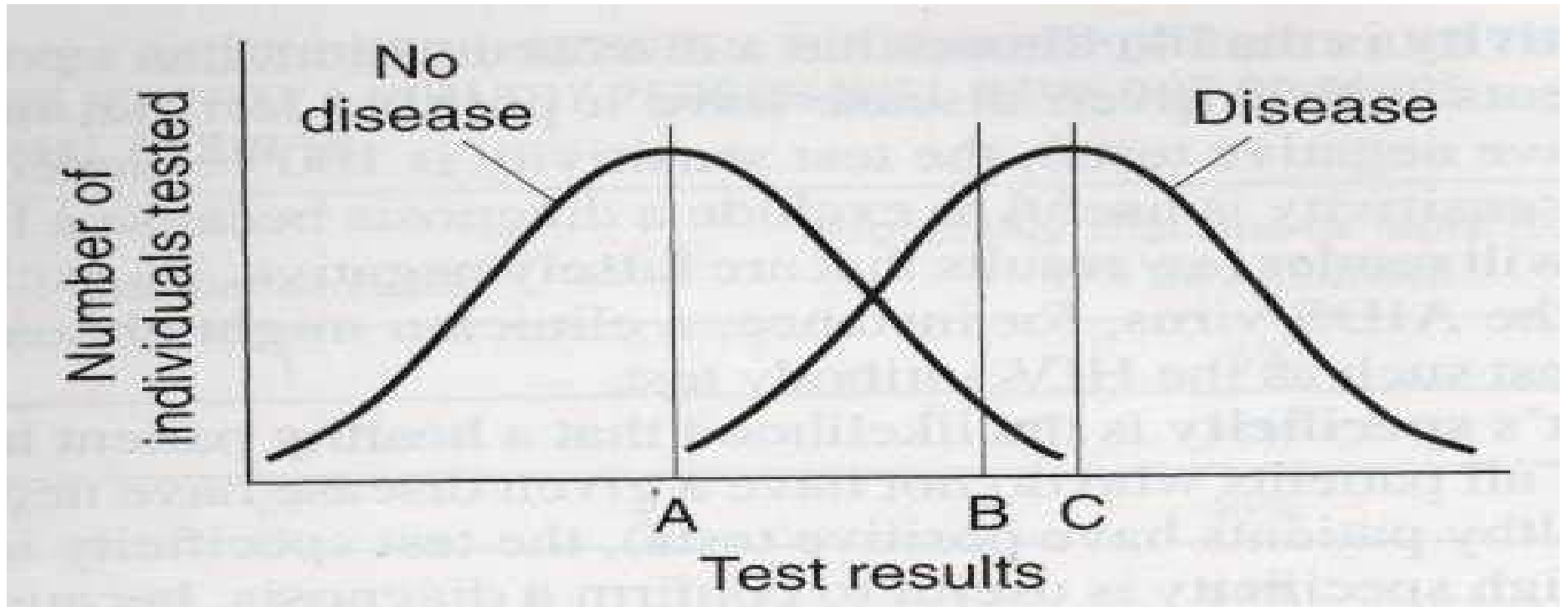


Optimal use of laboratory data

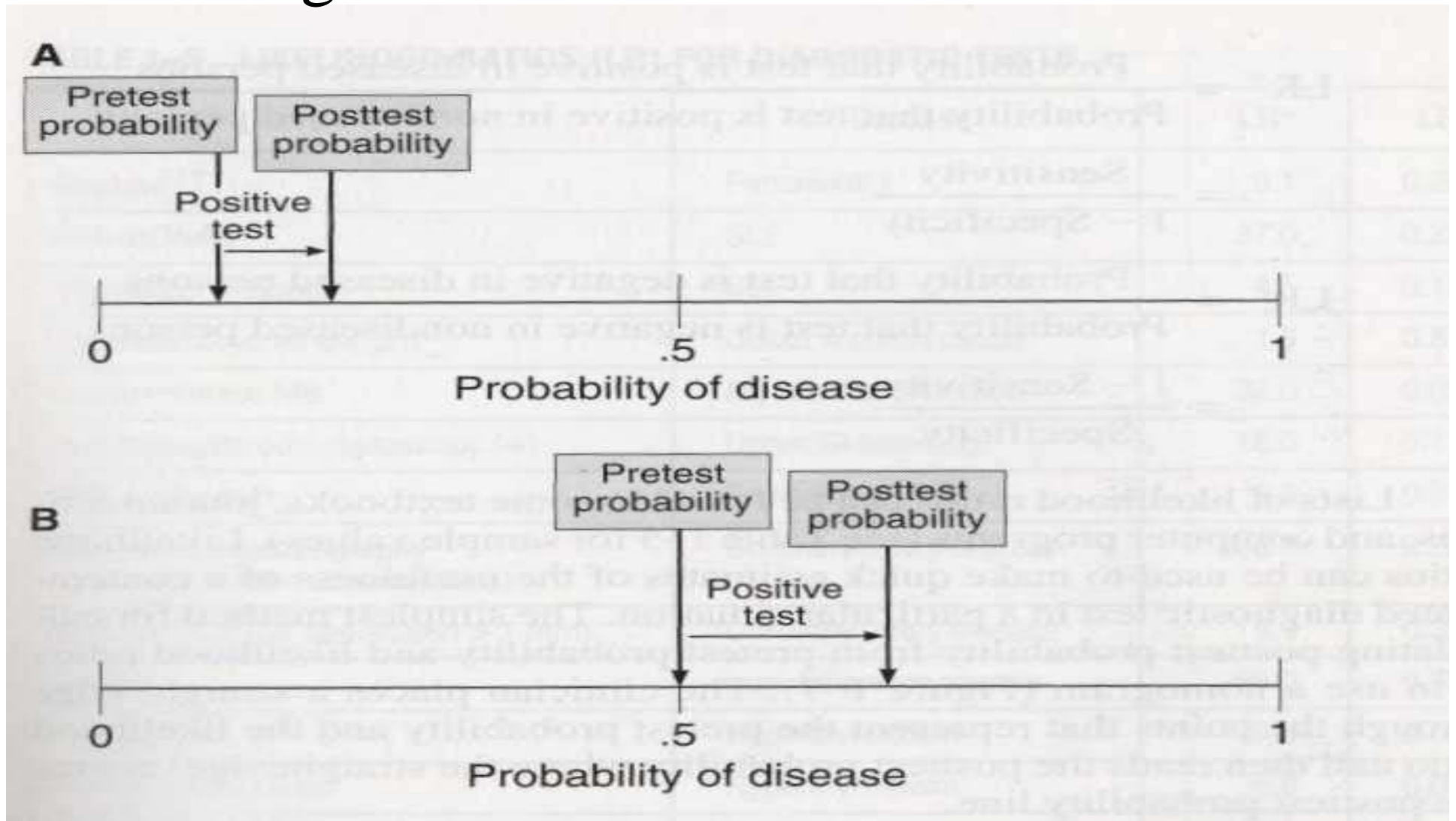
**An “academic/ operational”
perspective**

Prof WJH Vermaak

“Diagnostic background”



“Diagnostic background”



Number of different tests performed on a single sample from an individual	Percentage chance of an abnormal result (%)
---	---

1	5
2	10
5	23
10	40
20	64

Utilization of Laboratory investigations

- A **4 billion Rand** industry in RSA
- **How much value is really added?**
- **2001 Research Award Winners**

Clinical Laboratory Report Card:

**Measurement of Cost, Quality, Access and
Service Dimensions of Clinical Laboratory
Testing Services**

Catherine N. Otto, Ph.D., MBA, CLS (NCA)

**“The outcome of clinical laboratory testing provides
valuable information for approximately 70% of all
health care decisions.”**

Rational use of Laboratory investigations

- A further analysis shows that Laboratory tests can also be seen as a **barometer of the quality of patient care** and by **reviewing the pattern and outcome of tests** on a patient an **objective audit** of the **whole clinical scenario** is obtained.
 - The jest of the project is that although the expenditure is only 10% of total budget it is a **summative parameter of the clinical reasoning** and how the **disease responds to intervention** of the doctor and the patient care environment.
 - **What pathology testing is all about:**
 - **Diagnostic acumen of clinical doctors**
 - **Patient compliance**
 - **Can the drug prescription be reconciled with the tests request etc**
 - **Prevention of other complications**
 - **Nosocomial infections**
 - **Quality of ICU and CCU care etc.**

Rational use of Laboratory investigations

- Although laboratory tests are useful and important it can only add value if correctly applied or used in a rational manner.
- So what does the rational use of laboratory tests means?
 - **The right test**
 - **On the right patient**
 - **At the right time**
 - **Performed accurately and timeously and with interpreting comments**

Millions Squandered In Unnecessary Tests Ordered In Routine Doctor Visits

**Johns Hopkins University, American Journal of Preventive
Medicine (June issue)**

- **Unnecessary medical tests are costing the U.S. health care system millions--and potentially billions-- of dollars per year, and add unnecessary patient stress,**
- **Not only are the tests unwarranted, but false-positive results lead to further tests and compound the expense**
- **Often doctors and patients alike feel that a routine health exam should include a number of tests they feel can screen for unknown diseases, but the evidence shows that some of these tests are less than beneficial when used in this way,**
- **More is not always better, and understanding this is especially important.**

Johns Hopkins University, American Journal of Preventive Medicine (June issue)

- **Studies show that 20-30 percent of ECG tests result in false positive results, and patients with these results usually have follow-up exams that are much more expensive**
- **“..the follow-up tests will cost about \$683 million, and that doesn't account for the stress, the time off from work, and the possible complications that result from the follow-up test.”**
- **Possible reasons:**
 - **It is possible that physicians are ordering these tests defensively, to guard against potential lawsuits.**
 - **Physicians may not be aware of USPSTF recommendations.**
 - **There may be a financial incentive to ordering these tests, especially if a physician's office includes a laboratory.**

The South African experience

- **HODs of academic departments estimation is that approximately 50% of tests in their respective hospitals are inappropriate**
- **Private sector ?**
- **Insurance industries experience with stress ECGs**
- **Reasons for inappropriate use of diagnostic tests:**
 - **Structural etc etc**
 - **Professional:**
 - **Many patients have expectations of receiving particular tests when visiting physicians**
 - **Financial incentives to ordering these tests**

Misuse and abuse of laboratory tests

- We **think** according to **nature**; we **speak** according to **rules**; but we **act** according to **custom**." -Francis Bacon
- *What are these customs?*
 - *U&E's, LFT, RFT, TFT, "Viral Studies", FBC, TORCH, SMAC etc, etc.*
 - *Do we really need the Chlorides, Total CO₂ etc ?*

Critical analysis of requesting patterns

- Concept: All pathology processes evolve over time with associated morphological and biochemical changes.
 - Some of these changes will be of diagnostic value and others will merely be “associated” and contribute very little to the management of the patient.
- Very few if any medical school ever teach students to differentiate or to be aware of the real value added by the lists of biochemical abnormalities that can be encountered in any specific abnormality.
- **The traditional focus has been on the transfer of knowledge about the different biochemical abnormalities that occur along the way rather than on teaching the skill to diagnose the patient in the most cost effective way**
- The result of this approach is that although diagnostic value is acquired, practical requesting skills remain weak and nebulous.
- What can we expect?

What can we expect?

- Irrational requesting of tests is a common problem
- Bad requesting habits lead to ineffective and unsafe management, harm to the patient and higher costs.
- They also make the doctor vulnerable to influences causing irrational prescribing, including patient pressure, imitation of colleagues and marketing
- *Irrational requesting is a habit which is difficult to cure*

Irrational use of Laboratory investigations

–Although it may be perceived as a saving the cost of a missed diagnosis or complications far exceeds the initial savings of not doing the test!

- Diabetes mellitus
- Thyroid dysfunction in elderly
- Rhabdomyolysis in MVA
- Addisonian crisis in severely stressed patients in hospital

Correcting irrational use

- What do we see as a solution to irrational use whether it is due to abuse, misuse or under use?
- **Ignorance: major reason**
- “Other” reasons
- Solutions can be overlapping
 - Redesigning the **medical curriculum** esp. for diagnostic medicine
 - Understanding the concept of **medical necessity**
 - **Problem orientated request form** based on analysis of medical schemes data to tailor-made solutions
 - **Evidence based medicine**

Most Frequent and Significant Diseases

CAUSES OF DEATH (MORTALITY)

CAUSES OF DISABILITY (MORBIDITY)

MEASURES OF MORTALITY AND MORBIDITY

FREQUENCY OF ACUTE DISEASES

FREQUENCY OF CHRONIC DISEASES

**DISEASE FREQUENCY RELATED TO VISITS TO
FAMILY PHYSICIANS**

AGING

TABLE 2-1. LEADING OVERALL CAUSES OF DEATH, 1990

Heart Disease	720,000
Malignant Neoplasms	505,000
Cerebrovascular Disease (Stroke)	144,000
Accidents	92,000
Chronic Obstructive Pulmonary Disease	87,000
Pneumonia and Influenza	80,000
Diabetes	48,000
Suicide	31,000
Chronic Liver Disease	26,000
AIDS	25,000

From Health United States DHHS Pub. No. (PHS) 95-1232, 1994.

**TABLE 2-2. PREVALENCE OF CHRONIC DISEASES
(NUMBER OF CASES PER 1000 PERSONS)**

Condition	All Ages
Chronic sinusitis	134
Arthritis	129
Deformities	129
Hypertension	108
Hay fever	101
Heart disease	86
Hearing impairment	86
Visual impairment	58
Asthma	56
Chronic bronchitis	54
Hemorrhoids	36
Dermatitis	35
Diabetes	30
Indigestion	27
Back ailments	23

Data from Vital and Health Statistics, U.S. Department of Health and Human Services; DHHS Publication No. (PHS) 96-1521, 1995.

TABLE 2-3. TOP 20 REASONS FOR VISITS TO A FAMILY PHYSICIAN

1. Unspecified
2. Supervision of normal pregnancy
3. Routine infant or child health check
4. Routine general medical examination
5. Gynecologic examination
6. Vaccination
7. Acute upper respiratory infection
8. Essential hypertension
9. Depressive disorder
10. Acute sinusitis
11. Acute otitis media
12. Cystitis
13. Acute bronchitis
14. Initiation of contraceptive measures
15. Backache
16. Acute pharyngitis
17. Abdominal pain
18. Pain in joint (arthralgia)
19. Unspecified disorder of skin
20. Asthma

Medical necessity

- The statutory basis for Medicare is found in Title 18 of the Social Security Act. Paragraph 1862(a)(1)(A) defines reasonable and necessary as **only** those **tests** and procedures **that are relevant and proved to be of value in the diagnosis or management of illness or injury** or to **improve functioning** in a malformed body part or tissue.

• **Medical guidelines**

- **“Hierarchy” of evidence in quantitative studies**

- **Cross-sectional studies**

- **Case-control studies**

- **Cohort**

- **RCT**

- **Meta-analysis**

- **Systematic review**

Problem oriented request forms

Introduction:

There are a number of diseases, some of them very serious, which only cause mild or vague symptoms.

People may not even really feel sick, “but just have a feeling that things are not quite right”.

In some conditions, the symptoms get worse over time, but for some conditions, the symptoms may stay vague or non-specific for a long period.

Causes of vague and non-specific symptoms in clinical medicine

- **8 diseases that are "very common".**
- **7 diseases that are "common".**
- **4 diseases that are "uncommon".**
- **1 diseases that are "rare".**
- **13 diseases that are "very rare".**
- **29 diseases without any prevalence information**

- **Causes of Vague symptoms that are very common**

- **Diabetes** - Early mild symptoms, endocrine, metabolic, inflammatory
- **HIV / TB**
- **Enterovirus** - mild symptoms, U & E, inflammatory
- **Hypertension** - non-specific symptoms, U & E, endocrine
- **Fe deficiency** - mild early symptoms, FBC, Fe-studies
- **STD** - Mild symptoms, inflammatory
- **Thyroid disorders** - vague symptoms
- **Brucellosis** - Early mild symptoms

- **Causes of Vague symptoms that are common**

- **Anaemia** - mild early symptoms

- **Celiac disease** - non-specific symptoms

- **Haemochromatosis** - non-specific symptoms

- **Lupus** - vague symptoms

- **Toxoplasmosis** - Mild symptoms

- **Malaria** - mild early symptoms

- **Causes of Vague symptoms that are uncommon**

- **Viral Hepatitis - mild symptoms**

- **Degenarative neurological disorders - mild symptoms**

- **Connective tissue disorders - non-specific symptoms**

- **Causes of Vague symptoms that are rare**

- The official US government definition of a "rare" disease is one that affects 200,000 people or less. The following causes of Vague symptoms appear in the population at a rate of less than 200,000 people per year in the USA:

- **Goodpasture syndrome - non-specific symptoms**

- **Causes of Vague symptoms that are very rare**

- **The following causes of Vague symptoms appear in the population at a rate of substantially less than 200,000 people per year in the USA:**

- **Acromegaly** - mild symptoms
- **CO poisoning** - non-specific symptoms
- **Gestational diabetes** - mild symptoms
- **Group A Streptococcus** - mild symptoms
- **Hyperparathyroidism** - vague symptoms
- **Ovarian cancer** - vague symptoms

- **Causes of Vague symptoms with no prevalence data**

- The following causes of Vague symptoms are ones for which we do not have any prevalence information.

- **Acromegaly- mild symptoms**
- **Amebic dysentery - mild early symptoms**
- **Anaemia mild early symptoms**
- **Brain abscess - vague early symptoms**
- **Conenital Toxoplasmosis - Mild symptoms**

Compiling a list of most common disorders that result in Pathology testing

- **Vague complains (persisting > 1mo.)**
 - **Anaemia**
 - **Arthralgia**
 - **Atopic syndromes**
 - **Chest pain**
 - **Acute abdominal pain**
 - **Diabetes mellitus**

Compiling a list of most common disorders that result in Pathology testing

- Thyroid disorders
- Dyslipidaemia
- Kidney disorders
- Dysuria
- Liver disorders
- STD
- TDM
- Hypertension

CLINICAL INFORMATION: Tests are required for -

- ❑ Exclusion of possible disease
- ❑ Diagnostic
- ❑ Monitoring of known disease
- ❑ Please phone / fax results

5. Atopic syndrome (ICD Nr 0000)

Inhalation allergy: IgE, Phadiotop screen

Food allergy (Only for children < 3 yrs): Foodmix screen

In case of positive screens, further tests will be performed - see manual.

6. Bleeding tendencies (ICD Nr 0000)

APTT

PT (INR)

Thrombocytes

7. Cardiac symptoms:

Angina pectoris (ICD Nr 0000), Heart failure (ICD Nr 0000)

Exclusion of myocardial infarction: Troponin I, myoglobin

In case of discordant results, CK, CK-MB and creatinine will also be measured - see manual.

Exclusion of conditions causing cardiac symptoms:

Hb TSH

Monitoring therapy for cardiac failure: Na⁺, K⁺, creatinine

9. Diarrhoea (Changed bowel habits) (ICD Nr 0000)

Screening for osmotic diarrhoea: Faecal Na⁺, K⁺, osmol

In seriously ill patients:

Faecal culture Paracytic examination FBC

Does the patient have constant fever? Yes No

Does the patient have fever peaks? Yes No

Palpable liver and/or spleen? Yes No

Urticaria present? Yes No

Malignancy screening: Faecal occult blood, faecal Hb

Three separate specimens at weekly intervals are required.

10. Dyslipidaemias (ICD Nr 0000)

Screening: Cholesterol

If CHD, or risk factors for CHD, is present:

Cholesterol, HDL-cholesterol

Exclusion of secondary causes of dyslipidaemia:

TSH, ALT, γ GT Glucose Urine albumin

Monitoring of cholesterol lowering therapy:

Cholesterol Fasting glucose

Fasting glucose required every three years.

11. Dysuria (ICD Nr 0000)

Urine microscopy, culture, sensitivity:

Is the sample catheter urine?

Yes No

Is the patient receiving antibiotic treatment?

Yes No

Creatinine PSA

12. Fever of unknown origin (ICD Nr 0000)

CRP

WBC

Malaria parasites

13. Hypertension (ICD Nr 0000)

Exclusion of identifiable causes/organ damage: Glucose

Urine albumin Na⁺, K⁺, creatinine

Risk assessment: Cholesterol, HDL-cholesterol

Monitoring diuretic therapy: K⁺

Monitoring ACE inhibitor therapy: Creatinine

14. Iron overload (ICD Nr 0000)

Screening: Hb Iron, transferrin saturation

Confirmation: Genotyping Ferritin, CRP, ALT, γ GT

15. Kidney disorders (ICD Nr 0000)

Screening/Monitoring: Creatinine Urine protein
 Urine albumin

*If calculated creatinine clearance is required, please supply
body mass: _____ kg*

16. Liver disorders (ICD Nr 0000)

Screening: ALT, γ GT
Viral hepatitis diagnostics: Hepatitis A Hepatitis B
 Hepatitis C
Immunity assessment: Anti-HBsAg, IgG

17. Pregnancy (ICD Nr 0000)

Confirmation: β hCG
Control at 12 weeks: HBsAg Hb
 ABO+Rh blood group
Control at 16 weeks: Down syndrome screen
Sonar gestational age _____ months

18. Psychogeriatrics (ICD Nr 0000)

- Screening: Hb, ESR Fasting glucose
 TSH, creatinine Homocysteine
- If indicated: Na⁺, K⁺, ALT, γ GT

19. STD (ICD Nr 0000)

- HIV antibodies Lues HBsAg
 Urine for Chlamydia trachomatis Swab: Gonorrhoea

20. Therapeutic drug monitoring (ICD Nr 0000)

- Lithium therapy: 3-monthly: Li⁺
Annually: Na⁺, K⁺, Li⁺, creatinine, TSH
- Digoxine therapy: 3-monthly: K⁺, digoxin
- Anticoagulant therapy: PT (INR)
- Other drugs: _____

Please supply name of drug as well as hours after previous dose.

21. Thyroid disorders (ICD Nr 0000)

- Screening/Diagnosis: TSH
- Monitoring of therapy: TSH, fT₄

Monitoring every 6 weeks until stable, thereafter annually.

- Thyroiditis, (De Quervain): fT₄, FBC

OTHER INVESTIGATIONS:

Clinical indication

Sample and test required

Clinical indication	Sample and test required

“There is nothing as useless as doing efficiently that which should not be done at all.”

Thank you!