1. INTRODUCTION

1.1 a) This document describes the specific requirements for clinical haematology laboratory before they can be accredited.

b) This document shall be studied in conjunction with ISO15189 Medical laboratories – Particular requirements for quality and competence., other Medical Series Technical Notes published by PNAC-MLAS (such as G-23/01) and Guidance Notes such as "ISO 15190 Medical Laboratories –Requirements for Safety".

2. GENERAL TECHNICAL NOTE: MEDICAL G-23/01

2.1 Please refer to **General Technical Note: Medical-G-23/01** for the following:

- PERSONNEL
- COLLECTION AND HANDLING OF SPECIMENS
- PHYSICAL FACILITIES
- REAGENTS
- REFERENCE MATERIALS
- REQUISITIONS TEST METHODS AND METHOD VALIDATION
- MAINTENANCE OF EQUIPMENT
- CALIBRATION OF EQUIPMENT
- QUALITY CONTROL AND PROFICIENCY TESTING
- LABORATORY SAFETY
- RETAINED SAMPLES
- WASTE DISPOSAL
- REPORTING OF RESULTS

3. HAEMATOLOGY

3.1 AUTOMATED BLOOD CELL COUNTING

3.1.1 The laboratory shall have a written, detailed procedure for calibration of automated instruments including indications from the quality control system for when calibration is needed.

3.1.2 Calibration techniques shall include the use of fresh whole blood specimens or stabilized commercial preparations.

Note: Assignment of values to calibrators either by primary reference

methods or by verification of manufacturers'assigned values is essential to obtaining accurate results.

3.1.3 Where non-adjustable, precalibrated instruments are used, calibration must be verified with appropriate control materials.
Note: Commercial materials marketed as controls may lack the careful value ssignments of those sold as calibrators.

3.1.4 Procedures for daily control shall include any combination of the following three approaches, with tolerance limits defined:

a. Processing of stabilized commercial control materials. Two different concentrations (ie normal and high) are required on each shift of patient testing. The laboratory shall plot standard Levy - Jennings graphs with control limits and applies at least some Westgard multi-rule criteria for determining if results are analytically acceptable. There is no requirement for three control levels and dilute low particle concentration controls are discouraged.

Note: It is important for the laboratory not to confuse package insert values for expected recovery range with + 2 S.D limits based on their own instrument's between day imprecision.

b. Periodic reanalysis of at least two retained patient specimens is required. These shall be run in each shift if stabilized control material is not run.
Note: Standard deviation of duplicate pairs is an appropriate statistical approach to data evaluation.

c. Moving average algorithm for erythrocyte indices and other parameters may be used. The laboratory shall set limits that are sensitive to significant alterations in calibration status but insensitive to minor fluctuations in patient population values.

3.1.5 Fluids used with blood cell counting instruments shall be periodically checked for contamination by performing background counts on the instrument. Appropriate count correction procedures shall be present as nucleated erythrocytes and blood megakaryocytes may have an additive effect on the instrument leukocyte count.

3.1.6 There also shall be protocols for common interference that may affect the accuracy of complete Blood Count data, such as lipemia, in-vitro hemolysis, microclots, cold agglutinin rouleaux, etc. Patients results that exceed laboratory defined reportable limits shall be verified (e.g. cytopenic samples shall be checked against haemocytometry or blood film estimates) and

documented.

3.2 MANUAL COMPLETE BLOOD COUNT METHODS

3.2.1 Where haemoglobin is quantified manually, at least four concentrations must be used to construct a calibration curve. Patient sample dilutions shall be checked for turbidity.

3.2.2 For microhaematocrits (packed cell volumes), packing studies shall be initially performed and then repeated when there is a change in the centrifuge timer or speed.

3.2.3 Where manual haemocytometry (WBC or Platelets) is performed, the laboratory shall carry out at least one cell count control during each shift of patient testing. Alternatively, a procedural control such as previously assayed patient sample or comparison with a blood film estimate shall be used.
Note: Because of the higher imprecision of chamber counts, the area sampled must be increased for cytopenic samples.

3.3 AUTOMATED DIFFERENTIAL COUNTERS

3.3.1 These instruments shall be carefully evaluated against prior patient-testing methods before being placed in service.

3.3.2 Quality control options include periodic comparisons with;
I. manual differentials or II. processing of commercial control materials with at least two different classes of leukocytes or WBC surrogates.

3.3.3 The laboratory shall have written criteria for checking and reviewing leukocyte differential counter, histograms and /or blood smears which have clinically important results flagged by the automated counter.

3.4 MANUAL BLOOD FILMS

3.4.1 There shall be written criteria for review of blood films with specified abnormalities by the laboratory head or qualified designee in haematomorphology.

3.4.2 The laboratory shall have a system that ensures that all personnel report microscopic morphology in a similar fashion.

Note : Suggested methods to accomplish this include:
I. Circulation of blood films with defined leukocyte differential distributions

and specific qualitative abnormalities of each class of cells, and /or
II. multi-headed microscopy, and /or
III. use of blood or bone marrow photomicrographs with referee and consensus identifications.

3.5 AUTOMATED RETICULOCYTES

3.5.1 Flow cytometric systems which are not using commercial kits traceable to International standards or validation protocol (e.g. FDA, NIST, etc.) shall have documented evaluation studies done on the strength and stability of the fluorescent dye binding to RNA or DNA-RNA. The laboratory shall have precision data for its automated method, based on analysis of commercial controls or comparison with manual methods. The laboratory shall have written policies and procedures for identifying samples that may give erroneous results due to interferences (e.g. Howell-Jolly bodies, nucleated RBCs, basophilic stippling, macrothrombocytes).

3.6 MANUAL RETICULOCYTES

3.6.1 To reduce imprecision of microscopic enumeration, the reported reticulocyte concentration shall be based on a minimum sample size of 1,000 red cells.

3.7 BONE MARROW PREPARATIONS

3.7.1 If fixed tissue sections and aspirates are independently evaluated by different sections of the laboratory, there shall be written policies of procedures to compare data and interpretations before reports are released by pathologists or qualified hematologists. To assess technical adequacy, bone marrow slides for routine and cytochemical stains shall be reviewed.

3.8 ABNORMAL HAMOGLOBIN DETECTION

3.8.1 If the laboratory uses alkaline cellulose acetate or isoelectric focusing as a separatory technique, solubility testing, acid agar electrophoresis, and/or HPLC, or any other tests as appropriate shall verify all abnormal bands.
Note: It is emphasized that solubility ("sickle") testing alone is not appropriate as a stand-alone test forhaemoglobinopathy screening or evaluation.

3.9 BODY FLUIDS

3.9.1 There shall be a system for dealing with partially clotted specimens, cell clumps, or debris noted during hemocytometry or automated counting.

3.9.2 For instrument counts, the laboratory shall have documented procedures of linearity studies and defined lower limits below which instrument counts are not reliable.

3.9.3 For blood film morphology, there shall be a written policy and personnel with written policy to ensure consistency of morphologic classification when multiple personnel are responsible for smear examination. Note: Differentials shall always be performed on stained preparations, and use of cytocentrifuge is strongly recommended.

3.9.4 Body fluid preparations with suspected malignant cells shall be reviewed by a pathologist or other qualified physician shall review.

4. COAGULATION TESTS

4.1 If the laboratory is located within a hospital, there shall be sufficient list of tests available for routine and emergency testing. This may not apply to non-hospital laboratories.
Note: The tests available in a hospital location must be able to detect, evaluate, and monitor the progress and therapy of the common disorders of coagulation.

4.2 The test shall reflect coagulation factor deficiency, coagulation factor inhibitors, accelerated fibrin (ogen) olysis and the monitoring of anticoagulant therapy. Patient results shall be reported with the accompanying reference ranges.

4.3 Appropriate control (at least two levels) shall be performed for all procedures. If factor assays are performed, the technical assessor shall examine sample assay data to determine that appropriate calibration points and dilutions of patient plasma are routinely used.

5. TRANSFUSION SERVICES

5.1 The goal of the transfusion service shall be safe transfusion of effective blood products to the patient. There should be a comprehensive and coordinated quality assurance programme in place which should include
I. measures to significantly decrease errors,
II. ensure credibility of test results,
III. implement process and system controls and
IV. ensure continued product safety and quality.

5.2 There shall be written procedure manuals on handling of specimens, preparation, reagents and controls, maintenance of instruments, and

verification and documentation of reagent performance.

5.3 All blood typing and compatibility procedures shall be followed in accordance with the procedures authorised by the procedure manual of the laboratory.

5.4 Transfusion and apheresis services provided by the laboratory shall follow authorized procedures with the particular emphasis on patient identification and blood component administration procedures.

5.5 Blood and blood component records shall be documented and traceable from source to final disposition. It shall have identification and traceability for every unit, including quarantine, ultimate disposition, wastage, incineration and other records. For transfusion services, it shall record and retain the identity the patient receiving a given unit.

5.6 Records of regular maintenance and monitoring of equipment including blood storage refrigerators shall be documented and monitored. Storage facilities for blood and blood components shall have a system to monitor the temperature continuously; this shall include an alarm system.

5.7 If donors are drawn and/or units are processed at the facility then there shall be written polices and procedures to be followed for
I. the donor interview and selection,
II. the phlebotomy procedure
III. storage,
IV. release and quarantine procedures.

5.8 Blood and blood components shall be managed appropriately including handling, storage and transport conditions as detailed by the procedure manual of the laboratory. If blood components are prepared, a system must be in place to ensure that blood component specifications are met.

5.9 There shall be adequate and appropriate documentation of procedures if infectious disease testing is done in the premises, regardless of where in the facility this is performed. Results not satisfying specified acceptance criteria shall be clearly identified to ensure that blood components are held from release.

5.10 There shall be a system of quarantine for blood components to ensure that they cannot be released for issue until all the specifications for collection, processing, handling and testing have been met.

5.11 If the laboratory is computerized, there shall be adequate documentation of system development, implementation, validation, operations and

modifications.

6. HISTOCOMPATIBILITY

6.1 The emphasis on this section is on proper procedure in specimen handling, and preparation of reagents and controls with verification and documentation of reagent performance.

6.2 Quality control requirements are similar to those in chemistry and diagnostic immunology in regard to procedure manuals and instrument maintenance.