Memorandum Core #172

To: UNCMC Hospital Physicians, Housestaff, Nursing Coordinators, Department Heads and Supervisors

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Subject: Major Changes to Laboratory Core Chemistry Testing at the UNC Medical Center

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Effective Tuesday July 13th, the Medical Center will implement new chemistry instrumentation in the Core Laboratory. This multi-year, enterprise-wide standardization impacts a variety of issues related to testing, order sets, collection tubes, and reference ranges in EPIC as the laboratory upgrades equipment. Key important changes are outlined below

Tube Type Change:
Default specimen type will change from serum to lithium heparin plasma for most chemistry testing where possible. Plasma samples do not need to clot for 30 minutes prior to centrifugation or analysis. Add-on testing may not be possible some tests that require serum which were typically added on to CMP or BMP orders.

Expanded Drug Testing:
Oxycodone, Buprenorphine, and Fentanyl qualitative urine drug screening will now be available. Reporting of drug testing results will be Positive/Negative and the cutoff will now be displayed in the reference range field. The fentanyl reagent has been tested and does cross react with a number of structurally related fentanyl analogs. (Data available upon request)

New	Cutoff (ng/mL)
Oxycodone	100
Buprenorphine	10
Fentanyl	1

Neonatal Bilirubin Testing:

Neonatal bilirubin orders will be harmonized across the UNC Health system. Each order will include a Total Bilirubin, Direct Bilirubin, and calculated Indirect Bilirubin. Additionally, better delineated reference ranges have been implemented for ages 0-6 days.

Test	Components
Neonatal Bilirubin	Total Bilirubin
	Direct Bilirubin
	Indirect (calculated)

Age Range	Reference Range	Critical value
0-1 days	0-5	>15
1-2 days	0-11	>15
2-3 days	0-13	>15
3-4 days	0-15	>15
4-5 days	0-15	>15
5-6 days	0-15	>15
> 6 days	0.3-1.2	>15

High Sensitivity Troponin Testing:

Please refer to the official UNC Health ED Chest Pain pathway for full educational guidance

Current Troponin I Assay	hsTroponin I Assay
ng/mL	ng/L
Reported as decimals	Reported in whole numbers
No ‘true’ serial order set built	Options, including 0-2-6H serial
Single 99th Percentile cutoff	Sex specific 99th Percentiles
No “Delta” value reported	“Delta” value calculated between serial measurements

Component	Abnormal	Critical
hsTroponin I	>99th Percentile (34 or 53 ng/L)	>99th Percentile (34 or 53 ng/L)
delta hsTroponin I	>7	>20

99th Percentile	
Female	34 ng/L
Male	53 ng/L
Unknown	34 ng/L

NT-proBNP switching to BNP

NT-proBNP does not currently have FDA approval on the Siemens Atellica platform. Correlating BNP and NT-proBNP results are challenging. Clinicians should continue to use BNP similar to how they use NT-proBNP, as outlined in the 2017 AHA/ACC/HFSA Heart Failure Guidelines. Interpretation of BNP results in patients who are receiving Sacubitril-Valsartan (Entresto) therapy should be done carefully due to a possible transient rise of BNP. More clinical information regarding the switch can be found on the McLendon lab website Memo Core #170.

Salicylate unit change

The units for salicylates with change from ug/mL to the more standard mg/dL.

Old Units	New Units
0-300 ug/mL	0-30 mg/dL

Tumor Markers

Different test methods cannot be used interchangeably due to differences in antibody specificity. Validation data generated by the laboratory shows that results will run lower on the new platform above the clinical cutoff for AFP, CA 125, CA 19-9, and PSA. The impact on individual patient results are difficult to predict but linear regression can estimate a general comparison between methods. (Additional data available upon request)

Test	Aggregate Comparison between Methods	New Assay Lower Limit	Old Assay Lower Limit
AFP	Results may run 18% lower	2 ng/mL	1 ng/mL
CA 125	Results >100 U/mL may run 28% lower	3 ng/mL	2 ng/mL

CA 19-9	Results < 500 U/mL may run 60% lower	1.2 U/mL	1.4 ng/mL
CEA	Results may run 54% lower	0.5 ng/mL	0.5 ng/mL
PSA	Results <60 mmol/L are well harmonized but still lower Results >60 mmol/L may run 30% lower	***0.04 ng/mL***	0.1 ng/mL

Implementation of Body Fluid Chemistry Interpretative Comments

Chemistry testing performed on body fluids (pleural, peritoneal, etc) will now display analyte-specific interpretative comments to support clinical interpretation and meet regulatory requirements related to reference range availability in the medical record. Clinical comments will now be found on fluid albumin, amylase, bilirubin, urea nitrogen, cholesterol, creatinine, glucose, lactate dehydrogenase, lipase, protein, and triglycerides. The compendium of comments along with matching reference publications is available upon request.

New age-specific ranges for CSF protein have been implemented for ages 0-60 days and 30-85 years.

Adult Reference Interval Changes (General Chemistry):

Most reference ranges will be modified slightly based on manufacturer's specifications (exceptions being guideline-based medical decision points such as A1c, lipids, glucose). Several assays with notable changes that deserve special consideration are listed below. Lactate dehydrogenase and lipase (both enzymatic assays) now utilize internationally recognized calibration standards. Results for these two tests will be drastically different than the previous method.

Test	Old Assay	New Assay
Prolactin ng/mL	M: 4-18 F: 3-19	F: 2.8-**29.2** M: 2.1-17.7
TSH mIU/L	0.60-3.30	0.55-**4.78**
FT4 ng/L	0.71-1.40	**0.89-1.76**
PTH pg/mL	12-72	18-**80**
Lactate Dehydrogenase U/L	338-610	**120-246**
Lipase U/L	44-232	**12-53**

Pediatric Reference Intervals

New evidence-based pediatric normal ranges have been implemented for certain analytes.

Where appropriate, reference ranges derived from the CALIPER study have been adopted.

(https://caliper.research.sickkids.ca/#/)

New age-based creatinine ranges from 0-1 year have been adapted from Boer DP et al Pediatr. Nephrol. 2010 (https://pubmed.ncbi.nlm.nih.gov/20505955/)

New Age-Based Creatinine Reference Ranges			
Age	**Low**	**High**	**Source**
Day 1	0.42	0.92	Pediatric Nephrology (2010) 25:2107-2113
Day 2	0.36	0.78	
Day 3	0.33	0.70	
Day 4	0.31	0.66	
Day 5	0.28	0.62	
Day 6	0.27	0.60	
Day 7	0.26	0.58	
Week2	0.24	0.52	
Week 3	0.21	0.46	
Week 4	0.19	0.42	
Month 2	0.17	0.37	
Month 3	0.16	0.34	
Month 4-6	0.16	0.34	
Month 7-9	0.16	0.34	
Month 10-12	0.17	0.36	
2-5 years	0.2	0.4	CALIPER: Siemens Vista
5-12 years	0.3	0.6	
12-15 years	0.4	0.8	
Female: 15-18 years	0.5	0.8	CALIPER: Siemens Vista
Female: >18 years	0.6	0.8	Siemens IFU
Male: 15-18 years	0.6	1	CALIPER: Siemens Vista
Male: >18 years	0.6	1.1	Siemens IFU

Clarified Reporting of Reference Ranges for Transgender Patients (SOGI ranges)

Based on input from providers who routinely care for transgender patients, we have improved our reporting of sex specific reference intervals for patients where sex and gender are incongruent in EPIC. Both male and female ranges will be displayed together as text in the reference range field in EPIC when sex and gender are incongruent. The most conservative numeric range (highest low and lowest high across male and female ranges) will be used for abnormal and critical flagging to drive review of any possible important results.

Chemistry tests with numeric sex-specific reference ranges		
ALP	Creatinine, Urine	
ALT	Ferritin	Prolactin
AST	GGT	Testosterone
BNP	Iron	Transferrin
Creatinine	Lactate Dehydrogenase	Uric Acid
Creatinine Kinase	Lipase	

New Tests Available in-house:

In addition to the new drug screens (oxycodone, buprenorphine, and fentanyl) there are four new tests being brought in-house: Insulin, C-peptide, CA 27,29, Levetiracetam (Keppra) and sex hormone binding globulin. Bioavailable and Free Testosterone via calculation with SHBG will be available later this summer.

	Insulin	C-peptide	CA 27,29	Levetiracetam (Keppra)	SHBG
Specimen type	Serum	Serum	Serum	Serum	Serum, Plasma
Requested Sample volume (uL)	1 mL	1 mL	1 mL	1 mL	1 mL
Measuring interval	0-300 mU/L	0.05-30 ng/mL	3.5-450 U/mL	0-100 ug/mL	1.6-180 nmol/L

Reduced Biotin Interference:

The new testing platform has eliminated biotin interference by fundamentally changing the conjugation and capture chemistry in the reagents. There are only 4 assays that may be affected by biotin.

	Biotin concentration causing >10% change
BNP	38 ng/mL
Folate	50 ng/mL
Sex Hormone Binding Globulin	300 ng/mL
Testosterone	30 ng/mL

For questions please contact

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