

Strengthening **L**aboratory **M**anagement **T**oward **A**ccreditation

Module 8:

Laboratory Testing

Key Message ...

My lab provides prompt, accurate, and validated test results.

Desired Outcome

- **All laboratory tests are performed promptly and accurately.**
- **Test results are validated and recorded before release.**

Laboratory Information

- Accurate, reliable test results
- The right test on the right patient at the right time
- Information used to diagnose, monitor and treat patients
- Confidence in the provided information is essential for patient care and proper laboratory utilization



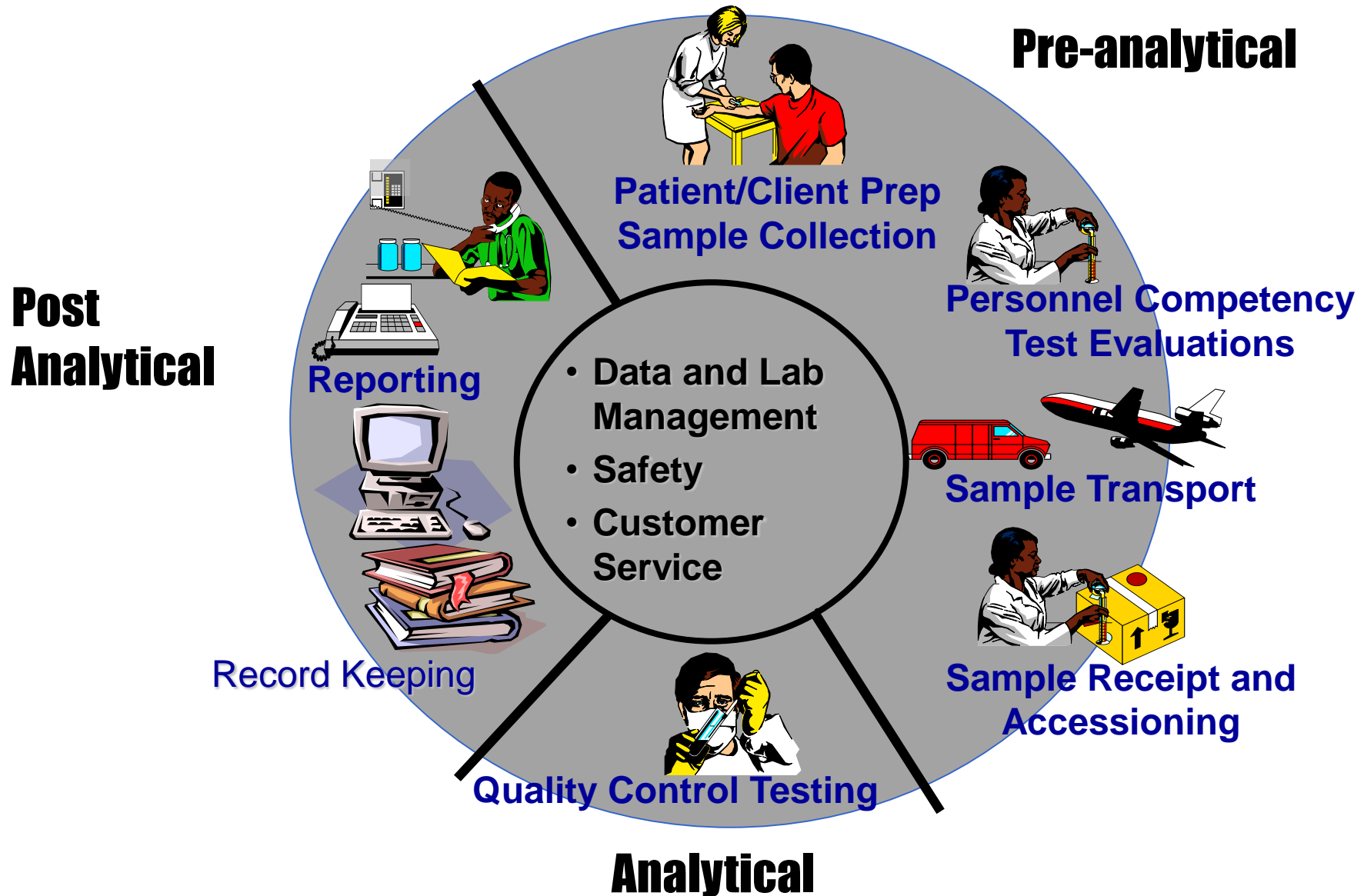
Tasks

- 8.1 - Monitor testing to ensure SOPs are followed and tests are performed and reported properly and promptly
- 8.4 - Validate assigned tests and specific abnormal results

Your providers must have confidence in your information.

Validation of Test Results

The Workflow Cycle



Activity: Validation of Tests Results

Purpose

To identify potential sources of errors or problems throughout the total testing process and create a checklist to verify before patient results are released.

What will you need?

- Paper to list potential errors or problems
- Flipchart paper and marker to write your checklist

What will you do?

Divide into two teams

- Select a team captain
- Brainstorm with your team to come up with as many errors or problems that can invalidate the results
- Create a validation checklist for each of the 3 phases (pre-analytical, analytical, and post analytical)



20 minutes

Tasks

- 8.2 - Cross-check test reports against test request to ensure completion of all tests
- 8.3 - Review test records and findings promptly to ensure accuracy and timely release of test results

Activity: Is the Test Report Ready to be Released?

Purpose

To identify errors and omissions in a lab report so that only complete, accurate, legible, and clinically valid test results are reported

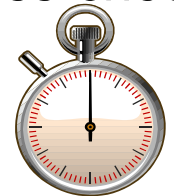
What will you need?

- Worksheet 1: Laboratory Report
- Worksheet 2: Report for Review

What will you do?

Work individually to:

- Complete the 'Patient Information' section on Worksheet 1
- Review the Worksheet 1 and circle all the omissions or errors committed by the laboratory staff members.
- Document on Worksheet 2 that you performed the cross-check review



10 minutes

Laboratory Report

Cape Clinic Laboratory

Report Date/Time: 5-10-2009 1500

Lab #: 38
 Drawn by: LS
 Collected Date/Time: 3-10-09 0815

Hematology				Additional In-House Testing			
<input checked="" type="checkbox"/> CBC		Tech initials: ZS		Tech initials: Am		Normal Value	
Results	Adult Normal Values			Celline Discrepancy	POS	NEG	N/A
15.3	WBC	7.2 - 10.0	4.4 - 9.8 x10 ⁹ /L	<input type="checkbox"/> CRP	POS	NEG	NEG
3.9	RBC	4.35 - 5.8	3.69 - 5.11 x10 ¹² /L	<input type="checkbox"/> Malaria Rapid	POS	NEG	NEG
11.0	HGB	13.7 - 16.7	11.3 - 14.3 g/dL	<input type="checkbox"/> TRDR	WEAK REACTIVE	REACTIVE	NON REACTIVE
32.0	ICT	10.5 - 49.7	34.1 - 41.3 %	<input type="checkbox"/> KOH	Source:		
68.9	MCV	78.7 - 92.0	81.5 - 96.7 fL	<input type="checkbox"/> Saline Prep			
22.6	MCH	26.1 - 33.2	26.5 - 33.1 pg	<input type="checkbox"/> Gram Stain			
31.0	MCHC	32.2 - 35.0	31.9 - 35.7 g/dL				
1.60	RDW	11.3 - 14.4	%				
122	PLT	140 - 440	x10 ⁹ /L				
<input checked="" type="checkbox"/> Differential				<input checked="" type="checkbox"/> CCMS Urinalysis			
Tech initials:		Adult Normal Values		Tech initials: Am		Normal Values	
85	Neutrophils	45 - 60%		Color	N/A		
10	Bands (Neutrophilic)	0 - 2%		Appearance	N/A		
7	Lymphocytes	20 - 40%		Urobilinogen	0.6 urobil.		
	Atypical Lymphocytes	0 - 2%		Glucose	Negative (mmol/L)		
	Monocytes	4 - 10%		Bilirubin	Negative (mmol/L)		
	Eosinophils	1 - 6%		Ketones	Negative (mmol/L)		
	Basophils	0 - 2%		Specific Gravity	1.005 - 1.030		
	Other:			Blood	Negative		
RBC Morphology				pH			
				6.5			
				16.0			
				⊕			
				moderate			
				Leukocytes			
				Negative			
				Microscopic			
				Tech initials:			
				Crystals:			
				WBC/HPF			
				RBC/HPF			
				EPI-leukocytes			
				EPI-epithelial cells			
				Mucus			
				Trichomonads / Yeast / Parasite			
Chemistry							
<input type="checkbox"/> Basic		<input type="checkbox"/> Comprehensive		<input type="checkbox"/> LFT		<input type="checkbox"/> Lipid	
Result		Normal (M/F)		Result		Normal (M/F)	
<input type="checkbox"/> GLUC		3.9 - 5.8 mmol/L fasting		30.1		0.41 - 0.23 U/L	
<input checked="" type="checkbox"/> UREA 4.9		2.5 - 6.4 mmol/L		<input type="checkbox"/> AST		0.37 - 0.31 U/L	
<input type="checkbox"/> Na		136 - 145 mmol/L		<input type="checkbox"/> ALP		53 - 128 U/L	
<input type="checkbox"/> K		3.5 - 5.3 mmol/L		<input type="checkbox"/> CK		38 - 171 U/L	
<input type="checkbox"/> Cl		98 - 110 mmol/L		<input type="checkbox"/> DH		230 - 460 U/L	
<input checked="" type="checkbox"/> CREAT 418		62 - 115 / 53 - 97 umol/L		<input type="checkbox"/> AMY		27 - 102 U/L	
<input type="checkbox"/> UREA ACID		208 - 330 umol/L		<input checked="" type="checkbox"/> CA ⁺⁺ /M		2.15 - 2.30 mmol/L	
<input type="checkbox"/> T-PROT		64 - 85 g/L		<input checked="" type="checkbox"/> PHOS		0.87 - 1.45 mmol/L	
<input type="checkbox"/> ALBUMIN 6.0		35 - 52 g/L		<input type="checkbox"/> HCL		3.6 - 5.7 mmol/L	
<input checked="" type="checkbox"/> T-BIL 1.5		5.1 - 20.5 umol/L		<input type="checkbox"/> TRIG		0 - 2.26 mmol/L	
<input checked="" type="checkbox"/> IN-BIL		0.0 - 3.4 umol/L		<input type="checkbox"/> HDL-C		0.78 - 1.91 / 0.83 - 2.38 mmol/L	
<input type="checkbox"/> TG		< 3.5 / < 3.8 U/L		<input type="checkbox"/> Total		< 1.7 - 5.44 U/L	
				<input type="checkbox"/> LDL-C		1.48 - 3.80 mmol/L	
Additional Test Requests							
Quality Assurance							
Date Requested: 03/10/09				Ordering Doctor: Smith			
<input checked="" type="checkbox"/> Routine <input type="checkbox"/> Stat <input type="checkbox"/> Waiting <input checked="" type="checkbox"/> Fastng <input type="checkbox"/> Non-Fasting							
QA Review:							
Date: / / Comments:							
Doctor Signature:							
Patient Information							
Name (Surname, first):							
DOB: / / Age: <input type="checkbox"/> Male <input type="checkbox"/> Female							
Patient No: Inpatient							
Patient Contact Information:							

Errors Noted

Cape Clinic Laboratory

Report Date/Time: **5-10-2009** ¹⁵⁰⁰

Lab #: **38**

Drawn by: **LS**

Collected Date/Time: **3-10-09 0815**

Hematology				Additional In-House Testing			
<input checked="" type="checkbox"/> CBC		Tech initials: LS		Tech initials: Am		Normal Values	
Results		Adult Normal Values		<input checked="" type="checkbox"/> Urine Pregnancy		POS	
15.3	WBC	7.3 - 10.6	3.9 - 9.8	<input checked="" type="checkbox"/> UR		NEG	
3.98	RBC	4.75 - 5.5	3.65 - 5.13	<input type="checkbox"/> Micro Rapid		POS	
11.0	HGB	13.7 - 16.7	11.7 - 14.5	<input type="checkbox"/> IRP		W-A: REACTIVE	
37.0	HCT	43.5 - 49.7	34.1 - 44.4	<input type="checkbox"/> RHO		REACTIVE	
68.9	MCV	79.2 - 92.0	81.7 - 95.7	<input type="checkbox"/> Seluk Prep		NEG	
22.6	MCH	26.1 - 34.3	26.5 - 31.5	<input type="checkbox"/> Gram Stain		NEG	
31.0	MCHC	33.3 - 35.0	31.9 - 35.3			NEG	
1.60	RDW	11.9 - 14.4				NEG	
1.22	PLT	140 - 440				NEG	
<input checked="" type="checkbox"/> Differential		Tech initials: LS		CCMS Urinalysis			
Results		Adult Normal Values		<input checked="" type="checkbox"/> Tech initials: Am		Normal Values	
85	No. counts	45 - 60%		yellow		Color	
10	Band (Neutrophils)	1 - 2%		hazy		Appearance	
7	Lymphocytes	20 - 40%		16		Urobilinogen	
	Atypical Lymphocytes	0 - 2%		neg		Glucose	
	Monocytes	4 - 10%		neg		Bilirubin	
	Eosinophils	1 - 5%		neg		Ketones	
	Basophils	0 - 2%		1.052		Specific Gravity	
	Other			moderate		Blood	
				6.5		pH	
				1.0		Protein	
				(+)		Nitrite	
				moderate		Leukocytes	
				Microscopic		Tech initials: LS	
				10-20		WBC/HPF	
				5-10		RBC/HPF	
				5-10		EPI/centrifuge	
				5-10		EPI/centrifuge	
				5-10		Bacteria	
				5-10		Mucous	
				5-10		Crystals	
				5-10		Cast(s)	
				5-10		Trichomonas / Yeast / Parasite	
Chemistry				Quality Assurance			
<input type="checkbox"/> Basic		<input type="checkbox"/> Comprehensive		<input type="checkbox"/> LFT		<input type="checkbox"/> Lipid	
Result		Normal (M/F)		Result		Normal (M/F)	
<input type="checkbox"/> GLEU	4.0 - 5.8 mmol/L (fasting)	<input checked="" type="checkbox"/> AC	30.1	<input type="checkbox"/> AST	8 - 17 U/L	<input type="checkbox"/> ALT	7 - 17 U/L
<input checked="" type="checkbox"/> BUA	2.5 - 6.4 mmol/L	<input type="checkbox"/> ALP	44 - 101 U/L	<input type="checkbox"/> GGT	0 - 37 U/L	<input type="checkbox"/> TBL	0.2 - 0.9 mg/dL
<input type="checkbox"/> Na	136 - 145 mmol/L	<input type="checkbox"/> CK	38 - 171 U/L	<input type="checkbox"/> TCR	26 - 145 U/L	<input type="checkbox"/> TCR	240 - 460 U/L
<input type="checkbox"/> K	3.5 - 5.3 mmol/L	<input type="checkbox"/> LDH	100 - 190 U/L	<input type="checkbox"/> LDH	100 - 190 U/L	<input type="checkbox"/> LDH	100 - 190 U/L
<input type="checkbox"/> Cl	98 - 110 mmol/L	<input type="checkbox"/> AMY	27 - 102 U/L	<input type="checkbox"/> AMY	27 - 102 U/L	<input type="checkbox"/> AMY	27 - 102 U/L
<input checked="" type="checkbox"/> CREAT	62 - 115 µmol/L	<input type="checkbox"/> AMY	27 - 102 U/L	<input type="checkbox"/> AMY	27 - 102 U/L	<input type="checkbox"/> AMY	27 - 102 U/L
<input type="checkbox"/> URIC ACID	208 - 433 µmol/L	<input checked="" type="checkbox"/> CALCIUM	2.15 - 2.50 mmol/L	<input type="checkbox"/> CALCIUM	2.15 - 2.50 mmol/L	<input type="checkbox"/> CALCIUM	2.15 - 2.50 mmol/L
<input type="checkbox"/> U-PROT	0 - 83 mg/dL	<input checked="" type="checkbox"/> PHOS	0.87 - 1.45 mmol/L	<input type="checkbox"/> PHOS	0.87 - 1.45 mmol/L	<input type="checkbox"/> PHOS	0.87 - 1.45 mmol/L
<input type="checkbox"/> ALBUMIN	35 - 52 g/L	<input type="checkbox"/> CHOL	3.6 - 5.7 mmol/L	<input type="checkbox"/> CHOL	3.6 - 5.7 mmol/L	<input type="checkbox"/> CHOL	3.6 - 5.7 mmol/L
<input checked="" type="checkbox"/> T-BIL	0.1 - 0.8 µmol/L	<input type="checkbox"/> TRIG	0.7 - 2.26 mmol/L	<input type="checkbox"/> TRIG	0.7 - 2.26 mmol/L	<input type="checkbox"/> TRIG	0.7 - 2.26 mmol/L
<input checked="" type="checkbox"/> D-BILI	0.0 - 3.4 µmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L
<input type="checkbox"/> TG	0 - 55 mg/dL	<input type="checkbox"/> LDL-C	0.85 - 2.38 mmol/L	<input type="checkbox"/> LDL-C	0.85 - 2.38 mmol/L	<input type="checkbox"/> LDL-C	0.85 - 2.38 mmol/L
		<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L
		<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L	<input type="checkbox"/> HDL-C	0.78 - 1.94 mmol/L
Additional Test Requests				Patient Information			
				Name (surname first): _____			
				DOB: _____ / _____ / _____ Age: _____ [] Male [] Female			
				Patient No.: _____ Diagnosis: _____			
				Patient Contact Information: _____			

Suggested Report Example

platelet count verified by peripheral smear critical plt called to Dr. Smith 9/11/22 3-10-09 2S

Cape Clinic Laboratory Lab #: 38
 Drawn by: 2S
 Report Date/Time: 3-10-09 1500 Collected Date/Time: 3-10-09 0815

Hematology				Additional In-House Testing			
<input checked="" type="checkbox"/> CBC		Tech initials: 2S		Tech initials: Am		Normal Values	
Adult Normal Values				Normal Values			
Results	WBC	4.3 - 10.0	7.4 - 9.8	<input checked="" type="checkbox"/> Urine Pregnancy	POS	NEG	NEG
15.3	RBC	4.35 - 5.9	3.69 - 5.13	<input type="checkbox"/> CRP	POS	NEG	NEG
3.96	HGB	14.7 - 16.7	11.7 - 14.5	<input type="checkbox"/> Malaria Rapid	POS	NEG	NEG
11.0	HCT	40.5 - 49.7	34.1 - 44.3	<input type="checkbox"/> RPR	WEAK REACTIVE	REACTIVE	REACTIVE
33.0	MCV	79.7 - 92.0	81.5 - 96.7	<input type="checkbox"/> KOUI	Source		
68.9	MCH	26.1 - 33.3	26.3 - 33.3	<input type="checkbox"/> Saline Prep			
22.6	MCHC	32.2 - 35.0	31.9 - 35.3	<input type="checkbox"/> Gram Stain			
31.0	RDW	11.6 - 14.4					
16.0	PLT	130 - 440					
<input checked="" type="checkbox"/> Differential		Tech initials: GW		CCMS Urinalysis			
Adult Normal Values				Normal Values			
85	Neutrophils	45 - 65%		yellow	Color	NEG	NEG
10	Bands (Neutrophils)	1 - 12%		hazy	Appearance	NEG	NEG
5	Lymphocytes	20 - 40%		16	Urobilinogen	<15 umol/L	
	Atypical Lymphocytes	0 - 2%		negative	Glucose	Negative (mmol/L)	
	Monocytes	4 - 10%		negative	Bilirubin	Negative (mmol/L)	
	Eosinophils	1 - 6%		negative	Ketones	Negative (mmol/L)	
	Basophils	0 - 2%		1.025	Specific Gravity	1.005 - 1.050	
	Other			moderate	Blood	Negative	
RBC Morphology <input type="checkbox"/> Normal Morphology				6.5	pH	7.35 - 7.45	
+1	Anisocytosis	Morphology Terms		1.0	Protein	Negative (g/L)	
+2	Microcytosis	1 - Slight		positive	Nitrite	Negative	
	Microcytosis	2 - Moderate		moderate	Leukocytes	Negative	
+1	Hypochromia	3 - Marked		<input checked="" type="checkbox"/> Microscopic			
	Poikilocytosis			5-10	WBC/HPF	Casts	
Chemistry				10-20	RBC/HPF	Casts/LPF	
<input type="checkbox"/> Basic		<input type="checkbox"/> Comprehensive		Tech initials: RZ		<input type="checkbox"/> EPI-metab	
Result		Normal (M/F)		Result		Normal (M/F)	
<input type="checkbox"/> GLUC	3.9 - 5.8 mmol/L -fasting	<input checked="" type="checkbox"/> ALP	41 - 121 U/L	30	41 - 121 U/L	<input type="checkbox"/> EPI-squamous	
<input checked="" type="checkbox"/> URIC	14.9	3.5 - 6.4 mmol/L	<input type="checkbox"/> AST	8 - 37 U/L		<input type="checkbox"/> Bacteria	
<input type="checkbox"/> Na	136 - 145 mmol/L	<input type="checkbox"/> ALT	5 - 35 U/L		51 - 128 U/L	<input type="checkbox"/> Mucus	
<input type="checkbox"/> K	3.5 - 5.3 mmol/L	<input type="checkbox"/> CK	26 - 145 U/L		38 - 171 U/L		
<input type="checkbox"/> Cl	98 - 110 mmol/L	<input type="checkbox"/> LDH	70 - 460 U/L		70 - 460 U/L		
<input checked="" type="checkbox"/> CREAT	418	67 - 117 / 55 - 97 umol/L	<input type="checkbox"/> AMY	27 - 100 U/L			
<input type="checkbox"/> URIC ACID		306 - 430 umol/L	<input checked="" type="checkbox"/> CALCIUM	2.30	3.15 - 3.50 mmol/L		
<input type="checkbox"/> PT-PRPT	64 - 81 g/L	355 - 360 umol/L	<input checked="" type="checkbox"/> PHOS	1.05	0.87 - 1.45 mmol/L		
<input type="checkbox"/> ALBUMIN	35 - 51 g/L	<input type="checkbox"/> CTDP	4.6 - 5.7 mmol/L		4.6 - 5.7 mmol/L		
<input checked="" type="checkbox"/> TBILI	6.0	3.1 - 20.7 mmol/L	<input type="checkbox"/> TRIG	0.26	0.26 mmol/L		
<input checked="" type="checkbox"/> DBILI	0.5	0.0 - 3.4 umol/L	<input type="checkbox"/> HDL-C	0.78 - 1.54 U/L			
<input type="checkbox"/> GGT	9.55 / 28 U/L	<input type="checkbox"/> calc	1.48 - 5.80 mmol/L		1.48 - 5.80 mmol/L		
Additional Test Requests				Quality Assurance			
				Date Requested: 3/10/09			
				Ordering Doctor: Smith			
				<input checked="" type="checkbox"/> Routine <input type="checkbox"/> Stat <input type="checkbox"/> Waning <input checked="" type="checkbox"/> Testing <input type="checkbox"/> Non-Fasting			
				QA Review:			
				Date: / / Comments:			
				Doctor Signature: _____			
				Patient Information			
				Information completed by participant			
				Name (Surname, First):			
				DOB: / / Age: Male Female			
				Patient No: Diagnosis:			
				Patient Contact Information:			

Activity: Workstation Set-up

Purpose

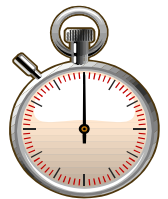
To create and organize an efficient and productive workstation using elements developed from each module.

What will you need?

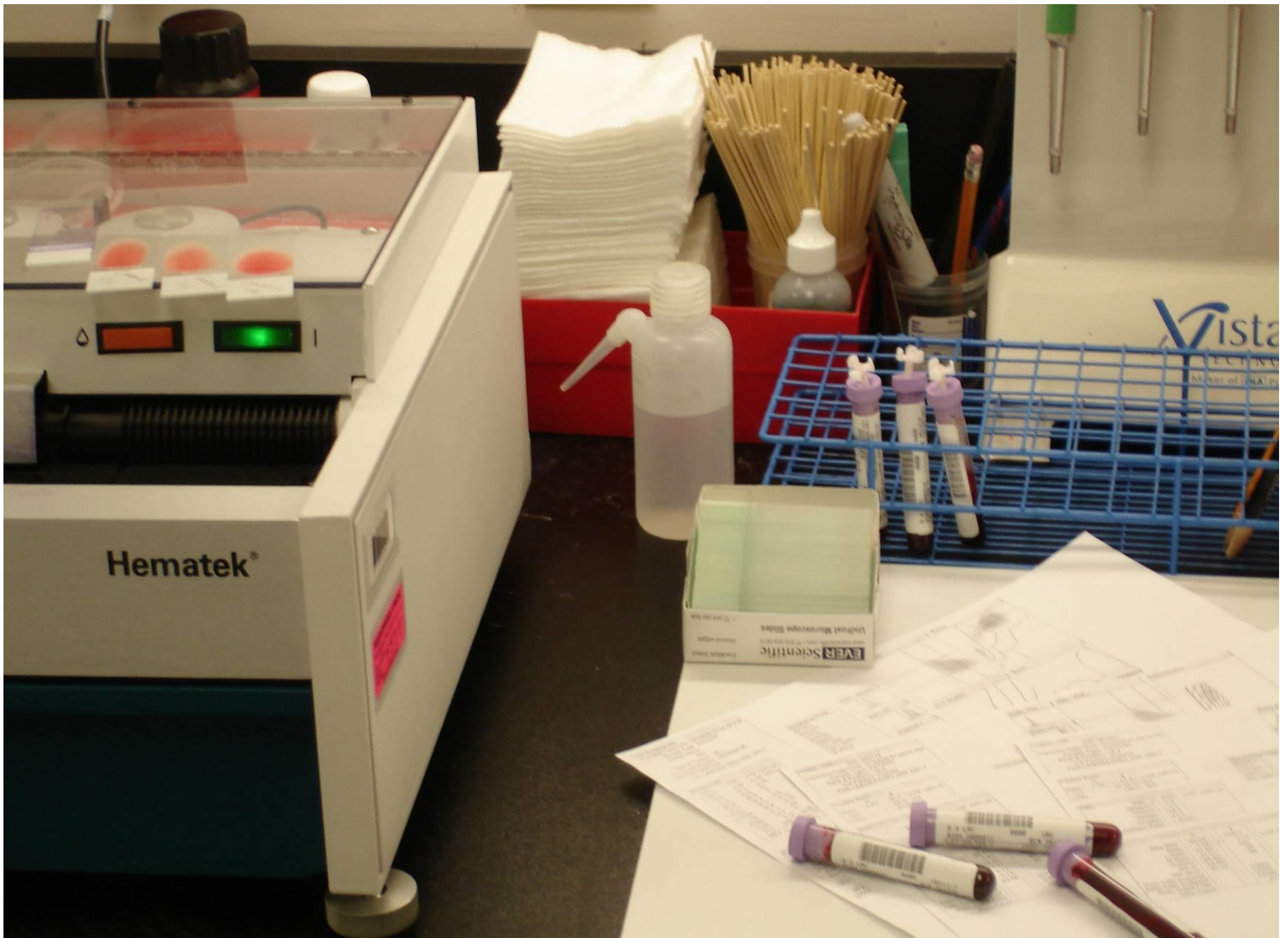
Laboratory Accreditation
Preparedness Checklist

What will you do?

- Participate in the classroom's discussion
- Integrate key concepts from earlier activities

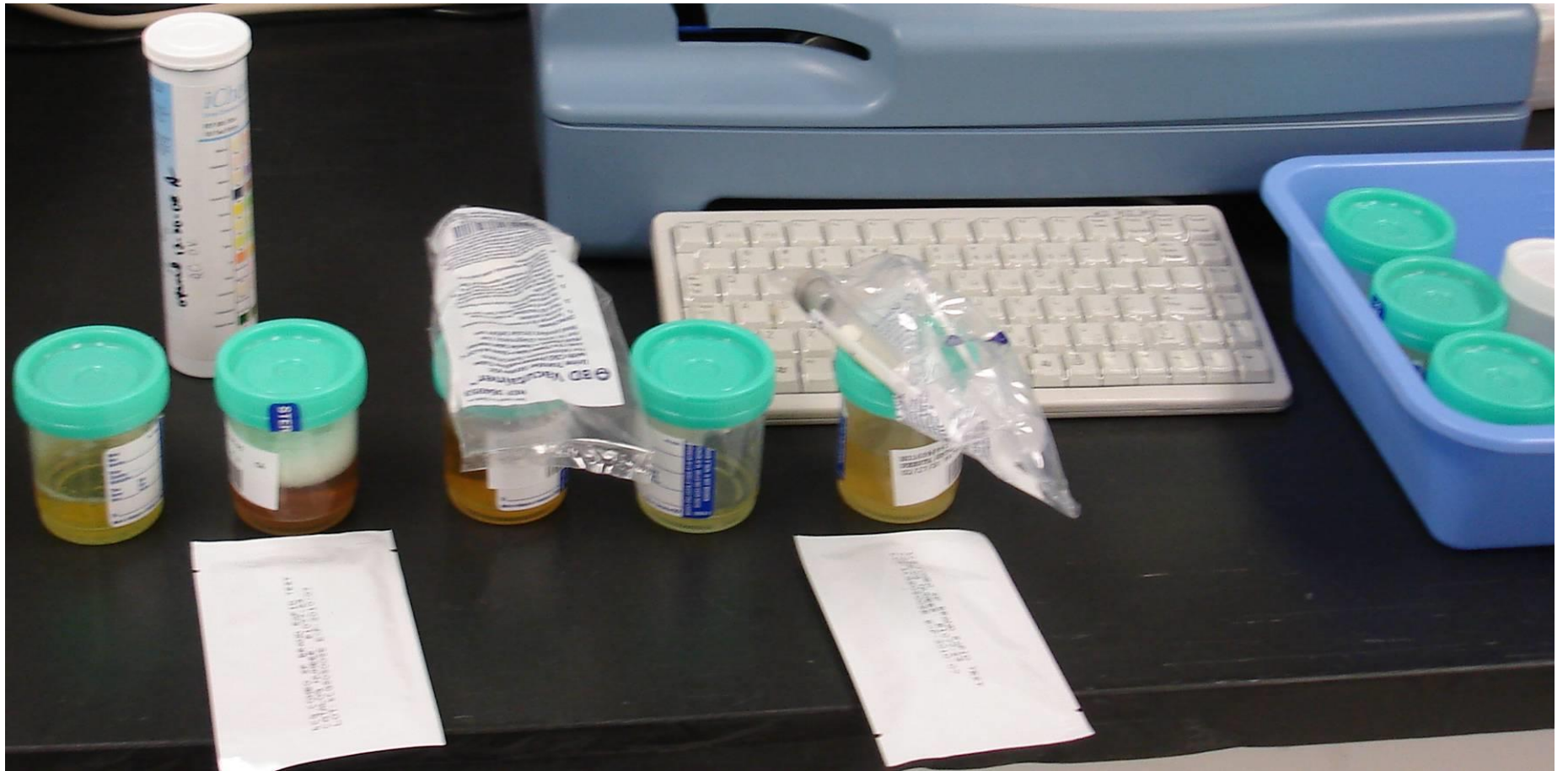


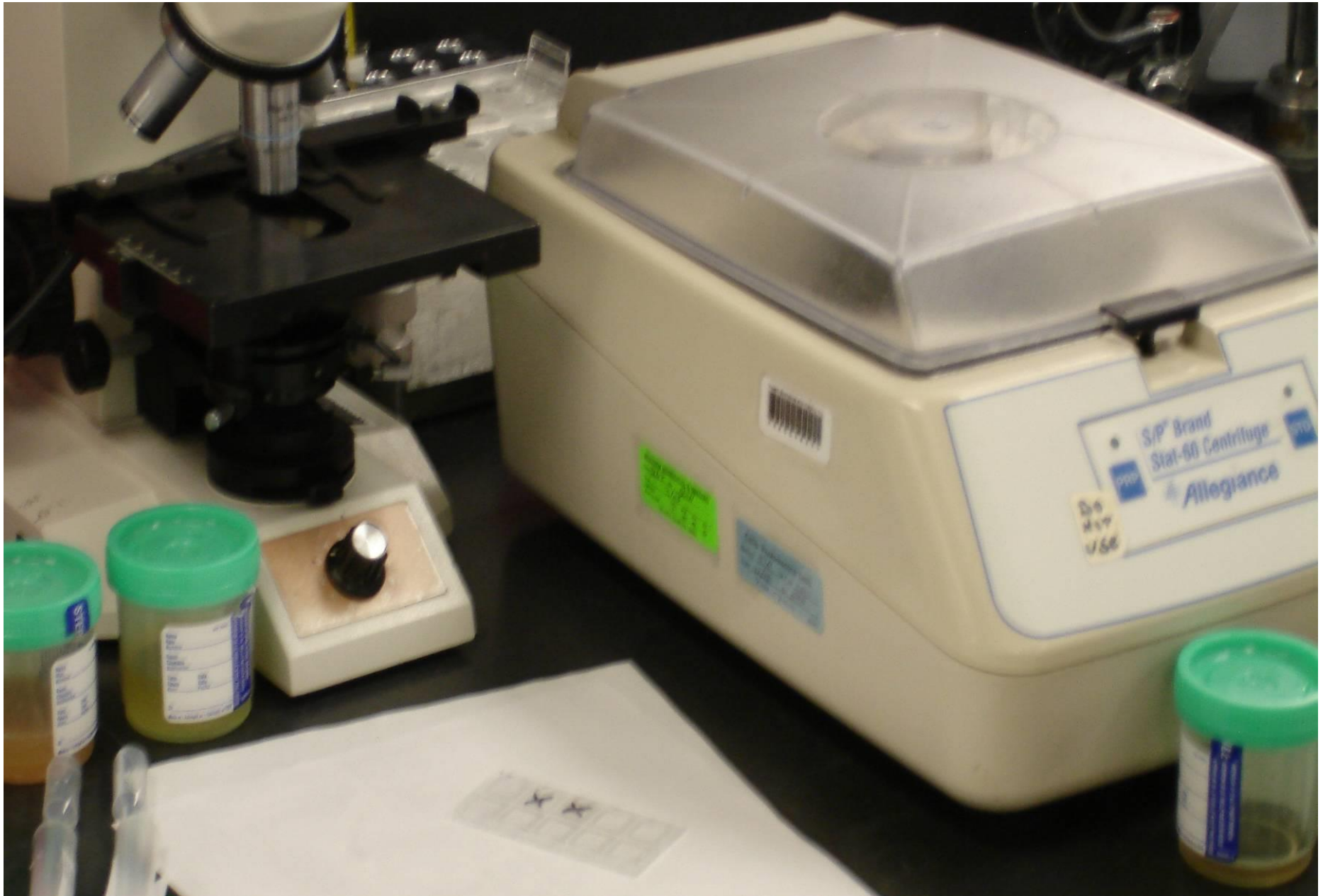
15 minutes

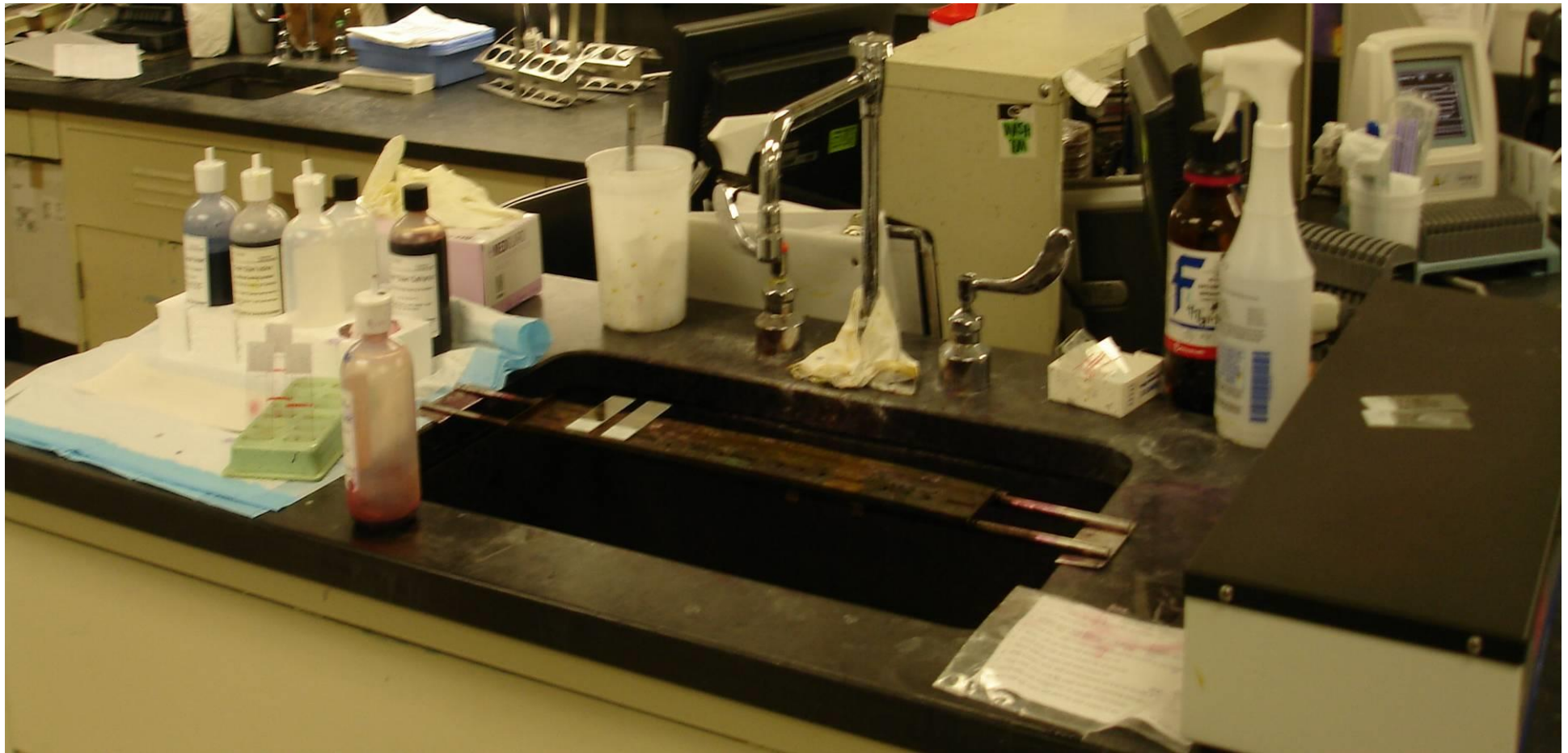
















Activity: What Would You Do?

Purpose

To integrate the module's lessons and apply them to the case scenario.

What will you need?

Handout: Case Study Scenarios

What will you do?

Divide into groups of 4-5

- Select a spokesperson for your group
- Formulate specific action steps to address the scenario from the Handout.
- The group's spokesperson presents the proposed steps during the 2 minute class report.



5 minutes

What Would You Do?

You cross-check results and notice several errors committed by the same staff member. Throughout the day, you notice this staff member preoccupied and distracted with personal phone calls. You feel this distraction is affecting the quality of his work.

How will you handle this situation?

What Would You Do?

You receive a call from the nurse who indicates that another urine pregnancy test was overlooked. From the occurrence log, you discover that your laboratory easily overlooks urine pregnancy tests when a routine urinalysis is ordered on the same specimen.

How will you address this problem?

Tasks

- Monitor testing to ensure SOPs are followed and tests are performed and reported properly and promptly
- Validate assigned tests and specific abnormal results
- Cross-check test reports against test request to ensure completion of all tests
- Review test records and findings promptly to ensure accuracy and timely release of test results