

upcoming National Healthcare ICT Conference (NHIC)
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eCUSUM: ICT Improving Quality in Healthcare Services

**An Initiative by Cawangan Kualiti
Penjagaan Pesakit
Ministry of Health**



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Purpose of presentation

To introduce CUSUM as clinical competency monitoring tool

To explore its implementation in clinical practice

Scope of presentation

- 1. Clinical competency monitoring in MOH**
 - Why we need
 - Current method
 - Ideal method
- 2. CUSUM –What, how, usefulness**
- 3. CUSUM in Ophthalmology**
- 4. Implementing CUSUM in other disciplines in MOH**

Ministry of Health

Service provider

- Diagnostic procedures
- Therapeutic procedures

Health care

Training Institution

- Houseman
- Trainees
- Post-graduate
- Gazettment



Quality of care
Patient safety

Skill and Technology Assessments

- New approaches
- New equipments

Need for competency monitoring

Continuous monitoring of competency

Need to determine :

- Rate of poor performance
 - inability to complete a procedure
 - intra-op & post-op complication
 - outcome –morbidity& mortality by dept or individual surgeon
- Number need to be done to be ‘safe’ surgeons (NTD)
- Unfit to proceed – objective measurement
- **After achieving “competency”**
 - Number need to do to maintain competency
 - converting to new technique e.g. open surgery to laparoscopic surgery, manual to robotic surgery
 - Using new equipment

Current methods of competency monitoring

Trainees

- Supervisor comments
- Peer reviews
- Log books
- Progress interview

Qualified doctors

- +/- Peer reviews
- Formal accreditation or credentialing

Limitation

1. Informal
2. Subjective- bias
3. Arbitrary-based on fix counts regardless of previous performance
4. No explicit reference to agreed standards
5. No structured framework for continuous monitoring

Ideal methods

1. Objective-non bias
2. Systematic-continuous performance
3. Evidence based
4. Accurate
5. Transparent
6. Relevant- referred to agreed standard
7. Beneficial to trainees and trainers
8. Non time consuming
9. Automated data collection & Statistical analysis
10. Simple graphic display

Answer : **CUSUM**

Cumulative Sum (CUSUM)

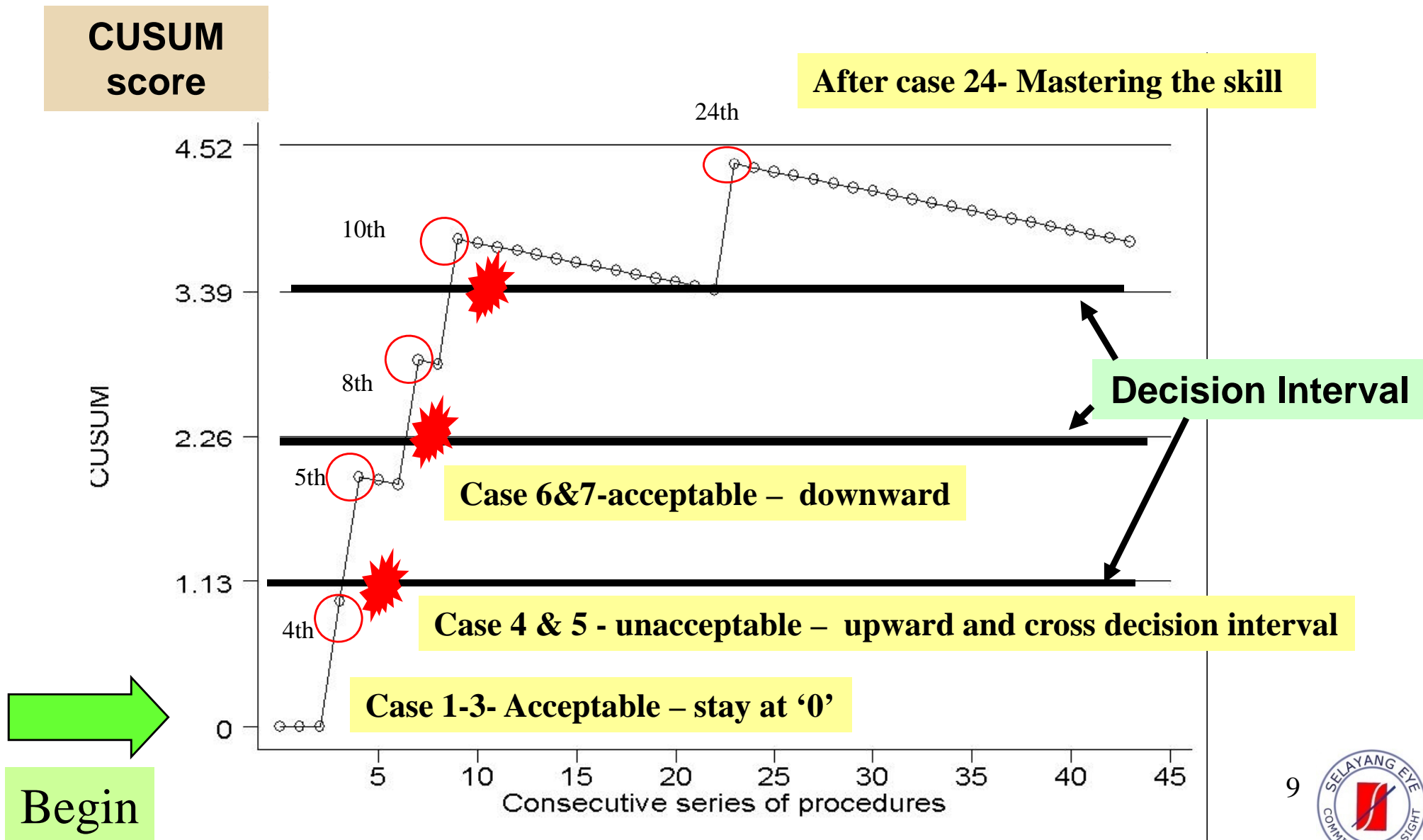


- Statistical process control tool - Control chart/ line chart
- Graphic representation of outcomes of a consecutive procedures by a surgeon
- Constructed based on CUSUM score derived from CUSUM formula

$$C_n = \max(0, C_{n-1} + X_n - k)$$

- **C = case**
- **n= no. of procedure**
- **X =outcome measure**
- **K= reference value (pre-specified standard)**
- **h is the decision interval (horizontal lines)**
- **CUSUM score**
 - Failure – positive, increase
 - Success –negative, decrease
- **Rate of progress – Steepness of curve**
 - Poor progress -Steep
 - Good progress- flattening

CUSUM Chart



Advantages of CUSUM

1. Monitoring trainees' performance – detect small changes, provide early warning
2. Provide number needed to be done under supervision before independent performance
3. Outcome standard - national or institutional standard & is modifiable
4. Trade off between sensitivity and false alarm
5. Objective and visual graphic make interpretation easy
6. Minimize potential for bias as data are entered by independent party

CUSUM in Ophthalmology

Cataract Surgery

- High volume-commonest surgery
- Adverse events leads to poor outcome
- Outcome closely related to surgeon's skill
- Awareness of adverse events – instantly, by doctors and patients
- Outcome parameters - clearly defined, measurable and routinely collected



Parameters for CUSUM monitoring in cataract surgery

- 1. Posterior capsular rupture (PCR)**
- 2. Post-op vision outcome**
- 3. Induced astigmatism**

1 and 2 – KPI Ophthalmology service

Data are routinely collected in web based Cataract Surgery Registry

Entered by independent staff

All data entered will be charted

Using eCUSUM

Feedback real time

Automated – ‘no sweat’

National Eye Database

www.acrm.org.my/ned



- Web- based patient registry
- On visual threatening eye diseases
- Participated by all MOH Ophthalmology depts

A screenshot of the National Eye Database website as viewed in Microsoft Internet Explorer. The browser window title is 'NED - Microsoft Internet Explorer'. The address bar shows 'http://www.acrm.org.my/ned/cataractSurgeryRegistry.html'. The website header includes the date 'Wednesday, September 03, 2008' and the 'NED National Eye Database' logo. A navigation menu lists various registries: Cataract Surgery Registry, Monthly Opt Service Census, MOH, Contact Lens Related Corneal Ulcer Surveillance, Diabetic Eye Registry, Glaucoma Registry, Retinoblastoma Registry, Age Related Macular Degeneration (AMD), Tele DR Screening, and Key Performance Indicators (KPI). The main content area is titled 'Cataract Surgery Registry' and contains text about the registry's establishment in 2002, its objectives, participation criteria, and downloadable data collection forms. A sidebar on the left contains a navigation menu with items like Home, About NED, Technical and Advisory Committee, Research Directory, Publications, Governance of NED, Directory, Links, and News and Event. At the bottom left, there is a red button for 'eNED Web Application' and a visitor number of 012881 since 21/12/2006. A 'Back' button is visible at the bottom right of the page content.

- Includes database on:**
- Cataract Surgery Registry
 - Contact Lens Related
 - Corneal Ulcer Surveillance
 - Diabetic Eye Registry
 - Glaucoma Registry
 - Retinoblastoma Registry
 - Age Related Macular Degeneration Registry
 - Monthly Ophthalmology Service Census, MOH
 - Key performance indicator

Cusum Chart-Occurrence of PCR

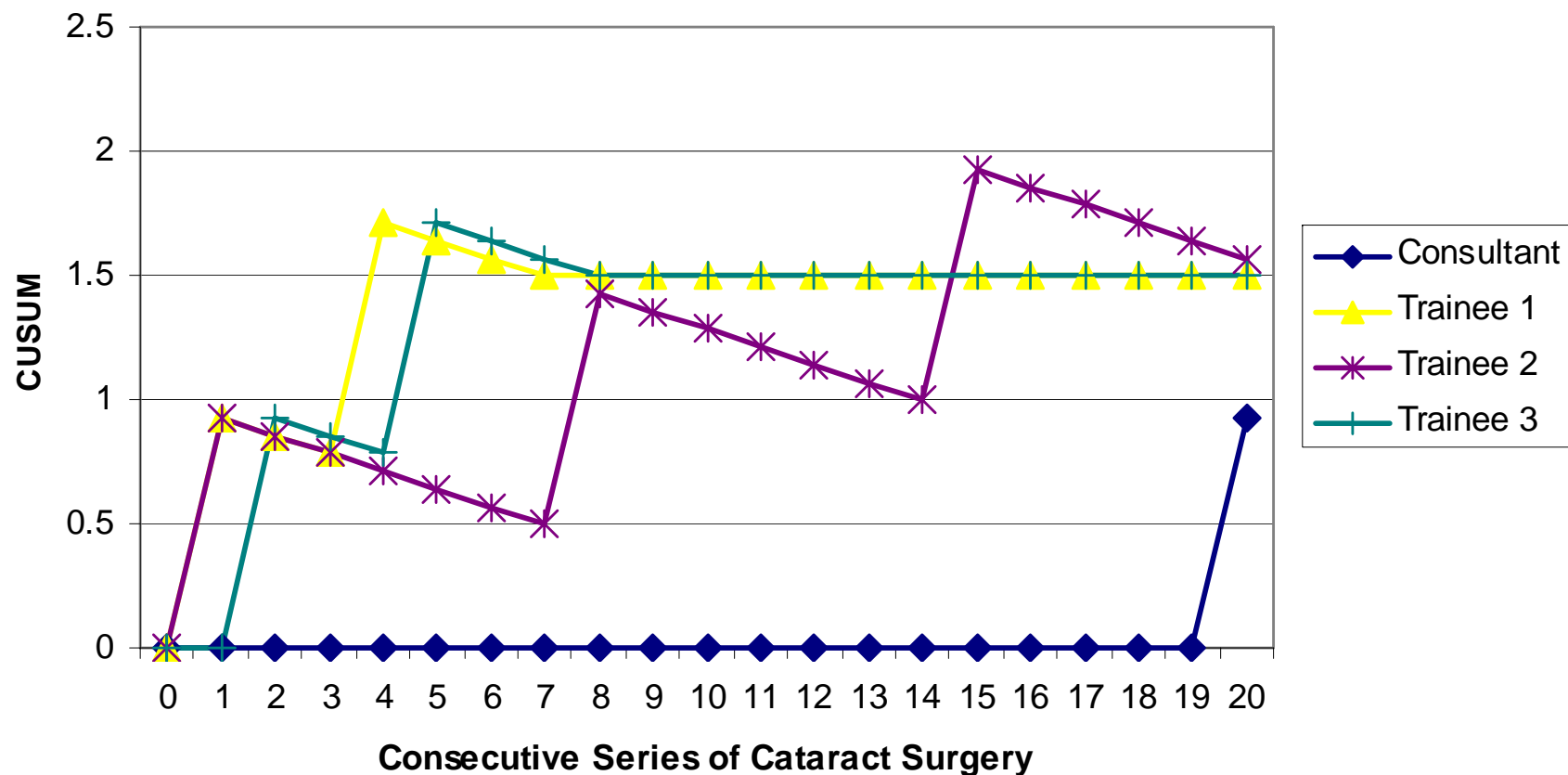
Trainee 1

Trainee 2

Trainee 3

Consultant

Phacoemulsification (Occurrence of Posterior Capsule Rupture)



CUSUM application in MOH

Current

1. Renal Biopsy
2. Cataract surgery

Explore new areas :

1. Medical –ERCP, cardiac catheterization
 2. Surgical – appendisectomy, Laparoscopic procedures
 3. Anaestehsia – Orotracheal intubations, local anaestehsia
 4. Interventional radiology
 5. Office procedure – biopsy
- Etc

Suitable Procedures

1. Frequently performed – High Volume
2. High Risk or maybe high cost procedure
 - complications or adverse events that lead to significant morbidity or even mortality
3. Adverse event - clearly defined and measurable
4. Outcome related to surgeon's skill
 - Can be 'bailed out' if is contributed by individual patients' factors or environmental factors
5. Display a demonstrable learning curve
 - reflects surgeons' mastering of skill over time

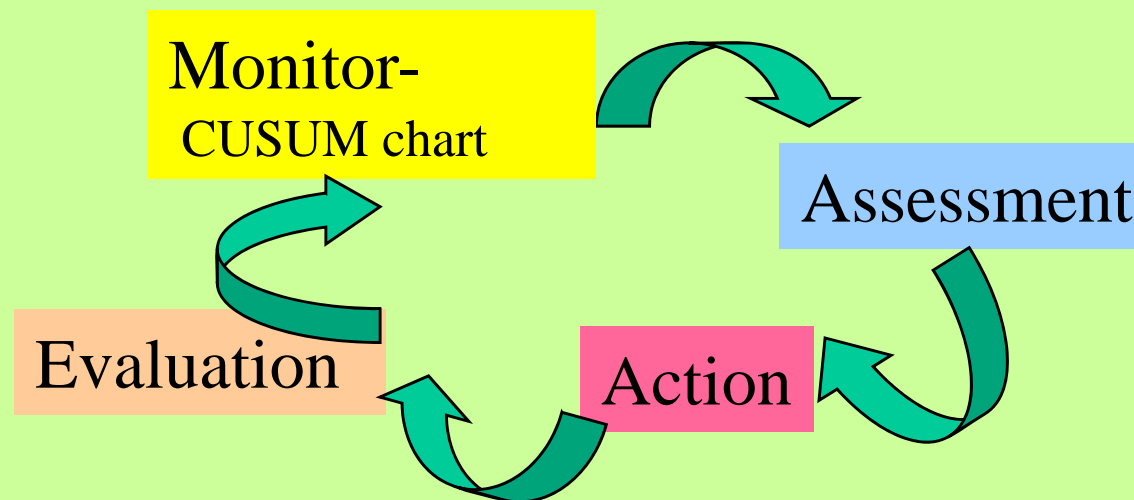
Explore Usage of CUSUM in MOH

Prospective clients

1. Individual: personal audit
2. Institution: Dept audit, trainees' progress
3. Medical discipline : Clinical service (NIA) / Professional body
4. National bodies responsible for performance improvement :
 - MOH Steering Committee for QA
 - MOH Hospital licensing authority
 - MOH/AMM: Specialist Credentialing Committee
 - MOH/MSQH: Hospital accreditation program

Before use of CUSUM

- **Acceptance of competency monitoring** need maturity & trust
- **Responsibility and commitment of supervisor/ consultants** : to monitor, assess, take action in implementing improvement programmed and to evaluate



- Establish a database (registry) – e CUSUM

<https://app.acrm.org.my/eCUSUM>

The screenshot shows a Windows Internet Explorer browser window displaying the eCUSUM website. The address bar shows the URL <http://patricklum/cusum/>. The website header includes the eCUSUM logo and navigation links: HOME, Documents, Links, Glossary, User Manual, and Administrators. A sidebar on the left contains a navigation menu with categories: Home, MOH Cawangan Quality, Patient Registries (listing Ophthalmology, Nephrology, Dialysis, Transplant, and Neonatal), Glossary, Documents & Bibliography, User Manual, Links, and Visitors so far: 0000019. The main content area features a 'Welcome' section with a paragraph about the Ministry of Health's commitment to healthcare quality and a list of rubrics: National Indicator Approach (NIA), Hospital Specific Approach (HSA), Key Performance Indicator (KPI), Clinical Care Pathway, Clinical Risk Management (Incident Reporting, Patient Safety, Hospital Infection Control, Occupational Safety and Health), Clinical Audit (Peri - Operative Mortality Review (POMR), National Adult Intensive Care Audit (NAICU), National Nursing Audit (NNA)), External Audit & Accreditation (MS ISO 9001:2000), Corporate culture (Budaya Korporat), Patient-Centred Service, Customer Satisfaction Survey, and Customer Feedback. Below this, there are three paragraphs discussing the latest initiative in Clinical Performance Monitoring, the purpose of patient registries, and the goals of the eCUSUM service. The footer of the website states 'Copyright © DataMed Clinical Computing Services Sdn Bhd'. On the right side of the page, there is a 'MEMBERS LOGIN' section with fields for Username, Password, and Auth. Code, and a 'CONTACT US' section with the address of DataMed Clinical Computing Services Sdn Bhd and contact information: Tel: +603 4044 0615, Fax: +603 4044 9703. The browser's taskbar at the bottom shows several open applications, including Microsoft Outlook, aaRegistryInCRC, Manual for CUSUM imple..., and Online CUSUM Chartin... The system tray shows the date and time as 1:07 PM.

Conclusion

- World Alliance for Patient Safety –WHO
Global Patient Safety Challenge – *Safe
Sur*
- 50% *Patients*
are
- Quality of care
- Patients' safety
- Patients' satisfaction
- Continuous monitoring of doctors' competency is mandatory
- eCUSUM- effective, easy, office tool

