



# **Reinvigorating clinical audit:**

## **A summit for the leaders of national clinical audit**

**Hosted by the Royal College of Physicians**  
**3<sup>rd</sup> November 2008**

**National Clinical Audit  
Advisory Group**



# Workshop 2

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## The technical and professional issues involved in identifying and managing outliers

Professor Paul Gregg, Vice-chair,  
National Joint Registry Steering Group

John Sparrow, Consultant Ophthalmologist,  
Bristol Eye Hospital

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 **HQIP**  
Healthcare Quality  
Improvement Partnership



# **Professor Paul Gregg, Vice-chair, National Joint Registry Steering Group**

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# HISTORY - SIR JOHN CHARNLEY

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“Serious consideration should be given to establishing a Central Register to keep a finger on the pulse of total implant surgery on a nation-wide basis”.

JC Internal Publication No. 39 July 1972

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# HISTORY

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- 1990 - Trent Region Arthroplasty Register
- 2002 – decision to establish National Joint Registry following 3-M Capital Hip Problem
- April 2003 – National Joint Registry (England and Wales) commenced data collection

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# NATIONAL JOINT REGISTRY

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- 202 NHS hospitals/TC's
- 11 ISTC's
- 159 IH's
- > 600,000 hip and knee joint replacements registered

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# NATIONAL JOINT REGISTRY

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- Funded by levy of £20 on sale of hip and knee implants.
- Northgate Information Solutions
- National Joint Registry Steering Committee

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# NATIONAL JOINT REGISTRY

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- 39,000 registrations per quarter
- Compliance > 80%
- Patient consent 88%
- Linkability 83% (20% in 03/04)

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# MINIMUM DATA-SET

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- Patient demographics
- ASA grade
- Orthopaedic unit
- Date of surgery
- Consultant
- Name and grade of lead surgeon
- Surgical technique
- Prosthesis
- Thromboprophylaxis

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# MEASURABLE OUTCOMES (PRESENT)

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- Mortality (0.6% at 3 months)
- Revision of joint replacement

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# MEASURABLE OUTCOMES (FUTURE)

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- Infection
- Dislocation
- Patient Reported Outcome Measures (PROMS)

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# METHODOLOGY FOR ESTIMATING UNIT, SURGEON AND PROSTHESIS “OUTLIERS”

- Incidence revision rate
- Calculated as revisions per living patient years and expressed as a percentage per year

# **METHODOLOGY FOR ESTIMATING UNIT, SURGEON AND PROSTHESIS “OUTLIERS”**

- To express uncertainty around the incidence revision rates, 99% confidence intervals (CI) will be calculated.
- National benchmark incidence revision rate will be calculated from all the data in the registry.

# METHODOLOGY FOR ESTIMATING UNIT, SURGEON AND PROSTHESIS “OUTLIERS”

- If benchmark incidence revision rate falls within the 99% CI for an individual surgeon’s incidence revision rate, surgeon would not be regarded as “outlier”.

# “OUTLIER”

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- May not indicate poor or deficient practice
- Simply a pointer to further analysis

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# PROCESS FOR INVESTIGATING “OUTLIERS”

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- Outlier reported to Chair NJR Steering Committee (NJRSC) and HQIP
- NJRSC Surgeons undertake review of data
- “No case to answer” – no further action
- Relevant parties notified
- Surgeon identity anonymous

# PROCESS FOR INVESTIGATING “OUTLIERS”

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- “Case to Answer”
- NJRSC surgeon notified of identity of surgeon and unit.
- Informal approach by telephone
- Surgeon advised to inform Chief Executive
- NJRSC surgeon notifies NJRSC Chief Executive member
- NJRSC Chief Executive contacts Unit/Trust Chief Executive informally by phone
- Request for internal audit to be undertaken and notified to NJR
- Letters sent to surgeon and Chief Executive requesting verification of NJR data

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# OUTSTANDING ISSUES

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- Registration for joint replacements should be made mandatory
- Reproducible methodology for defining ‘case complexity’
- Data quality
- Use additional outcome measures
- Surgeon support

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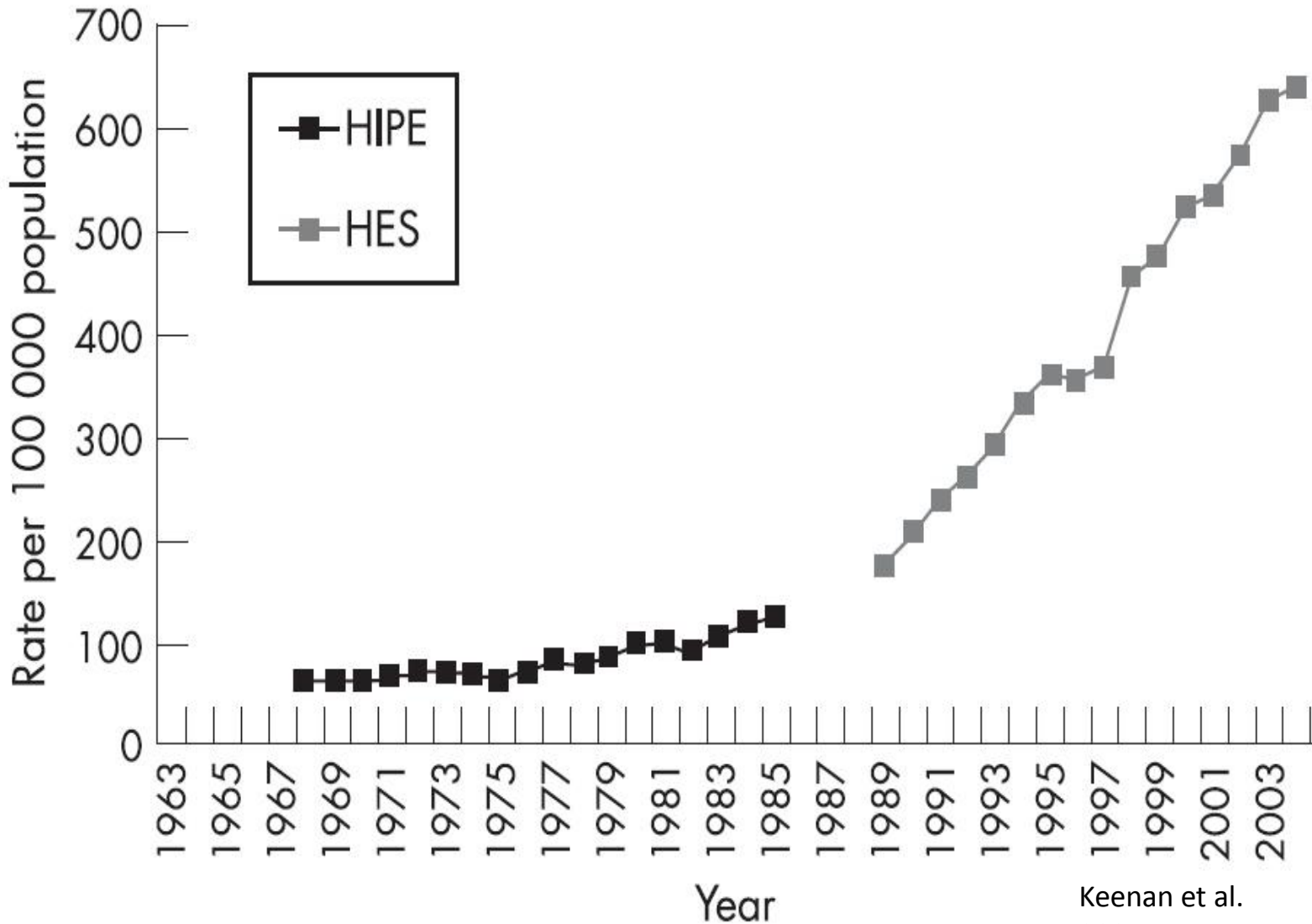
# **Identifying outliers in Clinical Audit: Technical issues in analysis of routine cataract surgery data**

**John Sparrow**  
**Consultant Ophthalmologist**  
**Bristol Eye Hospital**

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# Cataract Surgery in England



Keenan et al.  
2007

# Crude Rates for Cataract Surgery

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- Commonest surgical procedure on the NHS
- England– 6.0 per 1000 Population (~300,000 /yr)
- 4.4% of ALL NHS Operations
- Sweden– 7.2 per 1000 Population

# Electronic Multi-centre Audit of 55,567 Operations

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- Cataract National Dataset
- Electronic Patient Records
- 406 surgeons from 12 NHS Trusts
- November 2001 - July 2006 (86% from Jan 2004)

# Surgery

<b>Operative Complications (55,567)</b>	<b>Number</b>	<b>% cases</b>
None	52990	95.4
PCR or VL or both	1068	1.92
Other	634	1.14
Iris trauma / iris prolapse	305	0.55
Simple zonule dialysis (No VL)	256	0.46
Phaco burn / wound problems	140	0.25
Endothelial damage / Descemet's tear	138	0.25
Retained lens fragment (dropped nuclei)	99	0.18
Corneal epithelial abrasion	96	0.17
Corneal oedema	76	0.14
Lens exchange / other IOL problems	73	0.13
Supra-choroidal haemorrhage	38	0.07
Hyphaema	29	0.05
IOL into the vitreous	7	0.01

# Posterior Capsule Rupture or Vitreous Loss or both

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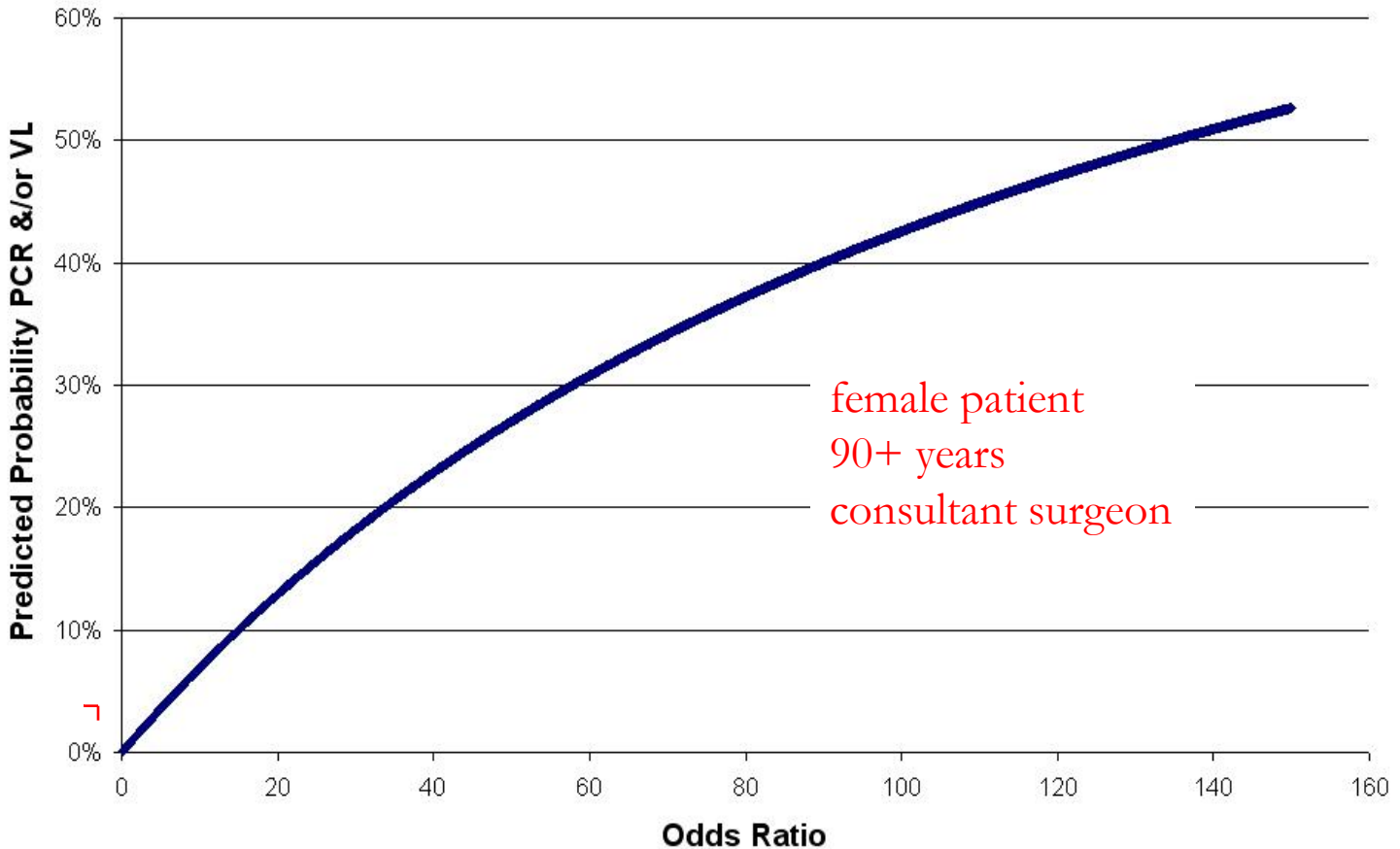
- Overall rate 1.92%
- Identify and quantify preoperative risk factors for PCR or VL or both
- Calculate a tailored risk score for each case

# Results – odds ratios

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Factor	Adjusted Odds Ratio
• inability to lie flat	1.27 (1.11 - 1.45)
• male gender	1.28 (1.13 - 1.45)
• presence of glaucoma	1.30 (1.03 -1.64)
• reducing pupil size	1.45 (1.10 - 1.91)
• axial length $\geq 26.0\text{mm}$	1.47 (1.12 - 1.94)
• doxazosin	1.51 (1.09 - 2.07)
• increasing age (80-89 years)	1.58 (1.20 - 2.08)
• trainee surgeons (SpR)	1.60 (1.38 - 1.85)
• presence of diabetic retinopathy	1.63 (1.24 - 2.14)
• increasing age ( $>90$ years)	2.37 (1.69 - 3.34)
• no fundal view / vitreous opacities	2.46 (1.70 - 3.55)
• pseudo-exfoliation / phacodonesis	2.92 (2.02 - 4.22)
• brunescient / white cataract	2.99 (2.32 - 3.85)
• trainee surgeons (SHO)	3.73 (3.09 - 4.51)

# “So what’s the risk of a complication?”



Composite Odds Ratio:  $1.00 \times 2.37 \times 1.00 =$

2.37

Predicted Probability PCR/VL = 1.7%

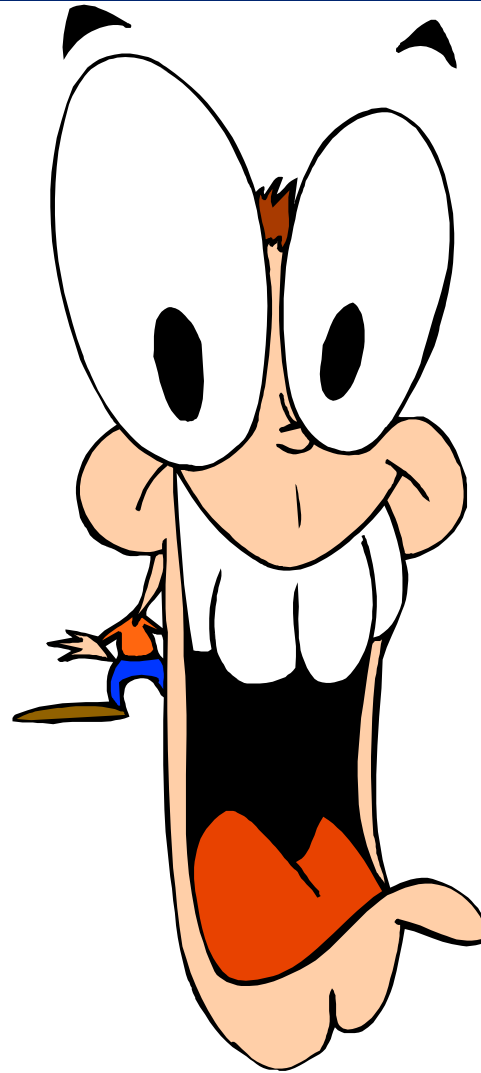
# “So what’s the risk of a complication?”

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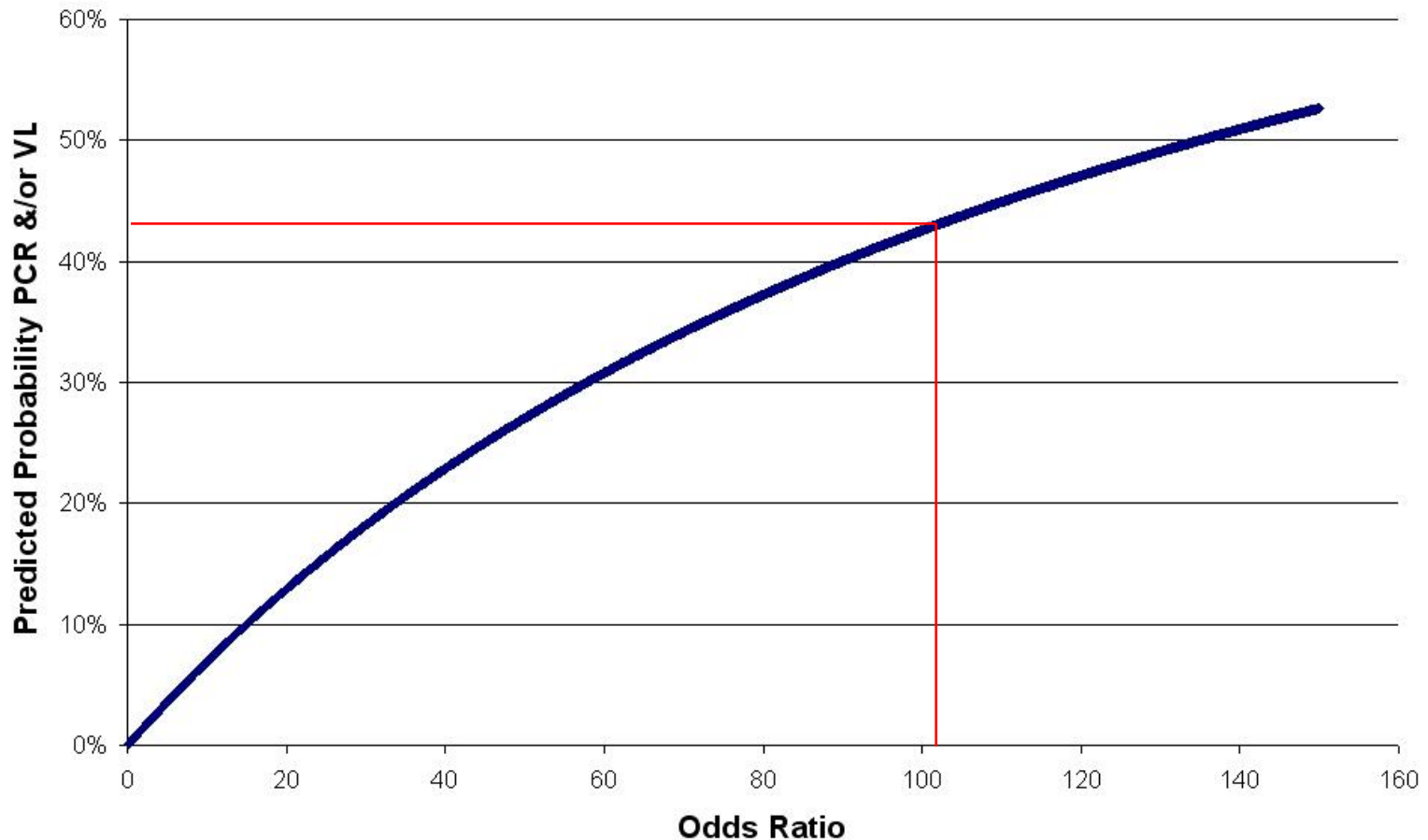
- Friday afternoon and you are the SpR operating alone....
- Male patient
- >90 years
- Pseudoexfoliation
- Glaucoma
- White cataract
- No fundal view
- With a small pupil

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.....who can't lie flat!!



# “So what’s the risk of a complication?”



Combined Odds Ratio:  $1.60 \times 1.28 \times 2.37 \times 2.92 \times 1.30 \times 2.99 \times 1.45 \times 1.27 = 101.4$

**Predicted Probability of PCR / VL = 44%**

# Case Mix Matters

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- Risk of a complication varies massively
- Danger that surgeons may become risk averse
- Patients who could benefit from surgery may be denied access to treatment
- Best surgeons should not be penalised for taking on difficult cases
- *Can we adjust surgeons results for case mix?*

# Simulation

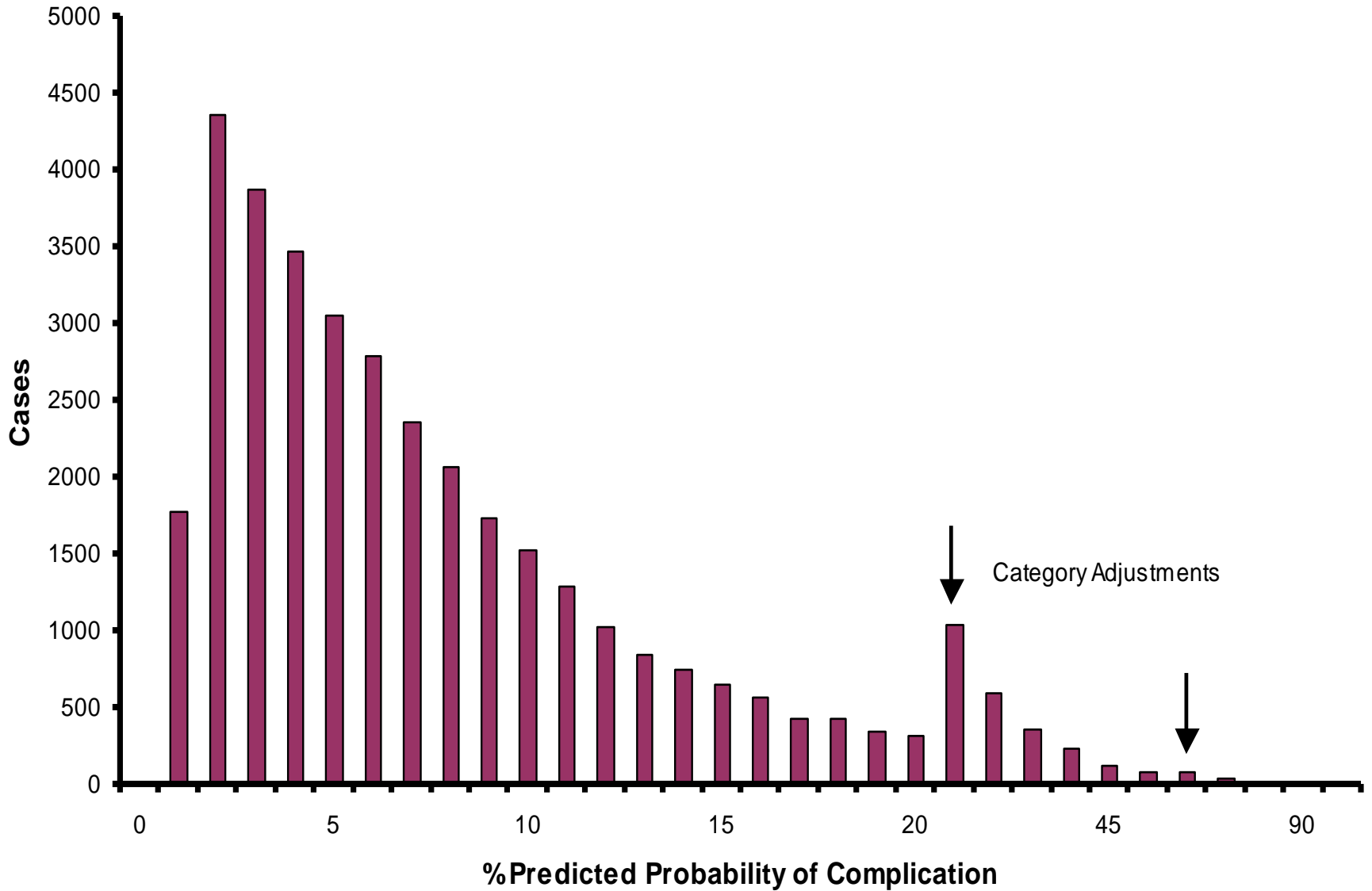


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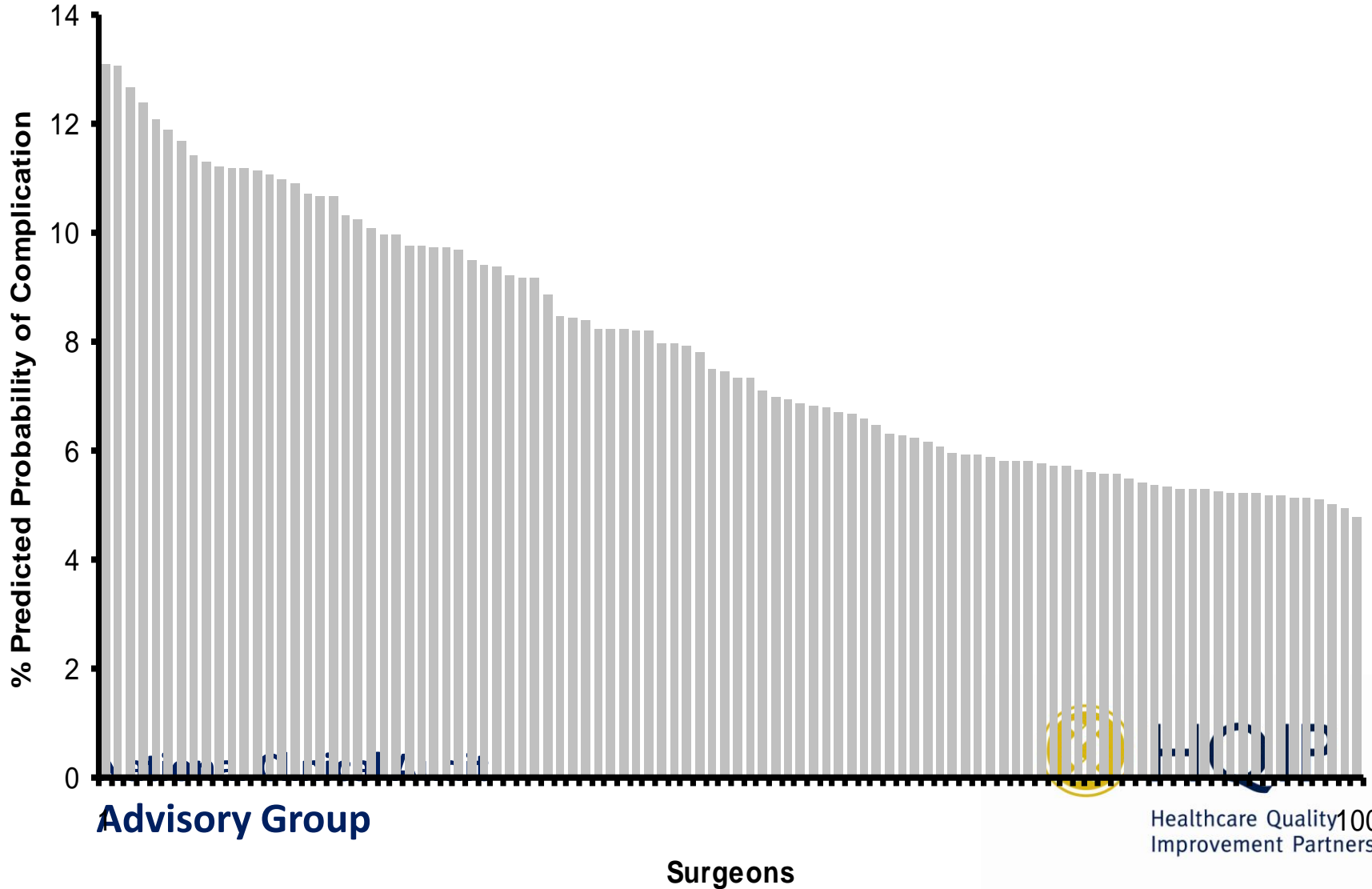
- 100 Surgeons
- 8% Complication Rate
- Variable Case Mix
- 36,263 Operations

# Case Mix Distribution Overall

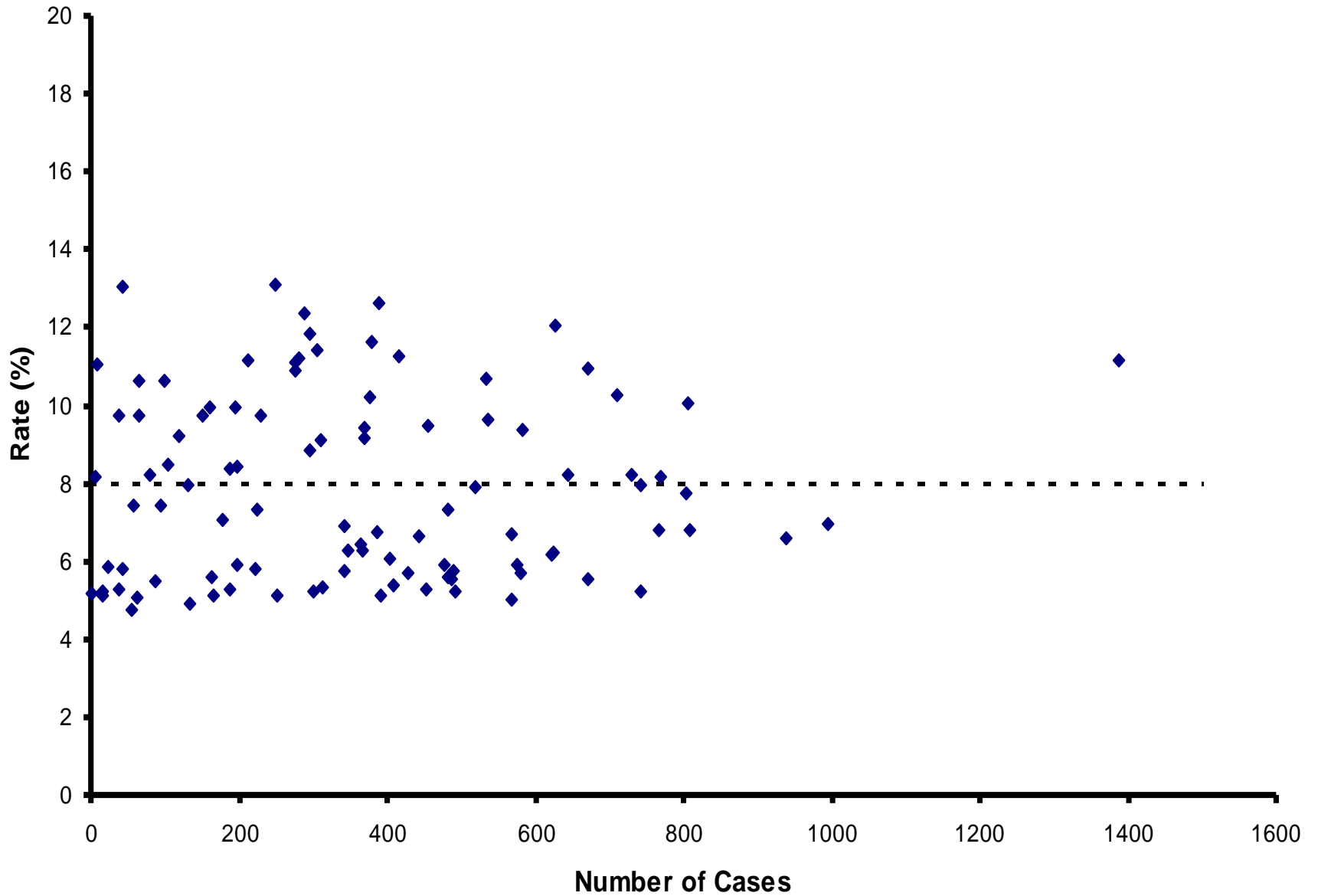
N=36263



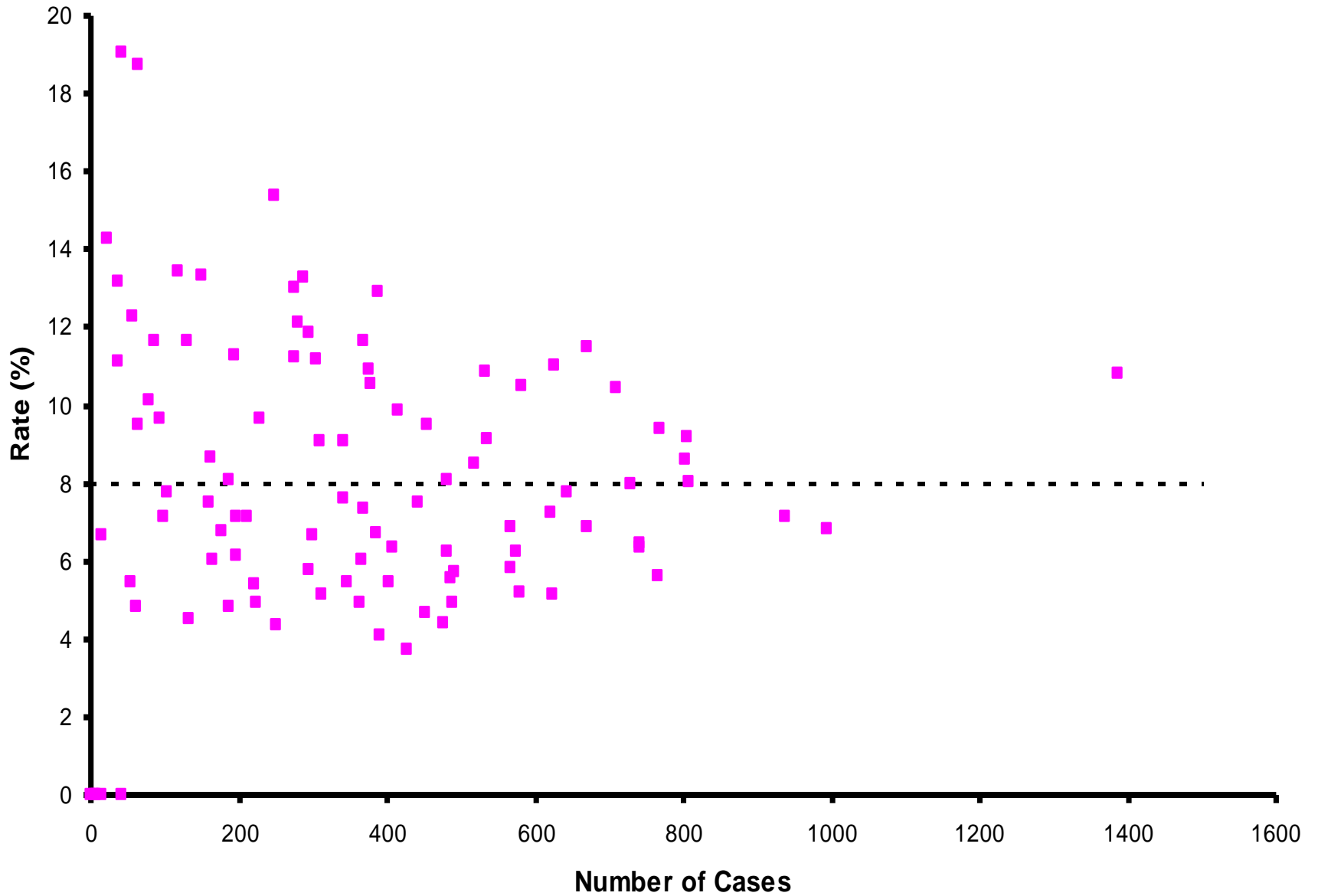
# Average Case Mix for 100 Surgeons (Case Mix Complexity)



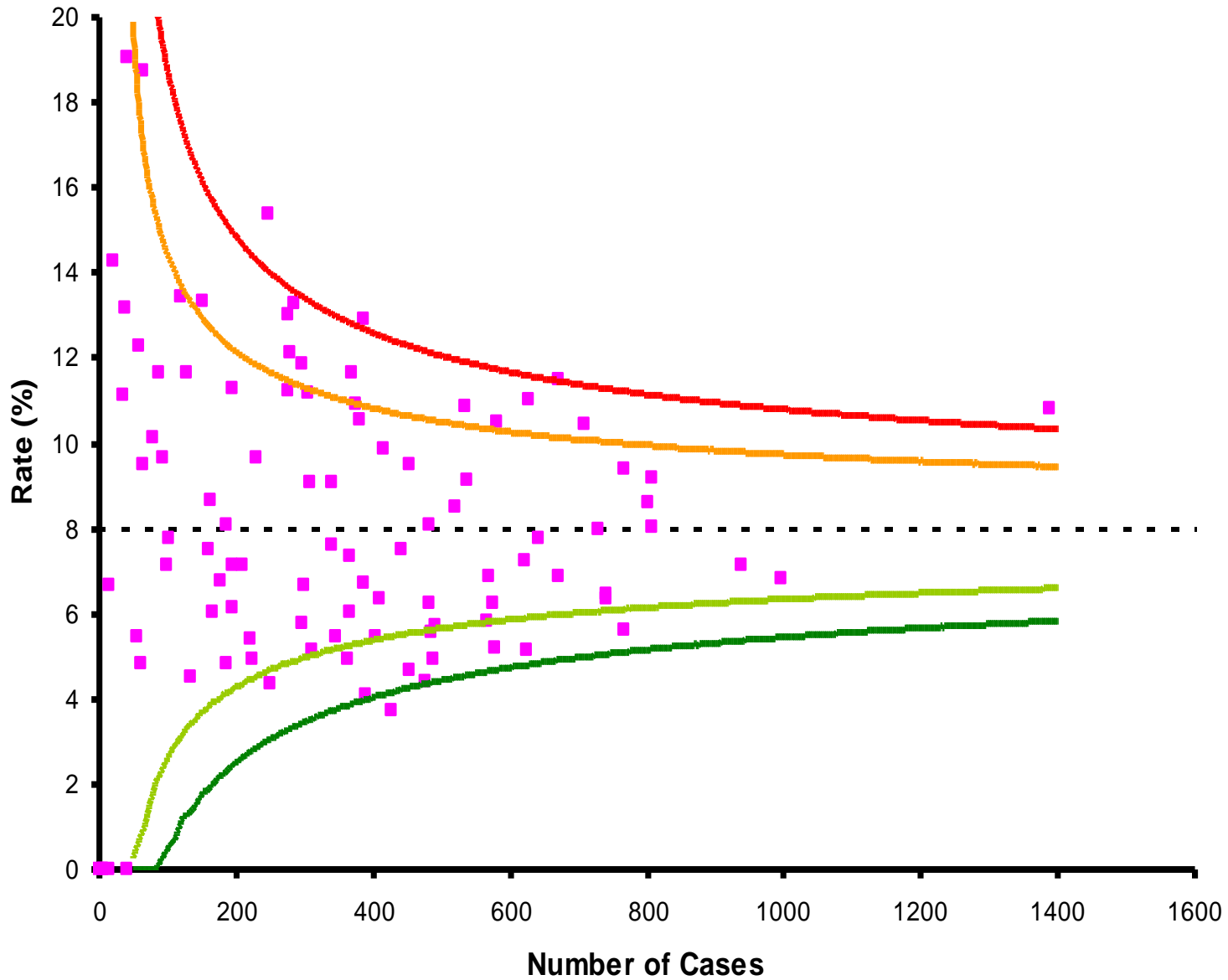
# Expected Complication Rates from Case Mix



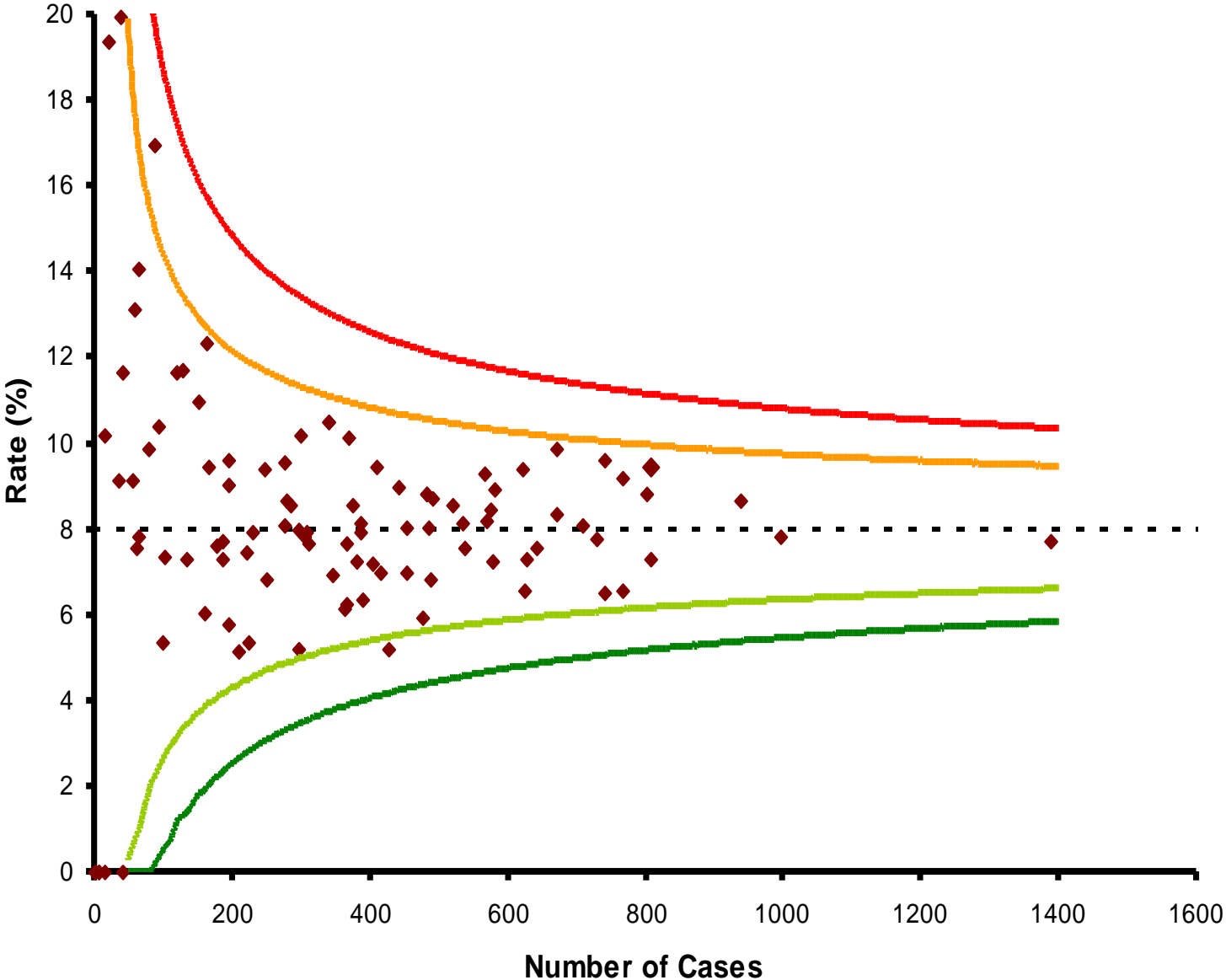
# Observed Complication Rates



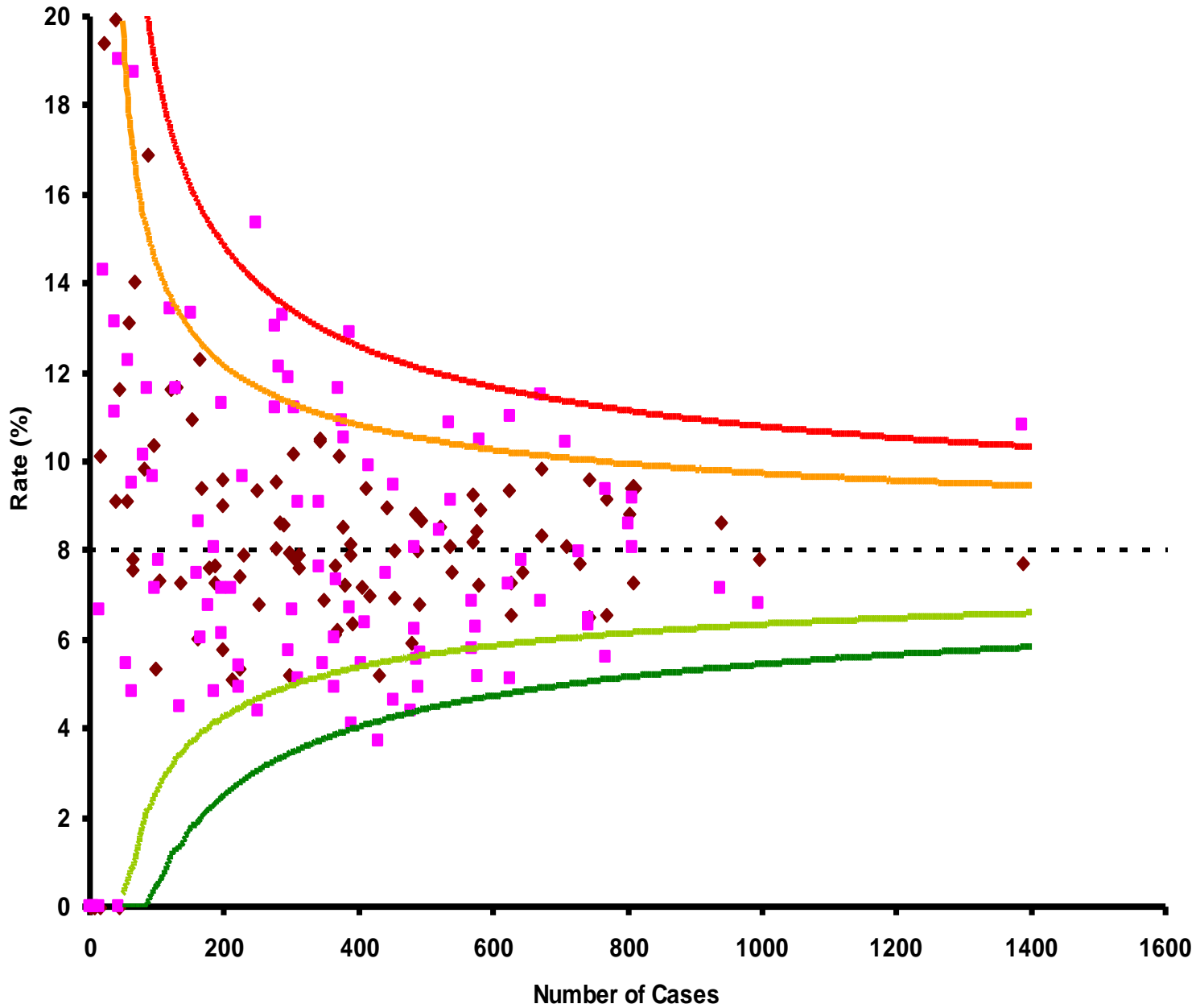
# Observed Complication Rates



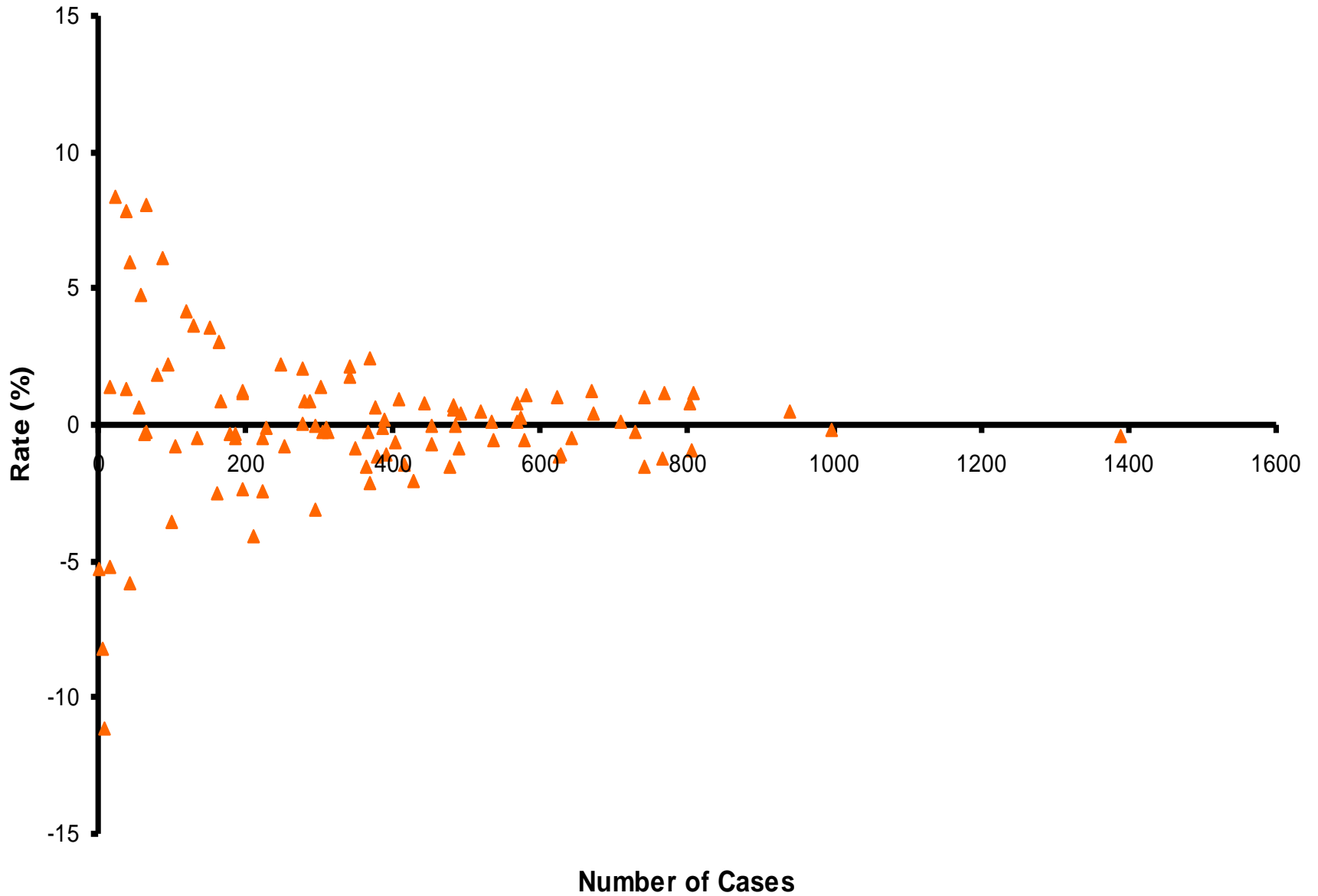
# Case Mix Adjusted Complication Rates



# Observed & Adjusted Complication Rates



# Complication Rate Differences: Observed - Expected



# Acknowledgements

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- Rob Johnston
- Phil Jaycock
- Hazel Taylor
- Niro Narendran
- The UK EPR users group
- 406 Surgeons
- 55,567 Patients

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# **1230 – 1300      Plenary feedback**

**Chair: Dr Kim Manley**

**Manager, Resources for Learning & Improving  
Royal College of Nursing**

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