyperkalaemia phenomenon across the full course of a patient's CLL management.

Incorporating a brief note about the pseudohyperkalaemia association into standard CLL patient education materials and into handover documentation when a patient transfers between treating teams or care settings would help ensure the awareness demonstrated by the haematology team in Case 3 is not lost at points of transition, which is precisely when the kind of individual clinician recall relied upon in the absence of a systematised laboratory flag is most likely to fail.

Haematology teams are also well placed to identify, from their own patient panels, which patients have a sufficiently high circulating lymphocyte count to warrant inclusion in a laboratory information system flag of the kind proposed earlier in this report, providing a practical mechanism for populating and maintaining that flag over time rather than relying solely on diagnosis-code-based flagging, which may not capture the specific lymphocyte count threshold at which clinically significant pseudohyperkalaemia risk becomes material.^{[5][7]}

Applicability of This Pathway to Point-of-Care Potassium Testing

An increasing number of clinical settings, including some emergency departments, now use point-of-care blood gas analysers capable of rapid potassium measurement, and the implications of this series' findings for point-of-care testing specifically are worth noting separately from the central laboratory pathway discussed throughout the rest of this report.

Point-of-care potassium measurement on a whole-blood or heparinised plasma sample analysed promptly at the bedside is, if anything, less susceptible to the prolonged clotting time that drives CLL-related pseudohyperkalaemia than a central laboratory serum sample subject to transport and processing delay, meaning a point-of-care result discordant with a preceding central laboratory serum result in a CLL patient should itself be treated as supporting evidence for pseudohyperkalaemia rather than as a competing result requiring separate independent adjudication.^[9]

Emergency departments managing a CLL patient with a markedly elevated central laboratory serum potassium result, as in Case 1, could reasonably use a point-of-care plasma or whole-blood measurement as a rapid confirmatory step while awaiting a formal central laboratory plasma result, potentially shortening the interval during which unnecessary treatment such as the cardiac monitoring and calcium gluconate administered in Case 1 continues before the spurious nature of the original result is established.

Summary of Recommendations for Implementing Centres

This report's recommendations span laboratory information system configuration, clinical ordering workflow, patient communication, and ongoing governance, and implementing centres may find it useful to sequence these recommendations roughly in order of ease of implementation rather than attempting all of them simultaneously.

A laboratory comment recommending confirmatory plasma testing on any markedly elevated serum potassium result in a documented CLL or hyperleukocytosis patient can typically be implemented quickly and at low cost, requiring only a laboratory information system rule change rather than any new testing capability, and represents the most readily achievable first step for most implementing centres.^[7]

Full reflex plasma testing, embedding the confirmatory step automatically rather than depending on the requesting clinician to act on a laboratory comment, requires more substantial workflow and specimen-handling changes and is more appropriately pursued as a second-phase enhancement once the simpler comment-based approach has been established and its effect on avoidable escalation has been locally audited, consistent with the governance recommendations proposed earlier in this report.

Why This Phenomenon Warrants Specific Mention in CLL Clinical Guidelines

General CLL management guidelines typically address disease staging, treatment indications, and monitoring for recognised treatment-related complications in considerable detail, but rarely mention pseudohyperkalaemia explicitly despite its demonstrated potential, illustrated by this series, to trigger unnecessary and resource-intensive clinical escalation.

Adding a brief, specific mention of the pseudohyperkalaemia association to general CLL management guidelines, alongside the laboratory-level and local pathway interventions proposed throughout this report, would provide a further, guideline-level mechanism for sustaining clinician awareness beyond what any single institution's local laboratory information system flag or training effort can achieve on its own, reaching clinicians at the point they consult general reference guidance rather than only those working within an institution that has already implemented the specific systems interventions described in this report.^{[5][6]}

Conclusion

Three CLL patients with markedly elevated serum potassium results were ultimately shown to have pseudohyperkalaemia on confirmatory plasma testing, with two of the three undergoing avoidable clinical escalation before this was recognised. A laboratory information system flag linking a known hyperleukocytosis diagnosis to an automatic recommendation for confirmatory plasma testing on any markedly elevated serum potassium would address the awareness gap responsible for these avoidable escalations.

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