PATHOLOGY TESTING - ASSISTING THE CLINICIAN WASTING RESOURCES?

SAMA Conference
Friday, 18 September 2015

Professor WJH Vermaak

vermaak and partners pathologists

leading through Innovation & Quality

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Contents

- Recognizing the problem
- Understanding the problem
- Practical proposal to address the issue

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Analysing the title:.. - *assisting* the clinician *wasting resources*?

- **Two components to the question**:
  - Assisting the clinician…… (intentionally or unintentionally?)
  - Wasting of resources……..(does it happen and if so ? magnitude)

- **Colin Powell approach**:
  - "First give me the facts and then you may tell me what you think"

- The first part of my talk is based on verifiable facts and the very last slide summarizes what I think.

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Perspectives on the Pathology Industry

- "Data generating factories" (**requiring financial, operational, management expertise etc.**)
- The challenge and professional responsibility is to convert data into clinically meaningful and relevant information to improve clinical outcome. (**professional component**)
- However, in today's environment (silo approach to healthcare) there is a lack of room for proper consultation with clinician and this undermines the quality of clinical outcomes

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Social (or Pareto) efficiency and wastage

- Exists when no one can be made better off without making someone else worse off
- Healthcare budgets are finite, thus wastage in one area affects one or more disciplines in other.
- Wastage: money spent that does not improve health outcome.
- Worldwide issue – estimated wastage in USA $700billion p.a.
- Funder response: reduce/constraining reimbursement rates and improve in-house efficiencies
- Triple aim: 1)reduce or control per capita expenses 2) Improve in-house efficiencies 3) Improve general health.

Improving efficiency and reducing cost of healthcare is also a burning issue in SA

Business 3.9.2015 08.00 am

CMS keeping a sharp eye on troubled medical schemes

21 8

Antoinette Slabbert

Picture: Thinkstock

The Council for Medical Schemes (CMS) has placed seven schemes on close watch due to their solvency levels falling below the statutory requirement of 25% during 2014.

National

NHI to reduce cost of healthcare

22 AUG 2015 09:53 | THULANI GQIRANA

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ORIGINAL

SA is working towards reducing the high cost of private healthcare and ensuring public healthcare is of quality. But it won't happen overnight.

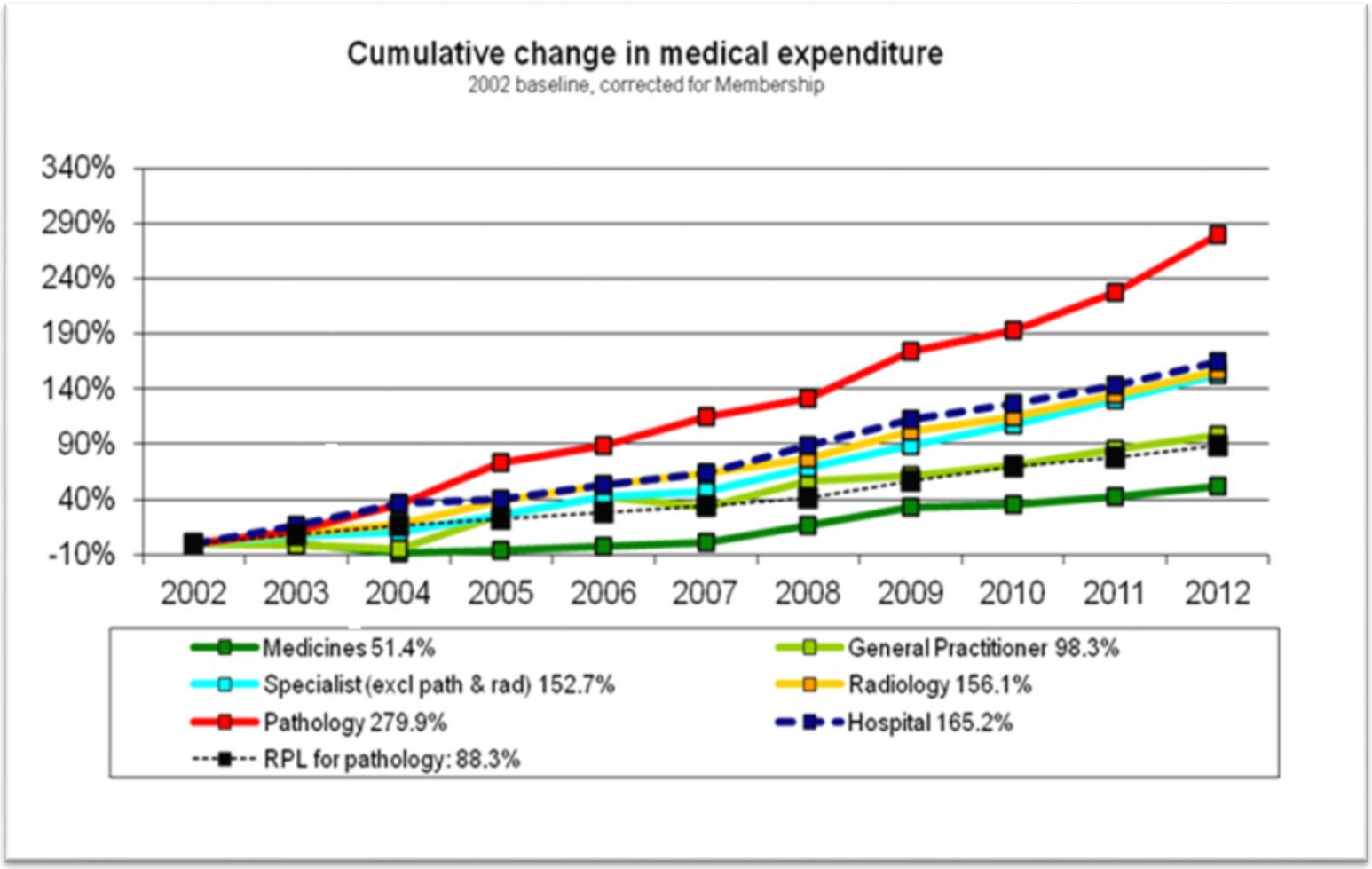
Home › South Africa › Article ›

South Africa's health sector is leaking money: what can be done about it?

Laetitia Rispel; Pieter de Jager and Sharon Fonn | 18 August, 2015 13:14

Health Minister Aaron Motsoaledi believes good quality private healthcare is no longer affordable in the country and that is why the country needs universal health coverage.

Pathology contributes significantly to overall healthcare cost increases



Possible levers to reduce costs

- **Pressure on pathology labs to improve analytical and operational efficiencies, service levels and productivity**
  - *"The Q.T.C. economic law"*
  - *It has potential for reducing costs, but needs to filter through patient savings*
- **Consolidation of laboratories:**
  - Economies of scale
  - Competition will be a determining factor
  - *Has potential for savings but needs to be actively managed and supervised*
- **Remuneration and Coding Structures** *(FFS, ARM, DRG's, ICD10 and CPT coding)*
  - *An all encompassing topic.*
- **Biggest single savings opportunity**: **UTILIZATION MANAGEMENT**
  - Driven by Individual Doctors
  - Not directly controlled by lab
  - Clinical outcome data

Reported wastage as a result of unnecessary pathology testing

- Harvard Medical School and Beth Israel Medical Centre reported that **30 %** of the 50 most commonly ordered lab tests are on average unnecessary.

- Several studies have shown that between **25% and 40% of all tests sent to the laboratory are unnecessary**, yet few laboratories in the UK have managed to reduce these unnecessary tests.[3–5]

- **5- 50%** of all in-patient lab test orders are inappropriate (Van Walraven and Naylor. JAMA 1998)

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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 Chlorides, Total CO2 etc. ?

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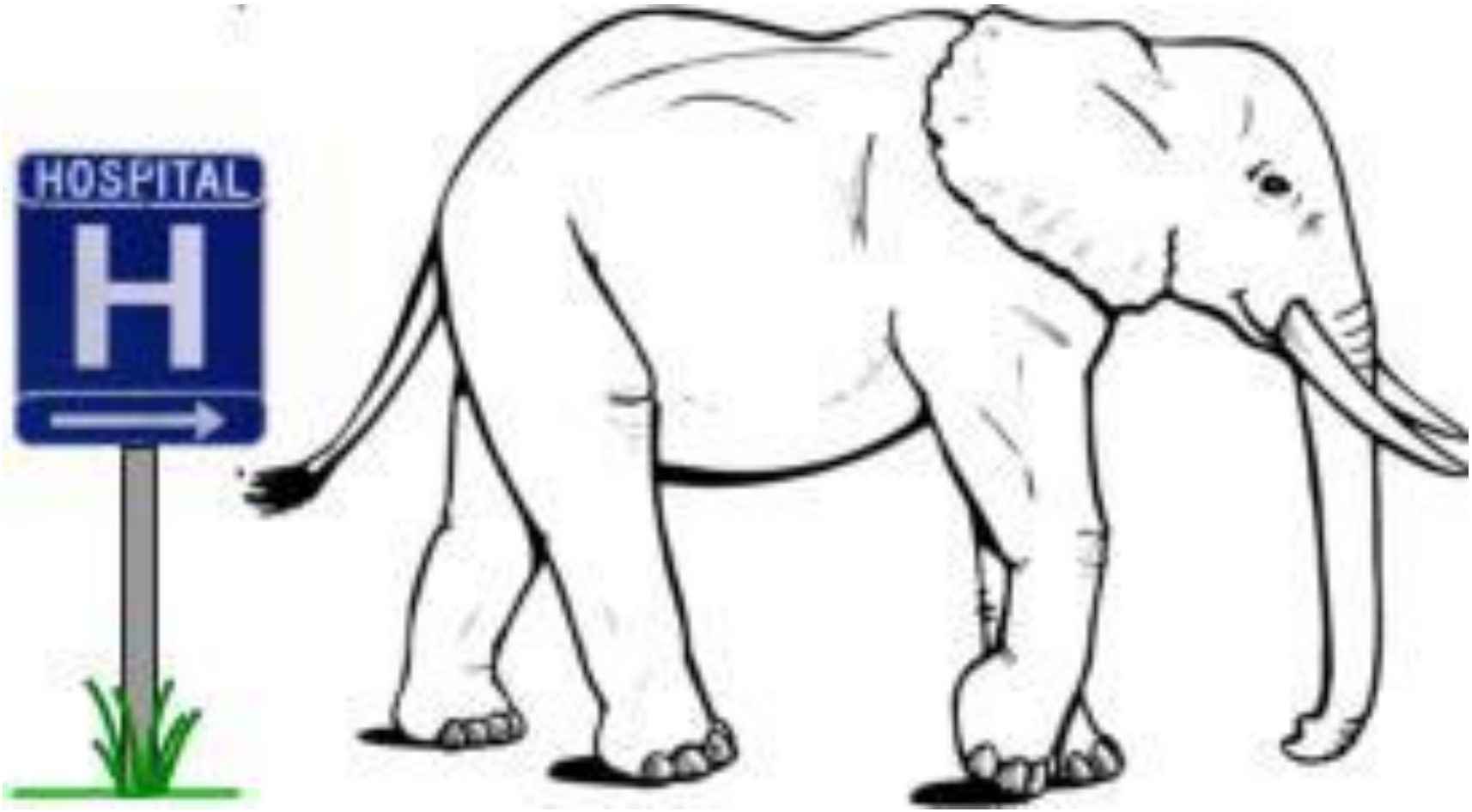
When do Path Tests add value?

- **Only when the right test is done on right patient and at right time**.
- **Barriers** to achieving this:
  - *New technology, new tests*
  - *Decrease in undergraduate course work in pathology*
  - "What there is to know can be picked up with time"
  - Popular study aids ("Synopsis of…; Essentials of ….; Primer of…") are no longer available.



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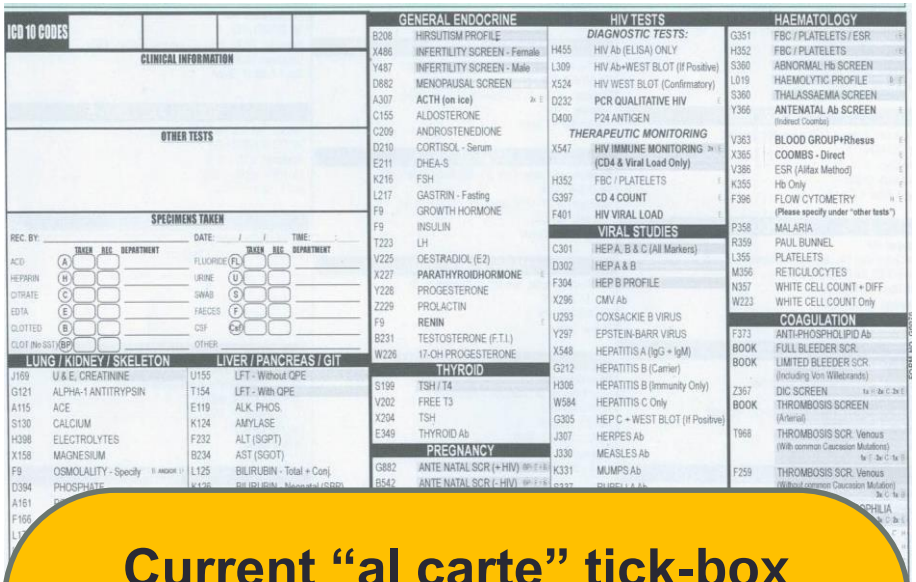
The elephant is …


ICD 10 CODES

CLINICAL INFORMATION

OTHER TESTS

SPECIMENS TAKEN

REC. BY: DATE: TIME:

	TAKEN	REC	DEPARTMENT		TAKEN	REC	DEPARTMENT
ACID	A			FLUORIDE	FL		
HEPARIN	H			URINE	U		
CITRATE	C			SWAB	S		
EDTA	E			FAECES	F		
CLOTTED	B			CSF	CSF		
CLOT (No SST)	BP			OTHER			

LUNG / KIDNEY / SKELETON

J169	U & E, CREATININE
G121	ALPHA-1 ANTITRYPSIN
A115	ACE
S130	CALCIUM
H398	ELECTROLYTES
X158	MAGNESIUM
F9	OSMOLALITY - Specify
D394	PHOSPHATE

LIVER / PANCREAS / GIT

U155	LFT - Without QPE
T154	LFT - With QPE
E119	ALK. PHOS.
K124	AMYLASE
F232	ALT (SGPT)
B234	AST (SGOT)
L125	BILIRUBIN - Total + Conj.

GENERAL ENDOCRINE

B208	HIRSUTISM PROFILE
X486	INFERTILITY SCREEN - Female
Y487	INFERTILITY SCREEN - Male
D882	MENOPAUSAL SCREEN
A307	ACTH (on ice)
C155	ALDOSTERONE
C209	ANDROSTENEDIONE
D210	CORTISOL - Serum
E211	DHEA-S
K216	FSH
L217	GASTRIN - Fasting
F9	GROWTH HORMONE
F9	INSULIN
T223	LH
V225	OESTRADIOL (E2)
X227	PARATHYROIDHORMONE
Y228	PROGESTERONE
Z229	PROLACTIN
F9	RENIN
B231	TESTOSTERONE (F.T.I.)
W226	17-OH PROGESTERONE

THYROID

S199	TSH / T4
V202	FREE T3
X204	TSH
E349	THYROID Ab

PREGNANCY

G882	ANTE NATAL SCR (+HIV)
B542	ANTE NATAL SCR (-HIV)

HIV TESTS

DIAGNOSTIC TESTS:

H455	HIV Ab (ELISA) ONLY
L309	HIV Ab+WEST BLOT (If Positive)
X524	HIV WEST BLOT (Confirmatory)
D232	PCR QUALITATIVE HIV
D400	P24 ANTIGEN

THERAPEUTIC MONITORING

X547	HIV IMMUNE MONITORING (CD4 & Viral Load Only)
H352	FBC / PLATELETS
G397	CD 4 COUNT
F401	HIV VIRAL LOAD

VIRAL STUDIES

C301	HEP A, B & C (All Markers)
D302	HEP A & B
F304	HEP B PROFILE
X296	CMV Ab
U293	COXSACKIE B VIRUS
Y297	EPSTEIN-BARR VIRUS
X548	HEPATITIS A (IgG + IgM)
G212	HEPATITIS B (Carrier)
H306	HEPATITIS B (Immunity Only)
W584	HEPATITIS C Only
G305	HEP C + WEST BLOT (If Positive)
J307	HERPES Ab
J330	MEASLES Ab
K331	MUMPS Ab

HAEMATOLOGY

G351	FBC / PLATELETS / ESR
H352	FBC / PLATELETS
S360	ABNORMAL Hb SCREEN
L019	HAEMOLYTIC PROFILE
S360	THALASSAEMIA SCREEN
Y366	ANTENATAL Ab SCREEN (Indirect Coombs)
V363	BLOOD GROUP+Rhesus
X365	COOMBS - Direct
V386	ESR (Alifax Method)
K355	Hb Only
F396	FLOW CYTOMETRY (Please specify under "other tests")
P358	MALARIA
R359	PAUL BUNNEL
L355	PLATELETS
M356	RETICULOCYTES
N357	WHITE CELL COUNT + DIFF
W223	WHITE CELL COUNT Only

COAGULATION

F373	ANTI-PHOSPHOLIPID Ab
BOOK	FULL BLEEDER SCR.
BOOK	LIMITED BLEEDER SCR. (Including Von Willebrands)
Z367	DIC SCREEN
BOOK	THROMBOSIS SCREEN (Arterial)
T968	THROMBOSIS SCR. Venous (With common Caucasian Mutations)
F259	THROMBOSIS SCR. Venous (Without common Caucasian Mutation)

Current "al carte" tick-box pathology test request form:

Encourages abuse
Discourages critical thinking

Like ordering food from a menu with somebody else paying the bill!

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Cost containment approaches

- The **number, complexity** and **costs** of clinical lab tests are simply overwhelming
- Practitioners are often **uncertain which test** and in **what sequence** to order, how to **interpret,** and how to go about **dealing** with that uncertainty.
- Working with GPs and MF in helping them make better use of diagnostic tests has been illuminating

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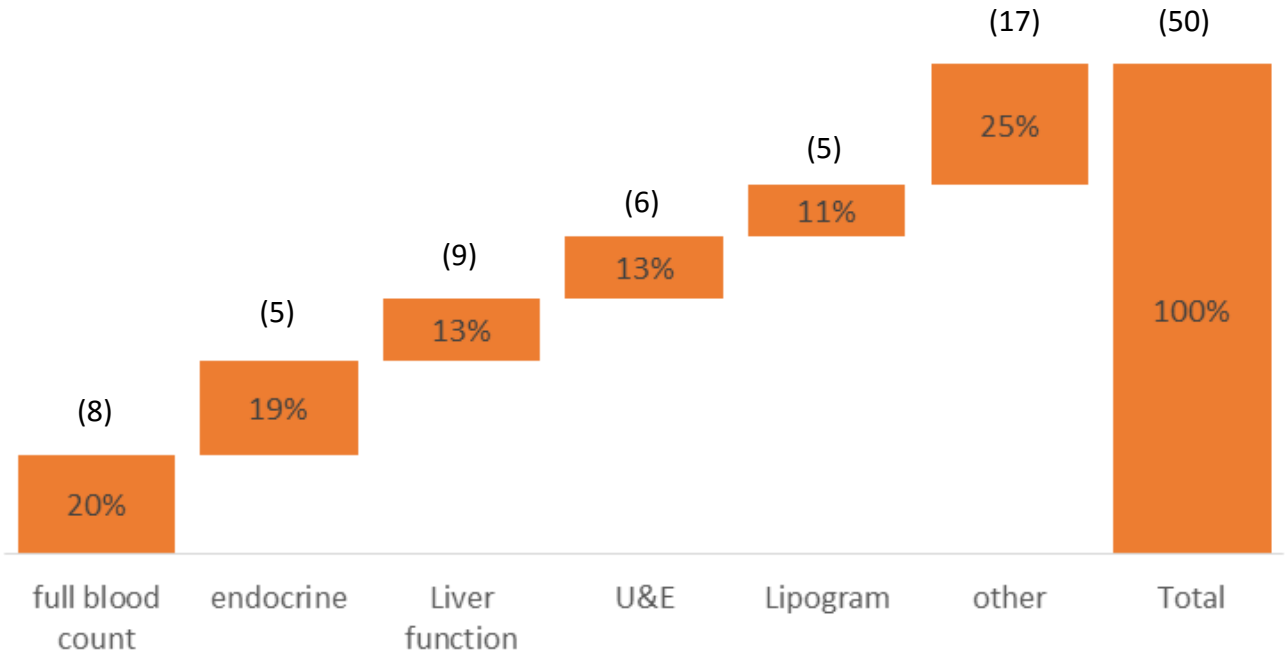
75% of out-of-hospital pathology spend is related to five major groups of diagnostic tests

2014 breakdown of top 50 codes of out-of-hospital pathology spend
100% ~ R 2.5 bn (estimate) per year
(No of tests in group)



R 2.5 bn = 5 x ultra-modern hospitals!

By investigating each of these groups, and applying diagnostic "common sense" we can identify specific opportunities for utilization optimization

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Full blood counts (20% of R2.5bn)

Procedure Code	% of value
3755 - Full blood count	47%
3947 - C-reactive protein	18%
4528 - Ferritin	10%
3797 - Platelet count	10%
4144 - Transferrin	6%
3743 - Erythrocyte sedimentation rate	5%
4071 - Iron	4%
3762 - Haemoglobin estimation	1%

2 Requested after abnormal result and consultation with pathologist

1 Requested by GP as standard screening

Closer interaction between GPs and pathologists can result in significant savings

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Significant savings opportunities exist in other test groups without sacrificing diagnostic value

Liver functions (13% of R2.5bn)

Procedure Code	% of value
4131 - Alanine aminotransferase (ALT)	17.3%
4130 - Aspartate aminotransferase (AST)	16.4%
4134 - Gamma glutamyl transferase (GGT)	14.7%
4001 - Alkaline phosphatase	11.4%
3999 - Albumin	11.4%
4009 - Bilirubin: Total	10.2%
4010 - Bilirubin: Conjugated	7.0%
4531 - Hepatitis: Per antigen or antibody	6.0%
4117 - Protein: Total	5.6%

Only GGT and ALT tests (30% of spend) vs full profile of liver function relevant for outpatients

U&E (13% of R2.5bn)

Procedure Code	% of value
4171 - Sodium + potassium + chloride + CO2 + urea	70.1%
4032 - Creatinine	20.1%
4155 - Uric acid	3.8%
4151 - Urea	2.4%
4113 - Potassium	2.0%
4188 - Urine dipstick	1.7%

If we only ask for Creatinine and K the cost would come decrease by 80%.

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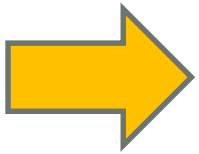
Similar opportunities in endocrine, lipogram test groups

Endocrine functions (19% of R2.5b)

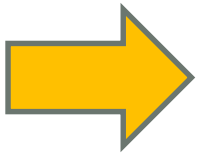
Procedure Code	% of value
4484 - Thyrotropin (TSH) + Free Thyroxine (FT4)	39.0%
4507 - Thyrotropin (TSH)	33.2%
4064 - HbA1C	13.2%
4482 - Free thyroxine (FT4)	7.3%
4057 - Glucose: Quantitative	7.3%



- 80% of thyroid pathology spend on both TSH / FT4 as screen, whilst only 25% have TSH abnormality

Lipograms (11% of R2.4b)

Procedure Code	% of value
4025 - Chol/HDL/LDL/Trig	37.4%
4147 - Triglyceride	19.3%
4027 - Cholesterol total	17.2%
4028 - HDL cholesterol	17.2%
4026 - LDL cholesterol	8.8%

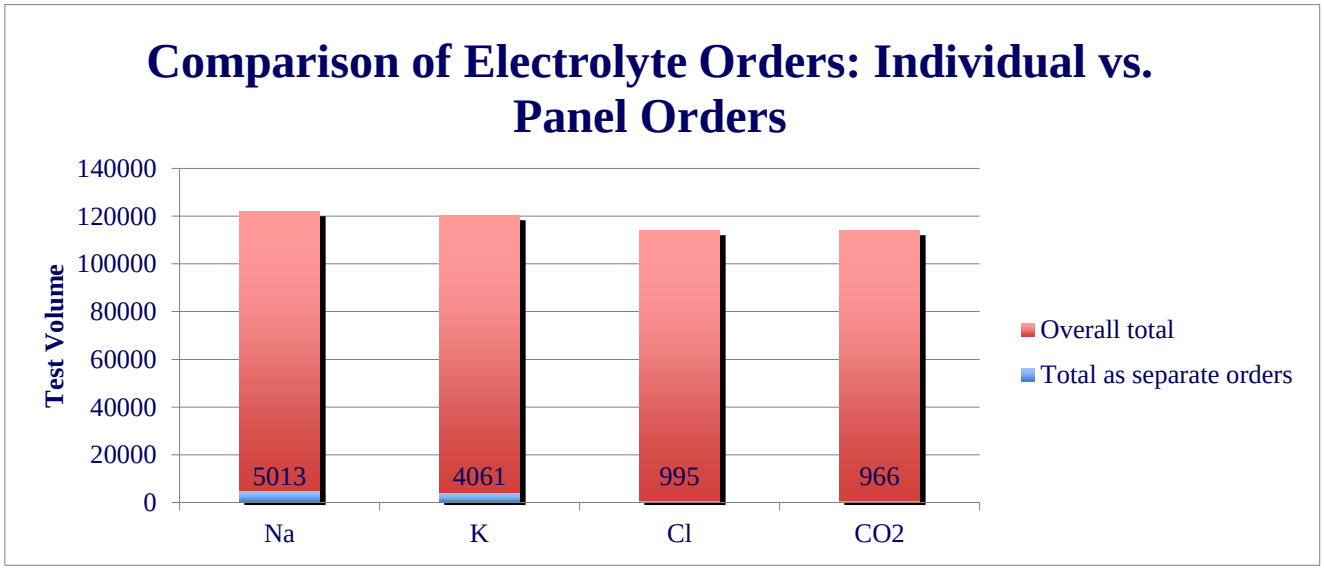


- More selective approach of requesting only TC as initial screening test in patients with no family history or absence of other physical risk factors 80 % of R240m p.a.

Ordering test panels in hospital patients also presents opportunities

- A study of orders for repeat electrolyte panels indicated that 10% were medically unnecessary and in 65% of cases a single test could have substituted for the entire panel

(Baigelman et al, Intensive Care Med, 11(6) 1985)



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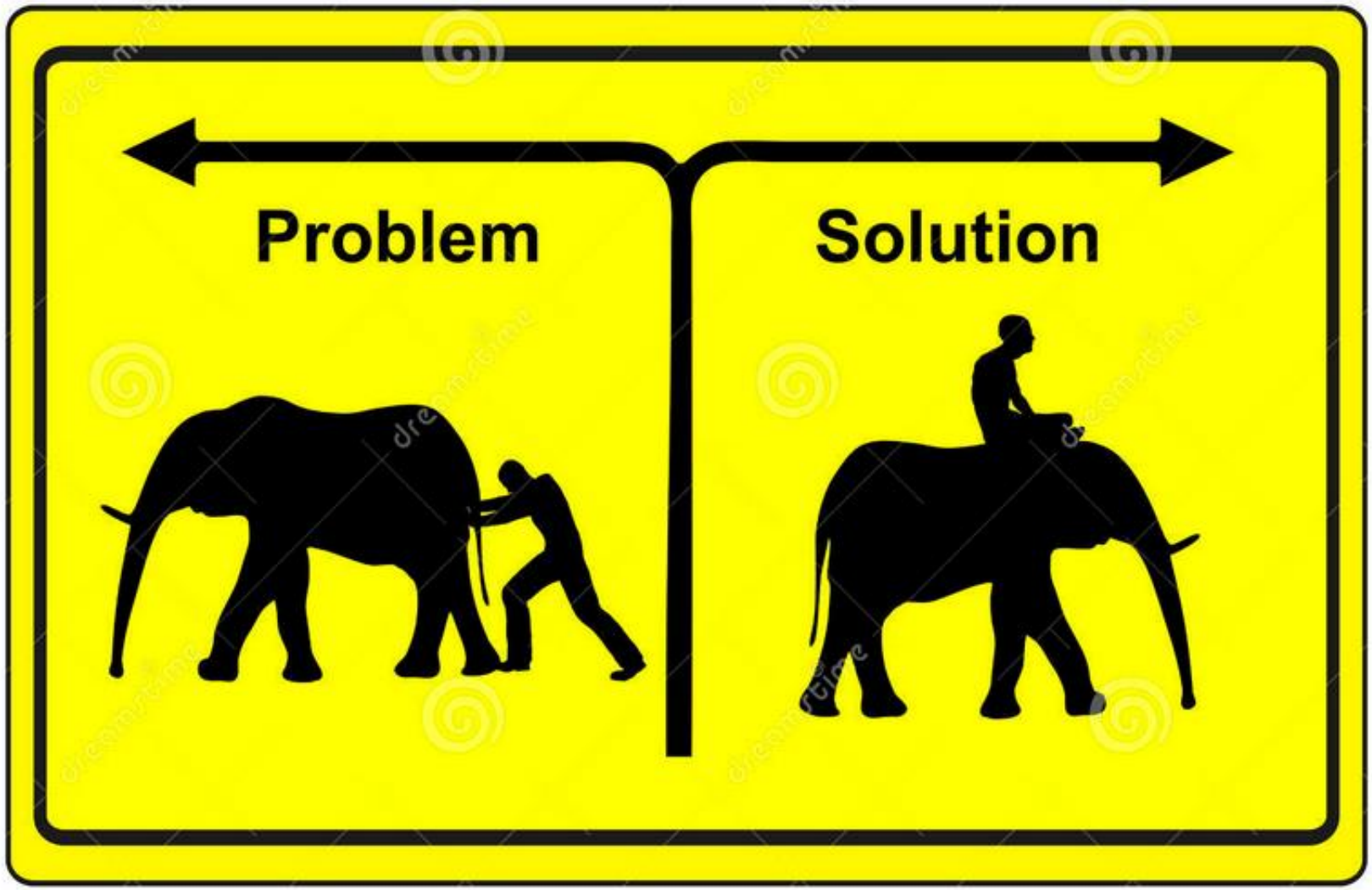
There is a practical way to help address the issue …



Alternative approach to Tick Boxes: Problem Based Request Form

- **Analysis of requesting patterns** → relatively limited number of clinical conditions attract majority of pathology testing
- Grounded upon **Evidence Based Medicine**
- **Basic pattern:**
  - Initial request: 1st. Stage initiated by GP (look for red flags)
  - 2nd. Stage interaction with Pathologist + selective follow-up
- Changes uncertainty to directed approach and **empowers the users**

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WILGERS HOSPITAL
SUITE 111
TEL: (012) 807-0859

UNITAS LAB
UNITAS HOSPITAL
ONCOLOGY, ROOM 12
TEL: (012) 664-6240

EUGENE MARAIS LAB
LES MARAIS
CORELLI AVENUE 672
TEL: (012) 335-1700

MICROBIOLOGY LAB
??????????????

FINANCIAL OFFICE
PO BOX ????????
LYNWOOD RIDGE
0040

TEL: (012) 349 25 42/3/4/5
FAX: (012) 349 1686
E-MAIL: ADMIN@VPATH.CO.ZA
WEBSITE: WWW.VPATH.CO.ZA

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patoloë

PR. NR. : 052000 0047368

PATIENT DETAILS

SURNAME		FULL NAMES	
TITLE	SEX / DATE OF BIRTH	PATIENT I.D NR	
	M F Y Y Y Y M M D D		
DOCTOR		TEL	FOLIO NR
		( )	
COPY REPORT TO		FAX	WARD
		( )	
COLLECTION DATE		COLLECTION TIME	
Y Y Y Y / M M / D D		H	AM PM

ACCOUNTS

SURNAME | INITIALS | TITLE
POSTAL ADDRESS | LANGUAGE E A
POSTAL CODE | TEL: (H) ( )
ID | CELL | TEL: (W) ( )
MED AID
MED AID NR | PLAN / OPTION
NAME OF NEXT OF KIN | EMPLOYER
ADDRESS OF NEXT OF KIN | TEL: (H) ( )

CLINICAL INFORMATION: Tests are required for -

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

1. GENERAL INVESTIGATION: Vague complaints (Persisting > 1 month)

☐ ESR ☐ ALT ☐ Hb
☐ Creatinine ☐ TSH ☐ Glucose (random)

2. Anaemia (ICD Nr 0000)

Screening: ☐ FBC
Suspected chronic inflammation present? ☐ Yes ☐ No
Diagnosis:
Microcytic/Normocytic anaemia: ☐ FBC ☐ Ferritin
Macrocytic anaemia: ☐ FBC ☐ LDH ☐ γGT
☐ Homocysteine
Monitoring of therapy: ☐ FBC

3. Appendicitis, exclusion of - (ICD Nr 0000)

Screening: ☐ FBC ☐ CRP

4. Arthritis (ICD Nr 0000)

Screening: ☐ ESR ☐ RF ☐ Uric acid, creatinine
Six monthly monitoring of RA: ☐ Hb, ESR
Follow-up of sulfasalazine therapy: ☐ FBC ☐ Urine protein
☐ ALT, γGT, creatinine
Therapy decision: Newly diagnosed gout:
☐ 24h urine uric acid

5. Atopic syndrome (ICD Nr 0000)

Inhalation allergy: ☐ IgE, Phadiatop 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

8. Diabetes mellitus (ICD Nr 0000)

Screening: ☐ Glucose (fasting) ☐ Glucose (random)
Risk assessment: ☐ Glucose (fasting) ☐ HbA1c
☐ Creatinine, cholesterol, HDL, triglycerides
☐ Urine albumin, urine creatinine
3-monthly monitoring: ☐ Glucose (fasting) ☐ HbA1c
Annual monitoring: ☐ Glucose (fasting) ☐ HbA1c
☐ Creatinine, cholesterol, HDL, triglycerides
☐ Urine albumin, urine creatinine

Organized around specific symptoms with guiding questions

Complemented with explanatory compendium

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9. Diarrhoea (Changed bowel habits) (ICD No R19.40)

Screening for osmotic diarrhoea: ☐ Faecal Na^+, K^+, osmol
In seriously ill patients:

☐ Faecal culture ☐ Parasitic 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
Three separate specimens at weekly intervals are required.

10. Dyslipidaemias (ICD No E78.5)

Screening: ☐ Cholesterol
If CHD, or risk factors for CHD, is present:
☐ Cholesterol, HDL – cholesterol
Exclusion of secondary causes of dyslipidaemia:
☐ TSH ☐ ALT, GGT ☐ Glucose ☐ Urine albumin
Monitoring of cholesterol lowering therapy
☐ Cholesterol ☐ Fasting glucose
Fasting glucose required every three years.

11. Dysuria (ICD No R30.0)

☐ 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 No R50.9)

☐ CRP ☐ WBC ☐ Malaria parasites
☐ Occupation / Travel / Exposure History

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13 Hypertension (ICD No I10)

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 No E83.1)

Screening: ☐ Hb ☐ Iron, transferrin saturation
Confirmation: ☐ Genotyping ☐ Ferritin, CRP, ALT, GGT

15. Kidney disorders (ICD No N28.9)

Screening/Monitoring: ☐ Creatinine ☐ Urine protein
☐ Urine albumin
If calculated creatinine clearance is required, please supply body mass: .....kg Patient height ..... cm

16. Liver disorders (ICD No K76.9)

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

17. Pregnancy (ICD No O26.9)

Confirmation: ☐ ß hCG ☐ *Rubella IGG*
Control at 12 weeks: ☐ HBsAg ☐ Hb ☐ *Syphilis serology*
☐ ABO + Rh blood group
Control at 16 weeks: ☐ ABO + Rh blood group
Sonar gestational age .....months

18. Psychogeriatrics (ICD No Z03.2)

Screening: ☐ Hb, ESR ☐ Fasting glucose
☐ TSH, creatinine ☐ Homocysteine
If indicated: ☐ Na^+, K^+, ALT, GGT

19. STD (ICD No A64)

☐ HIV antibodies (if pos+, follow up testing: CD4, Viral Load, ALT+GGT, Hep B + Hep C)
☐ Urine for Chlamydia trachomatis ☐ Urine for Gonorrhea ☐ Syphilis
Ulcer(s): Y/N Discharge: Y/N PID: Y/N ☐ HBsAg

20. Therapeutic drug monitoring (ICD No Z72.2)

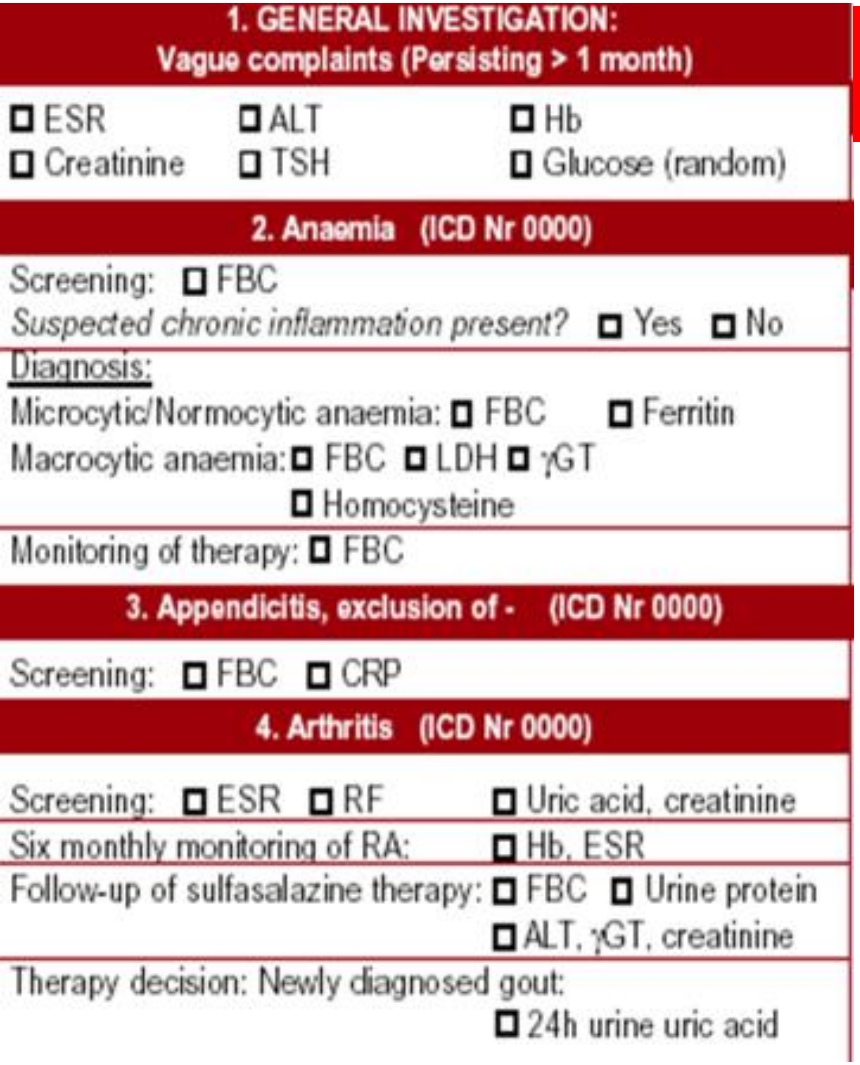
Lithium therapy: 3-monthly: ☐ Li^+
Annually: ☐ Na^+, K^+, Li^+, creatinine, TSH
Digoxine therapy: 3-monthly: ☐ K^+, digoxin
Anticoagulant therapy: ☐ PT (INR)
Other drugs: ----------
Please supply name of drug as well as hours after previous dose.

21. Thyroid disorders (ICD No E07.9)

Screening/Diagnosis: ☐ TSH
Monitoring of therapy: ☐ TSH, fT_4
Monitoring every 6 weeks until stable, thereafter annually.
Thyroiditis, (De Quervain): ☐ fT_4, FBC

OTHER INVESTIGATIONS:

Clinical indication	Sample and test required



1. Fatigue/Tiredness (>1 Month)

Patients under 50 years without other risk factors:

Tests: CBC, Ferritin

Comments: Searching for iron deficiency, macrocytosis, significant infections and leukaemias.

Patients under 50 years with risk factors for the following conditions may require extra tests:

Type 11 diabetes :Fasting glucose

Liver disorders :Liver function tests

Thyroid dysfunction :TSH

Renal impairment :Creatinine and eGFR, Electrolytes, Urinalysis

Body fluid transfer :HIV, Hepatitis B & C serology

Patients over 50 years OR tiredness lasting over one month

Tests: CBC, CRP, Ferritin, Iron saturation, LFT, Creatinine and eGFR, Electrolytes,
Calcium, Phosphate, TSH, Fasting Glucose, Urinalysis

Comments:

This wide range of tests reflects the increased risk that older people have of many diseases and the difficulty of reaching a diagnosis in chronic tiredness.

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Monitoring of therapy: ☐ FBC

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☐ ALT, γGT, creatinine
Therapy decision: Newly diagnosed gout:
☐ 24h urine uric acid

2 Anaemia (ICD Nr

Anaemia

Macrocytic

Alcohol
Folate/B_{12} deficiency
Haemolytic anaemia
Hypothyroidism
Liver disease
Myelodysplasia

Microcytic

Iron deficiency: blood loss (GI [e.g. peptic ulcer, malignancy], urogenital [e.g. menorrhagia, haematuria]), hookworm (Ancylostroma duodenale)
↓ absorption (gastrectomy, small bowel disease),
↑ demands (growth, pregnancy), ↓ intake (e.g. vegans)
Thalassaemia
Sideroblastic anaemia: congenital (XÙlinked), alcohol, drugs (isoniazid, chloramphenicol), lead, myelodysplasia
Lead poisoning
Anaemia of chronic disease (often normocytic, but may be microcytic)

Normocytic

Anaemia of chronic disease (chronic infection, inflammatory/connective tissue diseases, malignancy)
Haemolytic anaemia (may also cause macrocytic anaemia)
Hypothyroidism (may also cause macrocytic anaemia)
Pregnancy
Renal failure
Bone marrow failure

Haemolytic

Hereditary

Haemoglobinopathies: sickle cell anaemia, thalassaemia
Membrane defects: spherocytosis, elliptocytosis
Metabolic defects: pyruvate kinase deficiency, glucoseÙ6Ùphosphate dehydrogenase deficiency

1. GENERAL INVESTIGATION:
Vague complaints (Persisting > 1 month)

☐ ESR ☐ ALT ☐ Hb
☐ Creatinine ☐ TSH ☐ Glucose (random)

2. Anaemia (ICD Nr 0000)

Screening: ☐ FBC
Suspected chronic inflammation present? ☐ Yes ☐ No

Diagnosis:
Microcytic/Normocytic anaemia: ☐ FBC ☐ Ferritin
Macrocytic anaemia: ☐ FBC ☐ LDH ☐ γGT
☐ Homocysteine

Monitoring of therapy: ☐ FBC

3. Appendicitis, exclusion of - (ICD Nr 0000)

Screening: ☐ FBC ☐ CRP

4. Arthritis (ICD Nr 0000)

Screening: ☐ ESR ☐ RF ☐ Uric acid, creatinine
Six monthly monitoring of RA: ☐ Hb, ESR
Follow-up of sulfasalazine therapy: ☐ FBC ☐ Urine protein
☐ ALT, γGT, creatinine
Therapy decision: Newly diagnosed gout:
☐ 24h urine uric acid

4 Arthritis (ICD Nr 00000

Comments: Rather than requesting "arthritis panels" of tests, it is better to perform a careful history and physical examination to assess whether the arthritis is : monarticular/oligoarticular or polyarticular.
Pathology testing that pertains to mono/oligoarticular disorders are uric acid and creatinine or synovial fluid for M/C/S in septic arthritis.
Polyarticular disorders involve the determination of Rumatoid Factor and Antinuclear Factor.
Rumatoid patients on sulphasalazine/methotraxate therapy need to be carefully monitored to detect possibility of bone marrow suppression.

Diagnosis of RA

ESR
Rheumatoid Factor

Control of RA (six monthly)

Hb, ESR

Control of Sulphasalazine therapy

(2 weekly 1st 3 months; then monthly)
Hb, Leucocytes, thrombocytes, GGT, ALT, Creatinine
Urine Albumin

.

1. GENERAL INVESTIGATION: Vague complaints (Persisting > 1 month)

☐ ESR ☐ ALT ☐ Hb
☐ Creatinine ☐ TSH ☐ Glucose (random)

2. Anaemia (ICD Nr 0000)

Screening: ☐ FBC
Suspected chronic inflammation present? ☐ Yes ☐ No

Diagnosis:
Microcytic/Normocytic anaemia: ☐ FBC ☐ Ferritin
Macrocytic anaemia: ☐ FBC ☐ LDH ☐ γGT
☐ Homocysteine

Monitoring of therapy: ☐ FBC

3. Appendicitis, exclusion of - (ICD Nr 0000)

Screening: ☐ FBC ☐ CRP

4. Arthritis (ICD Nr 0000)

Screening: ☐ ESR ☐ RF ☐ Uric acid, creatinine
Six monthly monitoring of RA: ☐ Hb, ESR
Follow-up of sulfasalazine therapy: ☐ FBC ☐ Urine protein
☐ ALT, γGT, creatinine

Therapy decision: Newly diagnosed gout:
☐ 24h urine uric acid

4 Arthritis (ICD Nr 00000

Increased uric acid production		**Decreased uric acid excretion**	
Primary	**Secondary**	**Primary**	**Secondary**
Specific enzyme defects	Specific enzyme defects	Idiopathic	Chronic renal mass
	myelo or lyphoproliferative disorders	Familial juvenile gouty nephropathy	Kidney injury
	Infectious mononucleosis		Volume depletion
	Chronic haemoolytic anaemia		Hypertension
	Gaucher's disease		Sickle cell anaemia
	Severe proliferative psoriasis		Hypothyroidism
			Down's syndrome
			Beryllium or lead poisoning
			Cystinuria
			Drugs like diuretics, low dose aspirin

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

7. Cardiac Conditions

Pathophysiology

The afferent visceral input of the heart, lungs, oesophagus, and great vessels are through the same thoracic autonomic ganglia. A painful stimulus in these organs is typically perceived as originating in the chest, but because afferent nerve fibres overlap in the dorsal ganglia, thoracic pain may be felt (as referred pain) anywhere between the umbilicus and the ear, including the upper extremities.

Some Causes of Chest Pain:

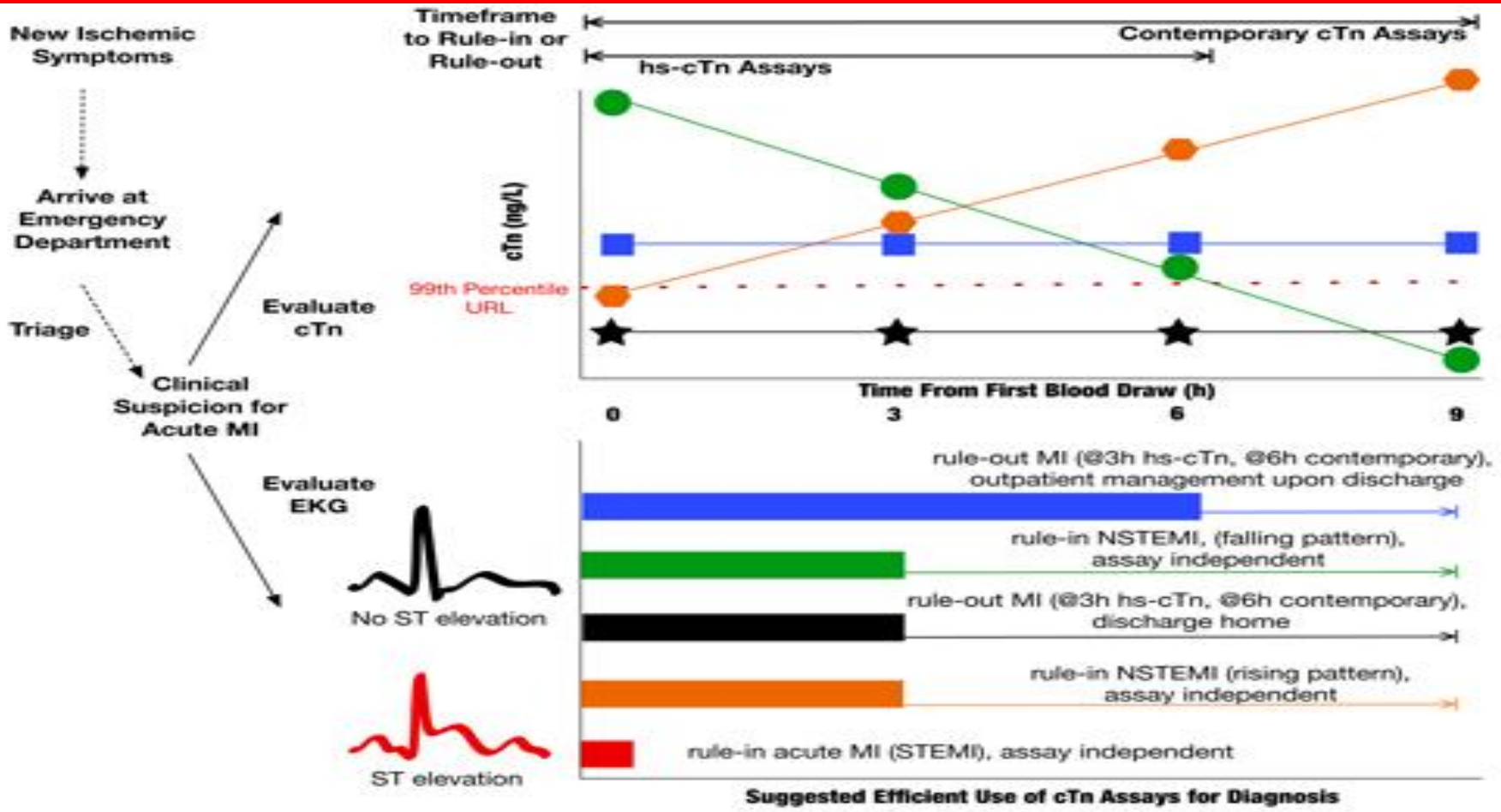
Some disorders are immediately life threatening:

- Acute coronary syndromes (acute MI/unstable angina)
- Thoracic aortic dissection
- Tension pneumothorax
- Oesophageal rupture
- Pulmonary embolism (PE)

Overall, the most common causes are

- Chest wall disorders (ie, those involving muscle, rib, or cartilage)
- Pleural disorders
- GI disorders (eg, esophageal reflux or spasm, ulcer disease, cholelithiasis)
- Idiopathic
- Acute coronary syndromes and stable angina

Cardiac Conditions



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, γGT ☐ Glucose ☐ Urine albumin
Monitoring of cholesterol lowering therapy:
☐ Cholesterol ☐ Fasting glucose
Fasting glucose required every three years.

10. Cholesterol (ICD No E78.5)

Very high-risk individuals do not require risk scoring Subjects considered to be at very high risk of cardiovascular events

Established atherosclerotic disease, i.e.

- Coronary artery disease
- Cerebrovascular disease
- Peripheral arterial disease

Type 2 diabetes

Type 1 diabetes with micro-albuminuria or proteinuria
Genetic dyslipidaemia, e.g. familial hypercholesterolaemia
Chronic kidney disease (GFR <60 ml/min/1.73 m2)

Individuals who do not fall into the very high-risk category

Risk scoring using well-documented key risk factors is appropriate to estimate the total cardiovascular risk in asymptomatic adults. Furthermore, risk scoring is especially important in individuals with the following:

- Hypertension and/or on antihypertensive medication
- Smoking: cigarette smoking is defined as any cigarette smoking in the past month or a history of 20 cigarettes per day for 10 years (10 pack years)
- BMI ≥30 kg/m2 or waist circumference >94 cm for men, >80 cm for women
- Family history of premature CVD (male before 55 years of age, female before 60 years)
- Auto-immune chronic inflammatory disease, e.g. rheumatoid arthritis, systemic lupus erythematosus, psoriasis.

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, γGT

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, γGT

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, γGT

19. STD (ICD Nr 0000)

☐ HIV antibodies ☐ Lues ☐ HBsAg
☐ Urine for Chlamydia trachomatis ☐ Swab: Gonorrhea

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, fT_4

Monitoring every 6 weeks until stable, thereafter annually.

Thyroiditis, (De Quervain): ☐ fT_4, FBC

OTHER INVESTIGATIONS:

Clinical indication	Sample and test required

To make a difference …

- Focus on the **Big Five** categories (Haematology, Endocrinology, Liver, U & E, Lipogram).
- Make a difference to ~ 50% of pathology spent and simultaneously improve patient care.
- Empower yourselves through a “problem based approach” based on best available information

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Take-home message: 5 questions to ask yourself before ordering a test

1. **Why** is the test being ordered?
2. What are the consequences of **not** ordering a test?
3. How good is a test in **discriminating** between health vs. disease?
4. How are the test results **interpreted**?
5. How will the test results influence patient management and **outcome**?

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Summary

Take home message for pathologists:

… for now:

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

…and for the future:

…it belongs to prepared minds.

I sincerely hope we shall see each other there!

vermaak and partners pathologists