Medical Laboratory Test Utilisation on a Grand Scale

27 Labs, 3 eMRs
Reducing unnecessary tests, improving outcomes, reducing costs

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New South Wales Health Pathology, Australia
KC, Missouri – 14,228 kilometres or 8,841 miles

New Orleans
14,291 kilometres
or 8,880 miles
Pressures on the Health System

- Demand for services
- Costs
- Budget available
- Focus on “appropriate use”
- Pressure to improve performance
- Consumer expectations
creating better health & justice systems

- partners in patient care
- improve treatment for the critically ill
- help solve crimes
- deliver extensive statewide services
- protect community health & safety
- deliver smarter better services
- build knowledge & capacity
I FACED IT ALL AND I STOOD TALL AND DID IT MY WAY
UNDERSTAND THE PROBLEM
From 05/2006 to 09/10
• Expenditure up 5.4% in public hospitals
• Pathology ordering up 5 - 10% p.a.

This trend is confirmed by other worldwide studies
In current climate, this is not sustainable

National Coalition Of Public Pathology "Encouraging Quality Pathology Ordering in Australia's Public Hospitals" Final Report Feb 2012
20% Increase in charges for pathology between 2011/12 and 2012/13

12% Per annum increase in activity since 2009

13% Average under use compared with guideline – not ordering the necessary test to contribute to diagnosis

26% Average overuse compared with guideline – unnecessary, no clinical indication
Appropriateness of care – the right test at the right time.............
HAVE A CLEAR VISION AND GOAL
Guidelines
Owned and led by Clinicians

Sustainability
of decision support using eMR functionality

Standardisation
Across 3 eMR’s

Transparency
Of outcomes and comprehensive reporting
Heightened awareness of ordering behaviour

Formalised Working Groups including Pathology

Clinical development of ordering guidelines

Understanding of activity and costs
ESTABLISH A REVIEW FRAMEWORK
Our Analysis Model

Understand ordering behaviour – gather data
Develop clinical guidelines
Communicate and educate
Implement
Monitor and feedback
TURN THE DATA INTO KNOWLEDGE
Strategy 1 – Stoplights in ED

MUST have Consultant approval

MUST have senior doctor approval

Can be ordered by all doctors
Stoplights in ED Outcome

$ Charges - Emergency Department

2011/2012 vs 2012/2013
Stoplights in ED Outcome

ED Charges Trend

- ED Charges
- ED Prediction
- Linear (ED Charges)
### Medical Oncology - Frequency

<table>
<thead>
<tr>
<th>Dr</th>
<th>Patient No.</th>
<th>Avge No. Tests/Pt</th>
<th>Avge Cost Unnec. Tests/Pt</th>
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<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>35</td>
<td>$219.81</td>
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<td>2</td>
<td>45</td>
<td>25</td>
<td>$125.69</td>
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<td>3</td>
<td>5</td>
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<td>6</td>
<td>44</td>
<td>32</td>
<td>$203.48</td>
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<tr>
<td>TOTAL</td>
<td>187</td>
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<tbody>
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<td>19</td>
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<td>47</td>
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<td>4</td>
<td>20</td>
<td>$117.75</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>9</td>
<td>$14.15</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>29</td>
<td>$89.83</td>
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<td>TOTAL</td>
<td>65</td>
<td></td>
<td></td>
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</table>

$83.16 savings p.p. (range $0 – $185.12)

12% reduction in testing (range 0 – 29%)
CLINICIANS MUST DRIVE STRATEGY
Clinically driven

Cross Directorate

Consultation focused

Inclusive of Pathology
High Growth Clinical Areas

Targeted tests for repeat ordering

Pathology Strategies already underway
<table>
<thead>
<tr>
<th>Test</th>
<th>Action</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-dimer (quantitative)</td>
<td>Discuss with registrar/consultant prior to ordering</td>
<td>Consider Wells' Criteria for pulmonary embolism</td>
</tr>
<tr>
<td>EPG, IEPG</td>
<td>Discuss with consultant prior to ordering</td>
<td>Supported - Rules already implemented for frequency</td>
</tr>
<tr>
<td>ESR</td>
<td>Not more than once weekly</td>
<td>Supported</td>
</tr>
<tr>
<td>Genetic tests</td>
<td>Discuss with consultant prior to ordering</td>
<td>Supported - Already being implemented for selected genetic tests</td>
</tr>
<tr>
<td>HbA1c</td>
<td>Not more frequent than 3 monthly</td>
<td>Supported - Medicare rules - not more than 4 times in a 12 month period</td>
</tr>
<tr>
<td>Immunology tests</td>
<td>Discuss with consultant prior to ordering</td>
<td>Supported - Covered by expansion of pilot to 30 tests</td>
</tr>
<tr>
<td>Lipid profile</td>
<td>Not more frequent than every 3 months for screening</td>
<td>Please ensure the patients are fasted for the test.</td>
</tr>
<tr>
<td>Pro-calcitonin</td>
<td>Discuss with consultant prior to ordering</td>
<td>Supported - 1 week rule with override if ? sepsis/ICU</td>
</tr>
<tr>
<td>PTH</td>
<td>Discuss with consultant prior to ordering</td>
<td>No electronic solution</td>
</tr>
<tr>
<td>Red cell folate</td>
<td>Not more than once every 2 months for screening</td>
<td>Supported - Medicare rules - not more than 3 in a 12 month period - IMPLEMENTED DEC 2014 DUE TO HIC CHANGES</td>
</tr>
<tr>
<td>Thrombophilia screen</td>
<td>Discuss with consultant prior to ordering</td>
<td>No Electronic Solution</td>
</tr>
<tr>
<td>TSH</td>
<td>Not more than once yearly for screening.</td>
<td>Checking thyroid function in inpatients is generally not recommended, unless there is known thyroid disease or thyroid disease is suspected.</td>
</tr>
</tbody>
</table>
START SMALL AND VALIDATE THE OUTCOMES
The Electronic Solution in eMR

- Rules checking duplicates in a given timeframe
- Order prevented or active decision to progress, advice to contact Pathologist
- Tests diverted to Clinical Review Queue for authorisation
- If no consultation in 7 days, test cancelled
Pilot Immunology Results

**ENA**

**ANCA**

**CCP Ab**

Positive impact on reducing “unnecessary” testing - $20,885 saved
The Conclusion so far.....

Analysis Model promotes better understanding

ED and Med Onc Pilots reduced ordering but not sustainably

Electronic Duplicate checking and clinical validation had a +ve impact on ordering behaviour
EXPAND THE STRATEGY AND QUANTIFY THE BENEFITS
Clinical appropriateness
Increase awareness

Provide education
Ensure compliance
Clinical – Improving appropriateness of ordering

**Problem:** Chlamydia psittaci Nucleic Acid Detection ordered instead Chlamydia trachomatis Nucleic Acid Detection. Wasting time checking orders and cancelling orders.

**Method:** Alert when requested using certain synonyms, prompts to change the order if in error.

**Result:** More appropriate order is placed
Clinical – Improving appropriateness of ordering

**Chlamydia psittaci Nucleic Acid Detection**

*Chlamydia psittaci Nucleic Acid Detection* is a specialised investigation and is rarely indicated. This test is different to and does not cover *Chlamydia trachomatis* testing. Select the most appropriate order below and click OK to proceed.

*Please contact the Clinical Microbiologist on 02 4734 2180 for further information, if required.*

Add Order for:

- [ ] *Chlamydia trachomatis Nucleic Acid Detection*
- [ ] *Psittacosis Nucleic Acid Detection*

[OK]
Clinical – Improving appropriateness of ordering

Cancelled Tests

Rule implemented
Education – modifying ordering behaviour

**Problem:** Drs ordering a costly HIV Viral load instead of Serology. Staff time used to cancel test and notify clinician.

**Method:** A rule was put in place to question whether the HIV Viral Load was actually required and prompts them to order Serology instead.

**Result:** Incorrect test orders have decreased and scientific staff can now be used for more important work.
Education – modifying ordering behaviour

HIV Viral Load is not a screening test

HIV Serology should be ordered for screening purposes.
HIV Quantitation Nucleic Acid Detection (HIV Viral Load) is not a screening test and should only be ordered if:
- Laboratory confirmed HIV Positive
- Early infection during Pregnancy
- Indeterminate Western Blot

To modify order, tick box next to HIV Serology and click OK
To continue with HIV Viral Load order, select continue and click OK

Alert Action
- Modify Order
- Continue

Add Order for:
- HIV Serology

OK
Education – modifying ordering behaviour

HIV Viral Load % Orders Not Placed

- Rules fired
- Orders placed
- Cancelled
Awareness – increasing transparency

**Problem:** Costly tests being ordered and sent to referral labs without oversight. Are these orders all valid?

**Method:** An alert is sent to screen when an identified "Costly" (i.e. over $600) orderable is ordered.

**Result:** Increasing transparency of high cost tests
Awareness – increasing transparency

Costly Test

Please Note:
Amniotic Fluid Amino Acids Quantitation
is a non-medicare rebatable test
and costs $600.

Alert Action
- [ ] Cancel
- [ ] Continue

OK
Awareness – increasing transparency

Pre Rule
$155K pa

Post Rule
$25K pa

$130,000 Savings
Compliance – with HIC/Medicare Rules

**Problem**: Changes to MBS rules for Vitamin B12 testing. Only one test per year.

**Method**: New rule to create an alert if Vitamin B12 orderable already exists on the patient in the last 365 days. The incoming order for Vit B12 is then cancelled. This rule will also allow the ordering physician to add a HoloTranscobalamin if they tick the check box.

**Result**: Reduced duplicate tests performed along the lines with HIC/Medicare rules
Only one Vit B12 test allowed per 12 month period

Only one Vitamin B12 test is allowed per 12 month period, as per MBS. As the previous Vitamin B12 result requested on 28 October, 2016 17:05:05 AEDT was low or equivocal (101 pmol/L), HoloTC can instead be ordered.

$142 K p.a. savings
A Combination - TFT

**Problem:** Lack of clinical information and over testing of FT4/FT3.

**Method:** A series of Alerts and associated rules evaluate orders, prompt tests and results.

**Result:** Improved appropriateness of ordering, modifying ordering behaviour, increasing transparency and compliance with HIC/Medicare rules.
Valid order Reason Required for TFT

Reason provided for ordering Thyroid Function Test (TFT) = None
To comply with Medicare Benefits Schedule, a valid reason is required to order TFT (TSH + FT4)

To continue with the TFT, click OK to Modify the order reason

If a valid reason for ordering cannot be selected, change order by clicking on CANCEL TFT, Select Add Order for TSH, add FT4 if abnormal then click OK.

Alert Action

- CANCEL TFT
- MODIFY REASON

Add Order for:

- TSH, add FT4 if abnormal
A Combination - TFT

17,647 Less unnecessary tests p.a.

46,845 TFT MBS compliant p.a.
### Other Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Immunopathology duplicates</td>
<td>Historical Encounters</td>
</tr>
<tr>
<td>Measles virus Genotyping</td>
<td>TORCH Screen</td>
</tr>
<tr>
<td>BHCG Tumour Marker</td>
<td>Methyl Malonic Acid</td>
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<tr>
<td>Free PSA</td>
<td>CMV NAT</td>
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<tr>
<td>IgA Antibodies</td>
<td>Myoglobin</td>
</tr>
<tr>
<td>Filovirus and Ebola testing</td>
<td>Chlamydia NAT ordering</td>
</tr>
<tr>
<td>Urine Catheter orders</td>
<td>Microbiology Sendaways</td>
</tr>
<tr>
<td>Adenovirus NAT</td>
<td>Q Fever NAT</td>
</tr>
<tr>
<td>Infection Control duplicates</td>
<td>Managing electronic Add-Ons</td>
</tr>
</tbody>
</table>
REAPPLY THE MODEL TO A NEW PROBLEM
Houston,
we have
a problem
Save Time
Reduce Errors
4 reasons to stop using manual processes
Improve Your Customers Experience
Access Improved Analytics
The deployment

- Consultation
- Training of lab and specimen management and staff
- Hepatitis Screen Rule Sep 2017
- Hepatitis A Antibodies Rule Nov 2017
- Hepatitis B Antibodies Rule Dec 2017
WHAT IS THE

Impact
Decrease in Hepatitis Orders Cancelled
(2016/17 to 2017/18 FY)

Number of orders cancelled

Date

Average % Decrease

- 98%
- 96%
- 89%
- 81%
- 91%
Decrease in Hepatitis Orders Added

Number of Add-on Orders for one month
(May 2017 vs May 2018)

Overall drop in Add-ons = 83%
## Reduced TAT for Hep B results

### Average Collected to Verified TAT (mins)

<table>
<thead>
<tr>
<th>Test</th>
<th>2017 Detected</th>
<th>2017 Not Detected</th>
<th>2018 Detected</th>
<th>2018 Not Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>HepB c Ab</td>
<td>36%</td>
<td>61%</td>
<td>38%</td>
<td>58%</td>
</tr>
<tr>
<td>HepB s Ab</td>
<td>48%</td>
<td>55%</td>
<td>58%</td>
<td>55%</td>
</tr>
<tr>
<td>HepB s Ag</td>
<td>48%</td>
<td>55%</td>
<td>58%</td>
<td>55%</td>
</tr>
</tbody>
</table>
Benefits Realised - Laboratory

- **Time saved as a result of NO manual checks**: 4hrs
- **Reduction in cancelled orders**: 91%
- **Reduction in Add Ons**: 83%
- **Reduction in repeat/unnecessary testing**: 100%
- **Improvement in TAT for “Not Detected”**: 58%
- **Improvement in TAT for “Detected”**: 41%

“Serology Laboratory is able to continue quality delivery of results despite loss of 1/3 of staff (over the last 5yrs)”…. Dr M. O’Sullivan
Benefits Realised – Clinical Impact
Benefits still to be quantified

Clinician
- More appropriate tests
- Decreased costs
- Time savings

Patient
- More appropriate tests
- Decreased costs
- Time savings

Lab
- Efficiency Savings
- Productivity Improvements
HAVE WE MADE A DIFFERENCE?
Current Status

- Actively implementing strategies
- Across 3 eMRS, covering 6 LHDs
- Sustained performance
- Standardised processes
- Uses native functionality
- WE ARE NOT FINISHED YET!
## Current Status

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Savings p/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical Encounters</td>
<td>$50,500</td>
</tr>
<tr>
<td>HIV Viral Load</td>
<td>$69,000</td>
</tr>
<tr>
<td>Costly test alert</td>
<td>$130,000</td>
</tr>
<tr>
<td>Immunopathology duplicates</td>
<td>$135,000</td>
</tr>
<tr>
<td>B12 Level</td>
<td>$188,000</td>
</tr>
<tr>
<td>TFT</td>
<td>$492,000</td>
</tr>
<tr>
<td>Other Strategies</td>
<td>$106,700</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$1,171,200</td>
</tr>
</tbody>
</table>
Point of Care Testing Duplication

Customised decision support

Haematology and Molecular Genetics

Frequency ordering – CRP, ESR
What does the future look like for Pathology?
What does the future look like for Pathology?
What does the future look like for Pathology?
What does the future look like for Pathology?

- Accelerate the value of self-service through automation
- Transform practice through analytics
- Redesign programs to serve unique customer segments
What does the future look like for Pathology?
What does the future look like for Pathology?
What does the future look like for Pathology?
LEARNINGS AND CONCLUSION
Learnings

- Appropriate Tests in timely manner
- Impactful Reduced unnecessary testing
- Time saving Less time correcting orders
- Innovative Solve simple and complex problems
WARNING
Conclusions
UNDERSTAND THE PROBLEM

HAVE A CLEAR VISION AND GOAL

ESTABLISH A REVIEW FRAMEWORK

TURN THE DATA INTO KNOWLEDGE

CLINICIANS MUST DRIVE STRATEGY

START SMALL AND VALIDATE THE OUTCOMES

EXPAND THE STRATEGY AND QUANTIFY THE BENEFITS

REAPPLY THE MODEL TO A NEW PROBLEM
IT'S JUST THE BEGINNING...
Acknowledgements

Pathology Applications Services (PAS) Team in NSW Health Pathology West/Regional and Rural

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- Brad Carter, Snr Application Specialist, PAS
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- Medical Oncology Network, Westmead Hospital
- Emergency Department, Westmead Hospital