Section 6.5 – Poster Presentations

1. PathCape 2018

A virtual poster was presented at a congress, PathCape in 2018 held in the beautiful town of Stellenbosch at a wine farm. The Audit, which I have done has been used for this poster presentation. The congress was an amazing experience. There were sessions with Prof. Tahir Pillay (University of Pretoria) for exam preparation aimed at specifically the Chemical Pathology registrars, which helped with preparations for the Chemical Pathology part 1. There were also various interesting presentations and case discussions presented from registrars, scientists and consultants in the field of Chemical Pathology (Clinical Chemistry). Some of the most interesting presentations which I could attend, were:

- History of HbA1c in diabetes mellitus management – Prof Gillery
- Glycated Albumin – an emerging biomarker for Diabetes – Prof Zemlin
- Performance of glycated albumin for diabetes and prediabetes diagnosis in a Mixed-Ancestry South African population – Marizna Barkhuizen
- Reference interval determination for glycated albumin in a South African population – Marizna Barkhuizen
- A case of X-linked childhood cerebral Adrenoleukodystrophy – Tumelo Satekge
- Seasonal pseudohyperkalaemia in a temperate climate – South Africa – Ashlin Rampul
- The role of Mass Spectrometry in improving the diagnosis and management of Adrenal and thyroid diseases – Prof Soldin

- Endocrine Disruptors – Prof Verena Gounden
- Conflict resolution- Prof Aye Aye Khine
- Spectrum of genetically confirmed mitochondrial disease diagnosed at the UCT/NHLS IMD laboratory over the past 27 years -Surita Meldau
- Two unrelated cases with identical genotype suggest underdiagnosis of hyperphosphataemic familial tumoral calcinosis in Southern Africa – Justine Cole
- Discordant thyroid function test results in a patient with metabolic bone disease – Doreen Jacob
- Identification of pathogenic TP53 and PTEN mutations in circulating cell-free DNA of a patient with triple negative breast cancer – Armand Peeters

My Virtual Posters:

1. Overcoming incomplete laboratory request forms – is an updateable online database the answer?
Overcoming-incomplete-laboratory-request-forms.pdfDownload

https://www.researchgate.net/publication/345330618_Overcoming_incomplete_laboratory_request_forms_Is_an_updatable_online_database_of_clinician_contact_details_the_answer

2. Auto-immune chylomicronemia in a child with hypertriglyceridaemia & acute pancreatitis

ChylomicronemiaDownload
https://www.researchgate.net/publication/349945438_Auto-immune_chylomicronemia_in_a_child_with_hypertriglyceridaemia_acute_pancreatitis

2. Annual Research Days – Department of Pediatrics and Child Health 2019 – Red Cross War

Memorial Children’s Hospital – Cape Town

Poster:

Interference of N-acetylcysteine in Paracetamol Measurement at GSH NHLS

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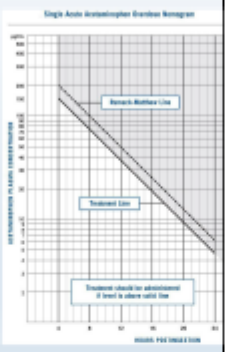
Introduction

Paracetamol (Acetaminophen, ACETA) poisoning frequently results in acute hepatic injury. An acute single overdose of paracetamol of ≥ 200 mg/kg or 10 g (whichever is less) over a period of < 8 hours may result in hepatic injury. In patients who have induction of hepatic enzymes (eg. alchohol abuse), lower doses may be hepatotoxic. Renal tubular necrosis may also develop.
Hepatic and renal failure typically manifest after 2 – 5 days.



To assess risk for hepatotoxicity, blood for plasma paracetamol levels are drawn 4 hours post ingestion or as soon as possible thereafter. Liver damage is likely to occur in patients with paracetamol levels >300 ug/mL at 4 hours or 45 ug/mL at 15 hours post ingestion. Levels < 120 ug/mL at 4 hours are unlikely to be associated with hepatotoxicity.

The nomogram commonly used to determine whether treatment should be given, is illustrated. *N*-acetylcysteine (NAC) is the common antidote given IV or PO to replace intracellular glutathione, which helps prevent hepatic toxicity by inactivating the toxic paracetamol metabolite, NAPQI, before it can injure liver cells.

Background – Measurement of Paracetamol

Paracetamol is commonly measured enzymatically on automated analysers for determination of serum concentrations in presumed or confirmed overdose cases. The enzymatic assay used, relies on acetaminophen's hydrolysis by arylacylamidase to p-aminophenol and acetate. The p-aminophenol is then converted to indophenol in the presence of o-cresol and a Na periodate catalyst. The production of indophenol is followed colorimetrically.

Objectives

The question at hand is, whether at plasma concentrations of NAC, there is significant negative interference in the measurement of ACETA. Negative interference and false negative results with enzymatic assays have been described before, with concomitant N-acetylcysteine (NAC) administration as the antidote[1], but it was unknown whether the ACETA assay used at our laboratory at Groote Schuur NHLS, Cape Town, South Africa on the Cobas 6000 (cobas c 501/502) yielded similar negative interference. The package insert for the ACETA assay stated that "No significant interference with the assay was found." [3]

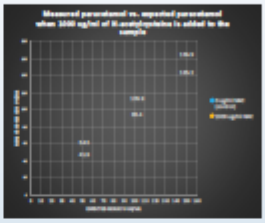
Methods

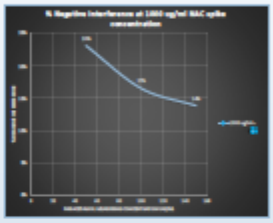
In the first experiment, three known ACETA concentrations (50, 100 and 150 ug/mL) were spiked with NAC stock solution from a therapeutic vial (2g/10ml) to yield a final sample concentration of 1000 ug/mL NAC. All samples were run on the Cobas 6000 automated analyser and compared to known ACETA control samples without the spiked NAC.

In the second experiment, three different solutions of NAC were spiked into an ACETA calibrator of 100 ug/mL, corresponding to the 8 hour post-ingestion cut-off for probable toxicity according to the Rumack-Matthew nomogram. All samples were run on the Cobas 6000 automated analyser.

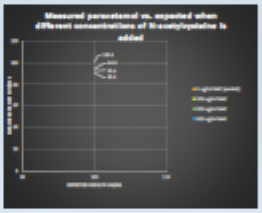
Results

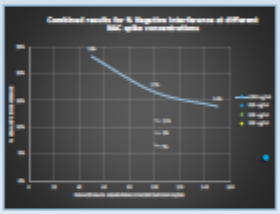
After addition of NAC (1000ug/ml), ACETA concentration of 54.5ug/ml was measured as 41.9ug/ml (-23% interference), 105.9 ug/mL measured as 88.4 ug/mL (-17% interference) and 156.9 ug/mL measured as 135.2 ug/mL (-14% interference). Sample volumes were corrected for the dilution effects of spiking with NAC.





In the second experiment, lower NAC concentrations of 300, 500 and 800 ug/mL, more closely resembling therapeutic plasma levels[2], were used. Acetaminophen control of 100.9 ug/mL measured as 94.5 ug/mL with 300 ug/mL NAC spiked (-7% interference), 92.6 ug/mL with 500 ug/mL NAC (-9% interference) and 90.6 ug/mL with 800 ug/mL NAC (-11% interference).





Discussion and Conclusion

Significant negative interference was found in the enzymatic measurement method of ACETA when samples were spiked with NAC in vitro. The interference was significantly more than the coefficient of variation of 6.9%[3] on our analyser. The negative interference might be even more at lower concentrations of the ACETA measuring range, evidenced by the increasing negative interference (up to 23%) which could be seen at the lower ACETA level of 50ug/ml (blue line).

This study illustrates the importance of confirming the ACETA measurement method of each laboratory and that in-house studies per laboratory need to be done to determine whether NAC significantly interferes with the specific analyser and measuring method.

Limitations:
Correction for the possible "matrix-effect" of serum was not done, which in retrospect could have been done if the dilution of the calibrator was done with patient serum samples of known null ACETA. It was assumed that normal saline which was used as dilution of the ACETA calibrator and the stock NAC from the therapeutic vial would not yield erroneous values, although DW 5% is used in the therapeutic administration. This is however a limitation which was considered, but for this in vitro experiment, no patient samples were analyzed. We plan to run more samples with the necessary funding and reimbursement for reagent costs.

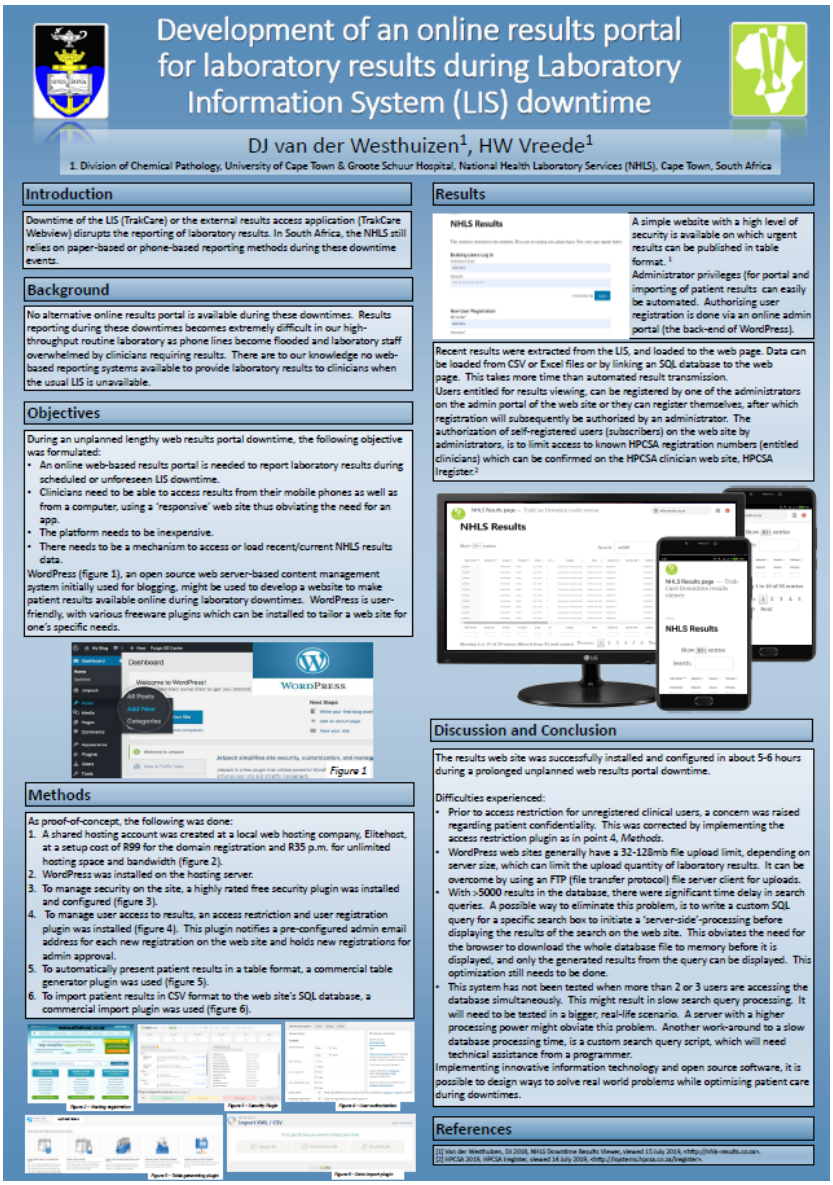
References

[1] Mayer M, Salpeter L. More on interference of N-acetylcysteine in measurement of acetaminophen. Clinical chemistry. 1998 Apr 1;44(4):832-3.
[2] Prescott LF, Donovan JW, Jarvie DR, Proudfoot AT. The disposition and kinetics of intravenous N-acetylcysteine in patients with paracetamol overdosage. European journal of clinical pharmacology. 1989 Sep 1;37(5):501-6.
[3] ACETA Acetaminophen - cobas® 20767174 322 [package insert]. Mannheim: Roche Diagnostics; 2014.

Interference-of-N-acetylcysteine-in-Paracetamol-Measurement-at-GSH-NHLSDownload

3. PathRed – 2019

Poster:



Poster – Development of an online results portal for laboratory results during Laboratory Information System downtime
[Poster-Online-results-portal-for-downtime-results-viewing-final PDFDownload]

Invited Speaker:

1. ChemHelp, an automation script to help

reviewers of chemistry results.

ChemHelp-Presentation-AutosavedDownload

2. Development of on Online Results Portal for Downtime Results Viewing

Presentation: Development-of-an-online-results-portalDownload

4. AACC 2020

A project on which I collaborated with the WITS Chemical Pathology team, Reinhardt Hesse and Jaya George, was selected to be presented as a poster at the international AACC (virtual) conference in December 2020.

The aim of this study was to describe the biochemical and haematological analyte changes seen in COVID-19 patients using South African laboratory data, and to determine the effect of HIV, TB and DM on the risk for acquiring SARS-CoV-2 and the outcomes as measured by intensive and high care admission.

We reported on data for 842,197 individuals, of which 11.7% (98,335) had at least one positive SARS-CoV-2 PCR test, and 88.3% (743,862) tested negative.

Our findings did not support an increased prevalence of either HIV or TB in individuals with SARS-CoV-2 infection but did indicate an increase in disease severity with HIV-positive status. Our findings of clear differences in several commonly measured analytes between the critical and non-critical group suggested that these may be useful in our setting to triage patients.

AACC-abstract-Lab-changes-in-COVID_finalDownload
AACC_poster_Laboratory-changes-and-the-relationship-between-TB-HIV-HbA1c-and-SARS-CoV2-in-SADownload

SARS-CoV-2 does not have a higher prevalence in HIV or TB patients, but leads to more critical cases in HIV patients of South Africa

COVID-19 related laboratory analyte changes and the relationship between SARS-CoV-2 and HIV, TB and HbA1c in South Africa

D.J. van der Westhuizen
R. Hesse
J.A. George

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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
UNIVERSITY OF CAPE TOWN

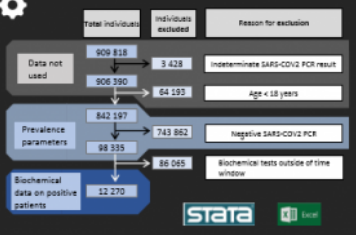
tinyurl.com/COVID-analytes

INTRODUCTION AND OBJECTIVE

We conducted a large retrospective analysis on SARS-CoV-2 data of 909 818 adults tested for SARS-CoV-2 across our laboratory network in South Africa over a 4-month period.

The aim of this study was to describe the biochemical and haematological analyte changes seen in COVID-19 patients using data from the National Health Laboratory Service and to determine the effect of HIV, TB, and Diabetes Mellitus (DM) on the risk for acquiring SARS-CoV-2 and the outcomes as measured by intensive and high care admission.

METHODS



CONCLUSION

- ✓ Prevalence: Uncontrolled DM, but not HIV, was more prevalent in individuals with SARS-CoV-2. Active TB was significantly lower amongst individuals with SARS-CoV-2.
- ✓ Severity: HIV was more prevalent amongst critical COVID-19 patients, but CD4 count did not have a clear correlation. HbA1c was not correlated with severity.
- ✓ Associated analytes: D-dimer, neutrophil-to-lymphocyte ratio (NLR), LDH, urea and other biochemical markers, but not platelet count or creatinine, were associated with more severe SARS-CoV-2 disease and may be useful for prognostication.

RESULTS

Table 1 - Prevalence values in the total cohort

	SARS-COV2 Negative	SARS-COV2 Positive	p-value
Prevalence (n = 842 197)	743 862 (88.3 %)	98 335 (11.7%)	
Age (mean; SD)	42.61 (14.7)	42.25 (15.0)	<0.001
Female sex (%)	58.3	61.6	<0.001
HIV+ (%)	6.31	6.25	0.444
Active TB (%)	0.79	0.40	<0.001
Uncontrolled DM (%)	1.36	4.61	<0.001

Table 2 – Median analyte differences between Non-critical and Critical Patients

Category	Parameter	Count (n)	Non-critical SARS-COV2	Critical SARS-COV2	Unit	p-value
Demographics	Total individuals	12270 (100%)	98.8 %	1.16 %	%	-
	Female sex	7055 (57.5%)	98.9 %	1.11 %	%	0.571
	Male sex	5144 (41.9%)	98.6 %	1.22 %	%	0.571
	Age (mean years)	12226	52.21	48.81	years	0.012
			Median	Median		
Inflammatory	CRP	8721	115	136	mg/L	0.009
	PCT	1387	0.25	2.1	ug/L	<0.001
	Ferritin	2075	574	592	ug/L	0.727
Coagulation	D-dimer	4445	0.61	1.37	mg/L	<0.001
Full blood count	WCC (total)	5563	8.48	11.05	x 10^9/L	<0.001
	Hb	10921	13.1	11.5	g/dL	<0.001
	Platelets	10900	268	283	x 10^9/L	0.663
WCC diff.	NLR	5671	5.12	9.18	ratio	<0.001
Liver related	AST	4050	44	60	U/L	0.002
	ALT	6271	28	36.7	U/L	0.023
	GGT	4127	56	87	U/L	<0.001
	LDH	3224	457	640	U/L	<0.001
	Total bilirubin	5482	8	8	umol/L	0.894
	Albumin	4483	34	29	g/L	<0.001
Cardiac	NT-proBNP	723	260	645	pg/ml	0.017
Endocrine	HbA1c	5479	8.4	9.4	%	0.404
Renal function	Urea	11170	5.65	9	mmol/L	<0.001
	Creatinine	11700	72.5	67.7	umol/L	0.567

Poster presented at AACC in December 2020