

## **Current Practice and Attitudes Towards Key Investigations in Acute Kidney Injury**

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### **Abstract**

#### *Aim*

To identify the current practice of performing key initial investigations of acute kidney injury (AKI) before a nephrology referral in hospitalised patients and assess the attitudes towards these investigations amongst non-consultant hospital doctors (NCHDs).

#### *Methods*

Retrospective data was collected using the intra-hospital online consults system between the period 1st November 2019 and 31st December 2019. Followed by a prospective survey of NCHDs using a standardised online tool to assess attitudes towards key AKI investigations.

#### *Results*

A total of 75 renal referrals were included. Baseline serum creatinine values were provided in 42 (56%), urine dipstick results in 11 (15%), renal ultrasound results in 15 (20%), and blood pH/ serum bicarbonate/potassium in 20 (27%). Amongst 47 NCHDs surveyed, 15 (32%) did not consider urine dipstick as an important AKI investigation and 24 (51%) did not always consider reporting urine dipstick before placing a renal consult. Twenty-three participants (49%) did not have a framework to assess AKI. Fluid balance chart and venous blood gas results were considered important before renal consult by 39 (83%) and 30 (64%) participants, respectively.

#### *Conclusion*

Key investigations in AKI, particularly urine dipstick, are insufficiently done before a nephrology referral. Assessment of attitudes of NCHDs suggest gaps in knowledge regarding the value of urine dipstick in AKI.

## Introduction

Acute kidney injury (AKI) is a clinical syndrome with an incidence of 3-18% in adult hospitalised patients<sup>1</sup>. AKI is associated with 10-20% mortality in the non-intensive care hospital setting and up to 50% mortality in the intensive care setting<sup>2</sup>. AKI leads to an increase in the length of hospital stay and costs<sup>3, 4</sup>. Early identification and investigations can potentially reduce adverse outcomes associated with AKI<sup>5, 6</sup>. We aim to identify the current practice of performing key initial investigations in the management of AKI before referring for a nephrology specialist review in hospitalised non-critically ill patients and assess the attitudes towards key investigations amongst non-consultant hospital doctors (NCHDs).

## Methods

Retrospective data was collected using the intra-hospital online consults system between the period 1<sup>st</sup> November 2019 and 31<sup>st</sup> December 2019. The consults were given by the medical and surgical teams to the nephrology department. All patients above 18 years of age with AKI and inpatient for more than 24 hours were included in the study. AKI was defined as per The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines and where hourly urine output or serum creatinine values were not provided terminologies that suggested a recent acute worsening of renal function such as 'rising creatinine' or 'decreased urine output' were included. Referrals regarding chronic dialysis patients, simple electrolyte abnormalities (e.g., hyponatraemia without kidney injury) and chronic kidney disease follow-up were excluded. A standardised proforma was used to collect data which included: urine dipstick results, creatinine baseline (before acute deterioration) and current value, blood pH, serum bicarbonate, serum potassium (venous blood gas result was considered adequate) and renal ultrasound result.

A prospective survey was done using a standardised online tool (SoGoSurvey©) to assess attitudes towards key AKI investigations and included interns and senior house officers (SHO) from various hospitals.

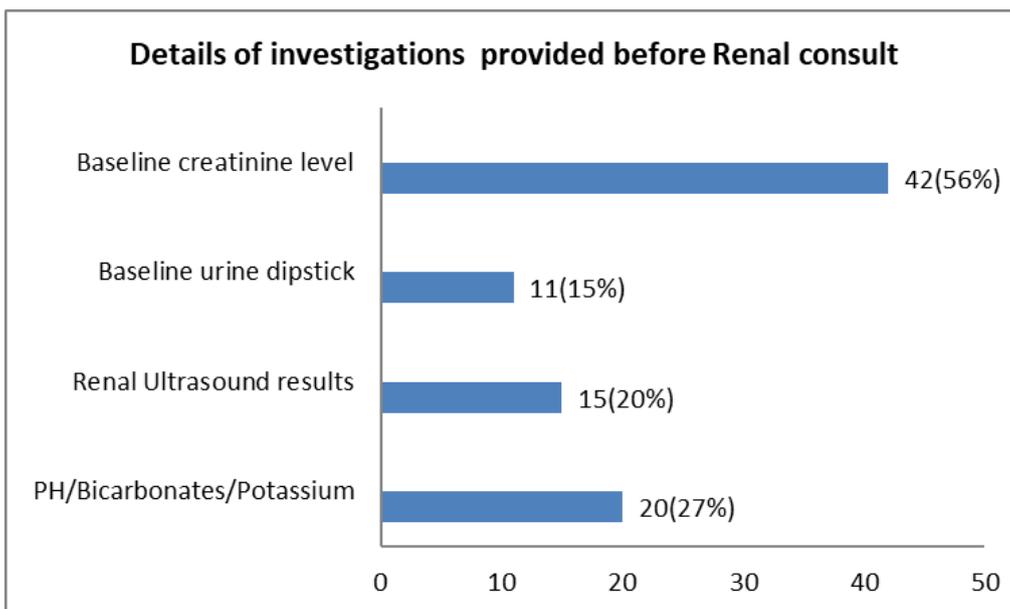
## Results

A total of 75 renal referrals met the inclusion criteria to identify the current practice of performing key initial investigations. Baseline serum creatinine values were provided in 42 (56%) referrals, urine dipstick results in 11 (15%) referrals, renal ultrasound results in 15 (20%) referrals, and blood pH/serum bicarbonate/potassium in 20 (27%) referrals (figure 1). Medical teams were involved in 43 (57%) consults, while surgical teams were in 32 (43%) consults.

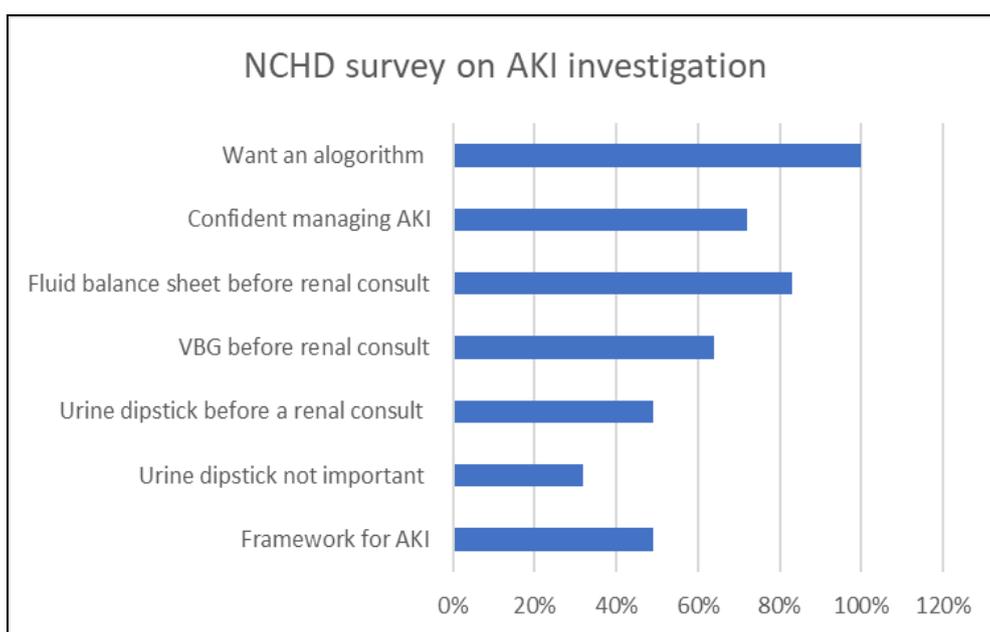
Survey of NCHDs to assess attitudes towards key investigations included 47 participants (figure 2). The group composed of 24 (51%) interns and 22 (46%) SHOs, while 1 (3%) did not disclose the rank. All the participants were within 48 months of graduating from medical school. Thirty-three (70%) represented the medical department, while 14 (30%) represented the surgical department.

Almost half the participants (49%) did not have a framework to assess AKI, and nearly one third (32%) did not consider urine dipstick a vital assessment tool in AKI. The majority (52%) did not always consider a urine dipstick before a specialised renal consult. Most NCHDs considered getting blood pH/serum bicarbonate/venous blood gas (VBG) (64%) and fluid balance chart (83%). Thirteen (28%) did not feel confident when managing AKI in an on-call setting. All the 47 participants (100%) agreed that having an AKI proforma or algorithm would benefit their practice when assessing patients with AKI, and 43 (91%) would like further practical tutorials in AKI management.

**Figure 1:** Results demonstrating the frequency of key investigations done before a nephrology referral. N=75



**Figure 2:** Survey of NCHDs to assess attitudes towards key investigations. N= 47



## Discussion

A high proportion of NCHDs who participated in the study do not consider urine dipstick as a valuable investigation in the assessment of AKI. This is further reflected by the limited referrals to the nephrology department containing the result of urine dipstick (15%). The incidence of AKI is rising, particularly in the hospital setting, in the Republic of Ireland<sup>7</sup>. There is substantial evidence to suggest AKI is associated with adverse long- and short-term outcomes, including the high economic burden on the health care system<sup>8-10</sup>. A delay in doing baseline AKI investigation such as urine dipstick can impede timely diagnosis and management of patients. Poor compliance with AKI investigations, particularly urine dipstick, is consistently seen in other European studies<sup>6</sup>. This may reflect knowledge gaps amongst NCHDs and support staff not taking a timely urine sample for assessment. The urine dipstick and urinalysis are simple and economic investigations that can provide crucial information such as distinguishing between intrinsic renal injury from other causes<sup>11,12</sup>.

Several management strategies are being employed around the world for prevention, early detection and initiation of appropriate investigations concerning AKI<sup>13</sup>. There is some evidence to suggest that introduction of AKI care bundles (proforma/algorithms/checklists) with relevant compliance by NCHDs, educational programs, and automated electronic alert system may improve outcomes associated with AKI<sup>5,6,14-16</sup>.

Most NCHDs are willing to engage with educational programs and apply available local guidelines when managing AKI. The practice of maintaining a fluid balance chart and obtaining a venous blood gas is encouraging in our study as the majority of acute complications of AKI revolve around volume status and electrolyte disturbances<sup>17</sup>.

This study has certain limitations that need to be considered when interpreting the present results. The intra-hospital online consults system was used to collect data on AKI investigations before renal consults and not the patient charts; thus, there is a possibility that some data may have been available at the time of placing a renal consult. The survey questionnaire did not include registrars and other senior clinicians which will affect its generalisability. Responses to certain questions, such as having a framework for AKI management, are subjective and may not be reproducible.

This study has many strengths, particularly identifying an important clinical area of improvement, both objectively and subjectively through retrospective analysis and prospective survey. This study can be used as a basis to improve AKI education and management at an undergraduate and postgraduate level. To our knowledge, this is the first study evaluating a part of AKI management and NCHD attitude towards AKI investigations in an Irish hospital setting.

In conclusion, key initial investigations in AKI, particularly urine dipstick, are not being appropriately done before a renal referral. Assessment of attitudes of NCHDs suggest gaps in knowledge regarding the value of urine dipstick in AKI. However, the majority of NCHDs are driven to improve their understanding of AKI management and consider AKI proforma or algorithm provided by the renal department would be beneficial to their practice. A national AKI quality improvement program and guideline need to be established.

**Declaration of Conflicts of Interest:**

No potential conflicts of interest. No financial support.

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