Public Health Committee Discussion Paper

Title: Sectional Update (Pathology)

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Author: Geoffrey Benjamin (Senior Biomedical Scientist)

What is Biomedical Science?

Biomedical Science is a biology and chemistry related discipline used mostly in healthcare laboratories to identify, research, monitor and treat diseases. As one of the broadest areas of modern science, it is constantly advancing, and underpins much of modern medicine. Based largely in laboratories, biomedical science focuses on the complexity of the human body, how cells, organs and systems function as well as investigating how disease and medicine affect them. If you have ever had a urine, blood, tissue or other sample taken by a doctor or nurse, chances are it will have been diagnosed by a biomedical scientist.

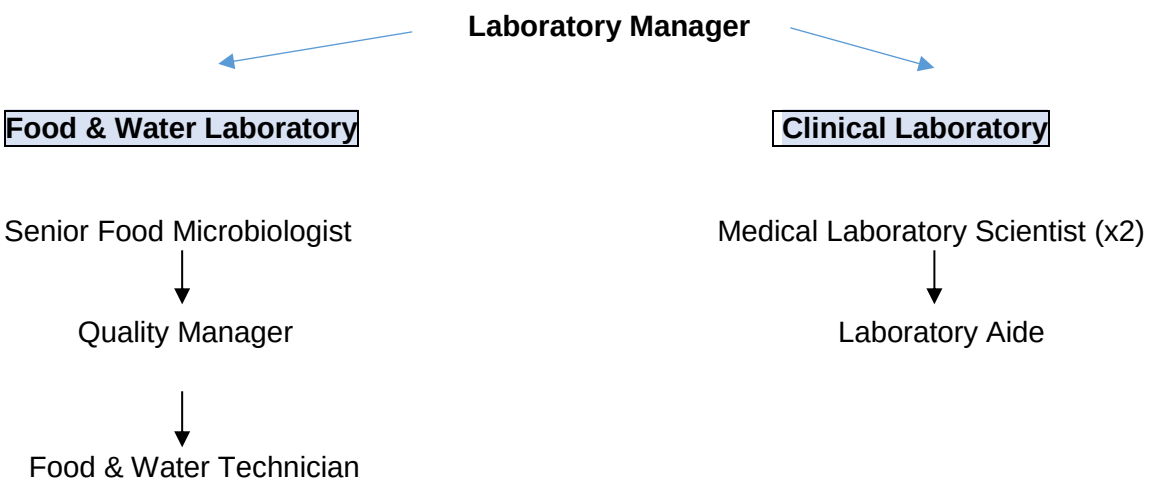
At the Heart of Healthcare

Biomedical scientists are central to the healthcare industry attributing to the health and wellbeing of the nation from cradle to the grave. Despite making up less than 1% of the workforce on St. Helena, 70% of all diagnoses are attributed to the work of biomedical scientists. Around 8000 requests are received and up to 95,000 test results are generated annually.

The Pathology Department performs two major functions:

- Provides a clinical service to the Medical Staff in order to diagnose, treat and monitor various illnesses and diseases.

- Provides Public Health diagnostic and surveillance services to the Environmental Health section and other stakeholders.



The St Helena Laboratory is a uniquely multidisciplinary unit and encompasses all of the following disciplines:

BLOOD SCIENCES

In blood science, biomedical scientists collect blood samples to diagnose disease or ensure that a donor's blood is matched with the patient receiving it. There are four disciplines in blood science:

Clinical Chemistry – is the analysis of blood and other biological fluids to help the diagnosis of diseases, such as diabetes. Clinical chemists also carry out toxicological studies, text kidney and liver functions and help to monitor therapies.

Haematology – is the study of blood. In this discipline, haematologists investigate the formation, composition, function and diseases of blood. Some of the diseases diagnosed in haematology are leukaemia, malaria and anaemia.

Immunology – deals with the conditions of the body's immune system and its role in infectious diseases, parasitic infestations, allergies, tumour growth, tissue grafts and organ transplants. It is particularly important in the monitoring and treatment of AIDS, autoimmune conditions and allergies.

Transfusion – is a science that identifies blood groups for blood donation, ensures the correct grouped blood is matched to the patient due to receive the donation and makes sure blood stocks are adequate for critical incidents such as road traffic accidents, operations and cancer treatments.

CELL SCIENCES

Cytology – is best known for its work in screening cervical smears, but it also provides a non-gynaecological service investigating cellular components in samples, such as sputum. Like cellular pathology, specialised techniques are used to prepare and study samples of cellular materials.

Histopathology – also known as Cellular Pathology, is the microscopical study of tissue samples, taken during surgery or at post mortem, to establish the cause of disease. Diseases such as cancer are diagnosed by looking for abnormal features in tissue and cells.

INFECTION SCIENCES

Infection sciences focus on the study of bacteria, fungi, parasites and viruses that attack the body, causing infections and diseases.

Medical Microbiology – Medical microbiologists study micro-organisms such as bacteria, fungi and parasites which cause disease. They identify organisms and establish the antibiotic treatment required to kill them. Diseases diagnosed include: meningitis, tuberculosis and food poisoning.

Virology –- Virologists study viruses and diseases caused by them, such as German measles, HIV and chickenpox. They are also involved in monitoring the effects of vaccines.

Molecular Pathology – Biomedical scientists working in this sphere study and diagnose diseases by examining tissues and fluids at molecular level, such as DNA, RNA and protein. DNA (also known as genes) act as templates in the production of RNA, which acts as a template for the production of protein. As well as studying and diagnosing diseases, molecular pathologists advise on the treatment and prevention of them.

PHLEBOTOMY

Phlebotomists collect blood for donation or for testing, so the blood can be analyzed in a clinical laboratory. Blood tests are used to diagnose illness, evaluate the effectiveness of medications and determine whether a patient is receiving proper nutrition. The phlebotomist must ensure that all equipment is properly sanitized before it is used to collect blood. Accurate labelling, proper storage and careful transport are key responsibilities. Misidentification or contamination of a blood sample can have serious consequences as medical professionals rely on blood test results to diagnose patients and monitor treatment progress. The phlebotomist must also observe strict safety protocols to avoid direct contact with the blood. Many infectious diseases, including HIV and hepatitis, can be transmitted through blood contact. The slightest distraction can lead to a "needle-stick" injury and possible infection.

REFERRALS

Tests which are very specialised, or not cost effective on island are referred to off-shore laboratories. It is important that all specimens are accounted for, packed and transported appropriately. There is also the need to receive, record and distribute results to the doctor in a timely fashion in order that patients are treated promptly.

ON-CALL SERVICES

The Laboratory runs a 24 hour service for emergencies outside of normal working hours.

PUBLIC HEALTH (FOOD, WATER & ENVIRONMENT)

The Food, Water and Environmental (FW&E) Microbiology Services are specialist microbiology laboratories in order to protect the public from microbiological threats posed by contaminated food, water and the environment.

Our laboratory is equipped to carry out a range of specialist microbiological tests on food, water and environmental samples. This work provides essential support in, for example, the investigation of outbreaks of food poisoning or Legionnaires' disease. Specialist testing can also be used to ensure the microbiological quality of food and water samples and to check on a regular basis that they are safe for human consumption. Our laboratory works closely with Environmental Health colleagues to provide a comprehensive service to the local population. The Food & Water laboratory is accredited through the United Kingdom Accreditation Service (UKAS) to ISO 17025.

ISO 17025 – is a quality management system and the main standard for testing and calibration laboratories. It shares many commonalities with ISO 9000 but evaluates the technical competence in laboratory testing and calibration services and applies to organizations that produce testing and calibration results.

To achieve ISO 17025 accreditation, the laboratory's quality management system and technical competence is evaluated thoroughly by a third-party. Audits are conducted on a regular basis to maintain accreditation, which can only be granted by an authorized accreditation body. Accreditation essentially means that the laboratory has met both the Management and Technical Requirements of ISO17025 and is deemed technically competent to produce calibration and testing results.

ISO 17025 Accreditation proves a laboratory has an acceptable quality management system in place and has the ability and competence to provide testing and calibration results. Accredited labs perform tests against international standards (ISO 17025) and results are mutually acceptable between different governmental and regulatory organizations.

The Health Directorate's Public Health Laboratory can provide the following services:

- **Testing:** A wide range of accredited specialist microbiology tests on food, dairy, water and environmental samples.

- **Advice:** Expert advice concerning the threat to health from pathogens found in food, water and dairy products and how these can be tested for and controlled.

- **Training:** Training to staff from external stakeholder organisations such as Local Authorities.

- **Evidence:** Results from tests and interpretation are used as evidence for prosecutions in food poisoning outbreaks.

- **Information:** Results from public health investigations. Local and national surveys provide authorities with a wide picture of changes which may affect public health such as effects of new food practices and effects of legislation.

Other agencies who use our services are:

- **Police Directorate** – For analysing alcohol levels in cases of driving under the influence. The Governor in Council appoints Approved Analysts.

- **Veterinary Department** – Samples are analysed to diagnose diseases in various animals.

- **Connect Saint Helena** – Water samples, treated and un-treated, are analysed on a weekly basis for microbiological content. Chemical testing is also carried out.

- **St Helena Fisheries Corporation** – All fish which is sold is batch tested in the Public Health Laboratory. Chemical testing such as histamine is also carried out.

QUALITY ASSURANCE

How do we know that we are producing the correct results?
The clinical laboratory runs an internal quality assurance program. Reference materials with known values are purchased from appropriate companies. These reference materials are run daily with all laboratory machines to determine if the correct results are being produced. Only then are patient samples analysed. Tests which fall outside of reference ranges are recalibrated with specific calibration materials to ensure the quality of results.

Reference materials are also employed across other disciplines to ensure validity of results. The Food and Water Laboratory also participates in an External Quality Assurance Scheme whereby samples are received and subsequently analysed on a monthly basis, for the complete range of pathogens. Findings are submitted to Public Health England who in turn review these results, along with those from other participating labs and subsequently score the St Helena Laboratory against these.

CHALLENGES

- **Budget Constraints**: Medical equipment and test kits are very expensive, and there is pressure to produce more from less! Year on year we are requested to reduce our budget. The number of doctors have increased, the number of patients seen have increased, thereby increasing the number of laboratory tests required. Equipment, test kits and consumables increase in price yearly. There is minimal scope for any reduction except to cut some services which we now provide, and there is little scope in this current financial climate to improve our diagnostic capabilities.

- **Equipment** - Lab equipment has a lifespan of 8 – 10 years. It is difficult obtaining funding to replace equipment, especially when competing with other sectors for a finite amount of money.

- **Extended Range of Testing** – Obtaining equipment/ test kits to perform more tests on island requires financial backing. With the implementation of the new Food Safety Regulations there is a requirement from agencies such as Environmental Health to extend our scope of tests and to perform more analysis. This cannot be entertained at present.

- **Biomedical Engineer** – Whilst there is an annual visit from an Engineer to service laboratory equipment, there is no resident Biomedical Engineer. Therefore equipment has to be repaired by the Lab Scientists or by telephone conversations with the off-shore engineers. This can lead to long 'down times' for some equipment if the problem cannot be easily solved, and replacement parts take time to reach the Island.

- **Staff Retention** – The medical laboratory scientists are a very small highly specialised group. Recruiting a Biomedical Scientist for St Helena has proven to be extremely difficult and understandably so as the medical sciences are diverse and qualified Biomedical Scientists in today's world specialise in specific areas. For St Helena these Staff are required to be able to work across all of the specialties. The work of Laboratory Scientists is critical to the medical services. Salary for these posts on St Helena is very low and unless this changes it is unlikely that the laboratories will be able to retain staff and the need to TC posts will increase.

- **Resupply** – This presents a difficult balancing act as there is no guarantee that supplies will arrive on time. If it misses one ship there is a long wait for another. There is also the problem of either running out, or having too much and wasting materials when they reach their expiry date.

- **Information Technology** – Slow internet speed and inability to access various sites which are essential to the work of the laboratory, has an impact on training and CPD for the staff and research as required, both during and outside of normal working hours.

Geoff Benjamin
Senior Biomedical Scientist/Lab Manager
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