AMGA Analytics recently conducted an analysis on the precision with which clinical laboratories (labs) report serum creatinine (SCr) measurements, which yielded some startling results regarding the variation of these measurements among different labs. The findings stimulate some questions healthcare providers should consider regarding this important lab function.

**Rounding measurements reduces a healthcare provider’s ability to make evidence-based treatment decisions.**

### Why Precise Serum Creatinine Measurements Matter
Serum creatinine is used, in combination with age, gender, and race, to estimate glomerular filtration rate (GFR) and assess kidney function. Clinical guidelines for the evaluation and management of chronic kidney disease (CKD) recommend that clinical laboratories for the evaluation and management of chronic kidney disease (GFR) and assess kidney function. Clinical guidelines consider regarding this important lab function.

Table 1 shows the potential impact of rounded SCr measurements on calculated eGFR values. A 65 year-old female with a rounded SCr of 1.00 mg/dL (blue row in Table 1; e.g., from a lab that only reports measurements to the nearest 0.1 mg/dL) could have an eGFR ranging from 56 mL/min/1.73 m2 (corresponding to a SCr of 1.04) to 63 (corresponding to a SCr of 0.95). If the same patient has a second rounded SCr value of 1.10 mg/dL (orange row in Table 1), the true decrease in eGFR could range from no change (56 to 56 mL/min/1.73 m2) to 13 mL/min/1.73 m2 (63 to 50), corresponding to a 0-21% decline in renal function. In addition to reclassifying CKD stage, these seemingly small differences can lead to qualitative differences in contraindications and dosing for common medications excreted through the kidney (e.g., ACE inhibitors, ARBs, diuretics, and NSAIDs).

### Methods Used to Quantify Precise Measurement
To better understand practices of reporting serum creatinine measurements, we examined records from 1.2 million patients aged 18-99, with a history of hyperglycemia, and at least one SCr measurement in the last six months (10/01/2016 – 03/31/2017). These data are available for the subset of AMGA members who use the Optum One population health and risk analytics platform.

The colors in Figure 1 stratify patients by the second place after the decimal of their most recent SCr (i.e., 0 through 9). With precise measurement, we expect ~10% of patients to end in each digit, including 0. Dark blue represents a second digit of 0, which would include patients with a SCr of 1.10 mg/dL, 1.20, 1.30, etc. At the population level, proportions of patients with a second digit of 0 much larger than 10% suggest that labs are reporting SCr measurements.
rounded to the nearest 0.1 mg/dL for at least a segment of the population. For the 1.2 million patients across all 27 organizations, 34.3% of patients had a second digit of 0, suggesting rounded SCr measurements.

**Precise Measurement by Organization**

There is large variation in the precision of serum creatinine measurements by organization. Figure 2 shows the distribution of the second place after the decimal of the most recent SCr for 27 individual organizations. Six organizations (on the left) have SCr values almost exclusively reported to the nearest 0.1 mg/dL, suggesting labs that report SCr with less precision, while nine organizations (on the right) have little to no evidence of rounding measurements. Organizations in the middle might be getting SCr measurements from several different labs with varying precision.

**Questions to Consider**

- How many different labs measure and report serum creatinine for your organization? Do any SCr measurements get processed in-house?
- Do labs report SCr rounded to the 0.1 or 0.01 mg/dL? Does it depend on the lab?
- How is eGFR calculated (e.g., is it calculated by the lab, in the EHR, by a physician at the point of care)?
- Does anyone have concerns about the precision of SCr measurements and the implications that has on eGFR values and clinical practice?
- How do you change the precision with which labs report SCr measurements?

**References**


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