PrAKI Consortium Position Statement: Recognition and Investigation of Elevated Serum Creatinine in Pregnancy and the Postpartum Period

Background

Pregnancy-related acute kidney injury (PrAKI) is a neglected, life-threatening complication which is associated with an increased risk of both maternal and perinatal death (Jeyaraman et al, 2025, Tran et al, 2025).

It remains under-recognised in both high- and low-income settings due to reliance on conventional (non-pregnant) serum creatinine thresholds.

A serum creatinine above 77 µmol/L (0.9mg/dl) at any time during pregnancy and peripartum should trigger investigations for PrAKI

Evidence Summary

1. Wiles *et al*. (Kidney Int Rep, 2019):
   Collated data from over 20 000 pregnancies across 27 studies, demonstrating that the mean serum creatinine in healthy pregnancy is approximately 55–60 µmol/L, and that the 97.5th centile rarely exceeds 77 µmol/L in late gestation. The review concluded that most women with values above this level have reduced renal function or emerging kidney injury.
2. Harel *et al*. (JAMA, 2019):
   Defined gestational reference intervals for serum creatinine using large electronic health-record datasets from >150 000 pregnancies. The 95th centile for serum creatinine was 77 µmol/L during the third trimester, supporting this value as an upper reference threshold for investigation.
3. Skinner et al. (Clin. Kidney Journal, 2024):
   In a contemporary UK cohort of 406 healthy pregnant women, the upper reference limit (97.5th centile) was 78 µmol/L. The study provides robust, UK-specific evidence that serum creatinine above approximately 77–80 µmol/L is outside the normal physiological range and warrants investigation.
4. Kuhrt et al, (TBC, 2025):
   In a cohort of 1,669 pregnant and postpartum women identified through routine vital signs assessment as being at risk of PrAKI, point-of-care creatinine testing was

performed at two time points. A maximum point-of-care creatinine ≥77 µmol/L was associated with a 3.5-fold increased risk of adverse perinatal outcome (odds ratio 3.51; 95% CI not stated) with specificity 0.77 and sensitivity 0.51. Similarly, a creatinine ≥80 µmol/L was associated with a 2.1-fold increased risk of adverse maternal outcome (odds ratio 2.14) with specificity 0.80. These thresholds offered the optimal balance of sensitivity and specificity for predicting poor maternal and perinatal outcomes in this population.

5. Nelson-Piercy et al (Nature Reviews Nephrology, 2025):
   The consensus statement from the 32nd Acute Disease Quality Initiative meeting, which involved international experts in obstetrics, midwifery, obstetric medicine, paediatrics, internal medicine, anaesthesiology, nephrology and critical care recommends the use of current published reference ranges be used in the diagnosis or PrAKI, quoting 77µmol/L as the current upper reference range.
6. Clark et al (TBC, 2026):
   Serum creatinine reference ranges were established using 1,676 samples from 607 pregnant women prospectively recruited with no pathology or risk factors for PrAKI. Measured creatinine concentrations were lower than those previously reported in population-based cohorts with 55µmol/L above the 95th centile at all gestations.
7. Miln et al (TBC, 2026):
   In an unselected cohort of 775 pregnant women at two sites in Southern Malawi using whole blood serum and enzymatic method, the upper reference (97.5th centile) was 69 µmol/L (first trimester) and 63 µmol/L (second trimester). (This excluded women with pre-existing diabetes, hypertension and obesity, and HIV infection). In women living with HIV, the upper reference was 71 and 70 µmol/L respectively.

These findings confirm the clinical validity of a creatinine threshold of around 77–80 µmol/L (0.87 – 0.9mg/dl) for identifying women during pregnancy or peripartum at significantly increased risk of PrAKI-related morbidity across diverse health-system contexts. Individual assessment is required for women with known chronic kidney disease.

In low-income settings where malnutrition is prevalent, the appropriate threshold may be lower. In settings where baseline creatinine in healthy pregnancy is consistently <50–55 µmol/L (e.g. many African LMIC cohorts), investigation should be considered for values ≥60–70 µmol/L or for rises ≥20–25% from baseline, even if creatinine remains <77 µmol/L. HIV infection may impact creatinine

concentration due to HIV-related kidney disease or reduced tubular creatinine secretion (Cohen et al., 2017)

Recommendation

The *Global PrAKI Consortium* aligns with the Royal College of Physicians and recommends that all hospital and laboratory guidelines in obstetric and maternity services:

1. Define 77 µmol/L. as the minimum action threshold for serum creatinine in pregnancy and the early postpartum period.
2. If gestation-specific local reference ranges have a lower upper limit of normal (≈65–70 µmol/L) these should *not* be raised upwards.
3. Ensure clinical review and investigation for all pregnant or postpartum women with serum creatinine ≥ 77 µmol/L, irrespective of local laboratory reference ranges.
4. In addition to an absolute threshold of 77 µmol/L, a rise in creatinine from the pregnancy nadir (e.g. ≥20–25% or ≥20–26 µmol/L within a few days) should also trigger investigation, even if the absolute value remains <77 µmol/L.
5. Incorporate this threshold into:
    - Obstetric early-warning and sepsis screening tools
    - Management protocols for the most common Obstetric complications leading to PrAKI: pre-eclampsia, post-partum haemorrhage, and sepsis
    - Obstetric and midwifery SBAR handover tools
    - AKI and renal-function investigation pathways
    - Postnatal readmission and peripartum deterioration protocols
6. Ensure continuity of investigation postpartum, as many cases of PrAKI present or persist after delivery.

Rationale

Applying non-pregnant thresholds risks delayed diagnosis, under-recognition of PrAKI, and missed opportunities for early intervention. A threshold of 77 µmol/L aligns with physiological reference data, supports timely nephrology input, and improves comparability across studies and services.

Although emerging biomarkers (e.g. cystatin C, NGAL, KIM-1) may aid future risk stratification, serum creatinine remains the most widely available and validated marker for routine detection of PrAKI.

Pathophysiological basis

In pregnancy, renal volume increases by 30% with dilation of the collecting system under the effects of progesterone and compression of the ureters at the pelvic brim by the enlarging uterus. The marked vasodilatation and increased cardiac output cause renal blood flow to increase by 50 to 85% (Conrad et al., 2015), whilst intraglomerular hydrostatic pressure is maintained, with a resulting incremental rise in glomerular filtration rate (GFR) (Lopes van Balen et al., 2019). This rise in GFR begins as early as six weeks' gestation, peaks at approximately 50% above baseline by the early second trimester, plateaus and then declines towards term (Davison and Dunlop, 1980, Lopes van Balen et al., 2019). Creatinine production does not change during pregnancy; therefore, serum concentration should inversely track GFR and is therefore the recommended method of assessing kidney function in pregnancy with urea being used to guide commencement of dialysis due to the risk of fetotoxicity (Wiles et al., 2019). However, due to the substantial and dynamic changes in GFR during pregnancy values considered "normal" outside pregnancy may indicate pathological renal impairment when occurring in pregnant or postpartum women

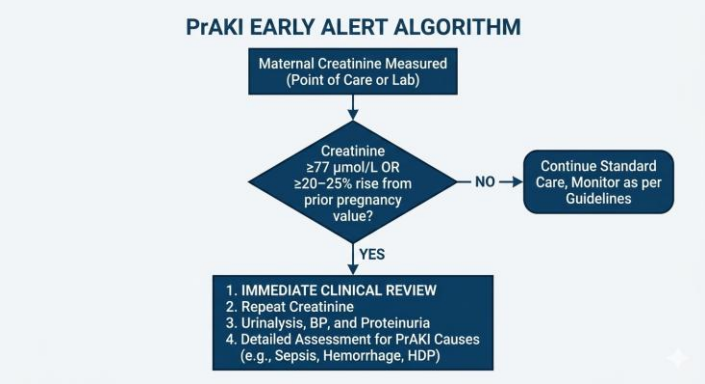
In late postpartum, creatinine may physiologically approach the pre-pregnancy baseline; hence clinicians should also consider the woman's pre-pregnancy/baseline creatinine and KDIGO criteria for AKI(change over time), not just the 77 µmol/L cut-point.

Implementation and Next Steps

The Consortium will support institutions to integrate this recommendation by providing:

- Educational materials and clinical decision aids
- Audit and quality-improvement templates to monitor uptake
- Training for a Kidney Kind Champion Midwife or Nurse, where appropriate, to advocate for implementation and support training.
- Access to forthcoming *PrAKI Toolkit* modules for practical implementation

Clinical services are recommended to embed this threshold in electronic alerts / lab reports e.g. flagging "above pregnancy threshold" even if below standard adult upper limit of normal.



Endorsement

This statement is issued by the *Global PrAKI Consortium and Academy* (2025), representing multidisciplinary experts in maternal kidney health from >20 countries, in alignment with international partners including:

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