POINT OF CARE TESTING

improving health outcomes

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Point of Care Testing
what is it?

“the provision of a test (result) at the point in time at which the result will be used to make a decision and take appropriate action which will result in an improved health outcome”
Point of Care Testing has also been known as:

- near patient
- bed-side
- physicians office
- extra-laboratory
- decentralised
- ancillary
- alternate site
- testing
Point of Care Testing
changes in healthcare: stimulus for change

quality concerns
cost concerns
patients expectations
new delivery models
new diseases
new evidence
new technologies
health economic strategies
Improving Delivery of Results

- Transmit result
- Report result
- Validate result
- Review quality control *
- Analyse specimen * and QC sample
- Prepare sample
- Transport to laboratory
- Register request
- Prepare request form
- Phlebotomy *
- Patient
- Doctor
- Interpret result *
- Prepare sample
- Transport to laboratory
- Register request
- Prepare request form
- Doctor
- Interpret result *
Improving Delivery of Care
changes in clinical practice

treatment close to first point of contact
patient focussed care
one stop clinics
elective vs emergency care
ambulatory care
primary care
home care
Point of Care Testing

where?

- home
- work and leisure place
- pharmacy
- health centre (inc DTC)
- paramedical vehicle
- emergency room
- operating room
- outpatient clinic
- ward
  (laboratory)
Changes in Health Care Delivery

conflicts of change

- In Patient
- Out Patient
- Health Centre
- Home

Patient Care
Laboratory Service
Improving Health Outcomes

what is a health outcome?

care of individual patients
maximisation of benefit
minimisation of risk
reasonable cost
Point of Care Testing
clinical outcomes; the 5Ds

Improving on .. death
.. disease
.. disability
.. discomfort
.. dissatisfaction
Point of Care Testing
clinical outcomes: surrogates

- faster decision making
- earlier treatment
- improved compliance
- reduced complications
- faster optimisation
- reduced readmission
- patient satisfaction
Point of Care Testing
health economic perspectives

society
health care plan payer
hospital
clinical team
test
Point of Care Testing

economic outcomes: surrogates

- clinic visits
- length of stay
- readmission rate
- intervention rate
- working days lost
- productive years gained
Point of Care Testing
why?

make a quicker decision?
instigate urgent treatment?
counsel a patient?
empower a patient?
improve a patient outcome?
save money?
Point of Care Testing

information
decision
action
outcome
Point of Care Testing

efficacy

good

quality

evidence

information

decision

action

outcome
Point of Care Testing
primary care

1057 publications identified
92 extracted

“… there is little evidence to support the introduction of NPT in primary care …”

Hobbs et al. 1997
Point of Care Testing effectiveness

information

decision

action

outcome

good quality management
Point of Care Testing
challenges

information

decision ★

action ★

outcome
Point of Care Testing
prompting action

start
withhold
modify
stop

.......treatment
Point of Care Testing
an integrated sequence

PATIENT
question

A

OUTCOME
action

B

OUTCOME

decision
test

question

PATIENT

A

B
Point of Care Testing
an integrated process

PATIENT
question
A

test

decision

OUTCOME
action
B

diagnostic accuracy
Point of Care Testing
an integrated process

PATIENT
question

A

diagnostic outcome

test

decision

OUTCOME
action

B
decisions

cost effectiveness

organisational impact

clinical impact
  - diagnostic
  - therapeutic
  - health outcome

diagnostic performance

technical performance
Point of Care Testing
keys to success

organisation and management

changing clinical practice
Briefly, some examples .....
Point of Care Testing
emergency room

*Tsai et al. 1994*
- 28% patient course altered

*Sands et al. 1995*
- 9% patient course altered
- 11% admission/discharge altered

*Kendall et al. 1998*
- 7% patient treatment altered
# Point of Care Testing

## turnaround times: before and after

<table>
<thead>
<tr>
<th>Test Change (%)</th>
<th>Laboratory TAT (min)</th>
<th>POCT TAT (min)</th>
<th>Change in min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinalysis (90)</td>
<td>40</td>
<td>4</td>
<td>-36</td>
</tr>
<tr>
<td>Pregnancy (94)</td>
<td>78</td>
<td>5</td>
<td>-73</td>
</tr>
<tr>
<td>Glucose (60)</td>
<td>10</td>
<td>6</td>
<td>-4</td>
</tr>
<tr>
<td>Cardiac</td>
<td>110</td>
<td>17</td>
<td>-93</td>
</tr>
</tbody>
</table>
## Point of Care Testing

### ED length of stay: before and after

<table>
<thead>
<tr>
<th>Test</th>
<th>ED LOS (min) Pre POCT</th>
<th>ED LOS (min) Post POCT</th>
<th>Change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinalysis</td>
<td>395</td>
<td>358</td>
<td>- 37</td>
<td>0.006</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>386</td>
<td>346</td>
<td>- 40</td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td>386</td>
<td>338</td>
<td>- 47</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>389</td>
<td>347</td>
<td>- 41</td>
<td></td>
</tr>
</tbody>
</table>

p=0.006
Point of Care Testing
the MGH ED ‘financials’

- **POCT unit cost**: $19.20 per test
- **Lab unit cost**: $2.94 per test
- **productivity**: 5,162 per FTE
- **total testing volume**: 25,812 per year
- **total POCT cost**: $495,590 (7d - 16h)
Point of Care Testing
the broader perspective: MGH

- bed minutes saved per test: 41
- bed hours saved per year: 17,638
- cost of a bed: $402,960
- cost of two beds: $805,920
- total saving: $805,920 - $495,590
  = $310,330
Impact of Point of Care Monitoring on Epilepsy Management

<table>
<thead>
<tr>
<th>monitoring:</th>
<th>laboratory</th>
<th>clinic</th>
</tr>
</thead>
</table>

for optimal control:

- weeks from first visit: 22.9 vs. 4.5*  
- number of dose changes: 2.0 vs. 1.5  
- number of drug assays: 4.5 vs. 2.5*  

*P<0.05

(Patsalos et al., Lancet 1987; ii: 39)
POCT for HbA1c in Diabetes Clinic

Cagliero et al 1999

p< 0.05
Point of Care Testing
compliance

- glucose
  - patient
  - doctor

- urine albumin
- HbA1c
Point of Care Testing
intraoperative PTH measurement
reduces reoperation rate
enables day case surgery
reduces length of stay
reduces cost per procedure
Intraoperative PTH

Chen et al. 1999

1998 DOLLARS

MIP

BL

p<0.001
Point of Care Testing

haematology

whole blood PT and APTT
monitor cardiopulmonary bypass
reduces erythrocyte, FFP and platelet requirement

annual saving $265,658

Despotis et al. 1994
Outcome Measures in Intensive Care

Admission ACR + 24 hrs Scores

SAP s
ns

APACHE s
ns

ACR s
ns

P<0.00001
P=0.0125
P=0.0002

Gosling et al 2002
Point of Care Testing
monitoring anticoagulation therapy
primary care setting

- computerised decision support
  - improvement in INR control, 23% to 86%, \( p > 0.001 \)
  - recall time extended, \( p = 0.033 \)
  - improvement in time spent in target range, \( p = 0.008 \)
  - proportion of tests in target range increased, \( p = 0.015 \)
  - ‘primary care as safe as secondary care’

## Point of Care Testing
**microeconomic cost analysis**

<table>
<thead>
<tr>
<th></th>
<th>glucose: cost / test ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>POCT</td>
</tr>
<tr>
<td>Lee-Lewandrowski et al., 1994</td>
<td>13.49</td>
</tr>
<tr>
<td>Winkelman et al., 1994</td>
<td>6.62</td>
</tr>
<tr>
<td>Greendyke, 1992</td>
<td>11.50</td>
</tr>
<tr>
<td>Nosanchuk et al., 1995</td>
<td>7.14</td>
</tr>
</tbody>
</table>
Improved Glycaemic Control

healthcare costs

Wagner et al 2001
Point of Care Testing
today’s challenges
maintaining good quality systems
CHANGING CLINICAL PRACTICE