Perceived time pressure and its effect on final dispensing check accuracy
Community pharmacy workload changes since 2005/6

- Seston & Hassell (2011)
- General Pharmaceutical Services Report (2012)

10% increase in pharmacists
22% increase in dispensing
73% increase in enhanced services
333% increase in MURs
20% increase in AURs
Workload is more than the volume of work you do...
Studies into the impact of community pharmacy workload

Research has found that since the 2005 contractual frameworks:

- Job satisfaction decreased  
  (Bond et al., 2008, Gidman et al., 2007, Gidman, 2011)
- Job related-stress increased  
  (Bond et al., 2008, Gidman et al., 2007, Gidman, 2011)
- Intentions to leave the profession increased  
  (Eden et al., 2009)
Our study into Pharmacists’ Mental Workload (aka my PhD)

**Pilot study**
(n=25 pharmacists & pharmacy students)

**Student pharmacist study**
- 2 x simulated pharmacy experiments (n₁=52, n₂=41)
- Qualitative interviews (n=15)

**Community pharmacist study**
- 2 x simulated pharmacy experiments (n=52 per experiment)
- Qualitative interviews (n=15)
- Mental workload diaries (n=40)
The accuracy checking task

2 x 25 dispensed items – 25 minutes

Self-completed questionnaire X 3
Big five personality inventory
Dundee Stress State Questionnaire
NASA-Task Load Index

<table>
<thead>
<tr>
<th>RATING SCALE DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
</tr>
<tr>
<td>MENTAL DEMAND</td>
</tr>
<tr>
<td>PHYSICAL DEMAND</td>
</tr>
<tr>
<td>TEMPORAL DEMAND</td>
</tr>
<tr>
<td>EFFORT</td>
</tr>
<tr>
<td>PERFORMANCE</td>
</tr>
<tr>
<td>FRUSTRATION LEVEL</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th></th>
<th>Pilot study (n=15)</th>
<th>Experiment 1 (n=52)</th>
<th>Experiment 2 (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal demand task 1 (s.d)</td>
<td>4.19 (2.74)</td>
<td>7.40 (2.14)</td>
<td>6.86 (2.06)</td>
</tr>
<tr>
<td>Temporal demand task 2 (s.d)</td>
<td>5.13 (2.72)</td>
<td>6.48 (2.44)</td>
<td>6.52 (2.58)</td>
</tr>
</tbody>
</table>

- **No time limit**
- **No timer**
Temporal demand scores were negatively correlated with hit rates (detection of dispensing errors) $r = -0.28$ ($p < 0.05$)

<table>
<thead>
<tr>
<th>Students reports of temporal demand</th>
<th>Miss rate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt;7.25) N=26</td>
<td>32.73%</td>
<td></td>
</tr>
<tr>
<td>Low (&lt;7.25) N=26</td>
<td>19.82%</td>
<td></td>
</tr>
</tbody>
</table>

(t(50) = 2.68, $p < 0.01$, $r = 0.35$)
Was there anything unique about the participants who felt more time pressure?

No significant difference was found in:

- Time taken to check the items
- Community pharmacy, or other pharmacy experience

<table>
<thead>
<tr>
<th>Number of weeks of community pharmacy work experience</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low temporal demand</td>
<td>26.94</td>
<td>32.81</td>
<td>6.44</td>
</tr>
<tr>
<td>high temporal demand</td>
<td>26.65</td>
<td>45.00</td>
<td>8.83</td>
</tr>
<tr>
<td>Total number of weeks of work experience in pharmacies (all types)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low temporal demand</td>
<td>32.00</td>
<td>32.32</td>
<td>6.34</td>
</tr>
<tr>
<td>high temporal demand</td>
<td>29.04</td>
<td>45.11</td>
<td>8.85</td>
</tr>
<tr>
<td>Time taken (in minutes) to check the 50 dispensed items in task 1 and 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low temporal demand</td>
<td>49.25</td>
<td>2.41</td>
<td>.47</td>
</tr>
<tr>
<td>high temporal demand</td>
<td>52.19</td>
<td>8.67</td>
<td>1.70</td>
</tr>
</tbody>
</table>
Was there anything unique about the participants who felt more time pressure?

A significant difference was found in:

- Mental effort scores for task 1
- Mental demand for task 2
- Frustration for task 1 and task 2
- Overall MW for Task 1 and Task 2
- Extraversion Personality trait
- Task Related Interference task 2

<table>
<thead>
<tr>
<th>Measure</th>
<th>Low Mean (SD)</th>
<th>High Mean (SD)</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>The effort needed to do the task (Task 1)</td>
<td>6.77 (1.24)</td>
<td>7.62 (1.33)</td>
<td>(t(50) = -1.67, p&lt;.05, r = .23)</td>
</tr>
<tr>
<td>The frustration you experienced during the task (Task 1)</td>
<td>2.31 (1.74)</td>
<td>4.35 (2.53)</td>
<td>(t(44.31) = -3.39, p&lt;.001, r = .45)</td>
</tr>
<tr>
<td>Overall Mental Workload Score (Task 1)</td>
<td>4.57 (.81)</td>
<td>5.88 (1.00)</td>
<td>(t(50) = -5.22, p&lt;.001, r = .59)</td>
</tr>
<tr>
<td>The mental demand of the task (Task 2)</td>
<td>7.31 (1.36)</td>
<td>8.35 (1.06)</td>
<td>(t(50) = -3.22, p&lt;.01, r = .41)</td>
</tr>
<tr>
<td>The frustration you experienced during the task (Task 2)</td>
<td>1.96 (1.56)</td>
<td>3.23 (2.54)</td>
<td>(t(41.59) = -2.17, p&lt;.05, r = .32)</td>
</tr>
<tr>
<td>Overall Mental Workload Score (Task 2)</td>
<td>4.35 (.85)</td>
<td>5.66 (.91)</td>
<td>(t(50) = -5.36, p&lt;.001, r = .60)</td>
</tr>
<tr>
<td>BFI Extraversion scale score</td>
<td>3.65 (.74)</td>
<td>3.29 (.51)</td>
<td>(t(50) = 2.05, p&lt;.05, r = .28)</td>
</tr>
<tr>
<td>Task related interference task 2</td>
<td>18.38 (5.80)</td>
<td>22.46 (6.35)</td>
<td>(t(50) = -2.42, p&lt;.05, r = .32)</td>
</tr>
</tbody>
</table>
Information processing model

(Wickens, et al., 2004, pp.122)
A quick experiment:

http://www.youtube.com/watch?v=Ahg6qcgoay4
Conclusions & Implications

• Reports of feeling under time pressure especially for less experienced pharmacists should be taken seriously by pharmacy managers and the profession as they present a demonstrated and direct link to the occurrence of dispensing errors.

• Some dispensary layouts may exacerbate perceptions of time pressure – these should be evaluated.

• Where the work being carried out has a safety element the work environment needs to be flexible enough to support these individual differences.
“As compared to other safety critical fields, healthcare does not extensively regulate its own production demands or set limits on its maximum performance. It seems as if there is always the next patient and more after that.”

Dekker (2011: pp.6)
Thank you for listening!

Acknowledgements & thank you to:

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- Dr Jane Sutton
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- Mr Chris Coy
- Dr Lynette James
- Dr Philip Rogers

- All our community pharmacist and pharmacy student participants who gave up their time to take part in this study

- Pharmacy Research UK (formerly PTECO) who funded the community pharmacist study

Download these slides at:
http://errorgirl.com

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Extra Slides
Individual differences

- Brain is still developing into our mid-to-late 20s (Lebel et al., 2008)

- There are well documented variations in cognition related to individual difference factors which can now be imaged using DTI/ fMRI (Kanai & Rees, 2011)

- As we gain expertise our performance and cognition changes... (e.g. more knowledge is stored in long-term memory) which may mean our work performance becomes susceptible to different factors...
We found a significant difference in temporal demand reports between pharmacy student and community pharmacy participants. We also found that temporal demand was not related to hit rates for the community pharmacist sample.
mental workload linked to hospital pharmacists’ perceived likelihood of making an medicine error

Chui & Mott (2012)
patient consultation, clinical and legal checks are perceived to be affected by interruptions and distractions, checking accuracy is perceived to be reduced by role time pressure /volume of work.

Reilley et al (2002)
simulated accuracy checking tasks, having less time available to carry out the task was linked to missing errors

Grasha (2001a, 2001b)
reduced accuracy at dispensing was related to lack of breaks, low task tension, poor supervisory support, poor lighting

Flynn et al (1999)
dispensing errors doubled during periods when pharmacists were distracted

Irwin et al (2013)
time pressure affected medicine selection in non-pharmacists but not pharmacists. They also studied the impact of orthographic proximity and Tall Man Lettering on medicine packaging
References