Re-thinking Bed Management

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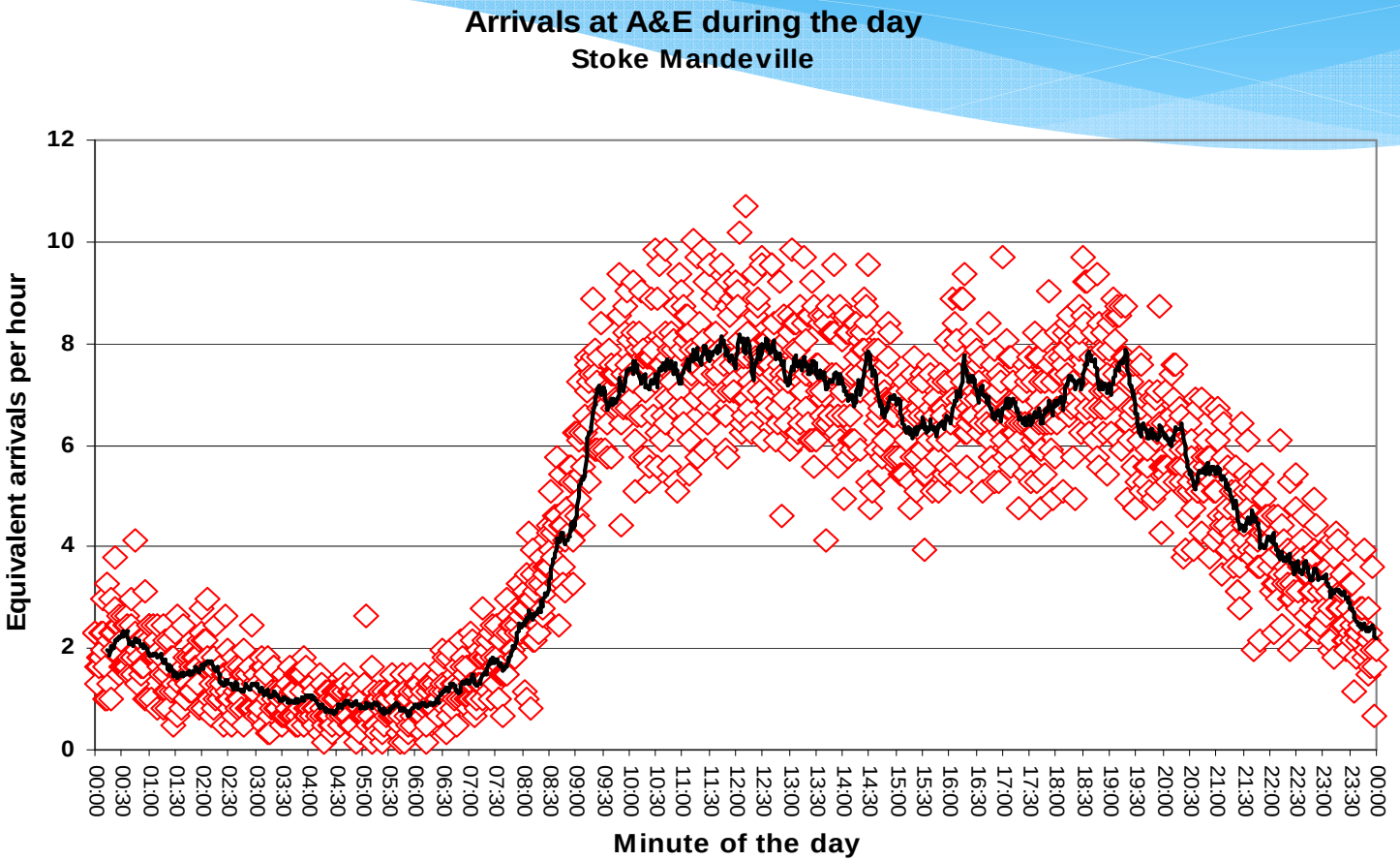
Re-thinking Bed Management

* Understanding variation is very important
* Why current bed planning is flawed
* A new method for bed planning
  * Bed numbers, occupancy & turn-away
  * Economies of scale
  * High throughput has consequences
* Elective vs emergency flows
* Can you 'plan' medical bed occupancy?

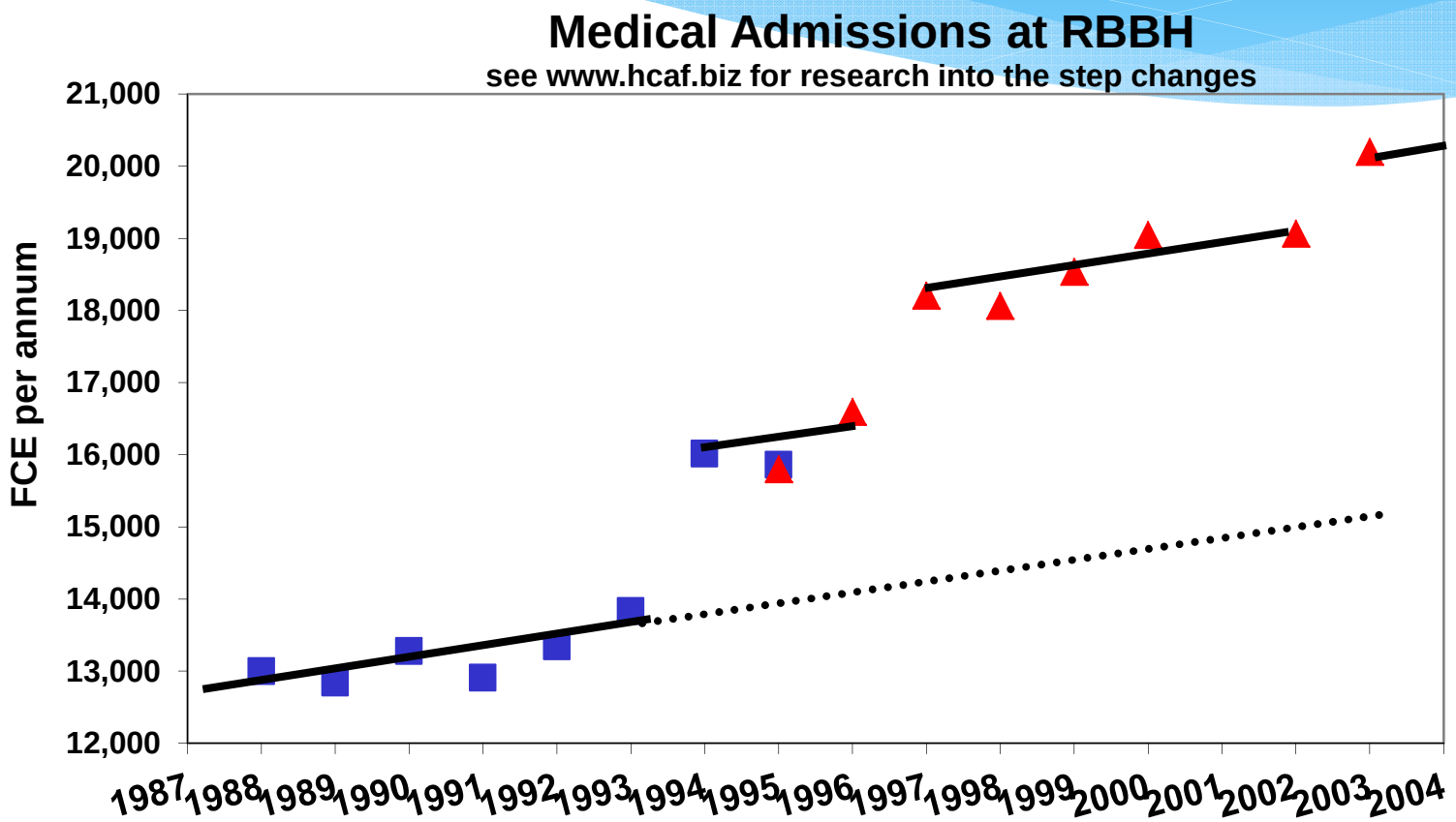
Understanding Variation

* Special cause variation
  * Anything that causes the average to change
  * Weather, Viruses & other infections, arrival of new technology, daily-, weekly- or annual-cycles
* Common cause variation
  * Statistical variation around the average
  * Largely described by Poisson statistics

Special Cause Variation



Special cause variation – why the bed crisis?



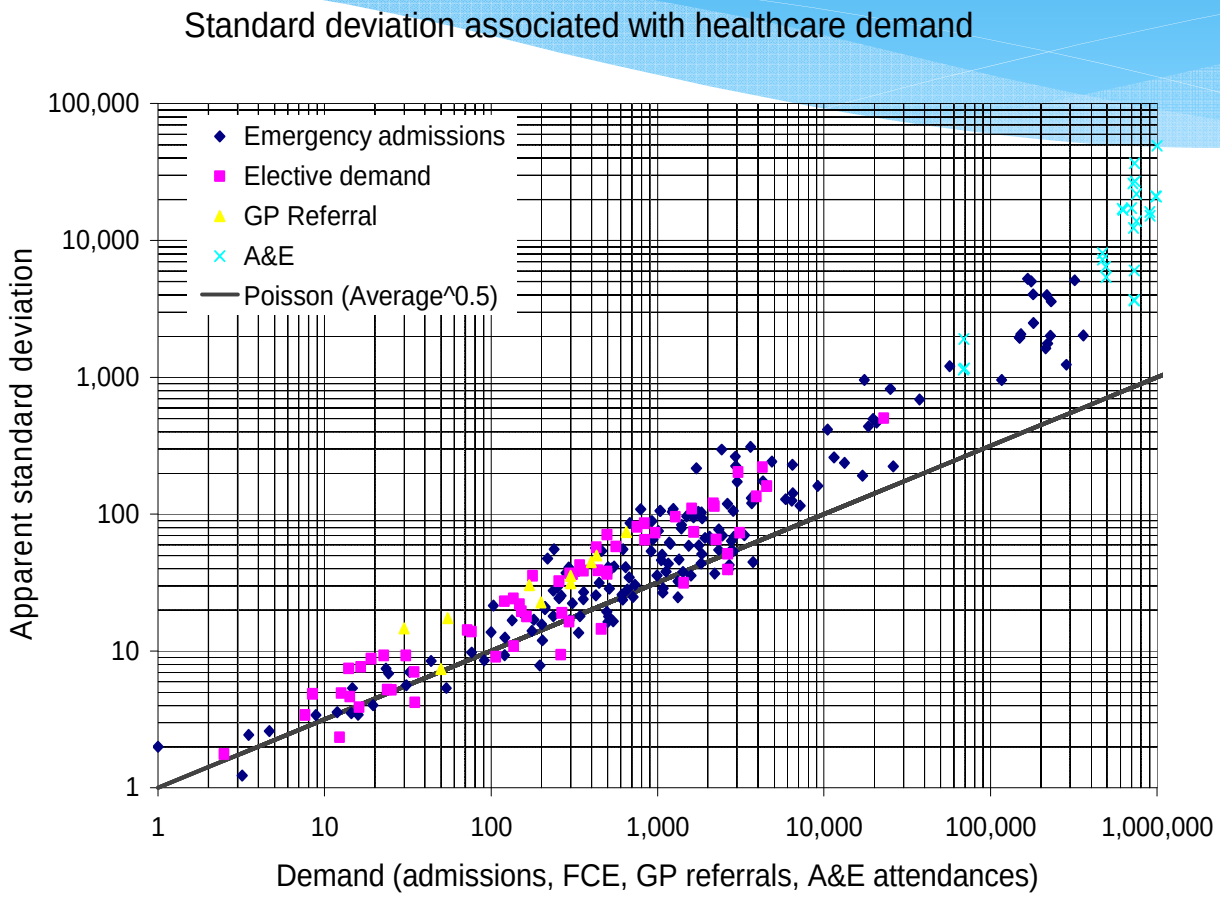
Poisson variation

* Poisson randomness describes arrival events
* Widely used in telecommunications, business and industry
* Is the basis of queuing theory
* Is the forgotten but controlling factor behind ALL healthcare demand and resource allocation, i.e. beds, appointments, equipment, etc

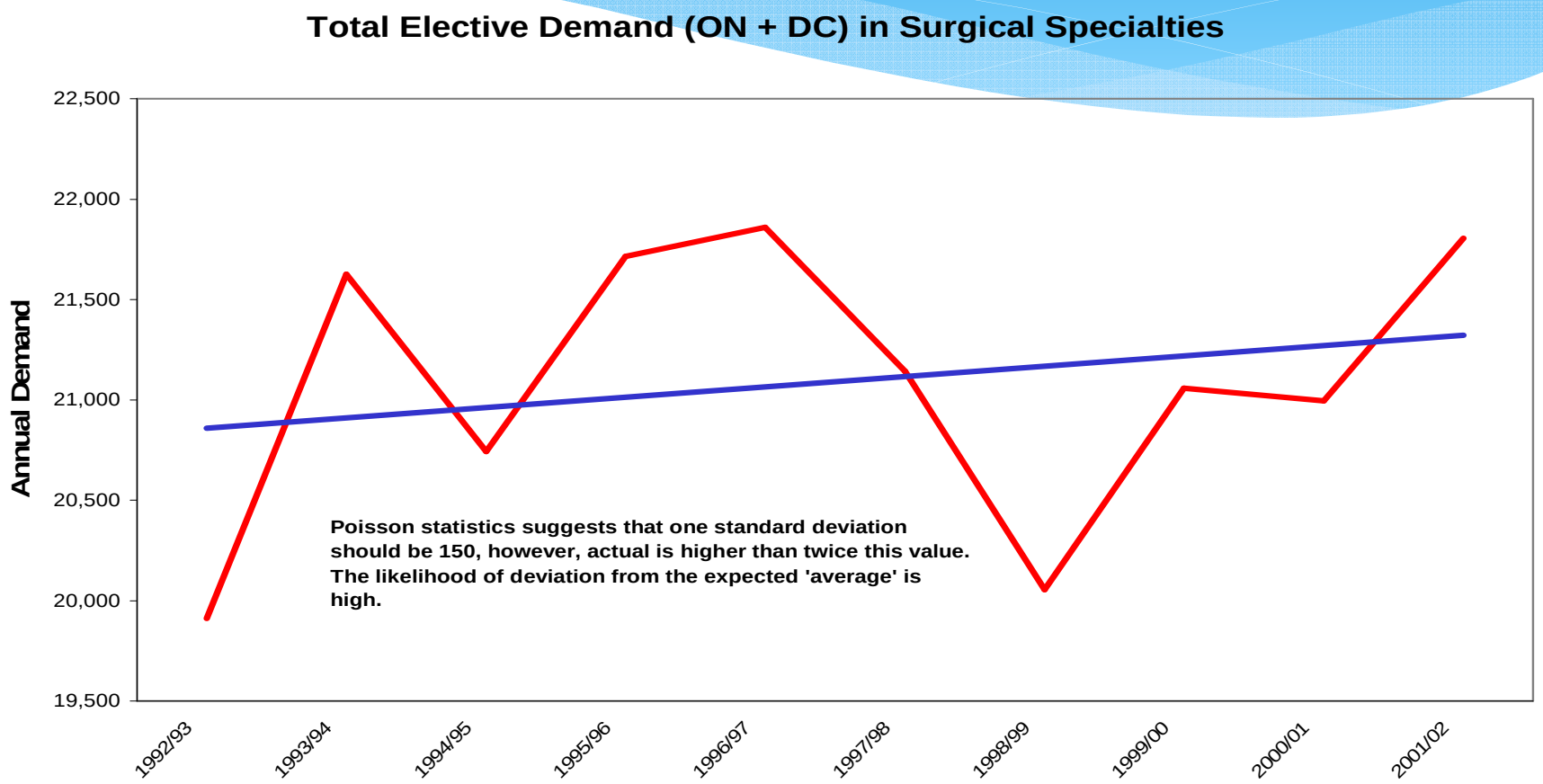
Poisson randomness

* Standard deviation equals square root of the average
* Maximum variation is three times the standard deviation
* But is a skewed distribution
* Skew increases as size decreases
  * All NHS demand is in the region of high skew
  * This creates the feeling of ‘out of control’

Special & Common Combine

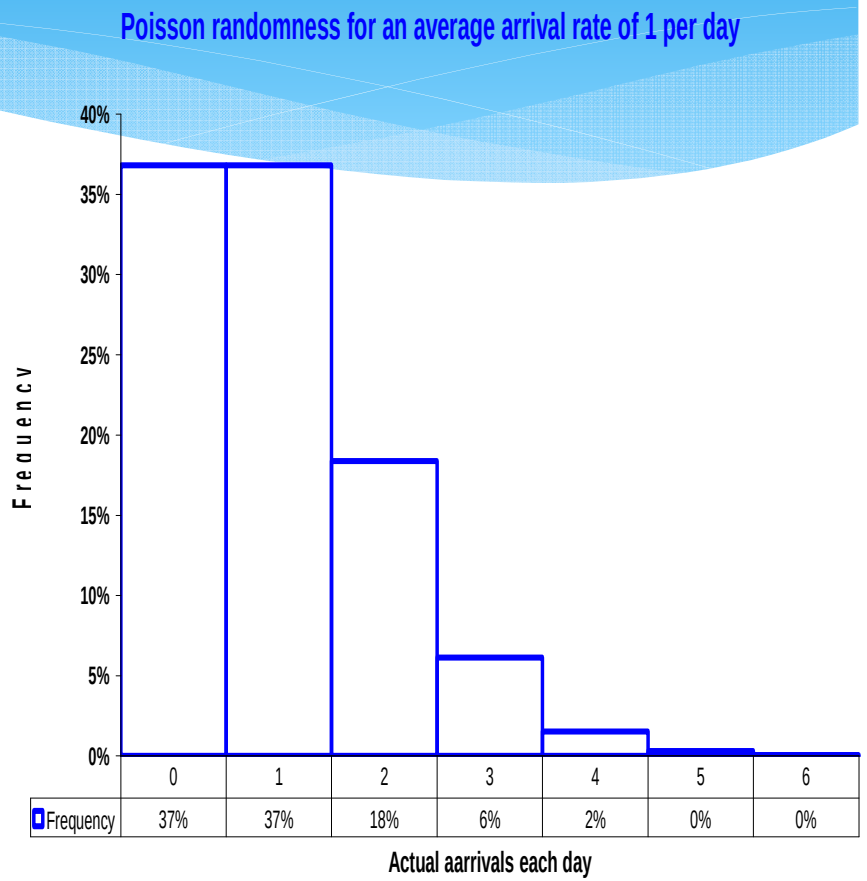


Elective demand – reality!



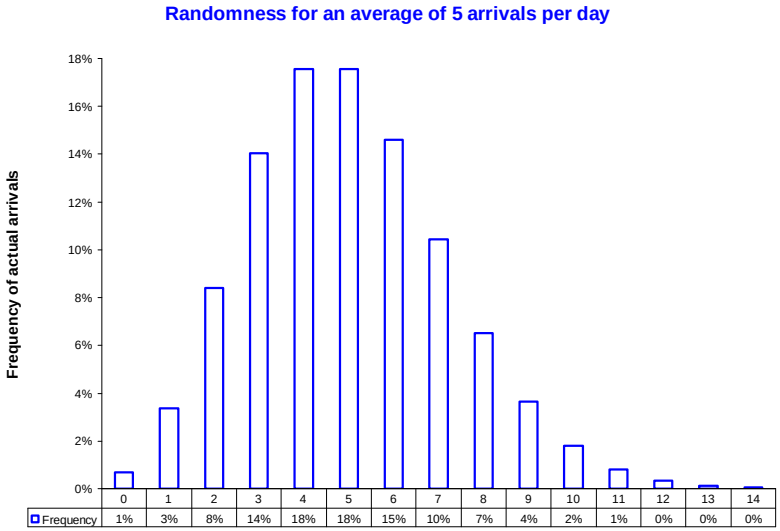
Poisson randomness

* You are expecting 1 per day but must be able to cope with 6 or 7 actual arrivals
* On 37% of days your resources stand idle as there are no arrivals
* 1 per day – ICU, CCU, etc



Poisson randomness

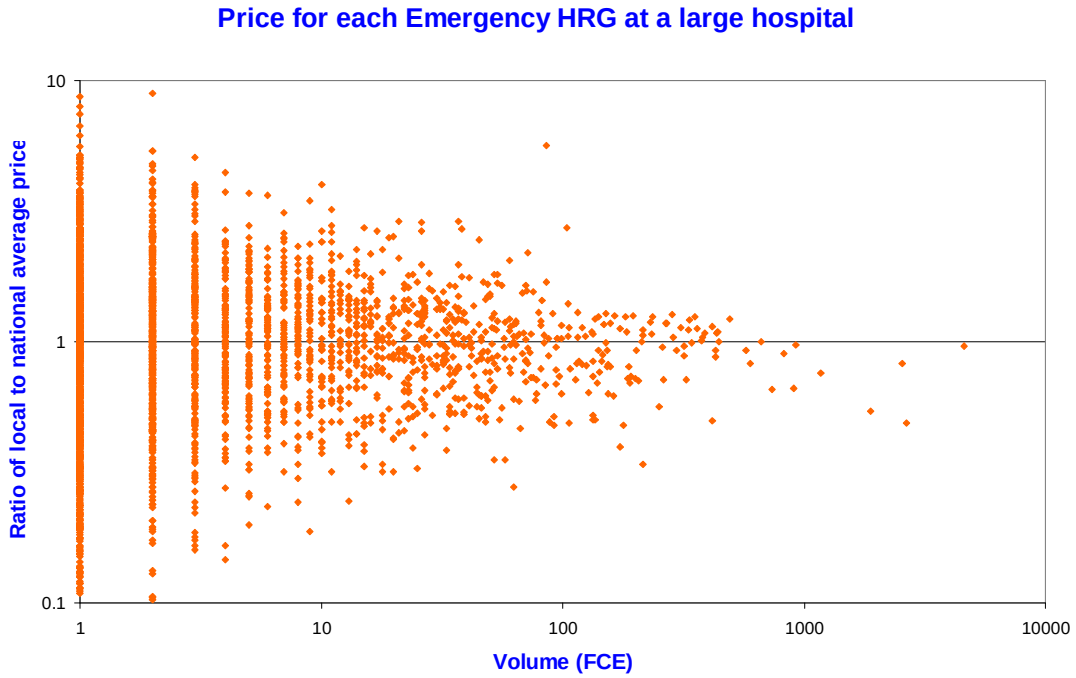
* At 5 per day need to be able to cope with 15 yet on 1% of occasions no arrivals
* All outpatient referrals to consultants less than 10 per work day
* Guaranteed 2 week cancer wait – impossible unless you flex resources!



Implications

* Size for financial stability - larger than any PCT
* HRG's - 95% have fewer than 1,000 p.a. thus unable to forecast prices (see next slide)
* Average is no longer easy to calculate
  * Contracting becomes difficult
  * HRG based income leads to high financial risk
* Size of A&E, bed pools, outpatient clinics, etc
* Not able to guarantee performance targets except with excess resources
* Booked admissions initiative needs statistical support

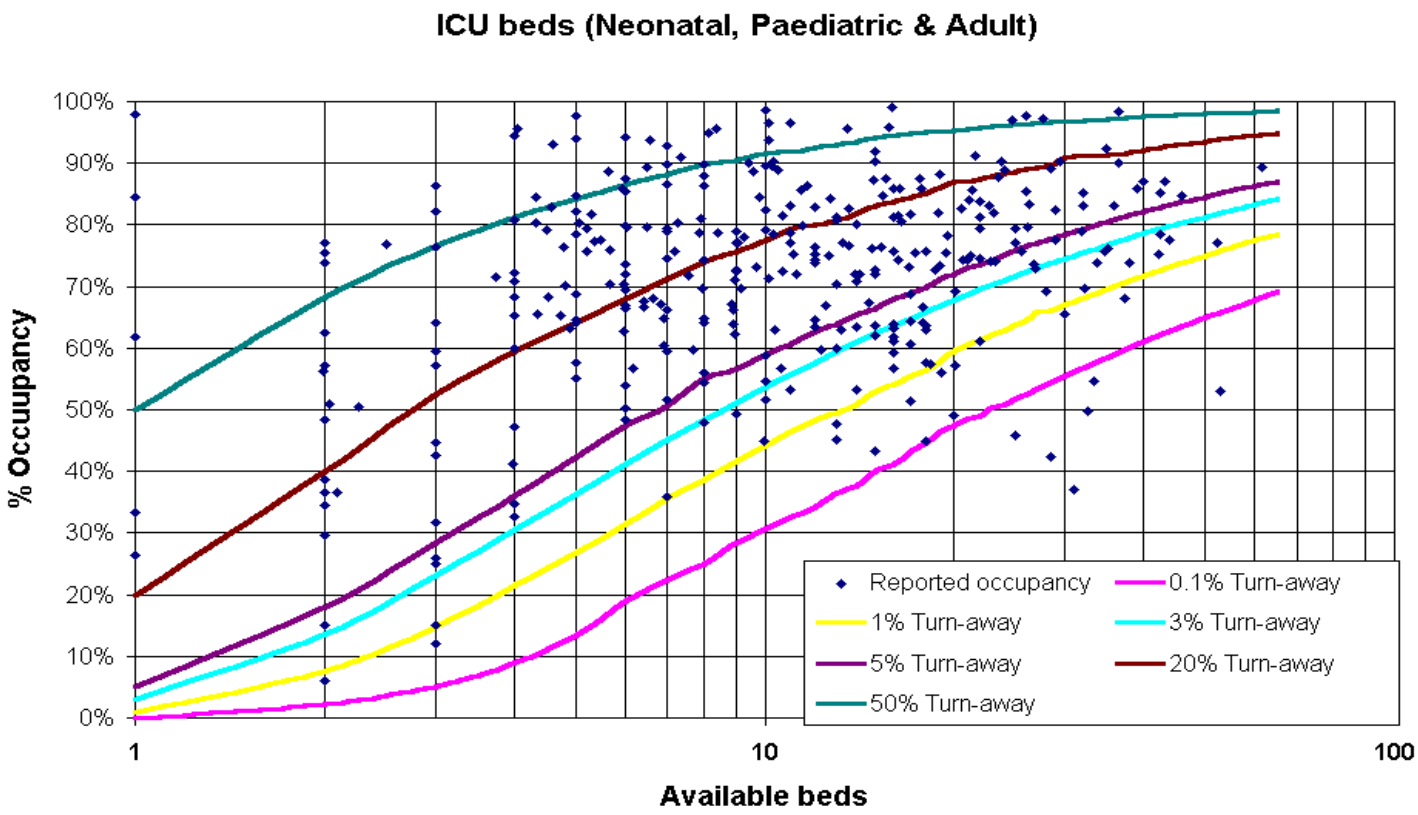
Is the price ‘accurate’?



Turned-away or join the queue

* When arrivals exceed resources you either go elsewhere or join a queue
* Hence - trolley waits, cancelled operations, borrowed beds, hidden queues
* Best illustrated by plotting % occupancy vs bed pool size

Benchmarks - size



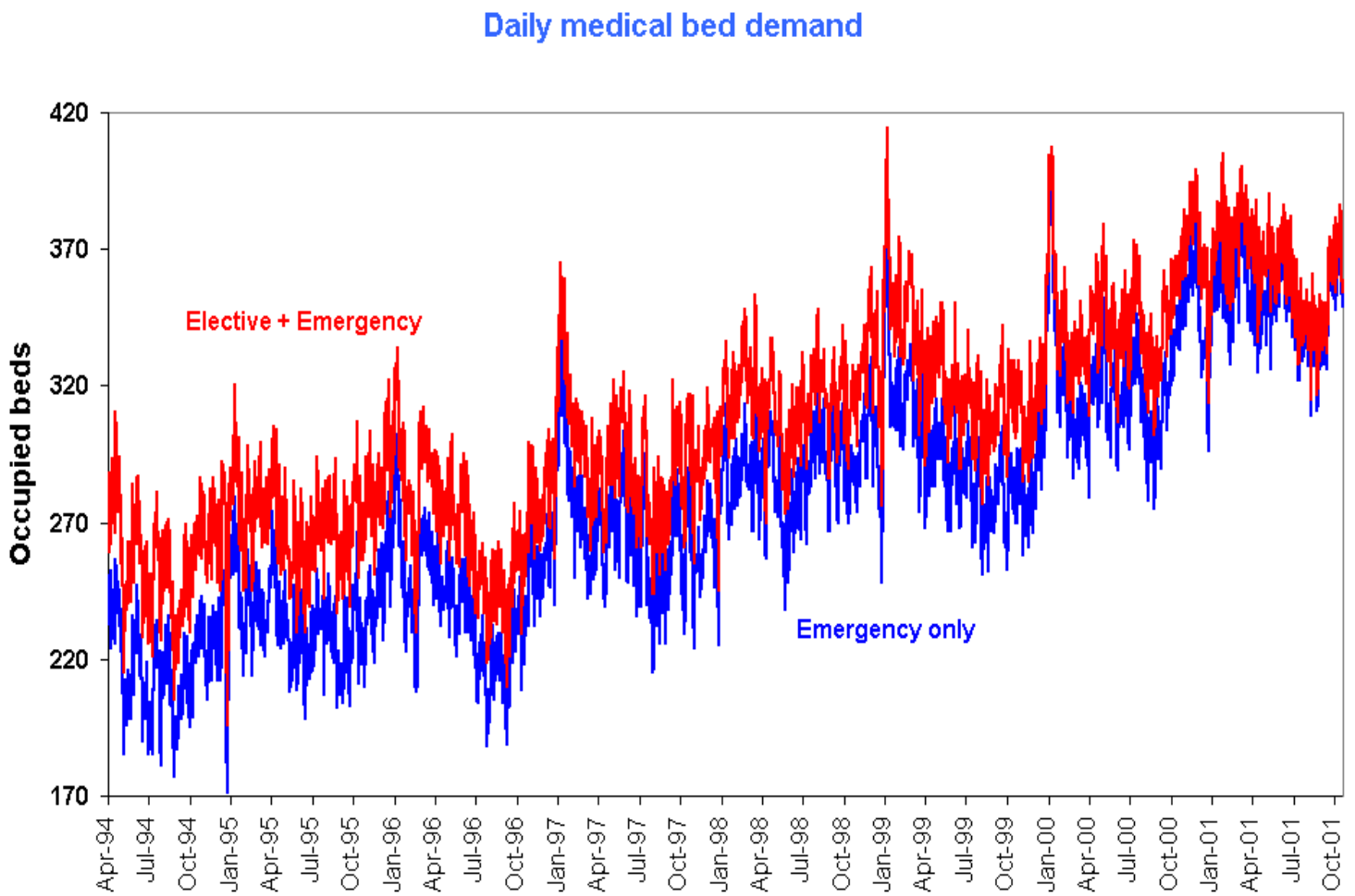
Benchmarks – why?

Region	Average Number of Acute Beds per NHS Trust	Average weighted Occupancy	Average weighted Turn-away
Trent	425	80%	0.8%
Northern	440	80%	1.4%
South & West	390	82%	2.0%
North Thames	330	85%	4.4%
Anglia & Oxford	260	87%	4.7%
West Midlands	350	87%	4.9%
North Western	380	85%	5.3%
South Thames	370	88%	6.5%

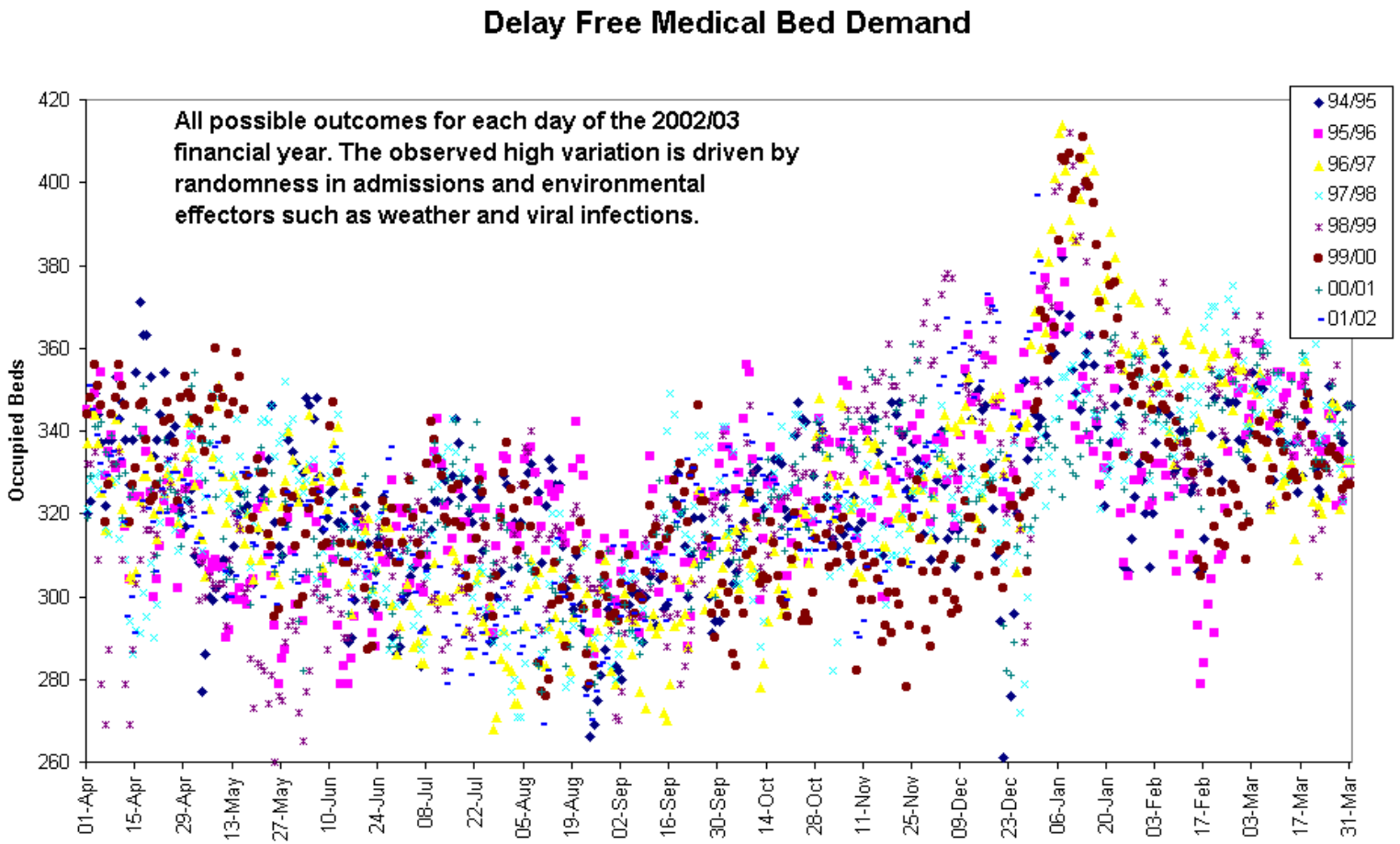
What can this method do?

* Accurate size for any bed pool
  * Links bed days to beds via correct occupancy
* What-if calculations
  * How big will the pool be if we remove ‘x’ bed days
  * How many beds would we save by merging two bed pools, e.g. two sites to one
  * Can we close beds over the summer

Medical bed planning



Medical bed planning



Is 75% day case achievable?

Specialty		LOS (days) 0	1	2
General Surgery	ON	7%	25%	25%
	EM	8%	20%	16%
Urology	ON	4%	15%	26%
	EM	16%	18%	13%
T&O	ON	8%	24%	17%
	EM	9%	22%	12%

Hidden Gain

* 0 LOS patients increase daytime occupancy leading to that part of A&E trolley waiting due to unavailable beds
* 1 day LOS can potentially be treated as day case – the hidden consequence of insufficient day case resources
* 2 day LOS are potential day case candidates if intensive input is available
* Short stay emergency imply need for streaming of patients
* The above do not save overnight beds but reduce daytime occupancy to the point that the 'system' (including A&E) starts to work again

HRG Pools

* Within the larger pool create sub-pools with a specialist interest
  * These specialist pools deliver reductions in LOS
* Around the specialist pool place pools with mixed interest
  * Patients are no longer scattered but are clustered
* Does imply the need for adequate bed days in the total system

Hot & Cold Sites?

* Forfeits economy of scale
* Elective demand is just as variable as emergency demand (as per earlier figure)
* Implies adequate bed provision on both sites
* Ignores realities of medical bed demand
* Same effect if an elective factory (IS TC) opens nearby

Conclusions

* Understanding randomness is important
* A little bit of queuing theory goes a long way to explaining a lot of things
* Some things are mathematically impossible - unfortunately they are part of your performance targets!
* If planning was that easy we would all have been doing it years ago

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