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Canadian Workload Measurement System — Laboratory

A Schedule of Unit Values for Clinical Laboratory Procedures

1982-83 Edition

Please use this manual
until there are sufficient amendments
to justify a new edition.

Canada

Statistics Canada

Health Division

Institutional Statistics Section

Canadian Workload Measurement System - Laboratory.

A Schedule Of Unit Values For Clinical Laboratory Procedures

1982-83 Edition

Note: The clinical chemistry section has been significantly revised. See explanatory text.

Procedure modifications in all sections are identified by asterisks *.

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Procedures	Section	Code Number
Stains		
Elastic Tissue	Histo	04563
Enzymes	Histo	04566
Fat (Neutral Fat)	Histo	04850
Fatty Acids	Histo	04852
Fungus Gridley's	Histo	04577
Fungus (Methenamine Silver)	Histo	04578
Giemsa	Histo	04583
Giemsa, Leishman or Wright	Micro	08849
Glees and Marsland	Histo	04584
Glycogen - (P.A.S.)	Histo	04585
Gomori	Micro	08873
Gram - General Bacterial Flora	Micro	08841
Gram - Specific Organisms	Micro	08840
Gram on Cultures	Micro	08988
Gram's Stains	Histo	04587
Hall's Stain	Histo	04591
Hematoxylin-Eosin	Micro	08870
Hemosiderin (eg., Perls') - Stains	Histo	04592
Holmes	Histo	04596
Holzer	Histo	04597
Iron (RBC and/or BM)	Hemat	01236
Lendrum's Phloxin Tartrazine	Histo	04598
Lipofuscin	Histo	04915
Luxol Fast Blue	Histo	04637
Mann's Stain	Histo	04641
Masson's Trichrome	Histo	04643
Mast Cells	Histo	04645
Mayer's Mucicarmine Stains	Histo	04646

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Procedures	Section	Code Number
Sheep Red Cell Rheumatoid Factor	Micro	09328
Shigella Serotype	Micro	09495
SIA Test (Macroglobulinemia)	Bl Bank	02717
Sickle Cell Preparation	Hemat	01390
Skin Tests	Micro	09475
Slide Agglutination	Micro	09085
Slide Culture	Micro	09184
Sodium	Chem	00924
Specific Gravity	Chem	00928
Specimen Transmission to Other Laboratories	Spec Proc	08826
Spleen Scintiscan	Nucl Med	07324
Splenic Film Preparations	Hemat	01396
Stains		
Acridine Orange - Fungi	Histo	04504
Albert or Neisser	Micro	08843
Alcian Blue	Histo	04507
Alcoholic Hyaline	Histo	04508
Amido Black - Hemoglobin	Histo	04509
Amyloid	Histo	04510
Argentaffin	Histo	04514
Auramine O - T.B.	Histo	04515
Bielschowsky	Histo	04534
Bile - Stein's or Gmelin's	Histo	04568
Bodian (Nerve Fibers)	Histo	04536
Bowies, J.G.	Histo	04537
Calcium	Histo	04541
Cone and Penfield	Histo	04546
Connective Tissue	Histo	04547
Cresyl Violet - NISSL	Histo	04540

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Code Number	Procedures	Unit Value	Item for Count
	Virology:		
09579	Cytology, Tissue Culture	10	
09585	Hepatitis Associated Antigen - Counter Current Electrophoresis - Per Plate	30	
09587	Hepatitis Associated Antigen - Counter Current Electrophoresis - With Concentration - Per Plate	50	
09591	Hepatitis Associated Antigen - Complement-Fixation	15	
09593	Hepatitis Associated Antigen - Immunodiffusion	10	

Code Number	Procedures	Unit Value	Item for Count
	Special Identification Procedures:		
09504	Identification of Enteropathogenic ESCHERICHIA COLI - Fluorescent Antibody Reactions on Fecal Specimens Using Polyvalent and Monospecific Sera - Microcolony Method, Direct	50	
09506	Identification of Enteropathogenic ESCHERICHIA COLI - Fluorescent Antibody Reactions on Fecal Specimens Using Polyvalent and Monospecific Sera - Microcolony Method, Indirect	60	
	Investigations on Mycoplasma:		
09511	Primary Isolation of Mycoplasma Per Solid Medium	4	
09514	Primary Isolation of Mycoplasma Per Diphasic Medium	4	
09517	Subculture on Solid or Diphasic Medium	20	
09520	Dienes Stain for Mycoplasma Colonies	3	
09523	Metabolic Tests, in Diphasic Media Per Test	4	
09526	Methylene Blue Plating Test	10	
09529	Hemolysis Test for MYCOPLASMA PNEUMONIAE	10	
09531	Hemadsorption Test	15	
09534	Growth Inhibition Test	10	
09537	Estimation of Colony-Forming Units - Single Reading	30	
09539	Estimation of Colony-Forming Units - Each Additional Reading	10	
09542	Cover-Slip Preparation for Mycoplasma	10	
	Virology:		
09551	Isolation of Virus by Tissue Culture, Per Tissue	35	
09554	Isolation of Virus in Eggs	30	
09557	Isolation of Virus by Animal Inoculation	80	
09561	Complement-Fixation Test - Single Antigen	20	
09564	Complement-Fixation Test - 5 Antigens	50	
09567	Complement-Fixation Test - 10 Antigens	85	
09570	Hemagglutination - Inhibition Test	30	
09573	Hemadsorption - Inhibition Test	30	
09576	Neutralization Test	40	

Code Number	Procedures	Unit Value	Item for Count
	Miscellaneous Procedures:		
09460	Preparation of Autogenous Vaccine	60	
09463	Animal Virulence Tests, Excluding Tuberculosis and Mycological Investigations - CORYNEBACTERIUM DIPHTHERIAE Virulence Test, Intradermal	30	
09465	Animal Virulence Tests, Excluding Tuberculosis and Mycological Investigations - CORYNEBACTERIUM DIPHTHERIAE Virulence Test, Subcutaneous	60	
09468	Animal Virulence Tests, Excluding Tuberculosis and Mycological Investigations - B. ANTHRACIS Virulence Test	60	
09471	Animal Virulence Tests, Excluding Tuberculosis and Mycological Investigations - Mouse Inoculation for STREP. PNEUMONIAE	30	
09475	Skin Test, Including Inoculation and Reading	30	
09479	Culture for Trichomonads	6	
09482	Reconstitution of Freeze-Dried Ampoules	3	
	Preparation of Media:		
09486	Preparation of Any Two Items of Medium, Plate or Tube	1	
	Special Identification Procedures:		
09492	Identification of Salmonella Serotype, Involving Slide Agglutination Tests with Antisera for Common O and H Antigens, Tube Agglutinations to Confirm Positive Slide-Agglutination, Phase Conversion and Subsequent Agglutination Reactions by Slide and Tube, and Biochemical Reactions, eg., 15 - 20 Tubes Per Strain	200	
09495	Identification of Shigella Serotype, Involving Slide Agglutination Tests with Antisera for Each of the Four Groups, Preliminary Boiling of Suspensions to Remove K Antigen, Tube Agglutination to Confirm Positive Slide Agglutination and Biochemical Reactions, eg., 15 - 20 Tubes Per Strain	80	
09498	Identification of Enteropathogenic ESCHERICHIA COLI - Slide Agglutination Tests with Polyvalent and Monospecific Antisera, Tube Agglutinations to Confirm Positive Slide Agglutinations. Biochemical Reactions to Confirm Identity as E. COLI.	50	
09500	Identification of Enteropathogenic ESCHERICHIA COLI - Fluorescent Antibody Reactions on Fecal Specimens Using Polyvalent and Monospecific Sera - Smear Method, Direct	40	
09502	Identification of Enteropathogenic ESCHERICHIA COLI - Fluorescent Antibody Reactions on Fecal Specimens Using Polyvalent and Monospecific Sera - Smear Method, Indirect	50	

Code Number	Procedures	Unit Value	Item for Count
	Slide Agglutination or Flocculation Tests:		
09399	Test for Agglutination of Organisms Isolated from Patient by Patient's Serum - Single Serum	20	
09401	Test for Agglutination of Organisms Isolated from Patient by Patient's Serum - Paired Sera	25	
09404	Complement-Fixation Test for ECHINOCOCCUS GRANULOSUS	50	
09407	Inoculation of Animal for Antiserum Production, Including Preparation of Antigenic Suspensions, Injection of Suspensions, Trial Bleeding and Preliminary Titration of Sera, Final Bleeding, Separation of Serum and Final Titration	250	
	Special Procedures in Environmental Bacteriology:		
09415	Tests of Sterilization, eg., for Autoclaves, Using Spore Strips - Initial Culture and Reading (Without Subculture)	3	
09417	Tests of Sterilization, eg., for Autoclaves, Using Spore Strips - Each Additional Reading (Without Subculture)	1	
09418	Tests of Sterilization, eg., for Autoclaves, Using Spore Strips - Final Plating and Reading	3	
09421	Tests of Sterilization, eg., for Autoclaves, Using Kilit Ampoules, Per Daily Reading	1	
09424	Collection of Material by Rodac or Sweep Plate	2	
09427	Colony Count on Rodac or Sweep Plate	3	
09430	Culture of Material on Membrane Filters, Including Preparation of Filters	10	
09433	Colony Count on Membrane Filter	3	
09437	Air Sampling by Settle Plate, Including Exposure of Plate and Colony Count, Per Plate	5	
09440	Air Sampling by Slit Sampler, Including Exposure of Plate and Colony Count, Per Plate	8	
09443	Air Sampling by Impinger, Including Subculture of Sampling Fluid, and Colony Count, Per Impinger Sample - Using Single Plate for Subculture	10	
09445	Air Sampling by Impinger, Including Subculture of Sampling Fluid, and Colony Count, Per Impinger Sample - Each Additional Plate	4	
	Miscellaneous Procedures:		
09452	Leukocyte Count, eg., on Urine Deposit	20	
09455	Uroscreen Test, Per Specimen	2	

Code Number	Procedures	Unit Value	Item for Count
	Slide Agglutination or Flocculation Tests:		
09335	Paul Bunnell Test, Using Sheep or Horse Red Cells - With Absorption by Guinea-Pig Kidney and Ox Cells	30	
09337	Anti-Streptolysin - O Estimation - 7 Serum Dilutions	25	
09338	Anti-Streptolysin - O Estimation - 12 Serum Dilutions	35	
09340	Anti-Streptolysin - O Estimation - Automated Method - Single Test	90	
09342	Anti-Streptolysin - O Estimation - Automated Method - Each Subsequent Test	5	
09344	Anti-Streptolysin - O Estimation - Micro-Technique - 18 Dilutions	40	
09347	Anti-Staphylococcal Alphalysin Estimation	25	
09350	Kahn Test, Excluding Preparation of Antigen - Standard Three Tube Test	3	
09352	Kahn Test, Excluding Preparation of Antigen - Quantitative Test, Per Dilution	3	
09355	Complement-Fixation Test of Wasserman Type, Excluding Titration of Complement, Washing Red Cells, and Preparation of Antigen, Per Serum Dilution	3	
09363	FTA - ABS - Fluorescent Treponemal Antibody Test (Absorbed) - Including Controls - Single Serum	85	
09366	FTA - ABS - Fluorescent Treponemal Antibody Test (Absorbed) - Including Controls - Each Additional Serum	30	
09369	Pregnosticon Test - Qualitative	2	
09371	Pregnosticon Test - Quantitative, Per Dilution	2	
09374	Latex Test for Histoplasmosis, Quantitative	20	
09377	Test for Antinuclear Antibody	50	
09380	Test for Smooth Muscle and Parietal Cell Antibody	50	
09383	Test for Mitochondrial Antibody	50	
09386	Thyroglobulin Tanned Red Cell Test	50	
09389	Thyroid Complement-Fixation Test - Screen Test	50	
09391	Thyroid Complement-Fixation Test - Full Quantitative Test	70	
09394	Serum Complement Level - Single Row	15	
09396	Serum Complement Level - Each Additional Row	3	

Code Number	Procedures	Unit Value	Item for Count
	Slide Agglutination or Flocculation Tests:		
09257	Heterophile Slide with Absorption	4	
	Cold Agglutination (see 01134 and 01136 Hematology)		
09261	C - Reactive Protein	2	
09263	V.D.R.L.	3	
09265	V.D.R.L. - Quantitative, Per Dilution	3	
09267	Latex Test for Histoplasmosis	2	
09270	Enteric Agglutination Test (Widal) - Single Antigen, O or H	20	
09272	Enteric Agglutination Test (Widal) - Each Additional Antigen	5	
09274	Enteric Agglutination Test (Widal) - VI Agglutination Test, Including Titration of Standard Serum	25	
09277	Brucella Agglutination Test - Single Antigen	20	
09279	Brucella Agglutination Test - Each Additional Antigen	5	
09281	Brucella Agglutination Test - If Performed Simultaneously with Enteric Agglutination Test, Per Antigen	5	
09284	Coombs Test, for Detection of Brucella Agglutinins	20	
09287	F. TULARENSIS Agglutination Test - If Performed Alone	20	
09289	F. TULARENSIS Agglutination Test - If Performed Simultaneously with Enteric or Brucella Agglutination Test	5	
09308	Weil-Felix Test - Single Antigen	20	
09310	Weil-Felix Test - Each Additional Antigen	5	
09313	Streptococcus M G Agglutination Test	20	
09316	Cold Agglutination Test, Quantitative	20	
09319	Leptospiral Agglutination Test, Using 4-6 Serum Dilutions - Single Antigen	30	
09322	Leptospiral Agglutination Test, Using 4-6 Serum Dilutions - Each Additional Antigen	10	
09325	Latex Test for Rheumatoid Factor, Quantitative	20	
09328	Sheep Red Cell Agglutination Test for Rheumatoid Factor	20	
09331	Paul Bunnell Test, Using Sheep or Horse Red Cells - Without Absorption	20	
09333	Paul Bunnell Test, Using Sheep or Horse Red Cells - With Absorption by Guinea-Pig Kidney	25	

Code Number	Procedures	Unit Value	Item for Count
	Mycology:		
09187	Examination of Hair by Ultraviolet Light	3	
09191	Biochemical Tests, eg., Sugar Reactions, Per Tube	2	
09192	Germ Tube Test for CANDIDA ALBICANS	5	
09193	Test for Chlamydospore Production	5	
09196	Animal Inoculation, Including Autopsy and Smear and Culture of Tissues	100	
	Parasitology:		
09205	Direct Microscopic Examination of Feces for Ova, Cysts or Trophozoites	10	
09208	Concentration Method for Ova and Cysts, Including Centrifugation	20	
09211	Scotch Tape Preparation	7	
09214	Warm-Stage Examination for Amoebic Trophozoites	20	
09217	Identification of Worm, not Involving Search for Scolex	10	
09221	Identification of Worm, Involving Search for Scolex	40	
	Diagnostic Serology:		
09226	Separation of Serum from Blood Clot	1	
09229	Centrifugation of Serum	2	
09231	Inactivation of Serum, Per Batch of 48 Sera	1	
09234	Washing Red Cells for Tests Involving Hemagglutination or Hemolysis	10	
09237	Preparation of Sensitised Red Cells	5	
09239	Titration of Complement Prior to Complement Fixation Test - Single Row	15	
09240	Titration of Complement Prior to Complement Fixation Test - Each Additional Row	3	
09243	Preparation of Cardiolipin Antigen	5	
	Slide Agglutination or Flocculation Tests:		
09253	Latex Test for Rheumatoid Factor	6	
09255	Quick Heterophile Slide	6	

Code Number	Procedures	Unit Value	Item for Count
	Antibiotic Levels in Serum, Plasma or Other Material:		
09146	Antibiotic Levels - Preparation of Antibiotic Media for Control Series, Per Antibiotic	20	
09147	Antibiotic Levels - Preparation of Dilution Series for Serum (or Other Material)	5	
09148	Antibiotic Levels - Preparation of Bacterial Inoculum, Per Strain	5	
09149	Antibiotic Levels - Setting Up and Reading Tests, Per Dilution of Serum (or Other Material), or Per Antibiotic Concentration for Controls	2	
09153	Serum Bactericidal Level, Per Serum	20	
	Bacterial Typing Systems, or Identification by Bacteriophage:		
09156	Propagation of Bacteriophage, Including Titration and Reading, Per Phage	20	
09159	Bacteriophage Typing, Including Preparation of RTD but not Propagation of Phage - Single Strain	60	
09160	Bacteriophage Typing, Including Preparation of RTD but not Propagation of Phage - Each Additional Strain	10	
09163	Colicine or Pyocine Typing, Per Strain	14	
09166	Identification of Organism by Specific Phage Lysis, eg., B. ANTHRACIS OR Y. PESTIS, Including Inoculating Plate with Organism and Phage, Setting Up Controls, Reading and Recording - Reading after Overnight Incubation, Per Strain or Control	3	
09167	Identification of Organism by Specific Phage Lysis, eg., B. ANTHRACIS OR Y. PESTIS, Including Inoculating Plate with Organism and Phage, Setting Up Controls, Reading and Recording - Rapid Microscopical Phage-Lysis Test, Per Strain or Control	9	
	Mycology:		
09172	Direct KOH Preparation for Mycelium	3	
09175	Culture on Agar Plates or Slants Including Initial Reading and Assessment of Growth, Per Plate or Tube	3	
09178	Each Subsequent Reading and Assessment of Cultures, Per Plate or Tube	1	
09181	Tease preparations in Lactophenol Blue	5	
09184	Slide Culture, Including Microscopic Preparation, eg., with Lactophenol Blue Staining, Per Culture	15	

Code Number	Procedures	Unit Value	Item for Count
	Bacterial Identification by Serological Methods:		
09114	Fluorescent Antibody Reactions, Including Controls - Microcolony Method - Indirect - Single Specimen or Strain Times One Antiserum	15	
09115	Fluorescent Antibody Reactions, Including Controls - Microcolony Method - Indirect - Single Specimen or Strain Times Each Additional Antiserum	6	
09116	Fluorescent Antibody Reactions, Includig Controls - Absorption, Per Test	2	
09118	Phase Conversion by Craigie Tube, Per Strain and Tube	4	
	Antibiotic Sensitivity Testing:		
	Routine 'Qualitative' Sensitivity Tests by Inoculation of Antibiotic Agar Plates or by Disc Method, Including Preparation of Inoculum of Test and Control Strains, Preparation of Plates, Inoculation of Test and Control Strains, Application of Discs, Reading and Recording of Results.		
09125	Sensitivity Tests - One Strain Times One Antibiotic at One Concentration or Strength	1	
09127	Sensitivity Tests - X Strains Times One Antibiotic at One Concentration or Strength	X	
09129	Sensitivity Tests - One Strain Times X Antibiotics at One Concentration or Strength	X	
09131	Sensitivity Tests - One Strain Times One Antibiotic at X Concentrations or Strengths	X	
09133	Sensitivity Tests - X Strains Times Y Antibiotics at One Concentration or Strength	XY	
09135	Sensitivity Tests - X Strains Times Y Antibiotics at Z Concentrations or Strengths	XYZ	
	Quantitative Sensitivity Tests:		
	Measurement of M.I.C. by Agar or Broth Dilution Methods.		
09138	Sensitivity Tests - Preparation of Antibiotic Media, Per Antibiotic	20	
09140	Sensitivity Tests - Preparation of Bacterial Inoculum, Per Strain or Control	5	
09142	Sensitivity Tests - Setting Up and Reading Tests, Per Antibiotic Concentration and Inoculum, Including Controls	2	
09143	Sensitivity Tests - Subculture for Bactericidal Activity, Per Tube Sampled and Per Plate Inoculated	2	

Code Number	Procedures	Unit Value	Item for Count
	Bacterial Identification by Serological Methods:		
09085	Slide Agglutination, Per Strain and Antiserum, Including Control	2	
09088	Tube Agglutination, Per Strain and Antiserum, Including Control, and Preparation of Suspension	20	
09091	Quellung Reaction, Per Strain and Antiserum, Including Control	5	
09094	Grouping of Streptococci - Lancefield Method - Each Strain Times One Antiserum	14	
09095	Grouping of Streptococci - Lancefield Method - Each Strain Times Each Additional Antiserum	2	
09096	Grouping of Streptococci - Maxted Method - Each Strain Times One Antiserum	4	
09097	Grouping of Streptococci - Maxted Method - Each Strain Times Each Additional Antiserum	2	
09098	Grouping of Streptococci - Rantz and Randall Method - Each Strain Times One Antiserum	8	
09099	Grouping of Streptococci - Rantz and Randall Method - Each Strain Times Each Additional Antiserum	2	
09104	Plate Toxin-Antitoxin Reactions - Nagler Reaction, Per Strain, Including Controls	8	
09105	Plate Toxin-Antitoxin Reactions - Elek Plate Test for C. Diphtheriae Toxin, Per Strain, Including Controls	10	
09108	Fluorescent Antibody Reactions, Including Controls - Smear Method - Direct - Single Specimen or Strain Times One Antiserum	12	
09109	Fluorescent Antibody Reactions, Including Controls - Smear Method - Direct - Single Specimen or Strain Times Each Additional Antiserum	4	
09110	Fluorescent Antibody Reactions, Including Controls - Smear Method - Indirect - Single Specimen or Strain Times One Antiserum	14	
09111	Fluorescent Antibody Reactions, Including Controls - Smear Method - Indirect - Single Specimen or Strain Times Each Additional Antiserum	5	
09112	Fluorescent Antibody Reactions, Including Controls - Microcolony Method - Direct - Single Specimen or Strain Times One Antiserum	13	
09113	Fluorescent Antibody Reactions, Including Controls - Microcolony Method - Direct - Single Specimen or Strain Times Each Additional Antiserum	5	

Code Number	Procedures	Unit Value	Item for Count
	Bacterial Identification by Biochemical Methods, Etc.:		
09015	ONPG Test	2	
09018	Tests for Breakdown of Urea, Phenylalanine, Nitrate, Starch, Gelatin, Casein, Gluconate, Cooked Meat, Per Test	2	
09021	Amino-Acid Decarboxylation Test, Per Substrate	4	
09024	Hugh and Leifson Oxidation-Fermentation Test	6	
09027	Tests for H_2S Production, eg., Lead Acetate Method, Per Reading	2	
09030	Inoculation and Reading of TSI Slant or Similar "Multi-Test" Medium	2	
09033	Test for DNA-ASE Production	2	
09036	Test for Phosphatase Production (Staphylococci or Pseudomonads)	2	
09039	Test for Pigment Production	2	
09042	Control Tests for Biochemical Reactions, eg., in KCN Test, Per Test	2	
09045	Any of the Above Tests Using Anaerobic Methods	3	
09048	Oxidase Test, Impregnated Strip Method	1	
09051	Catalase Test, on Organisms Other Than Mycobacteria - Without Preliminary Subculture	1	
09052	Catalase Test, on Organisms Other Than Mycobacteria - With Preliminary Subculture, eg., to Nutrient Agar	2	
09055	Coagulase Test - Slide Method	2	
09056	Coagulase Test - Tube Method	4	
09059	Heat Resistance Test, eg., for Group D Streptococci	6	
09062	Bacitracin Sensitivity Test	2	
09065	Optochin Sensitivity Test	2	
09068	Test for Bile Solubility - Any Method	2	
09071	Test for Satellitism, by Staphylococcal Streak or Impregnated Strip Methods Per Culture	3	
09074	Brucella Dye Test, (2 Dyes) - Plate Method	16	
09075	Brucella Dye Test, (2 Dyes) - Strip Method	8	
09078	Pathotec Tests, Per Test	1	

Code Number	Procedures	Unit Value	Item for Count
	Examination for Mycobacteria:		
08947	Ziehl-Neelsen Film, Performed for Confirmation of Positive Fluorescence, Per Preparation	5	
08950	Ziehl-Neelsen Film, Performed on Primary Specimen, Without Prior Fluorescence Microscopy	20	
08953	Preparation of Specimen for Culture (Chemical Treatment, Washing, Neutralization)	15	
08956	Inoculation of Each Slant	1	
08959	Reading of Cultures, Per Reading	1	
08962	Ziehl-Neelsen Film, Performed on Culture	5	
08965	Niacin Test, Per Culture	5	
08968	Arylsulphatase Test, Per Culture	2	
08971	Catalase Test, Per Culture	2	
08974	Animal Inoculation, for Specimens or Cultures, Including Autopsy, and Films and Cultures from Tissues	100	
08977	Antibiotic Sensitivity of Mycobacterial Cultures - Preparation of Inoculum, Per Stain	15	
08978	Antibiotic Sensitivity of Mycobacterial Cultures - Inoculation and Reading of Each Slant, Including Control	3	
	Bacterial Identification by Cultural and Morphological Methods:		
08985	Subculture for Purity, Per Plate	2	
08988	Gram Stain on Cultures	3	
08990	Spore Stain on Cultures	8	
08993	Motility Test - Hanging-Drop Method	5	
08994	Motility Test - Semi-Solid Agar Stab Method	2	
08995	Motility Test - Swarm-Plate Method	2	
	Bacterial Identification by Biochemical Methods, Etc.:		
09006	Sugar Fermentations, Per Substrate	2	
09009	Imvic Series Tests, Per Test	2	
09012	Growth or Utilization Tests, eg., Malonate Utilization, Growth in 6.5% NACL, Growth in KCN Medium, Per Test, Excluding Controls	2	

Code Number	Procedures	Unit Value	Item for Count
	Preparation of Specimens or Material for Culture:		
08886	Dilution Series for Quantitative Culture, Other Than Sputum - More Than 3 Dilutions	2	
08889	Liquefaction of Sputum, Excluding Chemical Processing for Mycobacterial Culture	3	
08892	Serial Dilution of Liquefied Sputum for Culture, Per Dilution	1	
	Primary Cultures:		
	Culture of Specimen on Solid Medium or in Semi-Solid or Fluid Media, to Include Inoculation of Medium and Reading of Plate to Assess Type and Amount of Growth, or Inoculation and Subculture of Fluid Enrichment Medium, with Reading of Subsequent Plate Culture. Not Including any Separate Identification Procedure Performed on Growth on the Solid Medium.		
08906	Aerobic Culture, Per Plate or Tube	3	
08909	Anaerobic Culture, Per Plate or Tube	4	
08912	Culture in Partial CO_2, Per Plate or Tube	4	
08915	Miles and Misra Count, Including Inoculation and Reading of Plates but Excluding Preliminary Dilutions (see Nos. 08885 and 08886) Per Six Plates	7	
08918	Pour Plate Count, Including Inoculation and Reading of Plates but Excluding Preliminary Dilutions, Per Plate	6	
08921	Agar Spoon Method for Urine Culture	3	
	Blood Cultures:		
08931	Blood Culture - Qual., Per Bottle, Per Medium, Per Subculture	3	
08933	Blood Culture - Quant., Per Pour Plate	6	
08936	Examination of Blood Culture Bottles, Without Subculture - Per 100 Bottles	5	
08937	Examination of Blood Culture Bottles, Without Subculture - Per 20 Bottles	1	
	Examination for Mycobacteria:		
08941	Preparation and Cleaning of Cabinet for Tuberculosis Work, Per Day	5	
08944	Fluorescence Microscopy for Mycobacteria, Per Preparation	5	

Code Number	Procedures	Unit Value	Item for Count
	MICROBIOLOGY		
08820	Clerical Handling of Specimen	3	
	Direct Smears etc. Including Microscopy:		
08830	Wet Film, eg., for Cells, Bacteria, Trichomonas (Unstained)	3	
08833	Methylene Blue Stain - For Bacterial Morphology	2	
08834	Methylene Blue Stain - For CORYNEBACTERIUM DIPHTHERIAE	4	
08837	Negative Stain for Morphology or Capsules, eg., India Ink, Nigrosin	3	
08840	Gram Stain - For General Bacterial Flora	3	
08841	Gram Stain - For Specific Organisms, eg., NEISSERIA GONORRHOEAE, C.S.F., Acute Pneumonias	6	
08843	Albert or Neisser Stain	4	
08846	Spore Stain	8	
08849	Giemsa, Leishman or Wright Stain	10	
08852	Dark Field Preparation, eg., for TREPONEMA PALLIDUM	10	
08855	Motility Test, by Hanging Drop Method, Including Initial Inoculation of Broth	5	
08858	Reading Agar Plate for Microcolonies, Per Specimen or Dilution Inoculated	1	
	Total Cell Count on CSF, Pleural, Peritoneal or Other Fluid (see 01125 Hematology)		
	Differential Cell Count on CSF, Pleural, Peritoneal or Other Fluid, by Leishman or Wright Stain (see 01124 Hematology)		
	Smear for Eosinophils (see 01292 Hematology)		
08870	Hematoxylin - Eosin Stain	10	
08873	Gomori Stain	15	
08876	P.A.S. Stain	10	
08879	Mucicarmine Stain	10	
	Preparation of Specimens or Material for Culture:		
08883	Grinding of Tissue for Culture	5	
08885	Dilution Series for Quantitative Culture, Other Than Sputum - Up to 3 Dilutions	1	

MICROBIOLOGY

If specimen procurement is done by Microbiology personnel use the units assigned in the specimen procurement and dispatch section.

Unit for Count: Tube, bottle, plate and slide. These items are used as units for count in microbiology because they represent readily definable points in the multiplicity of variables encountered in microbiological procedures.

Use of Schedule. Each laboratory should calculate the unit values for each type of specimen handled using the unit values given for the component procedures (see METHODS OF SIMPLIFYING RAW COUNTS). The 3.0 units for clerical handling of the specimen should be included in the composite unit value determined for each type of specimen to simplify workload recording. It is emphasized that the final unit value for a given type of specimen should be the average value calculated from a sufficiently large number of successive specimens so that it includes many negative results and many yielding organisms that require further investigation.

Once the average unit values are calculated, there is no further need to modify them unless a laboratory changes its procedure for handling individual specimens or investigations.

The Monthly unit output of the laboratory can now be assessed by counting the number and types of specimens handled, converting these to units and adding the units for media preparation. Media preparation may be recorded by counting the number of items prepared and dividing by 2 to obtain the units (09486 - Media Preparation, 1 unit for each 2 items prepared).

Code Number	Procedures	Unit Value					
		Manual	Automated				
			Simultaneous				
			1	2	4	6	12
	MISCELLANEOUS PROCEDURES						
08454	Basal Metabolic Rate (B.M.R.)	40					
08495	E.E.G. (Technical and Clerical)	120					
08501	Histocompatability - Tissue Cross Match (Only)	150					
08502	Histocompatability - Tissue Typing (Only)	210					
08503	Histocompatability - Tissue Cross Match and Typing Performed on a Patient at the Same Time	250					
08601	Film, Develop First Print (B.&W.)	10					
08602	Film Print, Additional Print	5					
08603	Photographs Per Picture (Gross)	15					
08680	Semen Analysis for the Presence of Sperm Only	5					
08681	Semen Analysis Incl. Count, Motility and Morphology	15					

Code Number	Procedures	Unit Value					
		Manual	Automated				
				Simultaneous			
			1	2	4	6	12
	NUCLEAR MEDICINE						
05883	I-131 Uptake and Conversion Ratio	45					
05884	I-131 48 Hr. Urinary Excretion (2 Urines)	40					
05887	I-131 Plasma Clearance	20					
05891	I-131 Uptake (Multi Determinational)	30					
05892	I-131 Uptake (Single Determination)	30					
05894	I-131 Uptake with Scintiscan	56					
05896	I-131 Uptake with Thyroid Suppression	60					
05898	I-131 Uptake with TSH Stimulation (Thyroid Stimulating Hormone)	64					
05900	T_3, Resin Uptake Test	8					
05906	Thyroxin (T_4) - Plasma or Serum	10					
06270	Rose Bengal Study	28					
06432	Hippuran Clearance Curve	60					
06440	I-131 Renogram	60					
06644	Schilling Test	36					
06672	Fat Absorption Studies (Blood Sample Method)	56					
06673	Fat Absorption Studies 24 Hr. Fecal Excretion	120					
06675	Iron Absorption and Utilization Studies	176					
06706	I-131 PVP Protein Loss or CR 51 Albumin	176					
06764	Blood Quant., Intestinal Fecal Studies (Separate from R.B.C. Survival)	150					
06902	Cardiac Output (IHSA)	28					
06904	Circulation Time	28					
07324	Spleen Scintiscan	60					
07572	Red Cell Survival	176					
07672	Blood Volume Total, Including Plasma Volume and Red Cell Mass	60					
07935	Bone Scintiscan	75					
07937	Brain Scintiscan (TC 99M)	60					
07939	Brain Tumor Localization (Surgical in O.R. Incl. Sterilization, etc.)	120					
08037	Lung Scintiscan	75					
08062	Ocular Tumor Localization	30					
08072	Pancreas Scintiscan	75					
08076	Placental Localization	24					
08092	Renal Scintiscan	75					

NUCLEAR MEDICINE

Units assigned should be regarded as only a temporary measure, to be revised at a later time. No time studies were conducted, therefore unit assignments are educated estimates.

Units assigned for a complete test.

Other radioisotopic procedures performed in vitro are listed in the Clinical Chemistry Section.

Code Number	Procedures	Unit Value					
		Manual	Automated				
			Simultaneous				
			1	2	4	6	12
	CARDIO-RESPIRATORY PROCEDURES						
05401	A - A Gradient (Scholander and Arterial (PO_2))	80					
05404	Alveolar Gas - Determination of Distribution or Mixing Efficiency	30					
05405	Alveolar Ventilation (VA) - Scholander Technique	60					
05431	CO Diffusing Capacity at Rest (DCO)	20					
05432	CO Diffusion Capacity (Transfer Factor)	32					
05452	Dead Space/Tidal Volume (VD/VT) (Bohr) - Scholander Technique	60					
05463	E.C.G. (Technical and Clerical)	26					
05474	Expiratory Flow Rate, Maximal-Mid (MMEF) Before and After Bronchodilator	20					
05475	Expiratory Flow Rate, Peak	5					
05482	Electrocardiograms, Fetal	30					
05483	Forced Vital Capacity (FVC) Before and After Bronchodilator	27					
05486	CO Fractional Uptake (FUCO)	10					
05488	Functional Residual Capacity (FRC) - Helium Equilibration Technique	40					
05502	Helium Dilution Nitrogen Washout, Residual Capacity and Residual Volume by, or Similar Procedures	30					
05542	Lungs, Mechanical Properties of (Static or Dynamic Compliance: Airway Resistance, etc.)	60					
05552	Maximum Breathing Capacity (MBC) Before and After Bronchodilator	12					
05553	Maximum Breathing Capacity (Direct)	20					
05556	Minute Ventilation (VE)	10					
05567	Oxygen Consumption (VO_2) Scholander Technique	30					
05584	Phonocardiograms	50					
05604	Residual Volume (RV) - Helium Equilibration Technique	40					
05632	Timed Vital Capacity	27					
05633	Timed Vital Capacity, Repeat, after Inhalation or Bronchodilator Material	20					
05654	Vectorcardiograms	30					

Code Number	Procedures	Unit Value	Item for Count
	Electron Microscopy:		
05255	Electron Microscopy - Preparation, Fixation, Dehydration and Embedding (Includes Glass Knife Making and Clerics)	58	Specimen
05282	Electron Microscopy - Screening (Scanning) and Photography	20	Grid
05293	Electron Microscopy - Thick Section Preparation (Include Cutting and Staining)	18	Slide
05295	Electron Microscopy - Thin Section Cutting, Checking and Grid Staining (Includes Stain Preparation - Lead and Uranyl Acetate)	45	"

Code Number	Procedures	Unit Value	Item for Count
	Special Stains: (Including Cutting, Staining and Mounting)		
	Group 2	17	Slide
04547	Connective Tissue (eg., Masson's)		
04554	D.N.A. (eg., Feulgen)		
04585	Glycogen - (P.A.S.)		
04587	Grams		
04598	Lendrum's Phloxin Tartrazine		
04915	Lipofuscin (eg., Schmorl's)		
04637	Luxal Fast Blue - Neuropath. Modification		
04641	Mann's Stain		
04643	Masson Trichrome		
04646	Mayer's Mucicarmine		
04922	Melanin (eg., Fontana)		
04926	Mucin (P.A.S.)		
04927	Myelin (eg., Luxal Fast Blue)		
04942	Oil Red O (Simple Fat)		
04678	PTAH - Neuropath. Modification		
04701	Saffron (Hematoxylin Phloxine Saffron)		
	Group 3	23	Slide
04508	Alcoholic Hyaline		
04509	Amido Black - Hemoglobin		
04537	Bowies, J.G.		
04566	Enzymes (eg., Gomori, D.O.P.A., Dehydrogenases)		
04850	Fat (Neural Fat) - Does Not Include F.S. (eg., Nile Blue S04)		
04852	Fatty Acids (eg., Fischler)		
04578	Fungus (Methenamine Silver)		
04577	Fungus (P.A.S. Counterstain) Gridley's		
04928	Myelin (Heidenhain)		
04665	Orcein Giemsa		
04972	Reticulum (eg., G and S)		
04695	Romanes		
	Group 4	30	Slide
04584	Glees and Marsland		
04596	Holmes		
04597	Holzer		
	Group 5	50	Slide
04929	Myelin (Marchi's Technique)		
	Group 6	100	Slide
04546	Cone and Penfield		
04534	Bielschowsky		
	Electron Microscopy:		
05142	Electron Microscopy - Electron Photomicrographs Developing	10	Picture

Code Number	Procedures	Unit Value	Item for Count
	Cytology:		
04089	Cytology - Preparation of Smears from Fluid by Microporous Filter	5	Slide
04090	Cytology - Fluid Concentration by Centrifugation	5	Specimen
04091	Cytology - Hormone Evaluation (Quantitative Index Count Performed)	10	Case
04092	Cytology - Cell Block - Cut and Stain	6	Block
04093	Cytology - Cell Block - Additional Cut	3	"
04094	Cytology - Cell Block - Screening	3	"
04095	Cytology - Gastric Washing - Technical Preparation and Scan for Tumor Cells - Long Trypsin Method (Smear and Clot)	80	
04097	Cytology - Chromosomal Karyogram Studies (Complete)	500	Specimen
04099	Cytology - Sex Chromatin Smears	16	Specimen
	Frozen Sections:		
04202	Frozen Sections - Additional Sections (Does Not Include Staining)	3	Slide
04376	Frozen Sections - Additional Sections Cut and Stain	6	"
04378	Frozen Sections - For Rush Diagnosis in O.R., Preparation of Block, Including First Slide and Staining of Same	26	Specimen
	Special Stains: (Including Cutting, Staining and Mounting)		
	Group 1	12	Slide
04504	Acridine orange - Fungi		
04510	Amyloid (eg., Congo Red)		
04568	Bile - Stein's or Gmelin's		
04541	Calcium (eg., Von Kossa)		
04540	Cresyl Violet		
04563	Elastic Tissue (eg., Verhoeff)		
04583	Giemsa		
04591	Hall's Stain		
04592	Hemosiderin (eg., Perls')		
04645	Mast Cells - Toluidine Blue		
04677	PTAH		
05005	Unna Pappenheim		
	Group 2	17	Slide
04503	Acid Fast - Ziehl-Neelsen		
04507	Alcian Blue		
04514	Argentaffin (eg., Fontana)		
04515	Auramine O - T.B.		
04536	Bodian (Nerve Fibers)		

Code Number	Procedures	Unit Value	Item for Count
	HISTOLOGY		
	Routine Surgical Pathology:		
03056	Surgical Pathology - Clerical Functions (Including Identification, Logging Reporting, Coding and Filing)	20	Surgical Spec.
03058	Surgical Pathology - Routine Technical Functions (Including Identification, Embedding, Cutting, Staining and Mounting H.&E. or H.P.S.)	10	Block
03075	Technical Assistant - Gross Description and Cutting of Surgical Specimens	10	Surgical Spec.
	Routine Autopsy Pathology:		
03308	Autopsy Pathology - Autopsy Attendant	200	Case
03356	Autopsy Pathology - Clerical Functions as No. 03056	200	"
03358	Autopsy Pathology - Technical Function as No. 03058	10	Block
	Special Procedures:		
03625	Autoradiography	24	Slide
03628	Barium Impregnation	18	"
03632	Decalcification	10	Case
03644	Embedding, Celloiden Embedding, Fixation and Filtration	10	Block
03781	Sections, Additional Sections (Cutting Only)	3	Slide
03782	Sections, Additional Sections (Including Cutting, Routine Staining and Mounting H.&E. or H.P.S.)	6	"
03784	Sedimentation Blocks from Body Fluids, Preparation of, (Includes Preparation, Centrifugation or Concentration)	15	Block
	Cytology:		
03927	Cytology - Clerical Functions (Normal Report)	4	Specimen
03929	Cytology - Clerical Functions (Abnormal Report)	20	"
03931	Cytology - Clerical Functions for Cell Block	20	"
04083	Cytology - Screen (Technical) - Gyn	5	Slide
04084	Cytology - Screen (Technical) - Non Gyn	8	"
04087	Cytology - Smears (Staining and Mounting Only)	3	"
04088	Cytology - Smears (Make, Stain and Mount)	5	"

HISTOLOGY

The unit value assigned to any given examination is the sum of the component parts of that examination, eg., routine surgical specimen as follows:

03056	Clerical function	20 units
03058	1 block and 1 stained slide	10 units
03782	2 additional slides and stains (2 times 6)	12 units
	Total	42 units

Code 03781, Additional Sections refers to extra slides made for potential special stains or for referring out unstained.

Items for Count

Block - is used where tissue or sedimented material is embedded into a block for histological processing.

Case - is used to define each autopsy.

Grid - is used in Electron Microscopy to identify the viewing and photography of one area or grid.

Picture - is the procedure related to the developing of one electron micrograph.

Slide - is used when the procedure requires the placing of material (section) on a slide for examination.

Specimen - is used when an assortment of related procedures are performed on one sample.

Specimen - (Surgical) is all of the tissue removed at a single surgical setting eg., hysterectomy plus appendectomy is one specimen, multiple skin lesions removed at the same time are one specimen.

Special Stains

The unit values for various stains refer to tissue sections and include the time of cutting and mounting.

To simplify and systematize the recording of unit values for special stains, those stains having identical unit values have been grouped.

Code Number	Procedures	Unit Value	Item for Count
	Miscellaneous:		
02590	Lyophilized Coagulation Concentrate Reconstituted	5	Unit
02650	Packed Cells, Preparation of Packed Cells	10	"
02652	Plasma, Preparation of Plasma	10	"
02654	Plasmapheresis Technical	70	Donor
02656	Platelets, Preparation of Platelet Concentrate	25	"
02657	Platelet Concentrate - Preparation for Infusion	3	Unit
02658	Platelets, Preparation of Platelet Rich Plasma	20	"
02659	R.B.C. Reagent - Preparation of Antibody Sensitized Normal R.B.C.	20	Pool
02260	R.B.C. Reagent - Preparation of A, B, or O	10	"
02661	R.B.C. Reagent - Preparation of Enzyme Treated	12	"
02714	Blood Unit Receiving	2	Unit
02715	Separation of Blood Unit into Aliquots	15	"
02716	Blood Unit, Issuing	2	"
02717	Sia Test (Macroglobulinemia)	6	Test
02722	Washed Cells for Transfusion, Preparation	35	Unit

Code Number	Procedures	Unit Value	Item for Count
	Antibody Identification:		
02220	Antibody Identification - Enzyme - 2 Stage plus AHG	45	Panel
02221	Antibody Identification - Saline	15	"
02222	Antibody Identification - Saline plus AHG	30	"
	Miscellaneous:		
02232	Coombs, Direct - (Including Control)	8	Test
02242	Coombs, Enzyme Indirect	22	"
02282	Coombs Indirect - (Including Control)	10	"
02504	Albumin, Preparation of Albumin	2	Unit
02506	Antibody Absorption Differential	35	Test
02507	Antibody Absorption Auto-Cold	5	"
02508	Antibody Titration - Enzyme	35	"
02509	Antibody Titration - Saline	25	"
02510	Antibody Titration - Albumin plus AHG	35	"
02514	Blood Bag Dispensed But Not Used	3	Unit
02523	Donor Rejected	11	Donor
02524	Blood Unit Collected from Donor	22	Donor
02525	Hemolysins, Cold	18	Test
	Cryoglobulin (see 00532 Chemistry)		
02528	Cryoprecipitate Preparation	17	Unit
02529	Cryoprecipitate, Thaw and Pool	3	"
02534	Leukocyte - Poor Blood Preparation	20	"
02544	Coombs Indirect - 2 Stage (EDTA) (Including Control)	18	Test
02546	Elution - Antibody Identification	35	"
02554	Fibrinogen, Preparation of Fibrinogen	12	Unit
02556	Frozen Cells, Preparation of Frozen Cells	6	"
02557	Frozen Cells, Thawing of Frozen Cells	10	"
02586	Isoagglutinin Screen	18	Test

Code Number	Procedures	Unit Value	Item for Count
	IMMUNOHEMATOLOGY (BLOOD BANK)		
	Blood Grouping:		
01602	ABO (Only) - Slide or Tube	5	Test
01604	ABO and RH - Slide or Tube	7	"
01608	ABO (with Reverse Grouping) and RH Slide or Tube	9	"
01610	ABO Hemolysin Test	5	"
01664	Coombs, Indirect, Other Groups (including control)	10	"
01771	RH (D) (Only) - Slide or Tube	5	"
01772	RH Types, Other Antigens by Direct Agglutination	10	Antigen
	Cross Matches:		
01926	Cross Match, Routine Without Grouping or Screen but With Albumin Tube and Single Coombs	13	Unit
	Antibody Detection:		
02201	Antibody Detection - Albumin	10	Test
02202	Antibody Detection - Albumin plus Anti-Human Globulin (AHG)	20	"
02204	Antibody Detection - Enzyme - 1 Stage	12	"
02205	Antibody Detection - Enzyme - 2 Stage	15	"
02206	Antibody Detection - Enzyme - 1 Stage plus AHG	22	"
02207	Antibody Detection - Enzyme - 2 Stage plus AHG	25	"
02208	Antibody Detection - Saline	10	"
02209	Antibody Detection - Saline plus AHG	20	"
02211	Antibody Detection - ABO and Hemolytic Disease of Newborn (HDNB)	18	"
	Antibody Identification:		
02215	Antibody Identification - Albumin	15	Panel
02216	Antibody Identification - Albumin plus AHG	30	"
02217	Antibody Identification - Enzyme - 1 Stage	20	"
02218	Antibody Identification - Enzyme - 1 Stage plus AHG	35	"
02219	Antibody Identification - Enzyme - 2 Stage	30	"

Transfusion Reactions-When a transfusion reaction work-up is performed, individual tests used during the work-up should be counted.

Control Tests-Controls performed in Blood Bank testing simultaneously with test procedures are generally included in the unit values assigned for the specific tests. Therefore, albumin or serum controls utilized during blood typing, direct Coombs to control D^u typing, and "check cells" for anti-globulin testing are not separately counted. Tests to standardize and determine the quality of reagents, when performed separately, are counted.

IMMUNOHEMATOLOGY (BLOOD BANK)

Unit values do not include specimen procurement.

Items for Count

Antigen - is used as the item for count in certain immunological procedures as there is variation among laboratories in the numbers of antigens tested, eg., Rh sub-typing, febrile agglutinations. This unit of count refers to each antigen listed, applied to each specimen tested.

Donor - is used for procedures requiring a donor.

Panel - is used for antibody identification where a panel of reagent red blood cells of known antigenicity is used. The unit value per procedure is based on the whole panel, usually 8-10 cells. For a 16 cell panel count, double the unit value per procedure.

Pool - refers to the preparation of a common reagent pool, eg., R.B.C. reagent pool.

Test - is a defined activity leading to a result.

Unit - is used to identify individual aliquots of donor blood, components or derivatives.

Counting the Procedures

Antibody Detection and Identification - Antibody detection procedures will be counted by the batch method as described under "item for count". The various combinations of testing procedures are listed. When enzyme techniques are used and the laboratory pretreats a pool of reagent red blood cells at the beginning of each day, this pool preparation will be counted separately (02661) and the antibody detection procedures will be counted as one-stage enzyme procedures. The values for two-stage procedures will only be used when the cells are sensitized with each determination. There are two procedures for antibody absorption, one for simple auto-absorption on the patient's cells (02507) counting the value for each time the absorption has to be performed. The other antibody absorption procedure (02506) involves the use of homologous red blood cells for the differential absorption of an antibody or antibodies from a combination. Antibody identification is valued by the panel (see "item for count") and the same principles apply. Generally, panel cells are enzyme-treated just prior to use so a two-stage enzyme procedure should be counted as such unless an enzyme-treated panel is prepared at the beginning of each day.

Blood Typing - Red blood cell typing has four codes for various combinations of ABO, RH_o (D) and back typing (01602, 01604, 01608, 01771). All other blood group antigens, including those of the RH system, are counted individually as direct agglutinations (01172) or anti-globulin tests (01664).

Pools of Test Cells - Preparation of pools of reagent red blood cells for testing are counted as follows: A, B or O back typing cells (02660), antibody sensitized cells for antihuman globulin control (02659), and enzyme pretreated reagent RBCs (02661).

Blood Donors - A single value is assigned for the complete processing and bleeding of a single unit of blood from a donor (02524). If the donor is processed and found to be ineligible and therefore rejected, a lesser value is utilized (02523).

Blood Unit Handling - A value is assigned to be utilized whenever a unit of blood derivative or component is received by or issued by the blood bank. This value applies whether the unit is issued to or received from an outside blood bank or from a hospital ward. An additional credit value (00182, Dispatch of specimen, six units) is given if the laboratory personnel have to physically deliver the units.

Blood Unit Pooling and Fractionation - Values are given for the preparation of the usual blood components. In the cases of cryoprecipitate and platelets, values are assigned for the work of preparing them for administration and pooling more than one unit into a single container (02529, 02657). The subsequent issue of such a pool of units will be counted as the issue of a single unit. When a unit of blood is split into aliquots, the value is given for each such aliquot (02715); that is, if 100 mls. are removed and eight hours later another 100 mls. are removed the value should be taken twice. If a unit is split three or four ways at the same time only a single unit value is counted.

Code Number	Procedures	Unit Value	Item for Count
	Stains Including Interpretation		
01460 *	Non Specific Esterase	20	Specimen
01465 *	P.A.S. (Periodic Acid Schiff)	20	"
01470 *	Peroxidase	20	"
01399	Sudan Black	20	"
01475 *	Tartrate Resistant Phosphatase	20	"
01414	Thromboplastin Generation Test	71	Test
01435	Vitamin B_{12} Microbiological Method	45	"
	Vitamin B_{12} R.I.A. Group I - See Clinical Chemistry		
01444	White Blood Cell Count - Manual or Single Cell Counter	6	"

Code Number	Procedures	Unit Value	Item for Count
01220	Hemoglobin Plasma	15	Test
01224	Heparin - Protamine Titration	50	"
01102	Indices (MCV, MCH, MCHC) Manual Calculation - Note: (Raw Count = 0)	2	Specimen
01264	L.E. Cell Preparation and Examination	28	Test
01270	Lymph Nodes Film Preparation	33	Patient
01363	Osmotic Fragility Screen	35	Test
01364	Osmotic Fragility - Quantitative	45	"
01274	Parasites Blood (Malarial and other parasites)	22	Specimen
	Partial Thromboplastin Time - see activitated P.T.T		
01310	Partial Thromboplastin Time with Substitution	15	Test
01318	Plasma Clotting (Recalcification) Time	8	"
01326 *	Platelet Count - Microscopic	9	"
01327 *	Platelet Count - Single Cell Counter	6	"
01323	Platelet Function - Aggregation	6	Tube
01329	Platelet Function - Factor 3 (PF3)	16	Test
01320	Platelet Function Retention Test (Salzmann)	Units to be assigned locally	"
01334	Prothrombin Consumption	20	"
01336 *	Prothrombin Time - Manual or Fibrometer	5	"
01354	Red Blood Cell Count - Single Cell Counter	6	"
01375	Reptilase Time	4	"
01372 *	Reticulocyte Count	9	"
01384 *	Sedimentation Rate (E.S.R.)	4	"
01390	Sickle Cell Preparation	14	"
01396	Splenic Film Preparation	33	Patient
	Stains Including Interpretation		
01236	Iron	11	Specimen
01450	Neutrophil Alkaline Phosphate (Leukocyte)	18	"

Code Number	Procedures	Unit Value	Item for Count
01292	Eosinophil Nasal Smear	6	Slide
01157	Euglobulin Lysis Time	20	Test
01332	Factor II Assay	37	"
01162	Factor V Assay	55	"
01164	Factor VII Assay	55	"
01166	Factor VIII Assay	55	"
01168	Factor IX Assay	55	"
01170	Factor X Assay	40	"
01172	Factor XI Assay	60	"
01174	Factor XII Assay	60	"
01175	Factor XIII (Urea Solubility Method)	10	"
01155	Fibrin Degradation Products - Ethanol Gelation Test	6	"
01184	Fibrin Degradation Products - Latex Slide Test	8	"
01176	Fibrinogen Screening Test (Thrombin Time)	6	"
01330	Fibrinogen Chemical Quantitative	28	"
01180	Fibrinolysis (plate method)	16	"
01182	Fibrinolysis, Clot Observation	7	"
01190	Folates - Microbiological Method	45	"
	Folates RIA Group I - See Clinical Chemistry		
01398	Glucose 6 Phosphate Dehydrogenase (Qual)	10	"
01206	Heinz Bodies, Direct	15	"
01208	Heinz Bodies Induction Test	20	"
01210	Hematocrit, Macro or Micro	3	"
01212	Hemoglobin	5	"
01214	Hemoglobin Electrophoresis	25	"
01218	Hemoglobin Fetal-Acid Elution (Kleihauer Betke)	18	"
01216	Hemoglobin Fetal (Alkali Denaturation)	31	"
01219	Hemoglobin Fetal Qualitative (Feces)	12	"

Code Number	Procedures	Unit Value	Item for Count
01202	Acid Hemolysin Test - Hamm Test	18	Test
01312 *	Activated Partial Thromboplastin Time or Partial Thromboplastin Time - Manual or Fibrometer	5	"
01110	Authohemolysis Studies	Units to be assigned locally	"
01115	Bleeding Time	11	Patient
01116	Blood Film Examination (including W.B.C. Differential, R.B.C. Morphology and Platelet estimate)	11	Slide
01118 *	Blood Film Screen (including W.B.C. estimate, R.B.C. Morphology and Platelet estimate)	5	"
01280	Bone Marrow Aspiration and Film Preparation (technical work in connection with aspiration and film preparation at the bedside, excluding staining)	36	Patient
01276	Bone Marrow Film Preparation in Laboratory	15	"
01278	Bone Marrow Stain Romanowsky	12	Specimen
01275	Bone Marrow - Differential	8	100 Cells
01117	Buffy Coat Preparation and Interpretation	16	Patient
01122	Capillary Fragility	7	Test
01124	Cell Count with Film and Differential (CSF or other body fluids, excluding blood)	18	"
01125	Cell Count (CSF or other body fluids, excluding blood)	7	"
01133	Circulating Anticoagulant Studies	Units to be assigned locally	"
01146	Clot Lysis Time Dilute Whole Blood	10	Test
01128	Clot Retraction Qualitative	6	"
01130	Clotting Time Whole Blood	24	Patient
01134	Cold Agglutinins Qualitative	6	Test
01136	Cold Agglutinins Quantitative	18	"
01138	Cryofibrinogen	15	"
01148	Donath - Landsteiner	23	"
01154	Eosinophil Count Total	8	"

Instrument Profiles

The most common automated hematology instruments such as multi cell counters (Coulter, S,S Sr,S Plus, Hemalog etc.) and coagulation instruments (Coag A Mate, Coagulyzer) have been studied and the unit value is characteristic of the instrument.

Units for other instrument profiles should be assigned a temporary unit value based on the unit value of a profile considered equal in time consumption. See Variation in Unit Values with Methodology.

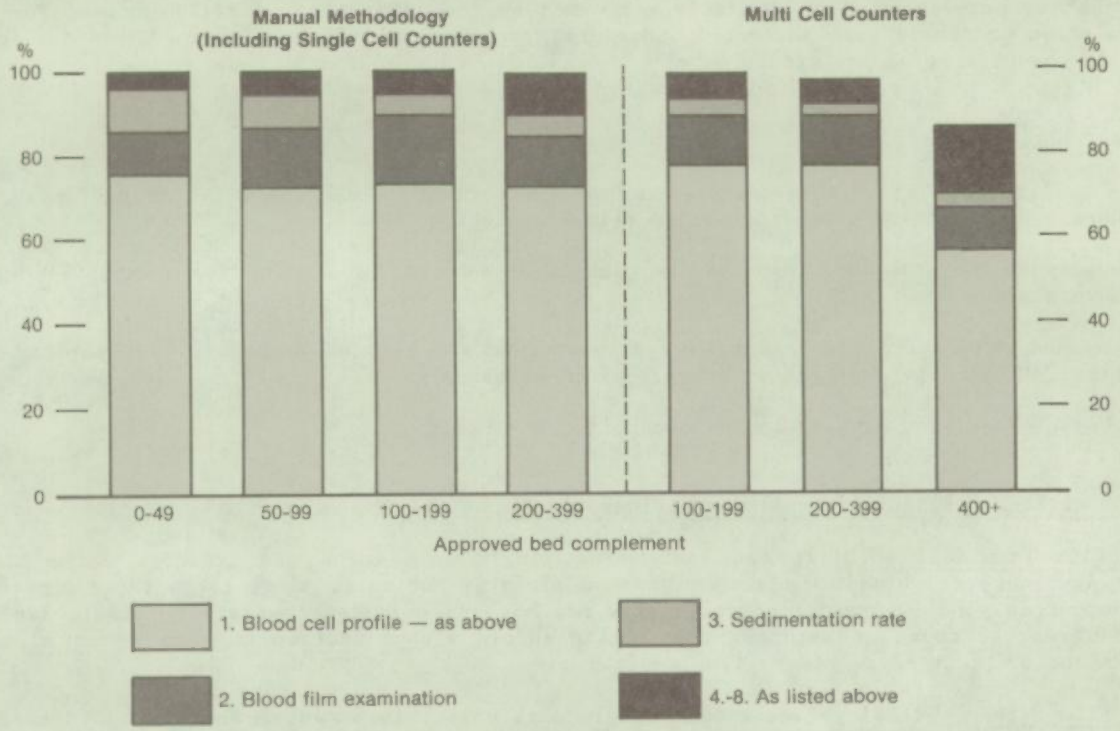
To simplify the recording of instrument profiles each has been assigned a unit value which represents the average number of units required to process one specimen (item for count). The number of component procedures (raw count) is also identified.

The total workload in units is obtained by multiplying the number of specimens and repeats and quality controls by the unit value.

To obtain the total raw count, that is the number of test answers produced by the instrument, multiply the total number of specimens by the number of component procedures.

Code	Hematology - Profile	Item for Count	Unit Value	Test Count
01126	Coulter S or S Sr Blood Cell Profile includes Hemoglogin, Hematocrit, R.B.C., W.B.C., MCV, MCH, and MCHC	Specimen	3	4
01520*	Coulter S Plus Blood Cell Profile includes Hemoglobin, Hematocrit, R.B.C., W.B.C., MCH, MCHC and Platelet Count	Specimen	3	5
01530*	Coag A Mate Profile includes Prothrombin and Partial Thromboplastin Times (single P.T. or P.T.T. = Unit Value 4, Raw Count = 1)	Specimen	4	2
01540*	Single Cell Counter Profile includes R.B.C. and W.B.C. on electronic single cell counter (single R.B.C. or W.B.C. = Unit Value 6, Raw Count = 1)	Specimen	8	2

Graphic Representation of 8 High Volume Procedures as Percentage of Total Raw Count



APPROVED BED COMPLEMENT

With the introduction of the new unit values there should be a decrease in the total number of units but NO decrease in the total raw count including productive patient answers. There will be a change in those laboratory indicators involving total units eg., average units per paid hour. The amount of change will vary depending on individual utilization patterns.

The hematology pattern of utilization is characteristic of each individual laboratory and depends on the patients served, the requesting physicians mode of practice, the total number of procedure requests per day, internal organization and the ability to batch test procedures.

Table 2. PERCENTAGE REDUCTION IN TOTAL UNITS
1982-1983 SCHEDULE VS 1978 SCHEDULE

BED COMPLEMENT	% REDUCTION
0- 49	0 to 11
50- 99	7 to 13
100-199	4 to 22
200-399	6 to 25
400+	11 to 19

The other procedures listed in the unit schedule though extremely important in large and/or teaching laboratories range from 0 to 15 per cent of the specific requests. Future activities of the Canadian Unit Committee will include a review of the more specialized hematological procedures.

Hematology Profiles

The grouping of tests or procedures performed simultaneously and reported as standard laboratory practice has been explained in Methods of Simplifying Raw Counts.

HEMATOLOGY

Unit values do not include specimen procurement. The unit value for each procedure covers all the activities required to complete the procedure once, including the performance of duplicates as required by the methodology, or routinely performed by the laboratory on all unknowns. For example, all coagulation tests and some automated procedures are performed in duplicate. These duplicates are included in the unit value assigned.

Items for Count

Patient - The item for count when the presence of the patient is necessary in the performance of the procedure eg., Bone Marrow Aspiration and Film Preparation.

Slide - used when the procedure requires the placing of material on a slide for examination eg., Blood Film Examination.

Specimen - used as the item for count when an assortment of related procedures are performed on one sample eg., Hematology profiles either automated or manual.

Test - a defined activity leading to the recording of a result.

Special Directions Related to the New Hematology Listing

Blood Film Examination (01116) is assigned a single unit value and includes white blood cell differential count, red blood cell morphology and platelet estimate. Since these three procedures are bound together in good laboratory practice they are no longer listed separately. Single requests for W.B.C. Differential count or Basophilic Stippling should always include an examination of the other components and are counted as Blood Film Examinations.

Blood Film Screen (01118) is assigned a single unit value. It includes White Blood Cell Estimate, red cell morphology and platelet estimate. It lacks the numerical information (Differential Cell Count of 100 WBC's) and the more complex morphological report of the Blood Film Examination. Single requests for R.B.C. Morphology or Platelet Estimates should include a White Blood Cell Estimate and be counted as a Blood Film Screen.

Red Blood Cell Counts, Manual have been deleted due to the extreme lack of accuracy. Accurate Hemoglobins and Hematocrits are more valuable. When R.C.B. Counts are required, an electronic cell counter should be used.

Changes in Hematology Unit Schedule

Since the publication of the last schedule, all the Hematology procedures which together comprise at least 85% of the workload of a general hospital hematology laboratory have been timed and reviewed. Changes in unit values have been made to reflect the current averages of all timings. This does not mean the work required to do the tests is less but that there has been an observable gain in efficiency over the last 11 years eg., improved recording and reporting (clerical) techniques. This gain in efficiency has contributed to a gradual rise in the indicators "average units per paid or worked hours".

To assist in identifying the magnitude of change which will occur with the introduction of the new unit schedule the following information on utilization patterns was obtained from a survey of 45 active Hematology laboratories (Spring 1980).

The following eight (8) procedures accounted for a mean of 98% (range 75 to 100%) of the workload in Hematology:

1. Blood Cell Profile including Hemoglobin, Hematocrit, W.B.C., R.B.C. and indices whether performed manually, individually or as a group, or by an automated multi-cell counter.
2. Blood Film Examination
3. E.S.R. (sedimentation rate)
4. Prothrombin Time
5. Platelet Count
6. Partial Thromboplastin Time
7. Reticulocyte Count
8. Bleeding Time

Code Number	Procedures	Unit Value	Item for Count
00974	Thiocyanates	15	Test
00975 *	Thyroid Stimulating Hormone - RIA Group I	7	"
00978 *	Thyroxine (T4) - RIA Group I	7	"
00984	Triglycerides	12	"
00987 *	Triiodothyronine - RIA Group I	7	"
00990	Trypsin Qual.	11	"
01010 *	Urate (Uric Acid)	8	"
01002 *	Urea	7	"
01003 *	Urea Qual. - Dipstick	T 3	"
01013	Urinalysis, any single analysis eg., Blood or Protein or Sugar	3	"
01014 *	Urinalysis, routine (Sugar, Protein, Acetone, Specific Gravity, PH. including diagnostic Stick Tests)	4	Specimen
01016 *	Urinalysis, routine as above but including Microscopy	6	"
01017	Urine Volume - Measurement and Calculation	2	"
01020	Urobilin Qual. - Urine	3	Test
01022	Urobilinogen Qual. - Feces, Urine	10	"
01026	Urobilinogen Quant. - Feces	35	"
01028	Urobilinogen Semi-Quant. - Urine - 24 Hr. Excretion	12	"
01042	Vanilmandelic Acid (VMA)	30	"
01044	Viscosity	4	"
01050 *	Vitamin B_{12} - RIA Group I	7	"
	Xylose Absorption - Unit Value is equal to the sum of Units assigned to each procedure		
00956	Xylose	8	"

Code Number	Procedures	Unit Value	Item for Count
00838	Porphobilinogen Qual.	9	Test
00842	Prophyrins Qual.	10	"
00846	Porphyrins, Fractionation	67	"
00844	Porphyrins Screening Test (Lead)	10	"
00848	Potassium - see Chemical Analysers		
00854	Pregnanediol	40	"
00856	Pregnanetriol	40	"
00879 *	Progesterone - RIA Group I	7	"
00881 *	Prolactin - RIA Group I	7	"
00863	Protein, Bence Jones, Qual.	18	"
00566 *	Protein Electrophoresis	12	Specimen
00870	Protein 24 Hr. Urine or Fluid	6	Test
00874 *	Protein, Total - Chemical	8	"
00872	Protein, Total - Refraction - Serum	6	"
00876	Protein, Total and A/G Ratio	20	"
00884	Quinidine	18	"
00887 *	Renin - RIA Group II	T 22	"
00892	Resin Test for Achlorhydria (Tubeless Gastric Analysis)	11	"
00902	Salicylates Qual.	5	"
00910	Salicylates Quant.	12	"
00924	Sodium - see Chemical Analysers		
00928	Specific Gravity	4	"
00925 *	Steroids urinary	17	"
00964	Sulfhemoglobin	21	"
00958	Sulfonamides	27	"
00960	Sulfonamides Crystals Qual.	2	"
00977 *	T3 Resin Uptake Test - RIA Group I	7	"
00971 *	Testosterone - with Chromatography - RIA Group II	T 22	"
00970 *	Testosterone - RIA Group I	7	"

Code Number	Procedures	Unit Value	Item for Count
00726 *	Lipids, Total	T 10	Test
00567 *	Lipoprotein Electrophoresis	12	Specimen
00728 *	Lithium - see Chemical Analyzers		
00723 *	Luteinizing Hormone (LH) - RIA Group I	7	Test
00729 *	Lysergic Acid Diethylamide (LSD) - RIA Group I	7	"
00730	Macroglobulins, SIA Test	6	"
00732	Magnesium (Chemical Method)	13	"
00735	Melanin Qual. - Urine	10	"
00740	Methemalbumin	21	"
00742	Methemoglobin or Sulfhemoglobin	21	"
00747 *	Morphine - RIA Group I	7	"
00754	Mucopolysaccharides	30	"
00756	Myoglobin - Spectrophotometric - Urine	11	"
00766	Nitrogen, Total	12	"
00776	Osmolality	10	"
00798	PH Routine (see No. 01014 also) Urine	3	"
00858	Phenolsulfonphthalein (PSP)	14	"
00802	Phenothiazine Qual.	8	"
00810	Phenyl Pyruvic Acid Qual.	4	"
00804	Phenylalanine	15	"
00806	Phenylalanine - Tyrosine Ratio	30	"
00835	Phenylketone (PKU)	4	"
00815	Phosphatase Acid	10	"
00818 *	Phosphatase, Alkaline	7	"
00824 *	Phosphate Inorganic	7	"
00828	Phosphorus Tubular Absorption	23	"
00832	Pigments, Abnormal - Spectroscopic	20	"
00837 *	Placental Lactogen - RIA Group I	7	"
00840	Porphobilinogen	32	"

Code Number	Procedures	Unit Value	Item for Count
00610	Gonadotropins - see FSH and LH		
00616 *	Growth Hormone - RIA Group I	7	Test
00626	Haptoglobin - Electrophoresis	26	"
00625	Haptoglobin Qual.	15	Antigen
00624	Hemoglobin, Qual. - Spectroscopic - Urine	5	Test
00628	Hemosiderin - Urine	3	"
00631	Homocystine Qual.	8	"
00632	Homogentisic Acid	9	"
00633	Hydroxybutyric Dehydrogenase	10	"
00636	5 - Hydroxyindoleacetic Acid (5-HIAA)	22	"
00638	5 - Hydroxyindoleacetic Acid (5-HIAA) Qual.	9	"
00635 *	Hydroxyprogesterone - RIA Group I	7	"
00639	Immunodiffusion, first Antigen	10	Antigen
00640	Immunodiffusion, each additional Antigen	8	"
00641	Immunodiffusion Qual.	10	"
00642	Immunoelectrophoresis	40	Plate
00643 *	Immunoglobulin E, Total or Specific - RIA Group I	7	Test
00647 *	Insulin - RIA Group I	7	"
00648	Iron, Total	10	"
00650	Iron, Total and Binding Capacity	15	"
00654	Isocitric Dehydrogenase	13	"
00682	Keto Acids Qual. - Urine	3	"
00706 *	Lactate Dehydrogenase (LDH)	7	"
00710 *	Lactate Dehydrogenase Isoenzymes Qual. - Electrophoresis	12	Specimen
00702	Lactic Acid	27	Test
00703	Lactic and Pyruvic Acids Together	58	"
00948	Lactose Qual. - Urine	6	"
00720	Lead or mercury (Chemical Method)	40	"
00722	Lecithin/Sphingomyelin Ratio	15	"
00724	Lipase	22	"

Code Number	Procedures	Unit Value	Item for Count
00536	Cystine (Nitroprusside) Qual.	8	Test
00539 *	Deoxycortisol - RIA Group I or II		"
00542 *	Digitoxin - RIA Group I	7	"
00545 *	Digoxin - RIA Group I	7	"
00574 *	Enzymes, Others	10	"
00857 *	Estrogens, Pregnancy - Spectrophotometric - Urine	T 14	"
00577 *	Estrogens, Specific (Estradiol) - RIA Group I	7	"
00584	Fat Qual. - Feces	6	"
00588 *	Fat, Total - Feces	T 55	"
00594	Fatty Acids Free	25	"
00589 *	Ferritin - RIA Group I	7	"
00865	Fibrinogen - Chemical Analysis	28	"
00866	Fibrinogen, Screening Test	6	"
00593 *	Folate - RIA Group I	7	"
00595 *	Follicle Stimulating Hormone (FSH) - RIA Group I	7	"
00596	Follicle Stimulating Hormone (FSH) - Urine Bioassay	45	"
00590	Formimino Glutamic Acid - Electrophoresis	45	"
00591	Formimino Glutamic Acid - Enzymatic Method	20	"
00932	Fructose	14	"
00934	Galactose Tolerance - as Glucose Tolerance		"
00600	Gamma Glutamyl Transpeptidase	7	"
00607 *	Gastrin - RIA Group I	7	"
00605	Gastric - Electrometric Titration	7	"
00867	Globulin	12	"
00944	Glucose	8	"
	Glucose Tolerance - Unit Value is equal to the sum of units assigned to each procedure		
00942	Glucose Qual. - Dextrotest, Dextrostik, or Dipstick	3	"
00562	Glyoprotein Electrophoresis	60	"

Code Number	Procedures	Unit Value	Item for Count
00458	Bromosulphthalein	11	Test
00462 *	Calcium	6	"
00464	Calcium 24 Hr. Excretion - Feces	93	"
00470	Calcium, Sulkowitch - Urine	7	"
00791	Calculation - Special	3	Specimen
00472	Calculus Analysis	25	"
00503 *	Carbon Dioxide, Total	14	Test
00500	Carbon Monoxide	23	"
00474 *	Carcinoebryonic Antigen - RIA Group I	7	"
00476	Carotene	8	"
00478	Catecholamines - Urine	80	"
	Cell Count with or without Film and Differential - CSF or other Body Fluids - see Hematology		
00486	Ceruloplasmin (Copper Oxidase)	19	"
00488 *	Chlorides	6	"
00969	Chloride Sweat Test	33	"
00499	Cholesterol, Total - With Extraction	10	"
00498 *	Cholesterol, Total - Without Extraction	7	"
00497	Cholinesterase	30	"
00509	Congo Red	13	"
00511	Copper (Chemical Method)	40	"
00514 *	Corticoids or Cortisol - RIA Group I	7	"
00517 *	Corticosterone - RIA Group I or II		"
00518	Creatine	26	"
00520 *	Creatine Kinase (CK)	7	"
00521 *	CK Isoenzyme Qual. - Electrophoresis	12	Specimen
00522	Creatinine	10	Test
00532	Cryoglobulin Qual.	9	"

CLINICAL CHEMISTRY

Note: Unless otherwise noted the following procedures refer to QUANTITATIVE methodology and the unit value applies to all body fluids on which the test may be requested ie., BLOOD, PLASMA, SERUM, URINE, and/or CSF.

Code Number	Procedures	Unit Value	Item for Count
00403	Acetone Qual. - Dipstick	3	Test
00404	Acetone Quant.	10	"
00406	Acid, Free or Total - Duodenal or Gastric	3	Specimen
00922 *	Alanine Aminotransferase ALT (SGPT)	7	Test
00860	Albumin	12	"
00415	Alcohol	49	"
00413 *	Aldosterone, Plasma, Serum - RIA Group II	T 22	"
00419 *	Alphafetoprotein - RIA Group I	7	"
00418	Amino Acids, Total - Chemical - Urine	12	"
00420	Amino Levulinic Acid - Urine	40	"
00422	Ammonia	39	"
00423	Amniotic Fluid Scan	20	"
00425 *	Amylase	10	"
00427	Ascorbic Acid	25	"
00920 *	Aspartate Aminotransferase AST (SGOT)	7	"
00430	Barbiturates Qual.	32	"
00434	Barbiturates Quant.	44	"
00502 *	Bicarbonate - Titration	8	"
00440	Bile Pigments Qual. - Urine	6	"
00444	Bilirubin Qual. - Feces	5	"
00446 *	Bilirubin Total and Direct	16	"
00448 *	Bilirubin Total or Direct	11	"
	Blood Gas Analysis - see Chemistry Instrumentation		
00450	Blood, Occult - Feces	6	"
00452	Blood Qual. - Dipstick	3	"
00456	Bromides	15	"

V. Chemical Analyzers: Dedicated Instrumentations

Instruments designed to perform one or more specific analyses have been found to have a unit value dependent on the instrument.

Code	Instrument	Item for Count	Unit Value
*	Beckman Cl/CO_2 Analyzer	Specimen	2.5
*	Beckman Glucose or BUN or Glucose/BUN Analyzers	Specimen	2.5
*	Flame Photometer - Single Channel (Na, K or Li) or a dual channel instrument used to measure lithium	Test	7.0
*	Flame Photometer - Dual Channel (Na and K) eg., Beckman Klinaflame, IL 143, 343	Specimen	4.0
*	Photovolt Stat Ion (Na, K, Cl, CO_2 optional)	Specimen	T 2.0
*	Technicon Stat Lyte (Na, K, Cl, CO_2)	Specimen	T 2.5

Unit Value Manual Procedures

The unit value is generally characteristic of the constituent being measured irrespective of the methodology when most of the activities are done manually. The "manual" unit values are listed beside the name of the constituent being measured (see following list). Where the unit value does vary with methodology, the general type of method to which the unit applies is noted.

FORM 6 DATA RECORDING FORM B

DATE _____

Laboratory Section _____ Instrument _____

Total Specimens _____ Total Tests _____ Total Workload Units _____

No.	Specimen Name	Classification									Tests Performed																
		Patients		Ref. In	Qual. Cont.	Cal. Std.	Envir.	Staff Health	Re-search	Re-peats	GLUC	UREA	Na	K	Cl	CO_2	AST	CREAT	BILIR	ALK PHOS	LDH	ALT	CK	TOT PROT	URATE	TRI-GLY	Ca
		In	Out																								
1																											
2																											
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	Total																										

Simplify forms by including only the columns required for specimen classification and the tests performed by the instrument.

a) Total Specimens _____ b) Unit Value Per Specimen _____ c) Total Units Per Specimens [a x b] _____

Total Tests _____

FORM 5 DATA RECORDING FORM A

DATE _____

Laboratory Section _____ Instrument _____

Total Specimens _____ Total Tests _____ Total Workload Units _____

No.	Specimen Name	Classification									Tests Performed																
		Patients		Ref. In	Qual. Cont.	Cal. Std.	Envir.	Staff Health	Re-search	Re-peats	GLUC	UREA	Na	K	Cl	CO_2	AST	CREAT	BILIR	ALK PHOS	LDH	ALT	CK	TOT PROT	URATE	TRI-GLY	Ca
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a) Total Specimens _____ b) Unit Value Per Specimen _____ c) Total Units Per Specimens [a x b] _____

d) Total Tests _____ e) Unit Value Per Additional Tests _____ f) Total Units Per Additional Tests [(d-a) x e] _____

Total Units Per Instrument (c + f) _____

To determine the workload in units record the total number of specimens, standards, quality controls and repeats processed and multiply by the unit value for the first analysis. Record separately the total number of test answers measured on the same specimens, standards, quality controls and repeats, subtract the number of specimens processed and multiply by the unit value for each additional analysis. The total workload is the sum of the total units for the first analysis plus the total units for the additional analyses (see Form 5 Daily Data Recording Form A).

IV. Chemical Analyzers: Profile or Multi Test Selection Mode

Instruments which are capable of performing a profile or series of analyses on a single specimen in sequence or in parallel have been found to have a unit value dependent on the instrument and independent of the number of individual tests run. To determine the workload in units record the number of specimens, standards, quality controls and repeats processed and multiply by the unit value for one specimen (See sample Form 6 Daily Data Recording Form B) which provides the full information needed to analyze the workload processed.

Code	Instrumentation - Profile Mode	Item for Count	Unit Value
*	American Monitor - K.D.A. (ATS Mode)	Specimen	3.5
*	Beckman - Astra 8	Specimen	3.0
*	Dupont - ACA (Automatic Clinical Analyzer)	Specimen	3.5
*	Hycel 10, 17 or HMA 16	Specimen	T 5.0
*	Technicon - Auto Analyzer (Dual Channel)	Specimen	4.0
*	Technicon - Auto Analyzer (Four Channel)	Specimen	3.0
*	Technicon - SMA 6/60	Specimen	4.0
*	Technicon - SMA 12/60	Specimen	4.0
*	Technicon - SMAC	Specimen	T 2.5

Code	Instrumentation (Single Channel)	Item for Count	Unit Value
*	Atomic Absorption eg., Ca, Cd, Li, Pb or Zn.	Test	T 5
*	RIA Group I (Saturation Analysis) - assays where the serum or biological material is added to the radioisotope with no preliminary preparation, eg., Digoxin, T_3 Resin Uptake, Thyroxine, Gastrin, etc. or a minimal preparatory step eg., Vitamin B_{12} - boiling step, Estradiol - simple organic extraction.	Test	7
*	RIA Group II (Saturation Analysis) - where the serum or biological material requires extensive preparation prior to the addition of the radioisotope, eg., Aldosterone - column separation.		
	Reproductive steroids - chromatographic separation.	Test	T 22
	Technicon Auto Analyzer, Methodology without extraction: eg., Glucose, Urea, Ca, Creatinine, Enzymes, Cholesterol, Total Protein or Urate (Uric Acid).	Test	4
	Technicon Auto Analyzer, Methodology with extraction: eg., Cholesterol or Triglycerides.	Test	6

III. Chemical Analyzers: Batch or Single Test Mode

Instruments which can be set up to perform a single analysis on a batch of specimens and then reprogrammed to perform a different analysis on the same specimens receive a given unit value for the first analysis and a lower unit value for each additional analysis performed on the same specimen. The first larger unit value includes the initial handling of the specimen, daily preparation and routine maintenance or repair of the instrument, recording and reporting of the results and any technical supervision as well as the time for the first analysis. The lower unit value for each additional analysis performed subsequently on the same specimen covers the technological testing needed to reprogram the instrument and perform the additional analysis.

Code	Instrumentation - Batch or Single Test Mode	Unit Value for Same Specimen	
		First Analysis	Each Additional Analysis
*	Abbott - Bichromatic Analyzer 50 or 100	3.5	1.0
*	Abbott - V.P.	T 3.0	T 0.5
*	Centrifichem - Union Carbide (Baker Diagnostics)	4.0	1.0
*	Gem Saec - Electro Nucleonics	4.0	1.0
*	Gemini - Electro Nucleonics	T 2.0	T 1.0
*	Gilford Systems 3400, 3500, 300 N - Electro Nucleonics	3.5	1.0
*	K.D.A. - American Monitor	T 2.5	T 0.6
*	LKB - Reaction Rate Analyzer	3.5	1.0
*	Rotochem - American Instrument	4.0	1.0

(2) FUNCTION TESTS-Involving the sequential performance of chemistry tests are not assigned separate unit values because there can be a variation in the number of tests involved. Proper recording can be achieved by selecting the appropriate components. For example, the workload involved in performing a glucose tolerance can be counted by entering each quantitative glucose determination on blood and urine as a Glucose Quantitative, 00944. If qualitative tests for urine glucose are performed as part of a tolerance test they are recorded as Urinalysis, Routine - any single analysis, 01013.

(3) CLEARANCE TESTS-For tests such as Creatinine Clearance and Urea Clearance an approach similar to Function Tests is used. When a calculation is required over and above that involved in determining the result of each component test an additional count and unit value is provided for this activity under Calculation Special, 00791.

(4) SATURATION ANALYSIS/LIGAND/RIA/ENZYME IMMUNOASSAY-The generic term Ligand or Saturation Analyses may include radioimmunoassays, radiometric assays, competitive protein binding assays and enzyme immunoassays eg., EMIT, ELISA, etc. For the purposes of this schedule, any procedure using a radioisotope will be termed RIA (see Chemistry Instrumentation - Section II Chemical Analysis: Single Channel Instrumentation). Since many enzyme immunoassays are performed on Chemical Analyzers, first check the Chemistry Instrumentation listings for the appropriate unit values. If an enzyme immunoassay is being performed on a manual instrument not listed use the appropriate RIA value listed under procedures.

CHEMISTRY INSTRUMENTATION

The unit value is generally characteristic of the instrumentation irrespective of the analyses being performed. However, some instrumentation eg., KDA may be used in single test mode or profile (multitest) mode and the unit values reflect the different timings in these two modes of operation. The most common instrumentation has been time-studied in routine operation. The following lists the instrumentation by group, providing for each a description, the item for count and the unit value.

I. Blood Gas Analysis

The unit for BLOOD GAS ANALYSES includes as required the calibration of the instrument, replicate steps of the analysis, calculation of the results and parameters and recording and reporting of these results. To determine the workload in units, record the number of specimens processed and multiply by the unit value per specimen. Do not count the calibration standards or repeats. If separate quality control samples are used they should be counted as a specimen.

Code	Instrumentation (Blood Gas)	Item for Count	Unit Value
*	Blood Gas: self calibration, self calculation eg., Radiometer ABL-1, ABL-2; IL 813; Corning 168 or 175.	Specimen	4
*	Blood Gas: manual calibration, self calculation, eg., Corning 165; IL 513.	Specimen	12
*	Blood Gas: manual calibration, manual calculation, eg., Radiometer Astrup, BMS3/MK2; IL 213, 313, 329, 413.	Specimen	20

II. Chemical Analysis: Miscellaneous "Single" Channel Instrumentation

Single channel instruments which are set up to perform a single analysis on one specimen or a batch of specimens have been found to have a unit value dependent on the instrument and independent of the nature of the analyses being performed. To determine the workload in units record the number of tests, standards, quality controls and repeats processed and multiply by the unit value for one test.

Antigen - used to define qualitative or quantitative testing of a specimen for an antigen. It refers to the first and each additional antigen applied to each specimen.

Plate - used in immunoelectrophoresis to define the procedure related to one complete plate.

SPECIAL DIRECTIONS RELATED TO THE NEW CHEMISTRY LISTING

Since the publication of the last schedule, the chemistry procedures and instrumentation which together comprise at least 85% of the workload of a general hospital chemistry laboratory have been timed and reviewed. Changes in unit values have been made to reflect the current averages of all timings. This does not mean the work required to do the test is less but that there has been an observable gain in efficiency over the last 11 years. This gain in efficiency has contributed to a gradual rise in the indicator "average units per paid or worked hour".

To assist in identifying the magnitude of change which will occur with the introduction of the new unit schedule the following information on utilization patterns was obtained from a survey of 46 chemistry laboratories (Spring 1981).

The following twenty-two (22) procedures accounted for a mean of 90% (range 77 to 100%) of the workload in Chemistry:

1. Glucose and Urea
2. Electrolytes: Sodium, Potassium, Chlorides and CO_2
3. Urinalysis with Microscopy
4. Enzymes: AST (SGOT), Alkaline Phosphatase, LDH, ALT (SGPT), CK
5. Creatinine
6. Bilirubin (Total or Total and Direct)
7. Total Protein (Total or Total and Albumin or A/G Ratio)
8. Occult Blood
9. Urate (Uric Acid)
10. Cholesterol and Triglycerides
11. Blood Gases
12. Calcium

TOP TWENTY-TWO TESTS AS % OF TOTAL WORKLOAD

Bed Capacity	Range	Mean
0 - 49	81 to 99	93
50 - 99	84 to 100	93
100 - 199	89 to 98	94
200 - 399	77 to 95	83
400+	86 to 94	89

With the introduction of the new unit values there will be a decrease in the total number of units but no decrease in the productive patient answers. There should also be a change in those laboratory indicators involving total units eg., average units per paid hour. The amount of change will vary depending on individual utilization patterns and the unit values used by the laboaratory for new instrumentation which previously had no assigned unit value.

In applying the workload to the sample hospitals a decrease in total units of 10 to 41% was observed. Since the variation is so dependent on methodology it is suggested that each hospital determine the impact by calculating the previous years total workload with both the new and old schedules to obtain the reduction factor characteristic of their hospital. A reduction in paid productivity to below 44 units per hour can be expected (see Paid and Worked Productivity Calculations - Laboratory Indicators Useful for Monitoring Laboratory Function).

Special Directions

(1) MEASUREMENT OF URINE VOLUME-Credit for the time expended in measuring 24 Hour Urine Volume and calculating the 24 Hour Excretion Concentration is provided for under Urine Volume Measurement and Calculation, 01017.

SPECIMEN PROCUREMENT AND DISPATCH

Specimen procurement or dispatch is counted only when work is performed by members of the laboratory staff. Specimens collected by nurses, residents, staff physicians and others not on the laboratory staff payroll will not be counted.

Items for Count

Patient - The item for count when the presence of the patient is necessary to perform the procedure eg., venipuncture.

Specimen - identifies the sample or material being collected or dispatched.

Code Number	Procedures	Unit Value	Item for Count
	Specimen Procurement and Dispatch:		
00213	Arterial Puncture	12	Per Patient
00314	Collection of Environmental Specimens - Swabs	3	Per Specimen
00315	Collection of Environmental Specimens - Rodac Plates	2	"
00321	Collection of Specimen for Dark Field Microscopy	20	"
00326	Dispatch of Microbiology Specimen to other Laboratories including background information and subsequent distribution of results	10	"
00182	Dispatch of other Specimens to other Laboratories including subsequent distribution of results (Specimen Procurement not included)	6	"
00210	Skin Puncture (Capillary) Technique - Pediatric	12	Per Patient
00211	Skin Puncture (Capillary) Technique - Adult	12	"
00036	Procurement of Drainage Specimen	6	"
00100	Procurement of Gastric Washings for Cytology	20	"
00188	Procurement of Swabs for Culture	6	"
00205	Procurement of Urine Specimen	6	"
00208	Procurement of Vaginal Smear for Cytology	5	"
00212	Venipuncture	8	"

CLINICAL CHEMISTRY

Unit values do not include specimen procurement.

Procedures included in this section are generally quantitative. The unit value for each procedure listed covers all activities required to complete the procedure once including blank determinations. Clerical activities such as sorting requisitions, recording patient information and filing reports as well as the technical activities (centrifuging specimens, separating and dispensing serum, recording and calculating results) are included.

Constituents measured in plasma, serum, urine, other body fluids, quality control materials or standards are all counted as ONE for the RAW COUNT and assigned the same UNIT VALUE in calculating the TOTAL WORKLOAD. The few exceptions are noted eg., 00796 pH BODY FLUIDS (DO NOT COUNT CALIBRATION STANDARDS, COUNT TESTS ONLY).

Items for Count

Specimen - used as the item for count when an assortment of related tests are performed on one sample, eg., urinalysis.

Test - a defined activity leading to the recording of a result.

Profile - A profile is a group of procedures which is defined by the laboratory for a reporting convenience. It may be requested or performed as a group.

Raw Count - Simple tally of items for count.

Repeat - A procedure performed to solve a problem in a sample run. To qualify as a repeat, all of the analytical, data handling, and recording steps following the initial preparation of the specimen must have been performed.

The routine performance of duplicate procedures simply for quality assurance purposes without a reasonable probability of discrepant results is not considered to be a problem, and therefore such procedures do not qualify as repeats. A repeat constitutes one raw count.

Replicate (duplicate, triplicate, etc.) - The planned multiple performance of certain steps. Replicated steps included in a specific methodology are already part of the unit value per procedure. Replicates are not counted.

Step - A well defined single function such as logging, pipetting, inoculating, etc.

Unit Value Per Procedure - The number of units required to perform all the activities to complete the defined procedure once.

"T" Unit Value - A temporary unit value based on two or more timing studies. Additional studies are needed before assigning a permanent unit value.

Workload - The sum of all the products obtained by multiplying the raw count for each individual procedure by the unit value per procedure.

DEFINITION OF TERMS

Item for Count - defines for each procedure what is to be counted to obtain the raw count.

Antigen - is generally used in Blood Bank and Immunology to define qualitative or quantitative testing of a specimen for an antigen or an antibody. It refers to each individual antigen listed applied to each individual specimen tested.

Block - is used for each block where tissue or sedimented material is embedded for histologic processing and one slide cut and stained.

Case - is used for autopsies.

Donor - is used for procedures requiring a donor.

Grid - is used in electron microscopy to define the viewing and photography of one grid.

Panel - is used for antibody identification where a panel of reagent red blood cells of known antigenicity is used. The unit value per procedure is based on the whole panel, usually 8-12 cells. For a 13-24 cell panel count, double the unit value per procedure.

Patient - is used when the presence of the patient is mandatory during the procedure, eg., venipuncture.

Per 100 - pertains to counting 100 elements, eg., bone marrow differential.

Picture - is used in electron microscopic photography to define the procedure related to the developing of one electron micrograph.

Plate - is used in Immunology for counter electrophoresis, immunoelectrophoresis, etc., to define the procedure related to one complete plate.

Pool - refers to the preparation of a common reagent pool.

Slide - is used when material is placed on a slide, eg., tissue, bacteria.

Specimen - A biological substance for analysis. Specimen is used:

(a) when the one procedure involves the production of more than one result, eg., urinalysis,
(b) to count the initial handling and clerical processing for surgical pathology, cytology, and microbiology,
(c) when the procedure involves a specimen without producing a reportable result, eg., centrifugation in cytology.

Specimen - (Surgical) is all of the tissue removed at a single surgical setting eg., hysterectomy plus appendectomy is one specimen, multiple skin lesions removed at the same time are one specimen.

Test - is a defined activity leading to a result.

Unit - is used in Blood Bank for individual aliquots of donor blood, components or derivatives, or associated procedures.

Laboratory Workload Unit - The basic measure of productive time in the Method. One unit is equal to one minute of technical, clerical, and aide time.

Procedure - A sequence of technical, clerical, and aide steps, constituting a laboratory activity listed in the Canadian Schedule of Unit Values. Each such procedure has a code number, a unit value per procedure, and an item for count and is arbitrarily assigned to a standard section.

Automated Procedure - A procedure in which most of the analytical steps are performed by an instrument. Unit values per procedure for such instruments are listed in the Method in the special directions.

Manual Procedure - A procedure in which most of the analytical steps are performed by hand.

FORM 4 WORKLOAD REPORT

MANAGEMENT INFORMATION

PRODUCTIVITY:

$\frac{\text{Total Units}}{\text{Total Paid Hours x 60}} \times 100 =$ Percent Paid Productivity

$\frac{\text{Total Units}}{\text{Total Worked Hours x 60}} \times 100 =$ Percent Worked Productivity

$\frac{\text{Total Units}}{\text{Total Paid Hours}} =$ Units Per Paid Hour

$\frac{\text{Total Units}}{\text{Total Raw Count}} =$ Units Per Raw Count

$\frac{\text{Total QCs + Stds}}{\text{Total Raw Count}} \times 100 =$ Percent Quality Controls and Standards

$\frac{\text{Total Repeats}}{\text{Total Raw Count}} \times 100 =$ Percent Repeats

COSTS:

$\frac{\text{Direct Operating Cost}}{\text{Raw Count}} \times 100 =$ Direct Operating Cost Per 100 Raw Counts

$\frac{\text{Direct Operating Cost}}{\text{Total Units}} \times 100 =$ Direct Operating Cost Per 100 Units

$\frac{\text{Paid Salaries \& Wages}}{\text{Total Units}} \times 100 =$ Salaries & Wages Cost Per 100 Units

UTILIZATION:

$\frac{\text{Inpatient Units}}{\text{Total Units}} \times 100 =$ Percent Inpatient Units

$\frac{\text{Inpatient Units}}{\text{Admissions}} =$ Units Per Admission

Percentage Quality Controls and Standards

PERCENTAGE Q.C. AND STANDARDS = Units Q.C. and Standards X 100 ÷ Total Units

PERCENTAGE QUALITY CONTROLS AND STANDARDS reflects the quality control procedures of the laboratory. Monitored on a monthly basis, this provides assurance that the quality control program of the laboratory section is being carried out on a regular basis.

The absolute value of PERCENTAGE QUALITY CONTROLS AND STANDARDS depends on the methodology and the number of procedure requests. From individual laboratory experience a minimum value can be established to assist in maintaining quality performance.

Percentage Quality Controls, Standards and Repeats

UNITS FOR QUALITY CONTROLS, STANDARDS AND REPEATS X 100 ÷ TOTAL UNITS

PERCENTAGE QUALITY CONTROLS, STANDARDS AND REPEATS should be reviewed for each procedure to identify those procedures of questionable stability, with a view to selecting stable and reproducible methodology. In selecting new methodology, particularly automated equipment, the extent of calibration required can significantly reduce the apparent productivity when viewed in terms of patient answers instead of samples processed per hour.

The Form 4 Workload Report - Management Information displays data which can be derived from the previous workload reporting forms. These indices of productivity, cost and utilization are suggested as the minimum monthly management information base. They can be expanded to present data for individual cost centres in the laboratory or they may be developed as utilization indices for special care units, physicians, or clinics, etc.

Indices related to the activities of laboratory physicians, laboratory scientists or individual groups of laboratory workers can be developed from total unit production. These indices may be useful in long range planning and in personnel development but have not been included in this schedule for routine monthly charting.

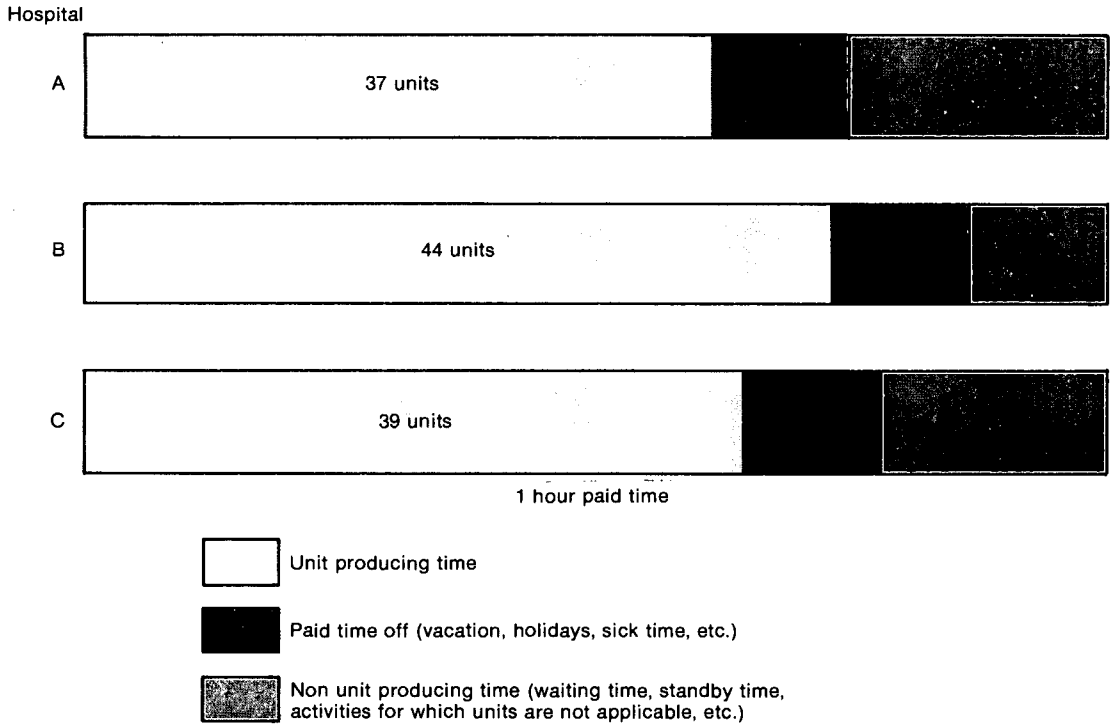
Additional Information Concerning the Workload Measurement System for Clinical Laboratories

Comments and questions about the Workload Measurement System should be communicated in writing to:

Workload Recording
Institutional Statistics Section
Health Division
Statistics Canada
Ottawa, Ontario
K1A 0Z5

Members of the Canadian Units Committee will answer your queries and use the information you provide to assist in the ongoing update of the Workload Measurement System.

Productivity Variation



Since changes in methodology are adjusted for in measuring units, an increasing PRODUCTIVITY must be considered with concern for quality of laboratory performance and adequate provision for unmeasured activities.

Average Units Per Raw Count

UNITS PER RAW COUNT = Total Units ÷ Total Raw Counts

UNITS PER RAW COUNT should be maintained at a relatively constant level. This reflects the current methodology and the nature of requests for laboratory analysis. Since the patient population served by a laboratory has been found to be remarkably constant, this indicator should not vary unless there is a change in methodology or expansion of laboratory service to a new and different patient population. Therefore monitoring of UNITS PER RAW COUNT provides a confirmation of laboratory utilization patterns and accurate and consistent collection of data (RAW COUNTS).

The absolute level of UNITS PER RAW COUNT is characteristic of a laboratory section and reflects the degree of automation, (eg., Clinical Chemistry and Hematology) or the complexity of the procedure routinely used to analyze a single specimen, eg., Microbiology and Histology. Changes in the absolute value which cannot be traced to inaccuracies in data collection indicate changes in methodological approach.

Average Units Per Procedure Request (Inpatients, Outpatients and Referred-Ins)

UNITS PER PROCEDURE REQUEST = Total Units ÷ Total Procedure Requests

The factors affecting UNITS PER PROCEDURE REQUEST are identical to those described for UNITS PER RAW COUNT. The absolute value will be higher giving a measure of the average number of units required to produce a productive answer including quality control, standards and repeats. UNITS PER PROCEDURE REQUEST may be used instead of UNITS PER RAW COUNT to monitor laboratory function or it may be used when it is necessary to project laboratory resource required to produce patient results, eg., due to increasing hospital size or opening a new outpatient clinic or service.

$$\text{Worked Productivity Index} = \frac{51 \text{ units/worked hour}}{60} \times 100$$

$$= 85\%$$

The worked productivity calculations in this example show that 85% of the worked hours are accounted for in workload producing activities. The remainder of the worked time available is made up of non-productive time such as waiting, or stand-by time and by work activities for which unit values are not applicable.

In the SAMPLE LABORATORY the eight employees have two fifteen minute coffee breaks per day and spend one half day per week in a group in a service education program. One technologist spends one half day per week in research and development and another averages five hours per month on purchasing functions. In addition the supervisory technologist spends about one quarter of each day on administrative duties. These activities amounted to 1,400 hours of worked time devoted to tasks unrelated to unit production. Fourteen percent of the worked time can be identified in activities not directly dedicated to workload production. These activities are essential to the function of the laboratory and should be maintained. A PAID PRODUCTIVITY OF 44 UNITS PER HOUR IS AN APPROPRIATE LEVEL FOR THIS LABORATORY, TAKING INTO CONSIDERATION EXISTING PERSONNEL POLICIES AND ESSENTIAL SUPPORT ACTIVITIES.

What Should My Paid Productivity Be?

There is no single answer to this question. Each laboratory should have a paid productivity reflecting its specific conditions. To answer the question, "What should my paid productivity be?" requires answers to two more questions.

WHY IS MY PAID PRODUCTIVITY WHAT IT IS?
IS MY PAID PRODUCTIVITY RIGHT FOR MY LABORATORY?

The following examples illustrate answers for three sample laboratories.

Hospital A - This hospital is a small community hospital under 50 beds. Two full-time and one part-time technologist are employed to support a "call back" service nights and weekends and to provide coverage during holiday and sick time. The paid productivity includes stand-by and waiting time which cannot be used with the present workload. Specimen collection includes driving time to the neighbouring town to collect specimens once a day.

Hospital B - SAMPLE LABORATORY as described in preceding text.

Hospital C - This hospital is a medical teaching hospital with interns, residents and medical technology students. Laboratory staff are involved in teaching and frequently attend ward rounds. The amount of research development and consultation is higher due to the hospital acting as a referral centre.

For projecting staff requirements a laboratory should use its own productivity figures to ensure that the existing services provided by the laboratory can be maintained. It is important not to ignore the time paid but not worked and the portion of time required for essential support activities as shown.

Each Individual Laboratory Section should have a characteristic PRODUCTIVITY (PAID or WORKED) reflecting the availability of laboratory service (days, nights, weekends), the flow of laboratory requests and the total responsibilities of the staff, eg., routine testing, special investigation, teaching, method development and consultation.

PRODUCTIVITY should be maintained at a relatively constant level. This reflects consistency of utilization of laboratory resource and appropriate balance between staff and workload (scheduling) and an atmosphere in which quality of performance can be maintained.

Laboratory directors finding that they consistently achieve very high productivity should question their results, verify that they are allocating time correctly, correctly capturing units and hours, and ultimately should examine their laboratory organization, level of service, turnaround time, employee turnover, and other factors. Since unit values per procedure are themselves averages, there should be no requirement to achieve an "ideal" median productivity. However, when a laboratory's productivity differs significantly from the median or "ideal" it is important to be able to identify the factors which produced the differences.

Worked Productivity

TOTAL WORKED HOURS are the total paid hours minus paid vacations, sick time, other paid time off (eg., educational leave, jury duty, etc.) and holiday time.

WORKED PRODUCTIVITY = Total Workload Units ÷ Total Worked Hours

Good laboratory management requires the evaluation of productivity figures in terms of the relation of total workload to total paid hours and to total worked hours.

PAID PRODUCTIVITY (Average Units per paid hour) is reported annually by all hospitals and quarterly on a voluntary basis. Since it measures the personnel component it is accurately recorded in a uniform manner and can be directly related to personnel costs.

WORKED PRODUCTIVITY (Average Units per worked hour) is calculated for internal laboratory management and provides a measure of the effectiveness of staff scheduling in relation to flow of workload by laboratory section.

The following purposely simplified theoretical example illustrates the calculation of the two forms of productivity. The time period chosen for the example is one year but the rational may be applied to any appropriate time period such as a month or a quarter of the year.

Suppose that a SAMPLE LABORATORY produced 498,000 laboratory units of work in one year. During this time period the staff consisted of four full-time and four part-time employees who amassed a total of 11,400 paid hours of work.

$$\text{Paid Productivity} = \frac{\text{total workload units/year}}{\text{total paid hours/year}}$$

$$= \frac{498{,}000}{11{,}400}$$

$$= 44 \text{ units/paid hour}$$

This ratio expressing productivity in minutes per hour can also be expressed in terms of percent by dividing by 60 and multiplying by 100.

$$\text{Paid Productivity Index} = \frac{44 \text{ units/paid hour}}{60} \times 100$$

$$= 73\%$$

The paid hour productivity calculations in this example showed that 73% of the paid hours were accounted for by workload producing activities. No laboratory should be expected to achieve a productivity of 60 units per paid hour.

In the SAMPLE LABORATORY the four full-time employees were on vacation for between four and five weeks over the whole year. Time off due to illness, educational leave, etc., amounted to an average of 10 days per employee and there were 11 statutory holidays during the year. These activities accounted for 1,600 non-worked paid hours during the year.

Total Worked Hours/Year = total paid hours/year - total non-worked paid hours/year

= 11,400 - 1,600

= 9,800 hours

$$\text{Worked Productivity} = \frac{\text{total workload units/year}}{\text{total worked hours/year}}$$

$$= \frac{498{,}000}{9{,}800}$$

$$= 51 \text{ units/worked hour}$$

Again this ratio can be shown as a percent.

Laboratory management and utilization indicators reflect the nature of the work being performed by the laboratory and laboratory sections. Some should be reviewed monthly as they assist in the ongoing assessment of laboratory functions and indicate development of trends. Others should be reviewed less frequently to assist in decisions relating to change in methodology, selection of new methodology and equipment, and projection of future requirements.

LABORATORY INDICATORS USEFUL FOR MONITORING LABORATORY FUNCTION

Productivity (Average Units Per Hour)

The total workload for the laboratory as a whole, by section or by individual procedure in units (productive minutes) is a primary data base for laboratory management. When this data base is related to hours, average productivity figures are the result.

Hours may be recorded in two ways each representing a different reality:
(1) Total paid hours.
(2) Total worked hours.

Paid Productivity

Total paid hours measure all paid time including vacations, sick time, statutory holidays, other paid time off eg., educational leave, bereavement and actual overtime hours. "On-Call" is included,and all paid hours when personnel are actually called in, are counted.

Total paid hours reflect the total cost of the personnel burden to the laboratory.

It must be emphasized that all personnel on the laboratory payroll (excluding only laboratory physicians, Ph.D. clinical scientist directors, medical students, interns, residents, or any other students) must be included in the calculation of hours, and all paid time whether productive or not for the laboratory, is to be included.

In order to precisely reflect the personnel cost, the number of total paid hours should be obtained either from the payroll office or from time cards that reflect all time paid, eg., FORM 3.

PAID PRODUCTIVITY = Total Workload Units ÷ Total Paid Hours.

In order to calculate the PAID PRODUCTIVITY for the individual laboratory standard sections it must be remembered that some laboratory personnel may not work solely for a given section of the laboratory. Their time must be counted and broken down on a reasonable basis between the various standard sections. The laboratory has the option of making the distribution based on percentages of paid hours, or of total units in each section. In the following example the majority of the laboratory staff work in one standard section. However, a chief technologist is in charge of administration for all the sections, another staff member is responsible for wash up and sterilization in all sections and a third is responsible for all night activities. Therefore the time of these three people must be apportioned to each standard laboratory section.

Standard sections	Administration	Wash up and sterilization	Night activities
	per cent		
Specimen Procurement	8	-	-
Clinical Chemistry	32	32	40
Hematology	10	12	18
Immunohematology (Blood Bank)	15	18	37
Surgical Pathology	4	5	-
Autopsy Pathology	1	3	-
Cytology	5	5	-
Microbiology	25	25	5
Total	100	100	100

FORM 3

TIME CARD

NAME: Mary Nelson MONTH: April 1982

Record the time worked each day to the nearest 1/4 hour, excluding lunch and/ coffee-break time.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
7	7			VACATION							7	7	7	7	7		

19	20	21	22	23	24	25	26	27	28	29	30	31	Hours Worked 112 / 176 Hours Paid
7	7	7	7	7			SICK	7	7	7	7		

Estimate the time (as %) worked in the various departments.

Clinical Chemistry	Hemat-ology	Blood Bank	Surg. Path.	Autopsy Path.	Cytology	Nucl. Med.	Micro-biology	Specimen Procure.	Other
25	50	25							
Hours worked and paid									
28 / 44	56 / 88	28 / 44							

	Personnel		Total Hours	
	Full-time	Part-time	Paid	Worked
Technologists				
Technicians (lab. assist.)				
Aides				
Clerical				
Clinical instructors(1)				
Other				
Total				

(1) Include only hours of preparation and formal teaching - not on bench instruction.

Costs	Dollars
Professional remuneration	
Consultant remuneration	
Salaries and Wages	
Employee benefits(1)	
Supplies and other expenses(2)	
Total direct operating costs(3)	

(1) Fringe benefits costs such as employer contributions on behalf of employees for pension, group insurance, medical, UIC, etc., should be included in "Direct Operating Costs" total.
(2) Supplies used in the examination and analysis routines carried out in the laboratory, including such items as glassware, bunsen burners, chemicals, reagents, stains, etc. (see CHAM Supplement).
(3) Direct operating costs exclude depreciation, building maintenance, capital investment, housekeeping, heat, light, water and other overhead.

Patient Utilization Information

Inpatient

Hospital Admissions - Adults and Children _____
Hospital Admissions - Newborn _____
Hospital Patient-days - Adults and Children
  Short-term Units _____
  Extended Care Units _____
Patient-days - Newborn _____

Ambulatory Care Services (Outpatient)-Visits

Emergency _____
General and Special Clinic _____
Day and Night Care Programs _____
Surgical Day Care Programs _____

Although there is a direct relationship between units of work and laboratory physician and Ph.D. clinical scientists activity, interpretive consultations, laboratory administration, teaching and method development, these activities have not been included in the time studies for individual procedures.

The Workload Measurement System produces practical information for:

Monitoring laboratory functions;

Projection of Staff and Space requirements;

Identification of areas of increased demand;

Implementing changes in methodology;

Budget preparation and monitoring.

The Workload Measurement System provides the following information per procedure, for each laboratory sub-section and standard section and for the entire laboratory.

	TOTAL RAW COUNT	TOTAL UNITS
Inpatients		
Outpatients		
Referred-In		
Quality Control		
Standards		
Repeats		
Environment and Infection Control		
Employee Health Service		
Research and Method Development		
Referred-Out		
Total		

In order to be useful to the Laboratory Director and the Administrator, certain personnel, financial and utilization data must be available to the laboratory statistician.

STAFFING

	Personnel		
	Full-time	Part-time	Consultation(1)
Laboratory physicians			
Ph.D. laboratory scientists			

(1) Consultant not on staff of Laboratory.

FORM 2 WORKLOAD SUMMARY

Date _____

	Raw Counts and Standard Units done by Hospital Laboratories during the year	Inpatients		Outpatients		Referred-In		Quality Controls, Calibration Standards and Repeats		Environmental, Staff Health and Research		Total Accumulated Hours	
		Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Paid	Worked
01	Specimen Procurement and Dispatch												
02	Clinical Chemistry												
03	Hematology												
04	Immunohematology (Blood Bank)												
05	Surgical Pathology												
06	Autopsy Pathology												
07	Cytology												
08	Cardio-Respiratory												
09	Nuclear Medicine												
10	Microbiology												
11	Miscellaneous												
12	Other (Please specify)												
13	TOTAL												

FORM 1

SECTION HEMATOLOGY

LABORATORY WORKLOAD

SUB-SECTION _____

MONTH April, 1982

Code No.	Procedure	Unit Value	In-patients		Out-patients		Referred-In		Quality Controls		Standards		Repeats		Environ-mental		Staff Health		Research		Total	
			Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units	Raw Count	Units
01126	Blood Cell Profile Coulter S	3	1,818	5,454	981	2,943	120	360	675	2,025	208	624	191	573	-	-	6	18	21	63	4,020	12,060
01116	Blood Film Examination	11	1,703	18,733	965	10,615	109	1,199	60	660							4	44			2,841	31,251
01384	Sedimentation Rate (E.S.R.)	4	127	508	167	668	66	264	9	36							1	4	6	24	376	1,504
01336	Prothrombin Time	5	87	435	19	95	16	80	34	170							3	15			159	795
01326	Platelet Count (Microscopic)	9	473	4,257	174	1,566	8	72	45	405									7	63	707	6,363
01312	Activated Partial Thromboplastin	5	86	430	22	110	17	85	45	225							3	15			173	865
01372	Reticulocyte Count	9	109		53		10		11										1		184	
01115	Bleeding Time	11	7	77	8	88															15	165

WHERE A COMPOSITE UNIT VALUE IS USED, IT SHOULD BE CONFIRMED ONCE A YEAR, OR WHEN THERE IS ANY CHANGE IN LABORATORY PRACTICE.

CALCULATION OF WORKLOAD UNITS

PROCEDURE WORKLOAD = RAW COUNT of each individual procedure multiplied by the UNIT VALUE for that procedure.

TOTAL WORKLOAD = Sum of PROCEDURE WORKLOADS.

CUMULATIVE RECORDS

A monthly cumulative record should be kept to record the number and category of samples performed for each procedure. Form 1 "Laboratory Workload" illustrates a Monthly Cumulative record for Hematology that provides complete information. The form incorporates the raw count collected daily and the calculation of workload units.

The data for each standard laboratory section may be recorded MONTHLY, QUARTERLY or YEARLY on a WORKLOAD SUMMARY, Form 2. This form is similar to the Annual Return of Health Care Facilities - Hospitals Part One. The only information included in the Summary Form not previously defined is TOTAL PAID HOURS and TOTAL WORKED HOURS.

TOTAL PAID HOURS are all paid time including vacations, sick time, other paid time off, eg., personal leave, bereavement leave, etc., education time away from the institution, holiday time, and actual overtime hours. "On-Call" time is included and all hours paid when personnel are actually actually called in. Total paid hours reflect the total cost of the personnel burden of a laboratory.

TOTAL WORKED HOURS are total paid hours minus paid vacations, sick time, other paid time off, eg., personal leave, jury duty, etc., education time away from the institution and holiday time.

In order to precisely reflect personnel time the number of total paid hours and total worked hours should be obtained from the time sheet of the laboratory. It must be emphasized that all personnel on the laboratory payroll (excluding only laboratory physicians, Ph.D. clinical scientists, medical students, interns, residents or any other students) must be included in the calculation of hours, and all paid time whether productive or not for the laboratory is to be included. Therefore all of the following are included:

Non Ph.D. Clinical Scientists, Registered Technologists, Registered Nurses, Non Registered Technicians, Laboratory Assistants, Clerks, Receptionists, Secretaries, Laboratory Aides and other technical or support staff included in the laboratory budget.

Usually one individual, eg., the Chief Technologist, is responsible for maintaining the time sheets for laboratory staff. Form 3 is a simplified variation of a time sheet which incorporates both paid and worked hours.

WORKLOAD MEASUREMENT SYSTEM

The Workload Measurement System tabulates the type and number of clinical laboratory procedures and that make up the laboratory workload (RAW COUNTS), and by applying a factor (UNIT VALUE) based on time studies for each type of procedure, provides a measure of the workload (units of technological, clerical, and aide time).

The UNIT VALUE for each procedure takes into account the methodology and where applicable, the instrumentation. The UNIT VALUE is based on the average experience with each method in several clinical laboratories. The time studies are carried out during the normal week day of the laboratory and include early morning batch processing of specimens as well as emergency processing of single specimens. They do not include waiting time in procedures such as incubation or pattern development in electrophoresis or waiting time on shift or call back when the low volume of work is insufficient to fully occupy the available staff.

EXAMPLE 1

The standard laboratory routine for electrolytes is: Na^+ and K^+ by Il flame photometer, HCO_3 by single channel AutoAnalyzer, Cl^- by Cotlove.

Simplified count equals:

00925 Na^+ semi-automated	2	units
00849 K^+ semi-automated	2	"
00503 HCO_3 single channel AutoAnalyzer	4	"
00488 Cl semi-automated	4	"

Simplified count = 4 Raw Counts

Unit Value = 12 Units per simplified count.

EXAMPLE 2

A routine Hematology profile consists of manual hemoglobin, blood smear, hematocrit and calculation of indices.

Simplified count equals:

01212 Hemoglobin	5	units
01116 Blood Smear	11	"
01210 Hematocrit	3	"
01102 Calculation of Indices	2	"

Simplified count = 4 Raw Counts

Unit Value = 21 units per simplified count.

Procedure Groupings with Variable Components

When a procedure grouping with variable components is performed by the laboratory as standard practice, it may be counted as a single procedure, provided that a pattern of performance or of component procedures can be observed and used to determine a composite unit value.

EXAMPLE

Microbiology-The preferred unit of count may be BLOOD CULTURE. However, the exact procedure for each culture will vary depending on the findings. To be able to count BLOOD CULTURES as one procedure, it is necessary to record the exact procedures used for a minimum of 100 successive blood cultures. The observed experience can be converted into a COMPOSITE UNIT VALUE as follows:

$$100 \text{ Blood Cultures} = 100 \text{ Procedure}^1 + 20 \text{ Procedure}^2 + 7 \text{ Procedure}^3 + 2 \text{ Procedure}^4$$

$$\text{Composite Unit Value} = \frac{100 \text{ U.V.}^1 + 20 \text{ U.V.}^2 + 7 \text{ U.V.}^3 + 2 \text{ U.V.}^4}{100}$$

Note: In the above equation, U.V. means unit value.

The determination of a COMPOSITE UNIT VALUE is possible because the number of abnormals processed by a laboratory is remarkably constant reflecting the nature of the patient population served. The percentage of abnormals is in fact so constant that it has been monitored in many laboratories as one measure of quality control.

(6) Repeats - a repeat is the total re-processing of a patient's sample done to solve an unforeseen or encountered problem. To qualify as a REPEAT and thus be counted in the RAW COUNT all of the analytical, data handling and reporting steps following the initial handling and preparation of the sample for analysis must be repeated. Sample preparation by techniques such as solvent extraction or column chromatography are considered analytical steps, AND MUST BE REPEATED TO COUNT AS A REPEAT.

Note: Replicate steps which are an integral part of the methodology are considered part of the procedure and are incorporated into the assigned unit value, eg., T4 and Digoxin. Similarly duplicates run side by side in the same test run are considered part of the procedure, eg., Prothrombin Time. Neither replicate steps nor duplicates are to be counted as separate or distinct procedures when making the RAW COUNT.

(7) Environmental - procedures done as part of the environmental control program of the hospital.

(8) Staff Health - procedures done as part of the employees' health program.

(9) Research - procedures done as part of the hospital's research or experimental programs or as part of new method development.

Depending on the individual laboratory's need to monitor the source of non-patient oriented activities, raw count categories 4 through 9 may be tallied separately or in two groups. Combined categories 4, 5 and 6 are useful in assessing the quality control and stability of specific procedures. Categories 7, 8 and 9 may be combined to provide an assessment of the laboratory resource committed to supporting other hospital activities.

Initial Raw Count

An accurate method of counting is important. The essential information is the number of samples processed in each category, eg., Inpatient, Outpatient, etc. Since all samples must pass through the specimen testing stage of the procedure, the simplest method of making the initial raw count is to RECORD AS YOU GO and incorporate counting into the specimen testing section of the procedure.

For example - when procedure answers or observations are recorded manually incorporating five to nine columns on the right hand of the technical work sheet, one for each category of sample, will enable the technologists to indicate the origin of each sample with a simple tick. The ticks may be totalled at the end of each page and carried forward to provide a total RAW COUNT PER MONTH. When data processing is the last stage of specimen testing the counting of workload should be incorporated into the program so that non-patient activities are accurately recorded.

METHODS OF SIMPLIFYING RAW COUNTS

The fewer the procedures to be counted, the more accurate the final count.

Profiles or Groups of Procedures with Constant Components

Frequently a group of procedures is performed simultaneously and reported regardless of whether one or all the procedures were requested. Provided this is standard laboratory practice, the group of procedures should be counted together as one simplified count. The UNIT VALUE used in determining the workload will be the sum of the unit values of component procedures. Simplification of raw count should be introduced wherever possible irrespective of whether the group of procedures is manual, automated or both. Such composite values should be reviewed at least annually.

Raw Count = Simplified Count multiplied by NUMBER of component PROCEDURES.

Workload = Simplified Count multiplied by the SUM of the component UNIT VALUES.

Areas where such simplification might be applicable include:

Electrolytes = Na^+ plus K^+ plus Cl^- plus HCO_3^-

Blood Cell Profile, manual = Hemoglobin plus RBC plus Hematocrit

Blood Typing = ABO direct and reverse, $RH_o(D)$ typing, Antibody Screening, Crossmatch.

Automated - Procedures in which most of the activities are performed by automated means. The UNIT VALUES vary with the nature of the automated equipment and are listed separately in each laboratory section listing.

Temporary Unit Values or "T" values - Are unit values for procedures on which only two or more time studies from different laboratories have been completed. Additional studies are required before a permanent unit value can be assigned.

Unassigned Unit Values - Procedures listed without a unit value or not listed have not yet been time studied. To account for personnel time, the individual laboratory should assign a temporary unit value based on the unit value of a procedure judged to be equal in time consumption.

Laboratories are also encouraged to perform time studies using the standard format to obtain temporary unit values. The assigned temporary unit value should be communicated to:

Workload Recording,
Institutional Statistics Section,
Health Division,
Statistics Canada,
Ottawa, Ontario
K1A 0Z5

These reported temporary values will assist in the ongoing review of the Workload Measurement System. When time studies are completed a UNIT VALUE will be assigned and incorporated into the annual publication of the Schedule of Unit Values. At this time, the temporary unit value should be replaced by the assigned unit value.

COUNTING PROCEDURES

Defining the method for counting each procedure is of fundamental importance if uniform usage is to be achieved. Standardized counting methods eliminate ambiguity in deciding what constitutes one procedure.

Procedure - a sequence of technical, clerical and aide steps constituting a laboratory activity listed in the Canadian Schedule of Unit Values. Each such procedure has a code number, a unit value per procedure and an item for count and is assigned to a standard laboratory section.

Item for Count - defines for each procedure what is to be counted to obtain the raw count.

Raw Count - a simple tally of items for count.

To provide complete information about patients' results as well as the origin of laboratory requests, the items for count are recorded in the following categories.

Note: The information collected by category is useful for internal laboratory management as well as being required for the Quarterly and the Annual Return of Health Care Facilities - Hospitals.

(1) Inpatients - procedures done on patients admitted to hospital.

(2) Outpatients - procedures done on all patients seen through Emergency and Outpatient facilities including outpatient surgery and private outpatients.

(3) Referred-In - procedures done on specimens received from other laboratories or physicians offices.

(4) Quality Control - procedures performed to measure or maintain quality performance. Quality control includes both internal control material and external proficiency survey material.

(5) Calibration Standards - procedures performed on a pure solution or reference sample of known concentration to establish accurate calibration. Calibration standards include those used for initial calibration as well as those run throughout the procedure to maintain calibration.

Note: (4) Quality Controls and (5) Calibration Standards are counted in the same manner as unknown specimens. It is recognized that the processing of Quality Controls or Standards is not identical to that of the unknowns. The additional preparation and statistical activities are compensated for by the omission of certain specimen preparation and reporting activities required for unknowns.

In measuring the Unit Value only productive procedure-oriented time is included. Waiting time is not included.

Each of the following areas of activity is assessed and when identified as part of the procedure is included in the time study and thus in the UNIT VALUE.

I. Initial handling of the specimen - includes all of the steps from the receipt of the specimen by the laboratory to the completion of all preliminary preparation and recording required before testing can be started. Initial handling will include time-stamping the requisition, sorting specimens, recording the patient's name, assigning a laboratory number, entering information on a worksheet, labeling the sample, placing the sample into and removing it from a centrifuge, separating the serum/plasma, and delivering to the work area.

II. Specimen testing - includes all of the steps required to perform the laboratory procedure up to and including the recording of the answers or observations. For example, specimen testing will include diluting the specimen, adding reagents, adjusting the measuring instrument, placing the test in the instrument, taking readings, recording the readings, and removing the test from the instrument.

III. Recording and reporting - includes all the steps required to report the results, that is, all the steps involved in converting the specimen testing results into the meaningful report that leaves the laboratory. These steps include calculating the results, recording them on the patient's report and in the laboratory's records, and checking, sorting, and filing the final reports. Incoming and outgoing telephone calls related to the initial report are also included.

IV. Daily or routine preparation - includes all preparatory steps which must be done daily before a procedure can be performed. Daily preparation encompasses only those activities which are done occasionally during the day and which need not be repeated for each sample tested. Daily preparation may include preparation of quality control samples from lyophilized specimens and/or diluting stock standards. If an instrument is employed, daily preparation will include instrument cleaning and warm-up, calibration, and instrument cleaning prior to shut down.

V. Maintenance and repair - includes all standard maintenance procedures performed by laboratory staff at set intervals eg., weekly or monthly. It also includes emergency repairs, part of which is defined as time spent identifying the defective reagent or part.

VI. Solution preparation - includes all bulk preparation of reagents, solutions, and quality control materials required for the procedure.

VII. Glassware wash-up - includes all support activities performed by laboratory staff in relation to the preparation of re-usable supplies for the procedure. Glassware wash-up includes washing, drying, and sterilization.

VIII. Technical supervision - includes the technologist's time required to directly supervise the procedure. Technical supervision includes time for checking quality control results and approving the reporting of results.

When a procedure does not follow the above pattern, the areas of activity are identified and their component steps included in the time studies so that the end result is a UNIT VALUE covering all procedure-oriented activities. The unit value for a procedure does not include specimen collection, standards, quality controls and repeats. All standards, quality controls, and repeats should be considered additional procedures and are assigned the same unit value as a patient specimen. Replicates (duplicates), in contrast to repeats are not counted. Specimen collection is assigned a separate unit value and counted separately. Please refer to the special directions for each laboratory section.

VARIATION IN UNIT VALUES WITH METHODOLOGY

In general, UNIT VALUES for a procedure fall into two categories related to methodology, MANUAL or AUTOMATED.

Manual-Procedures in which most of the activities are done by hand. No significant variation was generally observed in UNIT VALUES with manual methodology, therefore only one UNIT VALUE has been assigned per procedure. However, if a significant variation was observed, this is identified by assigning it a specific unit value in the procedure listing.

In order to provide uniform information for national reporting the workload should be recorded and reported in the laboratory section in which it is performed.

Alphabetical Index-In a second listing following the one by standard laboratory sections, all clinical procedures are listed alphabetically.

Alphabetical Index

Procedures	Section	Code Number
C - Reactive Protein	Micro	09261
Calcium	Chem	00462
Calcium 24 hr. Excretion - Feces	Chem	00464
Calcium Sulkowitch - Urine	Chem	00470

Note: If a procedure cannot be located in the Standard Section Listing, refer to the Alphabetical Index.

USER PROCEDURE FILE

The first step in setting up the Workload Measurement System in any laboratory is the development of a USER PROCEDURE FILE for each of the functional laboratory sections in that individual laboratory. It is important to note that all the sections for any individual laboratory may not coincide with the Workload Measurement System's ten standard sections. A small laboratory may consist effectively of only one functional section, while a very large one might have many functional sections, eg., automated chemistry, emergency laboratory, outpatient laboratory, electrophoresis, etc. Laboratory directors are encouraged to analyze their laboratories and designate appropriate functional sections. A functional section usually has a clearly defined team so that total paid hours expended to produce that section's total workload are easily identified.

After the sections are defined, every procedure performed in each section is listed (name, unit value and item for count) by consulting the manual. A single procedure may be listed in one or several different sections. Procedures sent to reference laboratories should not be listed apart from the collection and dispatch of the specimens. The USER PROCEDURE FILE, so developed, is the heart of the system for the user laboratory and must be amended whenever tests are added to or deleted from the armamentarium of the laboratory.

When the USER PROCEDURE FILE has been defined in relation to the functional laboratory sections, the workload as well as the total paid hours, for that section can be easily calculated. With this data base, productivity, manpower, instrumentation needs, etc., may be better managed.

Unit Values

Laboratory Workload Unit-The basic measure of productive time in the System. One unit is equal to one minute of technical, clerical, and aide time.

To determine the number of units to complete one procedure, time studies have been carried out to measure the time required to perform all of the activities that are part of the procedure. All the time studies of the same procedure in a variety of laboratory settings are averaged to give the UNIT VALUE for that procedure.

Unit Value-Is the average number of UNITS (productive minutes) of technical, clerical and aide time required to perform ALL the activities that are done by laboratory personnel to complete the defined procedure once (ONE RAW COUNT).

Workload Measurement System

Implementation of the Workload Measurement System requires:

(1) identification of clinical laboratory procedures done by the laboratory;
(2) introduction of an accurate method of counting the number of procedures performed daily in accordance with the counting procedure, defined for Workload Recording;
(3) conversion of the number of procedures performed into units to obtain the average technical, clerical and aide time needed to perform the laboratory procedures.

LISTING OF CLINICAL LABORATORY PROCEDURES

Nomenclature-The nomenclature used to describe each clinical laboratory procedure was selected to reflect customary practice and to achieve clarity of description. When more than one name is commonly used to describe a single procedure, the one selected reflects international usage.

Coding-Each procedure has been assigned a CODE NUMBER which may be used for:

(1) cross referencing the two lists of procedures, alphabetically and by standard laboratory section;
(2) recording of workload performed.

Standard Laboratory Sections-All clinical laboratory procedures are listed in one of ten standard laboratory sections corresponding to the ten sections identified for reporting laboratory workload in the Quarterly and the Annual Return of Health Care Facilities - Hospitals.

Section		Code number range
01	Specimen Procurement and Dispatch	00001-00399
02	Clinical Chemistry	00400-01099
03	Hematology	01100-01599
04	Immunohematology (Blood Bank)	01600-02999
05	Surgical Pathology	03000-03299 03600-03899 04200-05399
06	Autopsy Pathology	03300-03599
07	Cytology	03900-04199
08	Cardio-Respiratory	05400-05799
09	Nuclear Medicine	05800-08439
10	Microbiology	08800-12959

Sample Listing

Code Number	Procedures	Unit Value	Item for Count
00458	Bromosulphthalein	11	Test
00462	Calcium	14	Test
00464	Calcium 24 hr. Excretion - Feces	93	Test
00470	Calcium Sulkowitch - Urine	7	Test

The high volume laboratory procedures are uniformly performed in only one standard section of the laboratory and are listed in that section. The performance of less common procedures within a standard section is less consistant. These less common procedures are listed in the section in which they are most often performed.

INTRODUCTION

Effective laboratory management including short and long-term planning requires accurate data on the scope and amount of staff resource utilization. The Workload Measurement System provides this essential tool. Properly used, it provides a scientific basis by which to measure technical and support activity and to record these activities using a standardized unit of productive personnel time, terminology and coding which allows for internal and external comparative studies of productive, technical, clerical and aide workload. It also provides essential data to assist in decision making regarding staffing, cost effective equipment purchasing, space utilization, etc. The workload method in itself is NOT a cost accounting system and the workload unit is not a measure of cost.

The Canadian Workload Measurement System begun in 1954 was completely revised in 1969 to meet the following objectives:

(1) simplicity and flexibility;
(2) suitability for all types of laboratories;
(3) uniform approach to all laboratory disciplines;
(4) recognition of current methodology both manual and automated;
(5) provision for recording total laboratory workload including non-patient measurement such as quality controls and standards;
(6) provision of normative statistics which can be used in conjunction with other information for internal laboratory management;
(7) a method of continuous review and updating by the user so that the system continues to reflect current practice.

The 1969 Workload Measurement System was based on time studies carried out under uniform conditions in clinical laboratories of different sizes across the country. The time studies were designed to measure the personnel time expended to perform the various procedures which together make up the laboratory workload. The studies were reviewed and developed in a systematic manner by the Canadian Units Committee. The current committee is under the auspices of the Canadian Association of Pathologists with the participation of the Canadian Society of Laboratory Technologists, the Canadian Society of Clinical Chemists, the Canadian Association of Medical Biochemists, the Canadian Society of Cytology, the Canadian Hematology Society, the Canadian Association of Medical Microbiologists, the Canadian Association of Nuclear Medicine, the Canadian Hospital Association and Statistics Canada.

In 1970, the College of American Pathologists having endorsed the Workload Measurement System for use in the United States published the first American manual. The Workload Measurement System is now being used in several countries.

The Canadian Workload Measurement System is under continuous review. A standard time study format has been developed for use by individual laboratories. Using this format time studies are done to obtain unit values for new procedures and to validate old ones. The resulting unit values from both Canada and the United States are reviewed first individually and then by a joint international committee prior to inclusion in the Canadian Workload Measurement System.

Today the Canadian and American manuals are continually reviewed and updated, and are identical in philosophy and similar in content. The wording reflects the unique needs of each country.

Information about the number of procedures performed and the workload in minutes can be used alone or together with other pertinent data to establish an internal laboratory management system. Comparative information is made available for all hospitals through the Annual Hospital Information System and on a voluntary basis to the participating hospitals through the Quarterly Hospital Information System of the Institutional Statistics Section, Health Division, Statistics Canada.

The current edition of the Canadian Workload Measurement System Laboratory incorporates a number of revisions and clarifications designed to update unit values and overcome reported variations and problems. For easy identification each modification is identified with an asterisk in the margin.

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LABORATORY SECTIONS AND CODE RANGES - Concluded

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LABORATORY SECTIONS AND CODE RANGES