

# Final Report

Ergonomic Assessments in Microbiology and Core Laboratories

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## **Executive Summary**

This project was a collaborative effort between Victoria General Hospital (VGH) laboratory staff and management, the Occupational Health and Safety Services of the Vancouver Island Health Authority (VIHA), and the Occupational Health and Safety Agency for Healthcare (OHSAH) in B.C. Through funding from OHSAH's Partnership Initiatives Program, ergonomic assessments of the microbiology and core laboratories were conducted. Risks were identified, and recommendations developed by OHSAH Ergonomists and VGH laboratory staff. The recommendations were prioritized based on over-all impact and budgetary constraints. The key changes implemented were: a) re-design of the microbiology inspection bench, to increase working space and reduce awkward postures; and b) redesign of the core labs urinalysis area, to improve workflow and increase working space. Other solutions implemented included bench height adjustments to reduce awkward reaching and working postures, installation of gel padding on countertops to reduce contact stress, and the installation of black countertops to improve contrast during inspection-type tasks. Evaluation of the implemented changes was very positive. Several issues did arise during the feedback process, which were then incorporated into the ergonomic modifications. This project is an excellent example of a participatory Ergonomics process, and highlights the importance of evaluation and user input.

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## **Background**

This project was a collaborative effort between Victoria General Hospital (VGH) laboratory staff and management, the Occupational Health and Safety Services of the Vancouver Island Health Authority (VIHA), and the Occupational Health and Safety Agency for Healthcare (OHSAH) in B.C.

In the fall of 2001, OHSAH approved a proposal submitted by the Occupational Health and Safety Services of VIHA to develop and implement ergonomic controls in the Microbiology and Core Labs of VGH. OHSAH provided ergonomic expertise into identifying and assessing risk factors, and assisted VGH in designing, implementing and evaluating control measures. Funding of up to \$20,000 for the project was awarded through OHSAH's Partnership Initiative Program (formerly known as Stake Holder Driven Initiatives). The goal of the project was to minimize the risk of musculoskeletal injury (MSI) to laboratory staff in Microbiology and Core Labs at VGH, and to help develop provincial guidelines for safe laboratory work.

Two ergonomic assessments of the laboratories were previously conducted by the VIHA Occupational Health and Safety department; the first in January of 1999, and the second in July of 2000. The first assessment identified MSI risk to staff working in the Microbiology Lab, and the second assessment concentrated on MSI risk in the Core Labs. Various ergonomic recommendations were identified; however, few control measures had been successfully implemented.

### ***Microbiology***

The microbiology department employs approximately 40 staff members, consisting of medical laboratory technologists (MLT's), and technical assistants (TA's). Staff usually work an 8-hour shift, with two 15-minute coffee breaks, and one 30-minute lunch break. There are 4 TA's and 13-15 MLT's working during the day shift; there are 2 TA's and 2 MLT's working the evening shift. The TA's work in the "Accessions/Planting" station. The MLT's work in several stations, titled "Blood Culture", "Clinical", "Stool", "Inspection Bench", "TB/Mycology", "Anaerobic Chamber", "Microscope Hepatitis", and "Vitek" for the purposes of this study.

### ***Core labs***

The Core labs employ approximately 31 staff, consisting of MLT's, and TA's. Staff usually work an 8-hour shift, with two 15-minute coffee breaks, and one 30-minute lunch break. There are 3 TA's and 9 MLT's working during the day shift; there is 1 TA and 5 MLT's on the evening shift. During the night shift there are just 2 MLT's. There are several stations in the core labs, titled "Urinalysis", "Fluid Station", "AX-7 /BX-7 Analyzers", "STKs Station", "Accessions", "Coagulation Station", and "Microscope Station".

## **Objectives**

- To identify and assess laboratory tasks for risk of musculoskeletal injury
- To develop and successfully implement control measures to reduce the risk of musculoskeletal injury

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## Methods

A participatory ergonomics approach was taken, using an iterative process and incorporating staff feedback at each stage. The steps followed are outlined below:

1. Injury statistics and a questionnaire on MSI signs and symptoms (appendix 1a) were distributed to all staff, and used to establish general concerns and areas of risk.
2. Specific risk factors were identified through Ergonomic assessments of all areas of the lab. The assessments were conducted using informal interviews, direct observation, photographs, and video tape.
3. Recommendations / risk controls to reduce MSI risks and improve workflow were developed, again in collaboration with staff.
4. Focus groups were conducted with staff and management to further develop the recommendations, and to prioritize how and where the funding should be used.
5. Mock-ups of major changes to the lab were created and tested with staff, prior to implementation. Feedbacks from the mock-ups were incorporated into the design.
6. Recommendations / risk controls were implemented and trialed for a 3-month period.
7. Implemented controls were evaluated after the trial period, through written feedback forms and informal interviews.
8. Feedback from the evaluation was incorporated into the implemented ergonomic modifications.

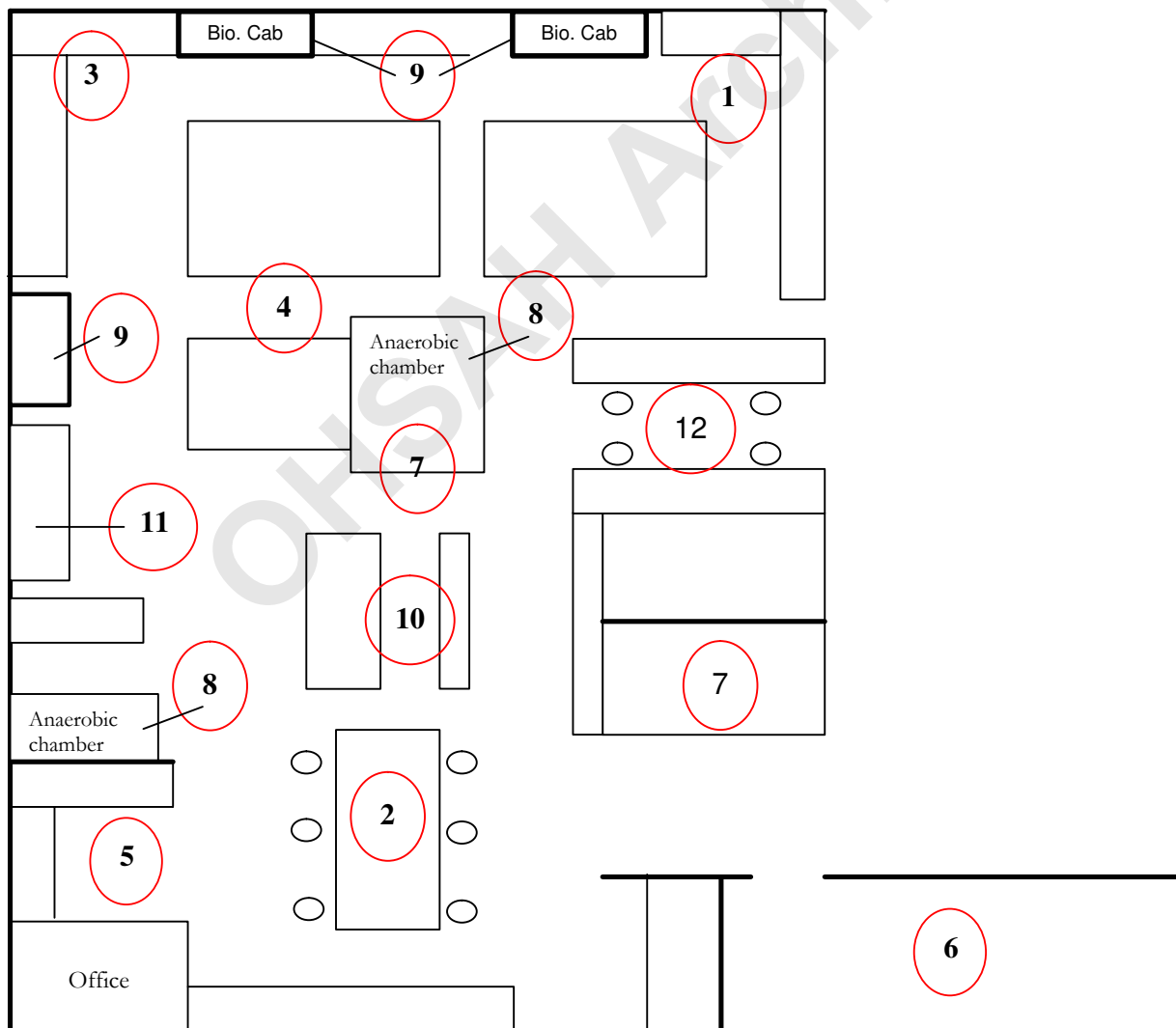
## Risk Factor Identification

This section outlines each area of the laboratory, and describes the various risks identified through the ergonomic assessments. Each station within Microbiology and Core labs is listed individually. (*\*note, the risks are simply listed, and not placed in any particular priority*)

### Microbiology

The following diagram shows the layout of the microbiology laboratory at VGH:

- |                        |                                  |
|------------------------|----------------------------------|
| 1. Accessions/Planting | 7. Microscope                    |
| 2. Inspection Bench    | 8. Anaerobic Chamber             |
| 3. Blood Culture       | 9. Biosafety Cabinets            |
| 4. Clinical            | 10. Vitek                        |
| 5. Stool               | 11. Hepatitis                    |
| 6. TB/Mycology         | 12. Offices/QC Computer Stations |





## 1. Accessions/ Planting

The accessions area receives all specimens destined for the microbiology lab. Specimens arrive from various sources from within the hospital and from outside agencies. A requisition form identifies who the sample is for and the tests that are required. All specimens are sorted, labeled, and double-checked for quality and accuracy. The specimen information is logged into a computer and then prepared for testing, which usually involves planting to media, and/or staining, depending on the type of sample and the tests being run.

1. The reception area is quite small and congested, sometimes causing difficulties in performing normal duties:



2. Contact stress on the forearms and wrists while using the computer and biosafety cabinet due to sharp edges of the countertop:



3. The monochrome computer monitors are difficult to read, and can cause eyestrain.
4. Awkward trunk/back postures while sitting (at main desk, biohazard cabinet, and urine prep station), due to task chairs that are not properly adjustable.
5. Awkward and static neck and shoulder postures while using the computers due partly to uncomfortable computer stools, and partly to the height of the monitor
6. Noise levels can be a distraction to work, especially when working near the printer and telephone.
7. Standing for long periods of time on a hard surface.

## 2. Inspection Bench

The inspection bench has five MLT's assigned per shift. There was initially five workstations and a microscope at the inspection bench: 1) Wound/Tissue bench; 2) VRE/MRSA and Fluid bench; 3) Throat and Genital bench, 4) Urine bench; and 5) Respiratory bench. Various tests are performed at each bench, although all require the inspection of plated media and access to a computer. Most tasks are performed while seated, and require fine motor skills (i.e., using a microscope). The MLT's assigned to the inspection bench are also required to use the Vitek machine and occasionally the anaerobic chamber (see later sections for a description of the anaerobic chamber and Vitek machine).

1. Crowded workstations create cramped and difficult working environments:



2. Repetitive reaching and bending for items, i.e. Petri dishes, lab equipment:



3. Awkward and static trunk, neck, and shoulder postures while inspecting specimens, due to inadequate height of workbench and non-adjustable task chairs:



4. Awkward neck, shoulder, and arm postures, while using computer keyboards.
5. The monochrome computer monitors are difficult to read, and can cause eyestrain.
6. Contact stress on the arms and forearms, due to the sharp edges of the counter top.
7. Awkward reaching down to discard planted media into box placed on the ground.

### 3. Blood Culture Bench

One MLT is assigned to the blood culture station, per shift. The MLT retrieves blood samples from an incubating instrument, and brings it to the biosafety cabinet where it is planted to culture media. Once planted, a Gram stained slide of the specimen is taken to the microscope station to be examined. When finished, the MLT returns to the blood culture station, and reports the results (by phone or e-mail) to the appropriate doctor or ward. Data is then entered into the computer terminal. Further workup of ongoing cultures is performed with antibiotic susceptibilities and results reported as soon as available.

1. Contact stress on the arms and forearms when using the computer, due to the sharp edges of the desktop:



2. Contact stress on the upper legs and thighs when working at the biosafety cabinet, as there is inadequate leg room with the current task chair:



3. Awkward trunk, shoulder, and arm postures while sitting, due to height of counter top.
4. Awkward neck and shoulder postures due to position of the monitor with respect to the keyboard.
5. Awkward and static trunk/back postures while sitting at biosafety cabinet because the stool is not adjustable.
6. The monochrome computer monitors are difficult to read, and can cause eyestrain.
7. Eyestrain when examining specimens at the countertop, due to inadequate contrast from the light beige colour.
8. Crowded workstations and workbenches create cramped and difficult working environments, for example lack of room for plates/samples.
9. Forceful exertions while lifting and carrying heavy boxes of blood samples.

#### 4. Clinical Bench

One MLT is assigned to the Clinical station, per shift. Samples are removed from a nearby fridge, and a work list is recalled from a computer. Samples are processed and centrifuged before placing in a Probetec machine. A common task that occurs at this station is repetitive pipetting (with an automatic pipette).

1. Awkward and static back, shoulder and arm postures while using pipettes, due to improper height of workbench, placement of drawers and cupboards below counter top, and inadequate task chair:



2. Awkward trunk, neck, shoulder, and arm postures while using the computer keyboard:



3. Contact stress on the forearms due to the sharp edge of the counter top.
4. Inadequate legroom when sitting, due to crowded cupboard units under the desk.
5. The monochrome computer monitor is difficult to read, and can cause eyestrain.

### 5. Stool Bench

One MLT is assigned to the stool bench, per shift. Specimens are analyzed at this station, either automatically with a machine after sample preparation, or manual examination of planted media using a magnifier/viewer. The majority of the work is performed while seated.

1. Inadequate space on the workbench creates a crowded, difficult working environment and leads to awkward reaching for the lamp, as well as items on the bench:



2. Awkward and static neck postures while examining specimens:



3. Eyestrain when examining specimens at the countertop, due to inadequate contrast from the light beige colour.
4. Awkward trunk, neck, shoulder and arm postures while using the computer keyboard.
5. The monochrome computer monitor is difficult to read and can cause eyestrain.
6. Contact stress on the forearms due to the sharp edge of the counter top.

## 6. TB/ Mycology

One MLT is assigned to the TB/Mycology station per shift. The MLT processes TB specimens in a biological safety cabinet, and a fair portion of the day is spent working inside this cabinet (~4 hours). Other tasks include microscope work, fluo/darkroom microscope work and culture tube examination and subculture.

1. Awkward trunk, shoulder, and neck postures while using the biohazard cabinet:



2. Awkward and static neck postures when using microscope to inspect specimen:



3. Awkward trunk postures when seated due to inadequate task chair.
4. Contact stress on the arms and forearms, due to the sharp edges of the countertop.
5. Poor lighting for microscope work.
6. Eyestrain from reading numerous slides

## 7. Microscope

The microscope is used throughout the day, by various MLT's. An MLT may sit for 5 minutes or up to two hours at a time, depending on the number of specimens requiring examination. Although various sample types are analyzed, the physical and mental demands of the task are similar for each use.

1. Contact stress on the arms and forearms, due to the sharp edge of the countertop:



2. Awkward trunk, shoulder, and arm postures, due to inadequate workbench height, and non-adjustable task chair:



3. Repetitive twisting movements of the wrist and pinch gripping with the fingers when using fine adjustment knobs.
4. Static postures of the hands while using microscope.
5. Eye strain from reading small slides for long periods of time
6. Awkward and static neck postures when viewing samples in the microscope.

## 8. Anaerobic Chamber

The anaerobic chamber contains planted media from specimens that are known or suspected to require an oxygen-free environment for organisms to grow. The chamber itself has an incubator and storage shelf, which can be accessed by a pair of permanent gloves attached to the cabinet. There are two anaerobic chambers; one of the chambers has a sliding compartment onto which samples can be placed and grasped without excessive reaching. The other chamber lacks this particular feature. In either case, the chambers are only used to incubate and retrieve planted media, not routinely to perform work.

1. Awkward trunk, arm, and shoulder postures while standing at anaerobic chamber, due to inadequate position of the gloves:



2. Awkward, excessive reaching and twisting when retrieving samples (in the chamber without a sliding mechanism) and accessing the “interchange” area in the chamber.
3. Changing catalysts and desiccants requires excessive reaching and twisting.
4. Flickering task light creates a difficult working environment.

## 9. Biosafety Cabinets

There are several biosafety cabinets within microbiology, each used for a specific station. Details for each can be found under the appropriate heading; however, general risks and concerns for biosafety cabinets are listed below:

1. Contact stress on the arms and forearms while working.
2. Some cabinets also cause contact stress on the upper legs, due to poor task chair, or non-adjustable cabinet height.



### **10. Vitek**

The Vitek instrument is used by most of the MLT's throughout the shift. It performs identification and antibiotic susceptibilities of organisms automatically, and sends the results to a nearby printer. Specimen must be prepared before being placed inside the instrument. Multiple specimens and tests can be performed simultaneously, by programming the Vitek accordingly.

1. Crowded workstation creates cramped and difficult working environments.
2. Awkward trunk, neck, arm, and shoulder postures while preparing specimens for the Vitek machine. This is due to inadequate task chair(s), and improper height of the preparation workbench.
3. Contact stress on the arms and forearms, due to the sharp edge of the countertop.

### **11. Hepatitis Bench**

One MLT is assigned to the hepatitis bench during the day. Blood samples are centrifuged and set into the instrument, to be analyzed for various hepatitis profiles. Once the tests are complete, the MLT verifies the results and enters them into a computer.

1. Crowded workstation and lack of space create cramped and difficult working areas.
2. Awkward postures of hands and wrists during keyboard entry.
3. Awkward and static postures of the low back when using biological safety cabinet.

### **12. Offices and QC Computer Stations**

The QC bench is used as the microscope teaching area for students, as well as some planted media inspection, QC documentation and computer work. Offices are primarily used for computer and telephone work.

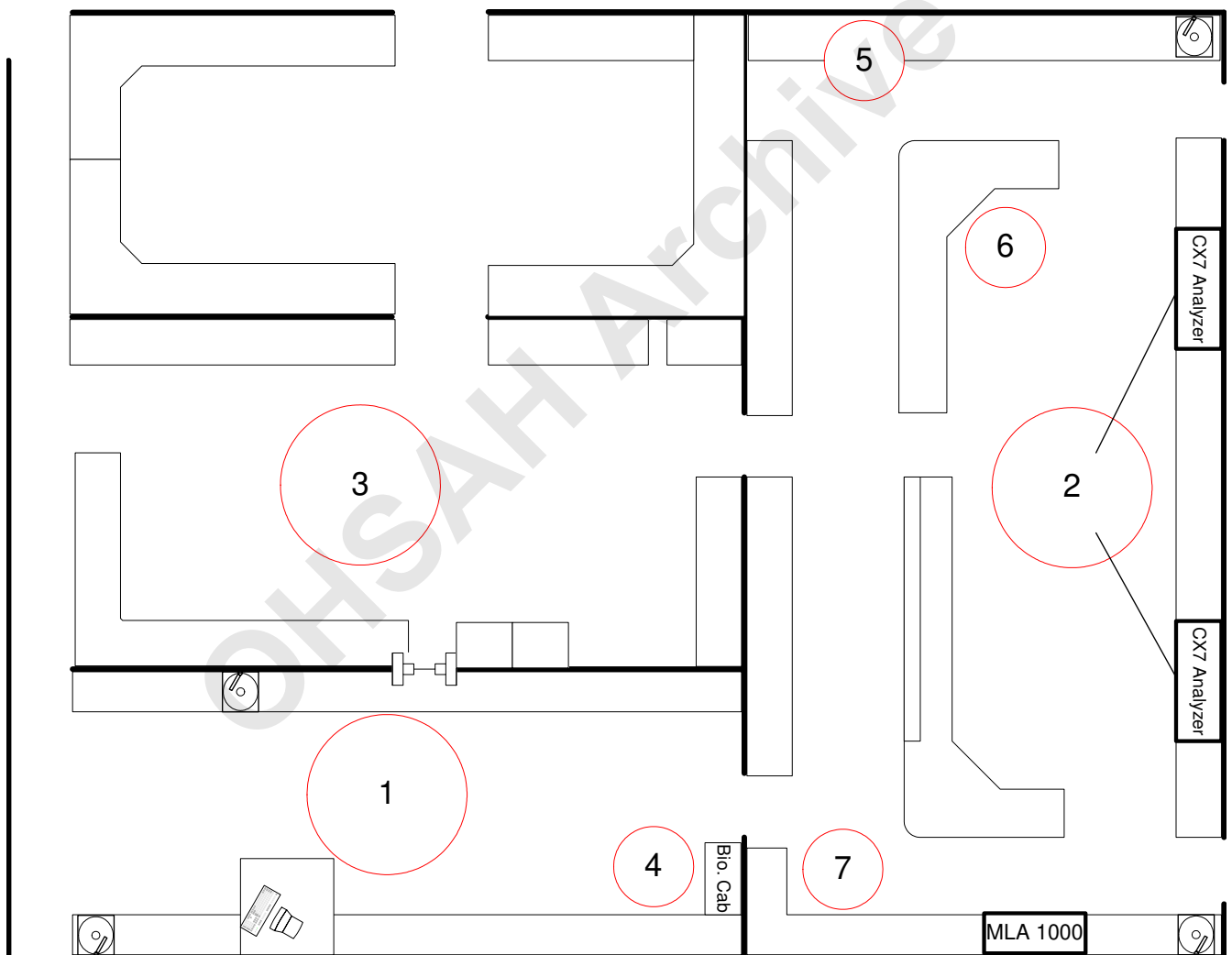
1. Awkward neck posture while using the computer, due to low height of computer monitor
2. Placement of keyboards sometimes results in awkward reaching and twisting
3. Cluttered and crowded work surfaces
4. Eye strain due to poor monitor quality

## Core Laboratory

Parts of the information for the assessment of the Core Labs has been taken from the report “Ergonomic Assessment for the Core Laboratory at Victoria General Hospital” (2000) written by Darren Buckler of the Vancouver Island Health Authority.

The following diagram shows the layout of the microbiology laboratory at VGH:

1. Urinalysis
2. AX-7 / BX-7 Analyzers
3. Accessions
4. Fluid Station
5. Microscope Station
6. STKs Station
7. Coagulation Station



## 1. Urinalysis

One MLT is assigned to the urinalysis station per shift. There are several sub-stations within the area, for example microscope, biohazard cabinet, centrifuge, and osmometer. The majority of the work is performed at the microscope. Once the results of the urinalysis tests are completed, they are entered into the computer system. The other sub-stations are used occasionally throughout the day, however, usually for no more than 5-10 minutes at a time.

1. The microscope and computer are positioned next to each other, on a relatively small countertop. There is inadequate working space, which creates a difficult working environment:



2. The computer opposite the microscope is used as a teaching resource; this is not ideal, as the noise level in the area is high, and the extra computer takes up a large portion of the workspace
3. Awkward trunk, neck, and shoulder postures while using the microscope, due to inadequate workbench height and leg room and a non-adjustable task chair.
4. Awkward and static neck and shoulder postures while using the computer keyboard.
5. Static standing posture.
6. Contact stress on the arms and forearms, due to the sharp edge of the countertop.
7. The monochrome computer monitor is difficult to read and can cause eyestrain
8. High noise levels from centrifuge and strong odor of Acetic Acid.
9. Awkward neck and shoulder postures while using the microscope(s).

## 2. AX-7 / BX-7 Analyzers

The AX-7 /BX-7 machines are used to perform various tests on liquid samples. Samples are received from accessions, and placed into the machines for analysis. A computer print out is retrieved, and the results are processed via computer and paper work.

1. Small work area creates a busy, cluttered environment, which makes working conditions difficult:



2. Small countertop area around AX-7 not adequate for paper work.
3. The printer for BX-7 is far away from the countertop where paper work is performed, creating an inefficient work process.
4. Standing for long periods of time.
5. Awkward postures of back, shoulder and wrist because keyboard height is uncomfortable.

## 3. Accessions

The accessions station receives all incoming specimens destined for Core labs. Specimens arrive by courier, the tube system, or by hospital personnel. Once received, the samples are logged into the computer, and prepared for testing. If the tests are not run in-house, a dispatch sheet is created, and the sample is sent to another lab location. Otherwise, the samples are centrifuged and/or pipetted to remove serum. A major portion of the job is computer use, as well as paper work and answering the phones.

1. The accessions area is quite small and congested, sometimes causing difficulties in performing normal duties.
2. There are only three computer workstations, however, there are often four people working at the same time.
3. Limited working space to perform pipetting tasks.
4. Awkward neck and trunk postures due to inadequate task chairs.
5. Contact stress on the wrists and forearms, due to the sharp edges of the countertop.
6. Awkward postures of neck, shoulders, and back due to low bench height.

#### 4. Fluid Station

Fluid samples arrive from accessions, and are usually centrifuged and aliquoted. This requires approximately 10 minutes to complete, and the sample is then taken to the microscope station to be analyzed. The MLT's assigned to the Fluid station will spend the majority of the shift at the microscope station (see microscope section below for more details).

1. The centrifuge is currently high off the ground, which results in awkward shoulder postures and extended reaching when accessing the machine.

#### 5. Microscope Station

One MLT is dedicated to the microscope station during the day. At this station, samples are placed onto slides and analyzed; a Differential Count machine is often used simultaneously while viewing samples. Once the slides have been analyzed, results are input into the computer, located next to the microscope.

1. Awkward and static neck postures while operating microscope, as microscope is not height adjustable:



2. Awkward and static shoulder and arm postures, due to inadequate bench height and non-adjustable microscope.
3. Static sitting at microscope for long periods of time.
4. Awkward and static postures of the hands and wrists as they are not supported.
5. Eyestrain from reading numerous slides.
6. Contact stress on the forearms and elbows while operating the microscope.
7. Repetition of the wrists and fingers while operating the Differential Counter.
8. Awkward reaching when operating the Differential Counter.

## 6. STKs Station

Two MLT's work at the STKs station during the peak morning hours of the day. One MLT operates the analyzer, while the second is assigned to the "take-off" bench. Specimens arrive from accessions, and are loaded into the STKs machine. The samples are processed, and the results are analyzed by the MLT at the "take-off" bench, who decides if further tests on the sample are required. Other duties at this station include preparing slides, pipetting, and computer work.

1. Contact stress on the wrists and forearms due to sharp edges of the countertop:



2. Awkward and static neck postures when preparing slides.
3. Awkward postures of the hands, wrists, and arms due to keyboard placement.
4. Repetitive movement between STKs and "take-off" bench.
5. The monochrome computer monitors are difficult to read and can cause eyestrain.

## 7. Coagulation Station

One MLT works the coagulation station during the day. Samples arrive from accessions, are uncapped, and placed into the MLA1000 machine for analysis. A separate machine (CA5000) is used at night and as a back up machine; the CA5000 runs the same tests, but involves more manual loading and bar code scanning. Other tasks at the coagulation station include computer work and results analysis.

1. Limited leg room while using the computer, due to desk configuration and table legs.
2. Contact stress on the wrists and forearms, due to the sharp edges of the countertop.
3. Awkward and static shoulder postures while using the CA5000 machine, as it is located on a high countertop.
4. Static standing posture for long periods of time.
5. Awkward postures due to non-adjustable monitor height.

## Recommendations and Risk Controls

The following section describes the recommended risk controls, based on the risk factors identified through the ergonomic assessment. The controls are listed by area of the lab (\*note, the risk controls are simply listed and are not placed in any particular priority)

### ***Microbiology***

#### **1. Accessions/ Planting**

Recommendations and Risk Controls:

1. Cover the edges of the countertop with a soft gel or rubber padding to reduce contact stress.
2. Change the bench design to a “U” shape, to increase working space.
3. Re-arrange desktop to separate the printer and telephone from the areas that require lower noise levels.
4. Create more counter space at the main desk by mounting the existing computer monitor onto a monitor arm/stand, which can be attached to the far edge of the counter. Ideally, an adjustable monitor arm should be installed which can accommodate a wide range of staff.
5. Provide a document holder, for use while entering data off of requisition forms. This will help reduce awkward postures on the neck.
6. Lower the keyboard so that it is off of the countertop – this will increase the working space.
7. Provide adjustable chairs\*\* for the reception area, to reduce the awkward neck, shoulder, and back postures.
8. Provide a larger, colour monitor, to reduce eyestrain
9. Install height adjustable controls for the Biohazard cabinet; if this is not feasible, provide a sit/stand stool to accommodate the lack of legroom.
10. Provide anti-fatigue matting to reduce back strain.
11. Encourage micro breaks and stretching throughout the shift

#### **2. Inspection Bench**

Recommendations and Risk Controls:

1. Re-design the current workbench, to create more working space, and allow employees to operate using safe, comfortable work postures (see “Risk Control Implementation: Results and Evaluation” for more details).
2. Provide shelving units to reduce clutter.
3. Align the computer monitor and keyboard, so that employees do not have to use awkward postures when working with the computer.
4. Attach adjustable keyboard tray to allow keyboard to slide under the countertop.
5. Provide larger, colour monitors, to reduce eyestrain
6. Cover the edges of the countertop with a soft gel or rubber padding,
7. Provide adjustable task chairs for microbiology work, to help reduce the awkward neck, back, and shoulder postures.
8. Encourage frequent micro-breaks to minimize static and awkward postures
9. Ensure job or task rotation occurs to help minimize static and awkward postures.

\*\*see appendix 2 for a description of task chairs and sit/stand stools

### **3. Blood Culture Bench**

Recommendations and Risk Controls:

1. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
2. Provide adjustable task chairs to improve back and upper limb postures.
3. Align the computer monitor and keyboard in front of the employee, so they do not have to use awkward postures when working with the computer.
4. Provide a height adjustable biosafety cabinet, to improve working postures and eliminate contact stress on the legs.
5. Provide a larger, colour monitor, to reduce eyestrain
6. Paint the countertop black or install black arborite, to improve contrast when examining specimen.
7. Change bench design to a “U” shape to increase working space.
8. Re-arrange countertop to allow discarded planted media box to be put on counter. This will reduce the amount of awkward reaching.
9. Reorganize items on the table to reduce awkward reaches. Possibly store items on a turntable that can be rotated to bring items closer to the worker.
10. Use trolley or cart to transport heavy samples to reduce the amount of lifting and carrying.
11. Provide better lighting, to reduce glare.

### **4. Clinical Bench**

Recommendations and Risk Controls:

1. Provide proper, adjustable chairs for the workstations, to improve work postures while using the pipette and inspecting specimens.
2. Provide a proper workbench, to improve comfort and leg room while sitting, and also to eliminate the contact stress on the upper leg from the underside of the current workbench.
3. Attach adjustable keyboard tray to allow keyboard to slide under the counter top, to increase working space.
4. Raise computer monitors to eye level, to reduce awkward neck postures.
5. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
6. Move cupboard units to allow for more leg space.
7. Provide a larger, colour monitor to reduce eyestrain.



## **5. Stool Bench**

Recommendations and Risk Controls:

1. Align the computer monitor and keyboard, so that employees do not have to use awkward postures when working with the computer.
2. Attach adjustable keyboard tray to allow keyboard to slide under the counter top.
3. Provide proper, adjustable task chairs for inspection work.
4. Provide a desktop-bridge or extra workbench, to free up more working space
5. Paint the countertop black or install black arborite, to improve contrast when examining specimen.
6. Install height adjustable benches to provide more flexibility in working heights.
7. Provide a larger, colour monitor, to reduce eyestrain.
8. Cover the edges of the countertop with a soft gel or rubber padding.

## **6. TB/ Mycology**

Recommendations and Risk Controls:

1. Provide proper, adjustable chairs (especially for microscope use) for the workstations, to help minimize awkward trunk, neck, and shoulder postures.
2. Provide foot rests, which may help promote proper working postures
3. Install a height adjustable mechanism for the biosafety cabinet
4. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
5. Install an ergonomically adjustable microscope head.
6. Install microscope knob sleeves (to enlarge the radius of the knobs) to reduce pinch grips.
7. Provide additional desktop or overhead lighting
8. Encourage frequent micro-breaks

## **7. Microscope**

Recommendations and Risk Controls:

1. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
2. Install arm/wrist rests on both sides of microscope, to reduce contact stress and minimize awkward arm/shoulder postures.
3. Install microscope knob sleeves (to enlarge the radius of the knobs) to reduce pinch grips.
4. Encourage more frequent micro-breaks.
5. Install an ergonomically adjustable microscope head
6. Provide an adjustable task chair for the microscope station, to help maintain good working posture.

## **8. Anaerobic Chamber**

Recommendations and Risk Controls:

1. Adjust the height of the anaerobic chamber, so that MLT's using the gloves are at proper working postures. This could be done by raising the table on which the chamber rests, or by installing height adjustable controls.
2. Attach a sliding mechanism to the chamber that lacks one, to reduce the amount of reaching and awkward shoulder and arm postures.
3. Store the plates at the front of the incubator
4. Ensure that maintenance keeps the task light inside the chamber in proper working condition.

## **9. Biosafety Cabinets**

General Recommendations and Risk Controls (see individual sections for recommendations for specific biosafety cabinets):

1. Cover the edges of the cabinets with a soft gel or rubber padding
2. When purchasing new equipment, choose a cabinet with an angled front edge plate.
3. Provide adjustable task chairs or sit/stand stools for the biosafety cabinets to reduce contact stress on the upper legs

## **10. Vitek**

Recommendations and Risk Controls:

1. Rearrange workstation to increase the working space.
2. Change bench design to a "U" shape.
3. Provide adjustable task chairs for the Vitek workbench, to allow workers to maintain good postures.
4. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.

## **11. Hepatitis Bench**

Recommendations and Risk Controls:

1. Rearrange workstation to provide more space.
2. Attach adjustable keyboard tray to allow keyboard to slide under the counter top and help free up working space.
3. Provide adjustable task chairs to help maintain good working postures.
4. Install adjustable height controls for the biosafety cabinet.

## **12. Offices and QC Computer Stations**

Recommendations and Risk Controls:

1. Hang and elevate monitors, to provide more flexibility
2. Provide arm support for extended periods of data entry.
3. Provide proper, adjustable task chairs
4. Install adjustable keyboard trays.
5. Re-arrange desktop so that the keyboard is directly in front of the monitor, not at an angle
6. Provide larger, colour monitors

## ***Core Laboratory***

### **1. Urinalysis**

Recommendations and Risk Controls:

1. The teaching computer should be moved to a location away from the main work area. This would free up extra working space for the MLT's.
2. Provide an adjustable task chair, to help maintain good postures.
3. Align the computer monitor and keyboard, so that employees do not have to use awkward postures when working with the computer.
4. Provide anti-fatigue matting to reduce fatigue associated with long-duration standing.
5. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
6. Provide a larger, colour monitor, to reduce eyestrain.
7. Move centrifuge to another location to reduce noise.
8. Keep Acetic Acid in fume hood, to minimize fumes.
9. Provide ergonomically adjustable microscopes

### **2. AX-7 / BX-7 Analyzers**

Recommendations and Risk Controls:

1. Modify the system to utilize two computers instead of three. This will increase the amount of working space around the AX-7 and BX-7.
2. Change workbench to an "L" shape, to better utilize available space
3. Move the printer for the BX-7 analyzer to the countertop where paper work is performed to improve working space.
4. Provide a sit/stand stool for the AX-7 / BX-7 analyzers, to allow workers to sit while using the computer terminals.
5. Provide anti-fatigue matting to reduce fatigue associated with long-duration standing.
6. Install an adjustable keyboard tray, to improve working posture. A keyboard tray may also help increase the amount of working space around the computers and monitors.

### **3. Accessions**

Recommendations and Risk Controls:

1. Move centrifuges or move the bench to increase the available working space.
2. Provide adjustable task chairs for the accessions station, to help maintain proper postures.
3. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
4. Raise height of bench to minimize awkward trunk and neck postures.

### **4. Fluid Station**

Recommendations and Risk Controls:

1. Move the centrifuge across to the opposite countertop, which is lower. This will reduce the awkward postures and reaches

### **5. Microscope Station**

Recommendations and Risk Controls:

1. Install an ergonomically adjustable microscope head.
2. Install microscope knob sleeves (to enlarge the radius of the knobs) to reduce pinch grips.
3. Provide adjustable task chairs to help improve working posture.
4. Encourage frequent micro-breaks and stretching to minimize static postures.
5. Provide arm pads/rests to reduce awkward arm and shoulder postures and to minimize contact stress.
6. Cover the edges of the countertop with a soft gel or rubber padding.
7. Implement a count system that is computer based. This would prevent the need for a separate differential count machine, and allow MLT's to enter data directly into the computer system.

### **6. STKs Station**

Recommendations and Risk Controls:

1. Provide an adjustable task chair to help maintain good postures.
2. Make this a standing bench with a sit/stand stool, so staff can move their body without twisting or reaching.
3. Cover the edges of the countertop with a soft gel or rubber padding, to reduce the contact stress.
4. Provide an adjustable keyboard tray to move the keyboard off the countertop and increase the working space.
5. Move "take-off" area closer to the STKs analyzer.
6. Provide larger, colour monitors to reduce eyestrain.

## **7. Coagulation Station**

Recommendations and Risk Controls:

1. Move the computer to the right, so that employees are able to sit with adequate legroom and proper posture.
2. Cover the edges of the countertop with a soft gel or rubber padding.
3. Move the CA5000 to the same countertop as the MLA1000. This countertop is lower, and will reduce the awkward shoulder postures.
4. Provide anti-fatigue matting to reduce fatigue associated with long-duration standing.
5. Provide a sit-stand stool as an option to standing while working.
6. Provide a height adjustable bench.
7. Provide adjustable keyboard trays and adjustable video terminals.

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## Focus Group Results

The focus group was conducted at Victoria General Hospital on August 13th, 2002. In attendance were: Chris Engst (OHSAH), Justin LoChang (OHSAH), Deborah Cain (VGH), Gail Sutherland (VGH), Ken Kamsteeg (OH&S Advisor, Vancouver Island Health Authority), and several employee representatives from microbiology and core labs.

The purpose and objectives of the focus group was to:

- Inform staff about the progress of the ergonomic project;
- Discuss the major concerns and issues identified in the staff survey;
- Discuss the major concerns and issues identified from the ergonomic assessments of the various workstations;
- Discuss the various risk controls identified in the staff survey;
- Discuss the various risk controls developed from the ergonomic assessments;
- Prioritize the risk controls, and determine the next course of action with respect to implementation of the risk controls.

From the focus group, a prioritized list of the control measures was developed to assist VGH and OHSAH in directing the funding for the project. The following areas were identified as the highest priority departments:

1. Inspection bench re-design
2. Urinalysis microscope bench
3. Microscope station accessories (Core labs and Microbiology)
4. Beveled desktop edges and/or gel padding on edges
5. Reception / planting work surface re-organization
6. Anaerobic chamber
7. AX-7 computer area

## **Implemented Controls**

After receiving input from the focus group, the following ergonomic controls were chosen based on need, ease of implementation, and budgetary constraints:

1. Redesign of the inspection bench in the microbiology lab
2. Re-organization of the urinalysis area in core labs
3. Gel padding reduce contact stress from countertop edges
4. Installation of black countertops to the stools and blood culture benches in microbiology

After a 3-month trial of the above controls, evaluation and feedback from staff prompted the following modifications to the implemented risk controls:

5. Modifications to the castor and wheel alignment of the portable shelves for the inspection bench
6. Modifications to the setup of the urinalysis area
7. Modification of the gram stain bench in the microbiology lab
8. Working height reduction for the plate streaking machine in the Microbiology reception area

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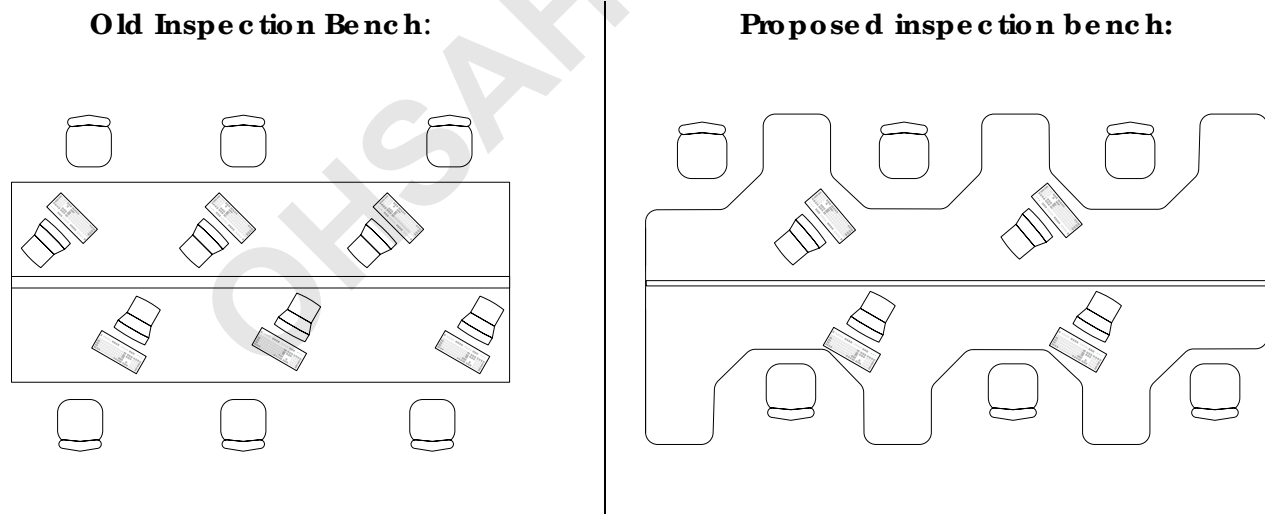
The following section describes the ergonomic changes in more detail:

### **1. Re-design of the Inspection Bench in the Microbiology Lab**

The inspection bench was deemed the most cost-effective control to implement in the microbiology lab, since six (6) MLT's work at the bench simultaneously per shift; thus improvements to the bench would affect the greatest number of employees. As well, the majority of concerns from staff involved the inspection bench or tasks that occur both at the inspection bench and somewhere else (e.g., computer use, microscopy).

The constraints on the design of the bench were challenging. The bench had built in electrical systems and gas outlets, which would be very expensive (more than the budget for the entire project) to move to another location; therefore, the base of the table had to remain in place. The bench could also not be expanded by more than ~ 1m on any of its four sides; otherwise it would encroach on other existing workstations.

A re-design of the bench was developed by VGH lab staff, the Plant Services department of VGH, and OHSAH. The proposed bench would remain rectangular in shape, but have curved extensions ("wings") to provide more working space. The top surface of the old bench would be removed and replaced with the re-designed version. This would allow the gas lines and electrical to remain in place. In addition to the curved extensions, portable storage shelves were modified with wheels and castors. These shelves could be pushed underneath the extensions of the benches when not in use. The tops of these shelves were also outfitted with the same black arborite as the lab benches, so they could be used as an extra working surface if required.





**Before Implementation**



Limited space to place Petri-dishes and other equipment



Crowded workstation, with limited working room

**After Implementation**



One of the “wings” of the new bench, and the portable storage shelf / work surface



More working space available for the MLT's



Staff utilizing the extension and portable shelf



Less crowded and congested workbench

***Evaluation:***

Verbal feedback from staff was very positive; the vast majority of the MLT's appreciated the additional room provided by the new bench and the portable shelves. Observations of staff noted a decrease in the amount of reaching and twisting of the back and neck. The workstations also appear to be less crowded and congested compared to the old inspection bench.

Areas of concern for the new bench include the limited space available for two people working at a single workstation (which occurs frequently while training students). Also, the new bench did not specifically address the issue of bending down to discard Petri-dishes in a box placed on the floor (some staff members have solved this issue by putting the discard box onto the portable shelves).

**Survey Results:**

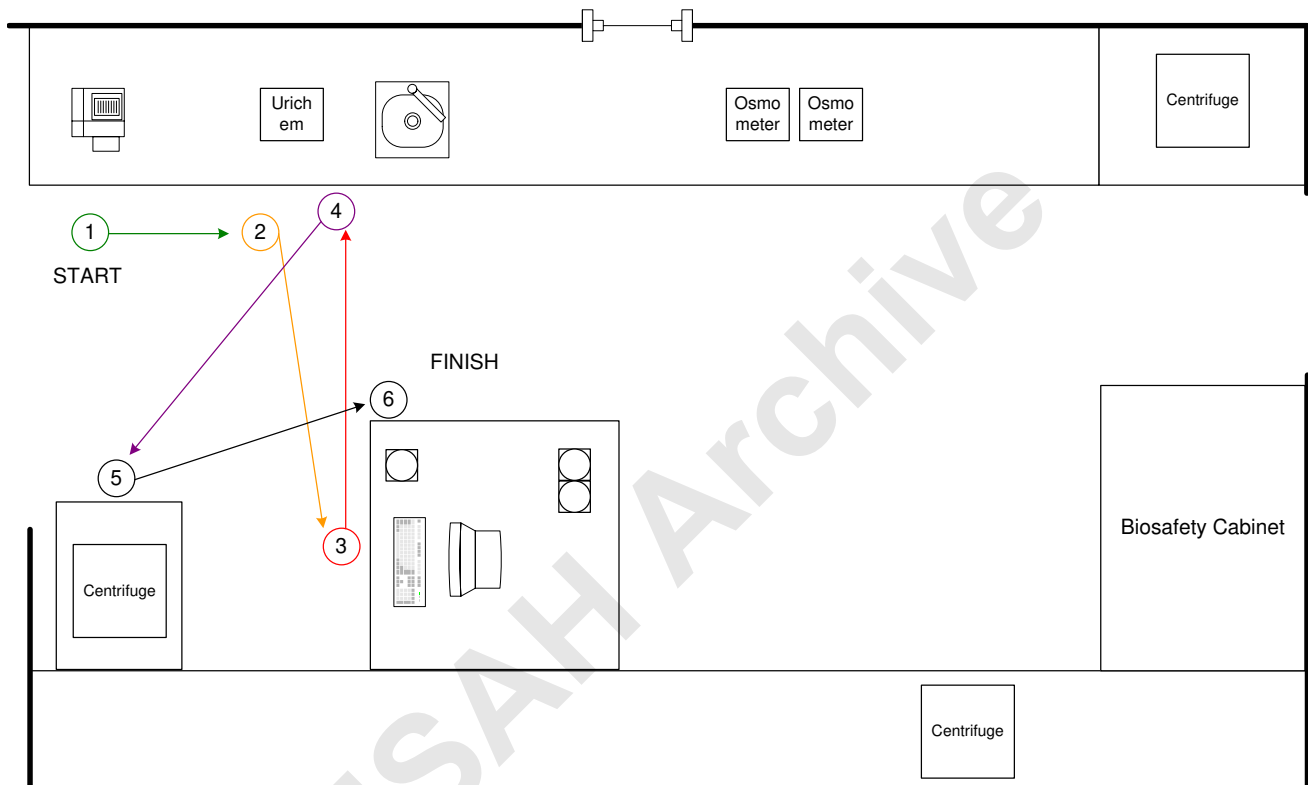
A survey was distributed, to gather subjective information about the new bench (appendix 1b). The results of the survey indicated that staff felt that the new bench provided more working room, and almost everyone preferred the new design over the old one. The movable drawers that can be used as an additional working surface was also well received. A full summary of the results can be found in appendix 3.

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## 2. Re-organization of the Urinalysis area

The main challenge for re-designing the urinalysis area was the limited working space in which multiple pieces of equipment had to be placed (computer, microscope, centrifuge etc.). A work-flow analysis indicated a lot of walking back and forth between stations, which was somewhat inefficient:

**Urinalysis drawing and work-flow diagram**



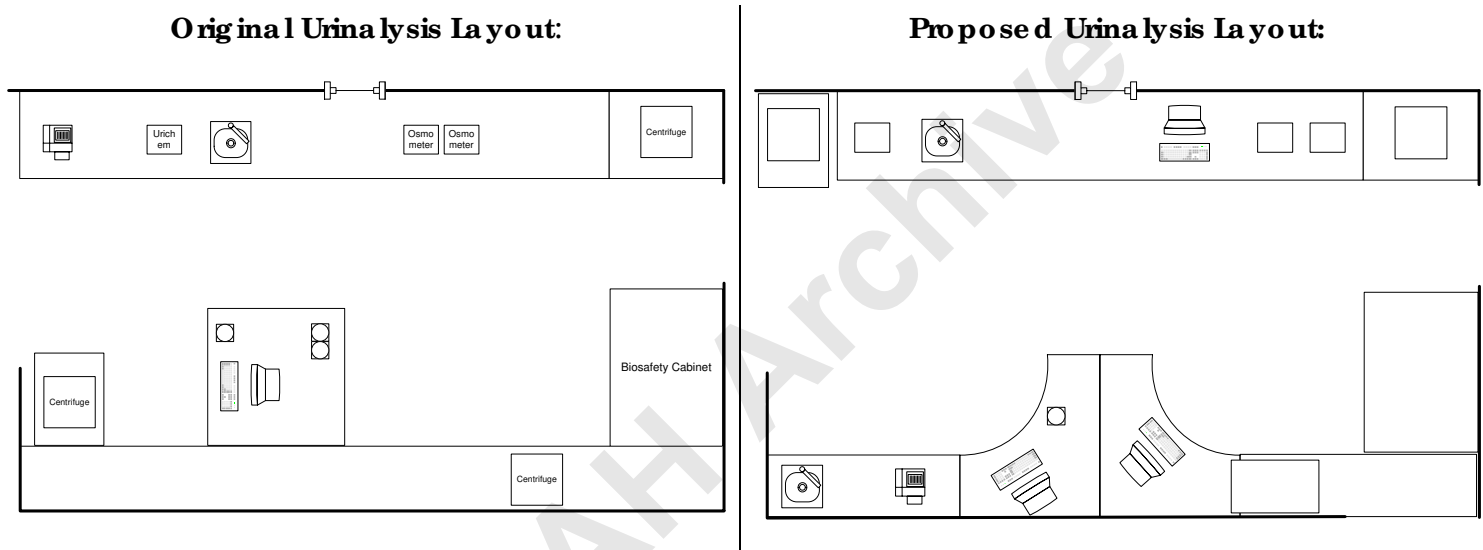
As can be seen in the diagram above, the MLT

- receives the sample
- logs the sample into the computer
- processes it in the urichem machine
- centrifuges the sample if microscopic analysis is required
- decants the sample at the sink
- analyzes the sample at the microscope
- inputs results into computer

After several discussions with core lab staff and management, any re-organization of the area should address the following concerns:

- Improve the work-flow
- Increase the amount of working space around the computer and microscope station
- Move the centrifuge away from the microscope, as the noise is distracting while trying to analyze samples
- Make the sink deeper to prevent splashes, and provide a second sink for hand washing

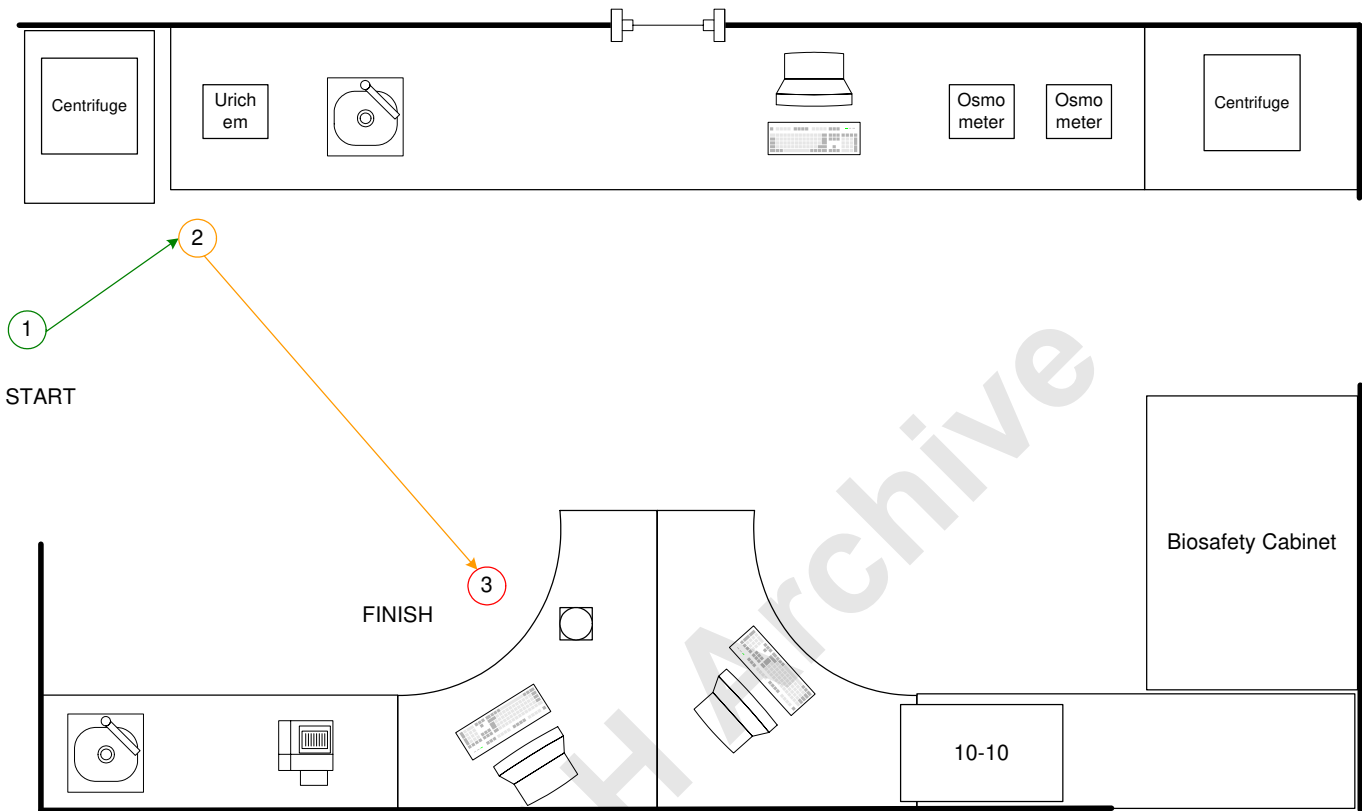
Several proposed designs were developed and reviewed by staff and management, and a final design was agreed upon by the majority:



- The end of the bench where the printer was located was cut away, and the centrifuge moved into the space. This had the added effect of opening access to a sink that was blocked from use by the centrifuge.
- The table containing the computer and microscope was removed
- The double-headed teaching microscope was taken away, to be stored in a different location
- The countertop was lowered to sitting height, and built with semi-circle extensions. This, in conjunction with the removal of the teaching microscope, provided more working room around the computer area
- The sink was adjusted, making it deeper, and an extra nozzle was added. The extra nozzle makes it quicker for MLT's to process samples in the sink
- A new machine (Elecsys 1010) was placed near the biosafety cabinet

A work-flow analysis of the new layout was conducted, and compared with the original setup:

**Work-Flow Diagram of Proposed Urinalysis Setup**



As can be seen from the above diagram, the flow of work is improved, with a reduction in the amount of walking between stations, as compared to the original setup. Staff can now process samples in the urichem machine, transfer to the centrifuge without having to walk, and then move to the computer and microscope. The centrifuge is now placed away from the computer and microscope, which reduces the noise while trying to analyze samples.

**Before Implementation**



The centrifuge on the right, and microscope table on the left



Centrifuge stored on a moveable table



Crowded workstation, with limited working room



The countertop opposite the microscope and computer station



The urichem machine on the far wall, next to the sink



Section of the countertop that was cut away, to make room for the centrifuge



Cart required to store supplies



Biosafety cabinet at the far side of the room



**After Implementation**



Curved bench with flat-screen computer terminal



Hand-washing sink now available for use, after moving centrifuge



New position for centrifuge



View of the urichem machine and sink



New (Elecsys) machine

***Evaluation***

After the initial implementation of changes in the urinalysis area, staff feedback revealed that further modifications were required. See the section on “modifications to the setup of the urinalysis area” below (pages 40-41) for more details.

### ***3. Gel padding to reduce contact stress from countertop edges***

Gel padding was purchased, to help minimize the contact stress experienced at many workstations throughout the labs. The main constraints of the padding were that it had to stand up to the chemical cleaning agents used in the lab, and had to be easy to apply to various countertops. The padding was applied to several countertops throughout the lab, on a trial basis.



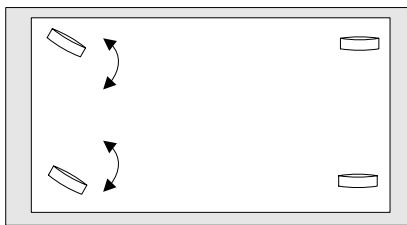
Shown above are examples of how the gel padding was used at the microscope stations. The padding was also used to wrap sharp corners in high traffic areas of the lab

### ***4. Installation of black countertops to the blood culture and stools benches***

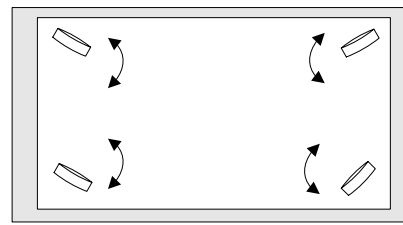
The countertops for the blood culture and stools bench were originally beige in colour. This made specimen inspection tasks difficult, due to the awkward contrast between the bench and the specimen plates. Both benches were replaced with black arborite.

### ***5. Modifications to the castor and wheel alignment of the portable shelves for the inspection bench***

When castors and wheels were initially fitted onto the portable shelves, they were arranged in a two-fixed / two-swivel configuration. This setup made it difficult for staff to move and turn the shelves, so they were re-modified so that all four wheels could swivel.



Two-swivel / Two-fixed wheel configuration



Four-swivel wheel configuration



## **6. Modifications to the setup of the Urinalysis area**

After the implementation of changes to the urinalysis area, staff feedback was obtained through informal interviews, reports from the lab managers/supervisors, and via a staff survey (see appendix 1c). The feedback resulted in a few modifications:

1. The end of the curved bench was extended by ~0.5m to further increase the working room on the countertop.
2. An extra computer terminal was placed opposite the microscope for the new Elecsys 1010 analyzer.
3. The bench where the Urichem machine sits was extended by placing a table next to the countertop. The centrifuge was replaced with a smaller unit that was placed on top of the table. This new centrifuge is small enough that it can be operated on the table without excessive reaching or awkward postures.

## **7. Modification of the Gram Stain bench in the microbiology lab**

The gram stain bench is composed of a rectangular countertop, with a computer terminal and microscope. The main issue with this bench is the lack of working space on the counter. To increase the available working area, a semi-circular addition was attached to the end of the bench.



The circular addition to the station

## **8. Working height reduction for the Plate Streaking machine in the Reception area**

A new plate streaking machine was placed in the reception area by the microbiology department. However, many staff had difficulty accessing the plate streaker, due to the height of the machine and the table it was placed upon. Based on staff feedback and suggestions, the plant services department

lowered a portion of the bench by ~8 inches. This will help minimize or prevent reaching above shoulder height to access the machine, for most staff members.



The height of the bench was adjusted, to lower the working height of the plate streaking machine

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## Conclusion

Ergonomic risk factors were identified in each station of the Microbiology and Core labs. The areas of greatest concern as determined through the ergonomic assessments, staff survey, interviews, and focus group were: the inspection bench (microbiology), microscope station (microbiology and core labs), sharp edges on countertops (microbiology and core labs), the accessions/planting station (microbiology), anaerobic chambers (microbiology), the urinalysis station (core lab) and the AX-7 analyzer station (core lab).

The following engineering controls were implemented through funding from the OHSAH Partnership Initiatives Program:

1. Redesign of the inspection bench
2. Redesign of the urinalysis area
3. Gel padding to soften bench top edges
4. Re-organization of the Microbiology reception area, including new monitor arm
5. Sit stand stool for Core AX-7 and Microbiology reception area
6. Anti-fatigue matting for anaerobic chambers, reception, and AX-7 area
7. Microscope ergonomic additions

The following administrative controls are recommended to help reduce the risk of musculoskeletal injury for staff:

1. Job / task rotation – this has already been established for most of the MLT and TA positions in both microbiology and core lab; it is recommended that this process continues indefinitely.
2. Continue to provide MSI prevention education, to keep staff aware of the risks of MSI and what can be done to prevent injury.
3. Encourage early reporting of signs and symptoms of MSI, so that problems can be detected and solved in the earliest stages.

It is recommended that the laboratory department and VGH continue to take a proactive approach to injury prevention, as was evident in this project. Staff and management should continue to collaborate to develop and evaluate solutions to any current or future concerns that arise.

## **Appendix 1: Definitions**

### ***Repetition***

A repetitive task is a task that uses the same muscles repeatedly. For example, using the Div counter during microscopy. The level of risk depends on the following variables:

- frequency of repetition
- time for rest or recovery
- speed of the motion or action
- muscle groups that are involved
- postures required
- amount of force required

### ***Awkward posture s***

Awkward posture occurs when the body has to work in a position that is not considered neutral. Neutral postures are those in which the muscles, tendons, and joints function optimally and require the least amount of effort to maintain. Awkward posture increases the amount of stress on muscles, tendons, ligaments, and joints and is of greatest concern when it is sustained for prolonged periods or combined with other risk factors. For example, examining slides while sitting at a microscope. What is considered awkward may be different for each body part.

### ***Static posture s***

Static posture is a body position that requires physical effort and is held for a prolonged period. The level of risk that static posture presents depends on the level of muscular exertion and the posture being held. For example, holding the neck static while using a microscope. If muscles do not have enough time to recover from the static posture, they may tire quickly.

### ***Forceful exertions***

Forceful exertion increases the body's energy demands and physically stresses the muscles, tendons, ligaments, and joints, which increases the risk of injury. The level of risk depends on the following variables:

- body parts that are used
- type of grip that is used (for example, a power grip or pinch grip)
- size, shape, and slipperiness of the object being handled
- posture
- type of activity
- temperature
- vibration
- duration of the task
- frequency of the task

***Contact stress***

Contact stress occurs when body parts come into contact with hard or sharp objects, for example, when kneeling on a hard floor or resting the wrists against a sharp table edge. Contact stress concentrates force on the underlying tissues and interferes with normal blood flow and nerve function. This can result in injury to tissues beneath the skin.

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## Appendix 2A: MSI Signs and Symptoms Survey

**1. Have you had any pain or discomfort *at work* during the last 12 months?**





YES

NO (If NO, skip to question 3 on page 3)

**2. Please complete the appropriate column(s) for each body part that bothers you:**

	Neck	Shoulder	Back
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> Upper <input type="checkbox"/> Lower <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>			
<b>Which job(s) or task(s) makes the discomfort worse?</b>			
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days

(Question # 2Continued)

	<b>Hand / Wrist</b>	<b>Elbow/Forearm</b>	<b>Leg</b>	<b>Ankle / Foot</b>
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column 
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>				
<b>Which job(s) or task(s) makes the discomfort worse?</b>				
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days	_____ days

Please answer the following questions regarding specific stations within the laboratory. If you do not work in a particular station, leave it blank and move onto the next question.

**3. Reception / Planting Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**4. Blood Culture Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**5. Clinical Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**6. Stools Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**7. Microscope Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**8. Anaerobic Chambers:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**9. Vitech Machine Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**10. TB / Mycology Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**11. Hepatitis Station:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**12. Office / QC Computer Workstations:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) What do you think could be done to prevent or minimize this pain or discomfort?

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**13. Inspection Bench:**

a) Are there any tasks that cause you pain or discomfort? If yes, please describe:

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b) Are there any specific workstations at the inspection bench that are more difficult or more uncomfortable to use than others? Please describe:

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c) What do you think could be done to prevent or minimize this pain or discomfort?

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**14. Please circle or fill in the following information:**

A) **Age** (in years): less than 19    19 – 29   30 – 39   40 – 49   50 – 59   60+

B) **Gender:**        Male                Female

C) **Department:** \_\_\_\_\_

D) **Job Classification:**    Laboratory Technologist        Technical Assistant

E) **Status:**            Full time            Part Time            Casual

F) **Do you work:**            Days                Nights                Mixed

G) **Shift Length (average):**        1 – 4 hrs            4 – 8 hrs            8 – 12 hrs

H) **Hours per week:** \_\_\_\_\_ hrs / week

I) **Years working at Victoria General Hospital:** \_\_\_\_\_ years

J) **Have you worked in another facility, performing the same or similar job?**  
If YES, for how many years? \_\_\_\_\_ years

**Comments:**

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## Appendix 2B: Inspection Bench Survey

Date \_\_\_\_\_(mm/dd/yy)

**1. Have you had any pain or discomfort *at work* during the last 6 months?**





YES

NO (If NO, skip to question 3 on page 3)

**2. Please complete the appropriate column(s) for each body part that bothers you:**

	Neck	Shoulder	Back
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> Upper <input type="checkbox"/> Lower <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>			
<b>Which job(s) or task(s) makes the discomfort worse?</b>			
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days

(Question # 2Continued)

	<b>Hand / Wrist</b>	<b>Elbow/Forearm</b>	<b>Leg</b>	<b>Ankle / Foot</b>
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>				
<b>Which job(s) or task(s) makes the discomfort worse?</b>				
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days	_____ days



**Comparing the ‘old’ inspection bench to the ‘new’ inspection bench....**

Indicate your answer for each of the questions below by circling the appropriate answer.

**3. Which bench design do you prefer?**

New Bench

Old Bench

Doesn't matter / No Difference

**4. Does the ‘new’ bench provide more *useable* working space compared to the ‘old’ bench?**

A lot more space      Moderately more space      A little bit more space      No Difference      A little bit less space      Moderately less space      A lot less space

**5. While working alone, does the ‘new’ bench provide enough leg room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room

**6. While working with a partner or training a student, does the ‘new’ bench provide enough leg room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room      I always work alone / Do not train students

**7. While working alone, does the ‘new’ bench provide enough elbow/arm room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room

**8. While working with a partner or training a student, does the ‘new’ bench provide enough elbow/arm room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room      I always work alone / Do not train students

9. On a scale of 1-10, rate how satisfied you are with the 'new' bench:

1      2      3      4      5      6      7      8      9      10

Not satisfied  → Very satisfied

10. What are the best features of the 'new' inspection bench?

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11. What improvements could be made to the 'new' inspection bench?

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12. Please provide any additional comments or concerns you would like to express. Remember, all responses will remain strictly confidential.

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**Please circle or fill in the following information:**

A) **Age:**    less than 19    19 – 29    30 – 39    40 – 49    50 – 59    60+

B) **Gender:**        Male            Female

C) **Status:**        Full time        Part Time        Casual

D) **Do you work:**        Days            Nights            Mixed

E) **Shift Length** (average):        1 – 4 hrs        4 – 8 hrs        8 – 12 hrs

F) **Hours per week:** \_\_\_\_\_ hrs / week

G) **Years working at Victoria General Hospital:** \_\_\_\_\_ years

H) **Have you worked in another facility, performing the same or similar job?**

    If YES, for how many years? \_\_\_\_\_ years

**Thank-you very much for your participation**

## Appendix 2C: Urinalysis Setup Evaluation Survey

**1. Have you had any pain or discomfort *at work* during the last 6 months?**





YES

NO (If NO, skip to question 3 on page 3)

**2. Please complete the appropriate column(s) for each body part that bothers you:**

	Neck	Shoulder	Back
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓	<input type="checkbox"/> Yes <input type="checkbox"/> No If YES, please complete this column ↓
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> Upper <input type="checkbox"/> Lower <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>			
<b>Which job(s) or task(s) makes the discomfort worse?</b>			
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (check one)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days

(Question # 2Continued)

	<b>Hand / Wrist</b>	<b>Elbow/Forearm</b>	<b>Leg</b>	<b>Ankle / Foot</b>
<b>At work, have you experienced discomfort for this body part?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 	<input type="checkbox"/> Yes <input type="checkbox"/> No If <b>YES</b> , please complete this column 
<b>Which side bothers you most?</b>	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both	<input type="checkbox"/> L <input type="checkbox"/> R <input type="checkbox"/> Both
<b>When did you first notice the discomfort?</b>	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)	_____ (mm/yy)
<b>How long does the discomfort usually last?</b>	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Less than 1 hr <input type="checkbox"/> 1 hr – 1 day <input type="checkbox"/> 1 day – 1 week <input type="checkbox"/> 1 week–1 month <input type="checkbox"/> 1 – 6 months <input type="checkbox"/> More than 6 mo.
<b>How often does the discomfort occur?</b>	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.	<input type="checkbox"/> Constant <input type="checkbox"/> Daily <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> Once a week <input type="checkbox"/> Once a month <input type="checkbox"/> Every 2-3 mo. <input type="checkbox"/> More than 6 mo.
<b>What do you think caused the discomfort?</b>				
<b>Which job(s) or task(s) makes the discomfort worse?</b>				
<b>Have you had this problem in the last 7 days?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>If YES, how would you rate this discomfort over the last 7 days? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>How would you rate this discomfort, on average, over the last year? (Circle number)</b>	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable	<input type="checkbox"/> = No discomfort <input type="checkbox"/> = Mild <input type="checkbox"/> = Moderate <input type="checkbox"/> = Severe <input type="checkbox"/> = Unbearable
<b>Have you had medical treatment for this discomfort?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Number of days of work lost in the last year due to this discomfort?</b>	_____ days	_____ days	_____ days	_____ days

**Comparing the ‘old’ urinalysis bench to the ‘new’ urinalysis bench....**

Indicate your answer for each of the questions below by circling the appropriate answer.

**3. Which bench design do you prefer?**

New Bench

Old Bench

Doesn't matter / No Difference

**4. Does the ‘new’ bench provide more *useable* working space compared to the ‘old’ bench?**

A lot more space      Moderately more space      A little bit more space      No Difference      A little bit less space      Moderately less space      A lot less space

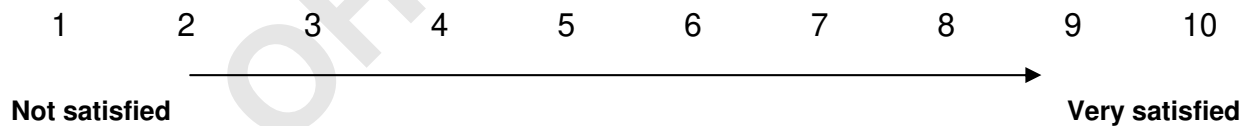
**5. Does the ‘new’ bench provide enough leg room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room

**6. Does the ‘new’ bench provide enough elbow/arm room compared to the ‘old’ bench?**

A lot more room      Moderately more room      A little bit more room      No Difference      A little bit less room      Moderately less room      A lot less room

**7. On a scale of 1-10, rate how satisfied you are with the ‘new’ bench:**



**8. What are the best features of the ‘new’ urinalysis bench?**

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**9. What improvements could be made to the 'new' urinalysis bench?**

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**Comparing the 'old' urichem and centrifuge setup to the 'new' setup....**

Indicate your answer for each of the questions below by circling the appropriate answer.

**10. Which setup/design do you prefer?**

New setup

Old setup

Doesn't matter / No Difference

**11. Does the 'new' setup provide more *useable* working space compared to the 'old' setup?**

A lot more space

Moderately more space

A little bit more space

No Difference

A little bit less space

Moderately less space

A lot less space

**12. Does the 'new' setup reduce the walking back and forth between stations compared to the 'old' setup?**

A lot less walking

Moderately less walking

A little bit less walking

No Difference

A little more walking

Moderately more walking

A lot more walking

**13. On a scale of 1-10, rate how satisfied you are with the 'new' setup:**

1      2      3      4      5      6      7      8      9      10

Not satisfied

Very satisfied

**14. On a scale of 1-10, rate how satisfied you are with the sink next to the urichem machine:**

1      2      3      4      5      6      7      8      9      10

Not satisfied

Very satisfied

**15. On a scale of 1-10, rate how satisfied you are with the handwashing sink across from the centrifuge:**

1      2      3      4      5      6      7      8      9      10

Not satisfied  → Very satisfied

**16. What are the best features of the 'new' urinalysis setup?**

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**17. What improvements could be made to the 'new' urinalysis setup?**

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**18. Please provide any additional comments or concerns you would like to express. Remember, all responses will remain strictly confidential.**

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**Please circle or fill in the following information:**

A) **Age:**    less than 19    19 – 29    30 – 39    40 – 49    50 – 59    60+

B) **Gender:**        Male                  Female

C) **Status:**        Full time        Part Time        Casual

D) **Do you work:**        Days                  Nights                  Mixed

E) **Shift Length** (average): 1 – 4 hrs        4 – 8 hrs        8 – 12 hrs

F) **Hours per week:** \_\_\_\_\_ hrs / week

G) **Years working at Victoria General Hospital:** \_\_\_\_\_ years

H) **Have you worked in another facility, performing the same or similar job?**

    If YES, for how many years? \_\_\_\_\_ years

**Thank-you very much for your participation**

## Appendix 3: Task Chairs and Sit/ Stand Stools

### *Seated Tasks:*

For tasks that require the employee to be seated (e.g., microscope use and inspection tasks), the chair should have the following properties:

- Adjustable seat height;
- Adjustable back tilt;
- An option for adjustable arm rests (not essential);
- 5-star castor arrangement (as required by the WCB of BC);
- Castors suitable for the floor surface (i.e., plastic castors for carpets, metal castors for hard floors);
- Locking mechanisms for the wheels on chairs that require strict immobilization (i.e., for high concentration tasks or inspection tasks, it is beneficial if the task chair does not shift or move while working).



Shown above is an example of an adjustable chair for general office or lab use.



Shown above is an example of an adjustable chair for tall workstations, and those that require wheel immobilization.

***Sit/ Stand Tasks:***

For tasks that require both sitting and standing (i.e., biosafety cabinet work, or work that requires movement to multiple areas), a sit/stand stool is an option. The stools allow the employee to rest against a comfortable surface and maintain a good working posture while completing tasks. The sit/stand stool should have the following properties:

- Adjustable seat height;
- Adjustable, tilted seat pan to allow good working postures;
- Stable castors.



Shown to the left and right are two examples of adjustable sit/stand stools.



## Appendix 4: Inspection Bench Survey Results

**Which bench design do you prefer?**

<i>New Bench</i>	<i>Old Bench</i>	<i>Doesn't matter / No Difference</i>
<b>10 (91%)</b>	<b>0</b>	<b>1 (9%)</b>

**Does the 'new' bench provide more useable working space compared to the 'old' bench?**

<i>A lot more space</i>	<i>Moderately more space</i>	<i>A little bit more space</i>	<i>No Difference</i>	<i>A little bit less space</i>	<i>Moderately less space</i>	<i>A lot less space</i>
<b>3 (27%)</b>	<b>7 (64%)</b>	<b>1 (9%)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**While working alone, does the 'new' bench provide enough leg room compared to the 'old' bench?**

<i>A lot more room</i>	<i>Moderately more room</i>	<i>A little bit more room</i>	<i>No Difference</i>	<i>A little bit less room</i>	<i>Moderately less room</i>	<i>A lot less room</i>
<b>0</b>	<b>2 (18%)</b>	<b>2 (18%)</b>	<b>7 (64%)</b>	<b>0</b>	<b>0</b>	<b>0</b>

**While working with a partner or training a student, does the 'new' bench provide enough leg room compared to the 'old' bench?**

<i>A lot more room</i>	<i>Moderately more room</i>	<i>A little bit more room</i>	<i>No Difference</i>	<i>A little bit less room</i>	<i>Moderately less room</i>	<i>A lot less room</i>	<i>I always work alone / Do not train students</i>
<b>0</b>	<b>0</b>	<b>1 (9%)</b>	<b>2 (27%)</b>	<b>3 (18%)</b>	<b>2 (18%)</b>	<b>0</b>	<b>1 (9%)</b>

**While working alone, does the 'new' bench provide enough elbow/arm room compared to the 'old' bench?**

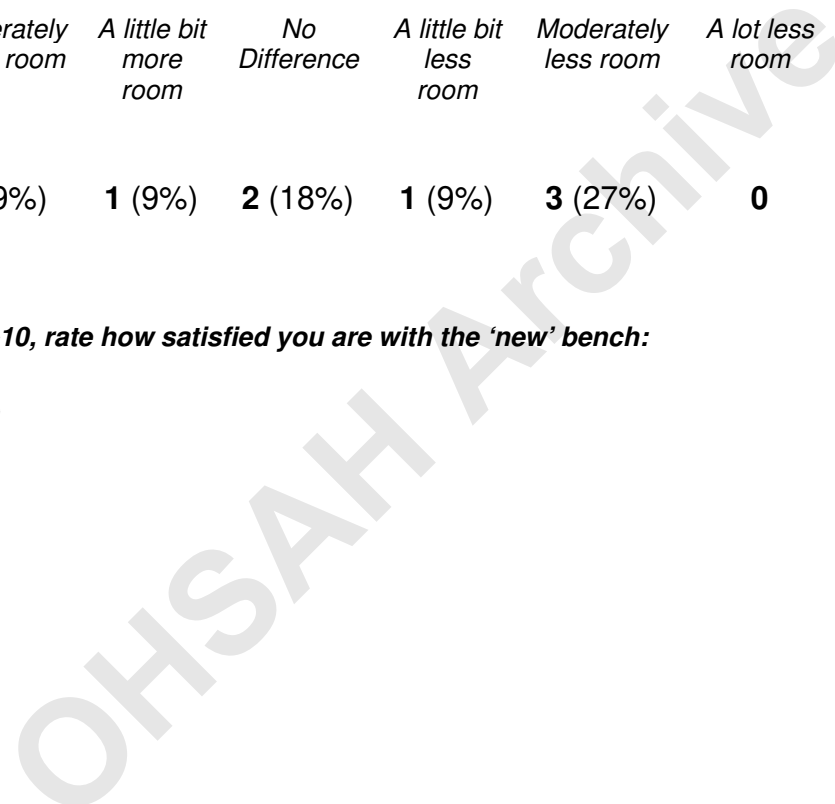
<i>A lot more room</i>	<i>Moderately more room</i>	<i>A little bit more room</i>	<i>No Difference</i>	<i>A little bit less room</i>	<i>Moderately less room</i>	<i>A lot less room</i>
2 (18%)	5 (46%)	1 (9%)	3 (27%)	0	0	0

**While working with a partner or training a student, does the 'new' bench provide enough elbow/arm room compared to the 'old' bench?**

<i>A lot more room</i>	<i>Moderately more room</i>	<i>A little bit more room</i>	<i>No Difference</i>	<i>A little bit less room</i>	<i>Moderately less room</i>	<i>A lot less room</i>	<i>I always work alone / Do not train students</i>
0	1 (9%)	1 (9%)	2 (18%)	1 (9%)	3 (27%)	0	1 (9%)

**On a scale of 1-10, rate how satisfied you are with the 'new' bench:**

Average: 7.45



## **ABOUT THIS DOCUMENT**

The Occupational Health and Safety Agency for Healthcare (OHSAH), which operated from 1998-2010, was a precursor to SWITCH BC. Conceived through the Public Sector Accord on Occupational Health and Safety as a response to high rates of workplace injury, illness, and time loss in the health sector, OHSAH was built on the values of bipartite collaboration, evidence-based decision making, and integrated approaches.

This archival research material was created by OHSAH, shared here as archival reference materials, to support ongoing research and development of best practices, and as a thanks to the organization's members who completed the work.

**If you have any questions about the materials, please email [hello@switchbc.ca](mailto:hello@switchbc.ca) or visit [www.switchbc.ca](http://www.switchbc.ca)**