CPRS Lab Formatter

User Guide

1 March 2016

Contents

Introduction

CPRS Lab Formatter is a utility designed to improve readability of laboratory data in CPRS. Medical laboratory values are often handwritten or displayed in a fishbone format to allow for quick location of specific values among large amounts of data. This application automatically formats the complete blood count and basic metabolic panel into the standard fishbone formats, displays the most recent values for other laboratory tests, and highlights abnormal values.

Additionally, medical decision making often depends on calculations derived from laboratory values. Using medical calculators requires multiple transpositions of data that results in more time spent and the possibility of more frequent errors. CPRS Lab Formatter is designed to automatically display the most frequently used derived values to avoid these time consuming and error prone transfers of data.

Features

2.1 Accessing the Formatter

The latest version of CPRS Lab Formatter will be available at https://bitly.com/cprsformat.

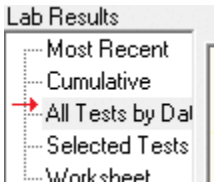
2.2 Formatting Labs

To format laboratory data:

1) Open CPRS, and enter the chart of the patient whose data you would like to format

2) There is a list of tabs at the bottom of the CPRS patient chart. Select the “Labs” tab.

3) In the top left of the screen, under the heading “Lab Results”, there are several options to choose how to display labs. Select “All Tests by Date”. Select desired laboratory data.



4) Paste desired data in top box of CPRS Lab Formatter.

5) Enjoy seeing the labs in an easy to read fishbone format!

```
    \ 8.9 /
5.3 ------ 252
    / 28.2 \

  140 |   106 |    25 /
---------------------- 96
  4.3 |    23 |   1.8 \
```

2.3 Trending Labs

To trend laboratory data over long periods of time:

1) Select the desired timeframe to trend each lab. *Single* will display the most recent lab value for your selected category, and is the default setting. *Week* will trend laboratory values from the past week in a separate table. *All* will trend all laboratory values for the selected category in a separate table.

2) Follow the steps listed in the section above (2.2 – Formatting Labs), selecting laboratory data that spans your desired timeframe.

3) Easily review trends in your selected data!

```
TREND DATA:

WBC    HGB    HCT    PLT    MCV
==============================
5.0    9.0    28.0   159    98.6
4.6    11.1   33.7   158    99.1
4.0    10.2   31.3   167    100.0
```

Lab Calculations

Here we detail the derived lab values calculated by CPRS Lab Formatter

3.1 Fractional Excretion of Sodium

Fractional excretion of sodium, or FENa, is a well validated index to determine if an acute kidney injury is related to impaired renal perfusion, or to intrinsic renal injury. It can only be utilized in patients not taking diuretics. The calculation is derived from urine sodium (U_{Na}), urine creatinine (U_{Cr}), serum sodium (S_{Na}) and serum creatinine (S_{Cr}). The formula is as follows:

$$FENa = U_{Na} \times S_{Cr} \ / (U_{Cr} \times S_{Na})$$

Values of < 1% are indicative of impaired renal perfusion, and values of >1% are indicative of intrinsic renal injury. Values for FENa are automatically calculated whenever a urine sodium, urine creatinine, serum sodium, and serum creatinine are available in a set of laboratory data.

3.2 Fractional Excretion of Urea

Fractional excretion of sodium, or FEUrea, is an analogue to FENa that has been demonstrated to differentiate etiology of renal injury in patients who are taking diuretics. It is derived from urine urea nitrogen (U_{Urea}), urine creatinine (U_{Cr}), blood urea nitrogen (S_{Urea}) and serum creatinine (S_{Cr}). The formula is as follows:

$$FEUrea = U_{Urea} \times S_{Cr} \ / (U_{Cr} \times S_{Urea})$$

Values of < 35% are indicative of impaired renal perfusion, and values of >35% are indicative of intrinsic renal injury. Values for FEUrea are automatically calculated whenever a urine urea, urine creatinine, blood urea nitrogen, and serum creatinine are available in a set of laboratory data.

3.3 Corrected Serum Calcium

Calcium is a divalent cation which exists both freely in serum as well as bound to the plasma protein albumin. Laboratory measurement of calcium typically measures the total of both free calcium and albumin bound calcium. However, it is the free ionized calcium concentration that is physiologically active and under homeostatic control – and thus ionized calcium is a much more clinically relevant marker. Ionized calcium can be measured at most laboratories if specially requested, but this is more expensive and not included on standard electrolyte panels. Fortunately, the decrease in total calcium in patients with low serum

albumin is predictable, and can be calculated from the serum calcium (S_{Ca}) and albumin (S_{Alb}), as follows:

$$\text{Corrected calcium} = S_{Ca} + 0.8 \times (4 - S_{Alb})$$

This measurement is automatically calculated whenever a serum calcium and albumin is available.

3.4 Mentzer Index

The Mentzer Index is used to aid in the differentiation of iron deficiency anemia and beta-thalassemia. It was shown to have a 98% sensitivity for identifying beta-thalassemia from a mixed population with microcytic anemia. It is calculated from the ratio of the mean corpuscular volume (MCV) and the red blood cell count (RBC), as follows:

$$\text{Mentzer Index} = \text{MCV} / \text{RBC}$$

A value of < 13 is indicative of thalassemia, and a value of > 13 is indicative of iron deficiency anemia. This value is automatically calculated in patients with anemia and microcytosis when the red blood cell count is available.

Contact

Please email Frederick.howard@yale.edu with any questions, concerns or suggestions. Thank you for using CPRS Lab Formatter.