



## **PART TWO: ANALYSING CLINICAL OUTCOMES**

### **Dr. MD relocates his practice (involuntarily): A Fictional Case**

Dr. MD is an aspiring surgeon who opens his practice in a metropolitan area within a private hospital complex. His practice goes well and his referrals climb steadily. There is a rumour that colleagues become slightly jealous about the success of his practice. Gossip appears that he would be “difficult to deal with” and he would have had “issues” at places he worked previously as a trainee.

Dr. MD operates on a patient who develops a severe adverse event postoperatively that results in the death of the patient. A coronial autopsy is performed. The hospital conducts an independent investigation into Dr. MD’s practice. For the duration of the investigation Dr. MD’s privileges are suspended. Instead of practicing medicine, Dr. MD spends the next few months reviewing every single chart of his many patients to table his clinical outcomes. In the meantime, the coroner’s findings suggest that Dr. MD acted appropriately and according to what can be expected from an experienced specialist.

After three months, the hospital concludes that Dr. MD’s outcomes are at least not worse than expected for his speciality. Dr. MD has moved his practice to another site in order to start all over again.

### **The impact of not knowing**

One could suspect that if Dr. MD continuously audited himself, he would have had results on his clinical outcomes readily available at any time. The availability of these outcomes would have saved Dr. MD a few months worth of stressful (desk) work. Maybe it would even have discouraged Dr. MD’s colleagues to question the safety of his practice or the hospital to suspend his clinical privileges.

### **Database (electronic) or Logbook (paper)**

The bare minimum that a practitioner needs is a logbook (notebook) of patients that they treat, plus a way of flagging the cases “that stand out”, so that they are easily accessible if needed. Such a system is feasible if the case load is rather small. For example, if the practitioner does less than ten operations of a certain type per year, it would be very easy to keep track of those procedures (paper cards). Upon request, the practitioner would only need to pull out a few charts and can retrieve more details from those if it is required.

Your practice management software would more than likely be insufficient for the task. Certain procedures can be coded (Medicare item numbers) in more than one way. For the task, it would be critical that the practitioner captures all cases; otherwise critics can accuse the practitioner of selecting favourable cases.



Practice management software does allow you to pull item numbers, but they can vary for certain procedures (e.g., hysterectomies can be coded in at least 11 different item numbers). Additionally, most practice management software often does not record standard quality indicators.

Alternatively, one can produce an Excel spreadsheet, which will put the practitioner in a great position to start an electronic logbook. It is highly recommended to have that file password protected, given the nature of the information. The practitioner should also specify the data fields in order to minimise data entry errors (acceptable range for data values/internal validation).

Widely accepted outcome parameters include:

- Anaesthetic incident
- Visceral injury (bowel, bladder, ureter)
- Vascular injury
- Transfusion of red cells (any)
- Conversion to laparotomy <if primary approach was laparoscopy>
- Hospital stay > 7 days
- Medication error
- Incidental finding of a malignancy
- Any unplanned readmission within 30 days from first operation
- Any unplanned return to theatre within 30 days from first operation
- Unplanned admission to ICU
- Thrombo-embolic event (PE/DVT) within 3 months from first operation
- Postoperative fistula (bladder, ureter, bowel)
- Death within 30 days from first operation

**SurgicalPerformance** is a software audit tool that will provide practitioners with a web-based database that is secure (secure login, password) and the data transfer is secure and protected. It can be used for general gynaecology, obstetrics, and colposcopy. It's web-based outcomes' reporting is available 24/7.

However, the heart of your QA project is not data entry but the information that is fed back to you. Widely accepted evidence from almost every specialty suggests that feedback enhances and improves your practice and clinical outcomes. Most research published on audit suggests that surgical adverse events can be reduced by 30% to 50% through audit alone.

## Ways of receiving feedback on outcomes

### Patient's List

You can print a list of your patients and study outcomes (raw data). Looking at raw data, not only might make you proud of your achievements but also you might develop a hypothesis about associations between variables that you can put to the test afterwards (e.g., every time I operate on a patient with elevated liver enzymes, the patient develops a wound breakdown). The larger the list is the more "hidden" the clues would be but also the more powerful your dataset would be to prove a hypothesis.



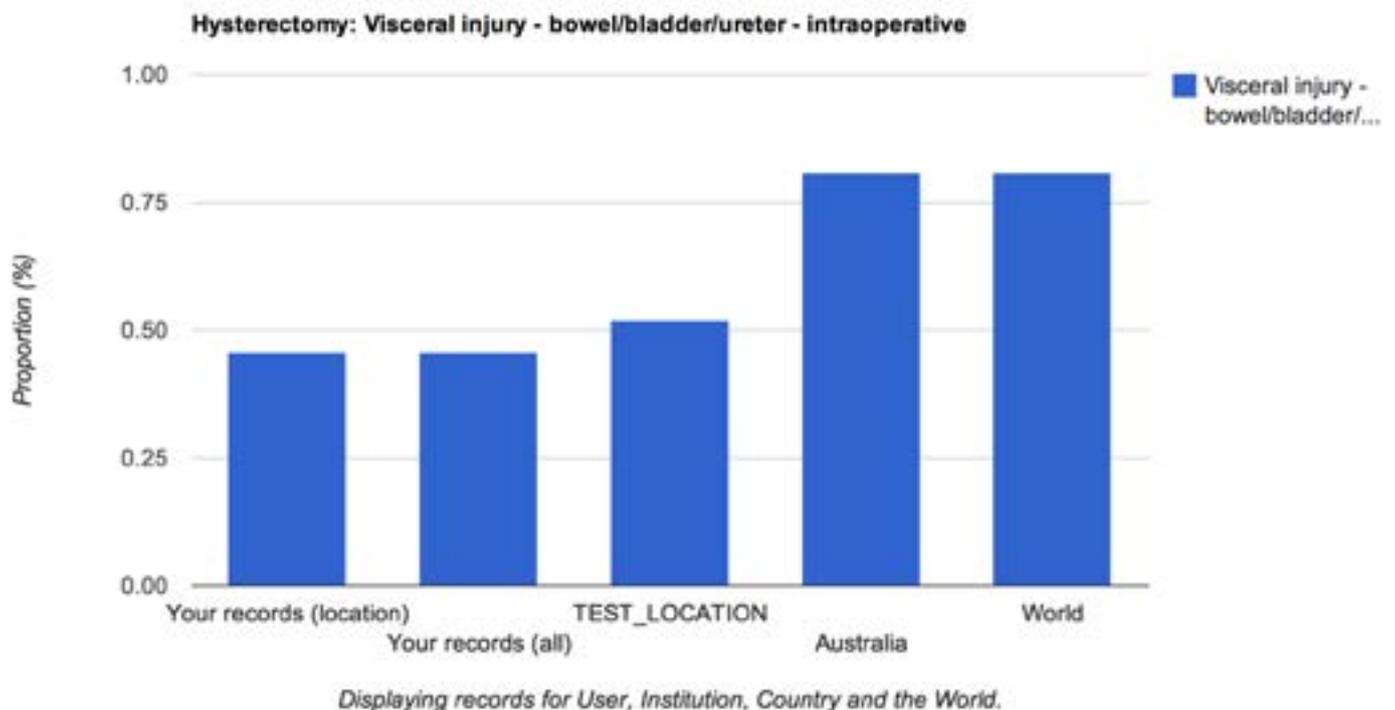
Patient lists can be used to provide basic documentation but also to apply for re-accreditation at a hospital if needed.

SurgicalPerformance lets you create lists of patients broken down by surgical procedure, location of practice (compare outcomes from private and public patients) and any outcome. These lists can be printed or exported into excel format for further processing (you may wish to add another variable to it and conduct your own research). In effect, you hold ownership of your data 24/7.

## Bar chart

A bar chart is a chart with rectangular bars where the lengths of the bars is proportional to the values that they represent. The bars can be plotted vertically or horizontally.

You can plot a bar chart yourself from your data but you would only be able to plot one bar (on the frequency of your own outcomes).



In addition to what you could do on your own, SurgicalPerformance will also show you averaged outcomes of your peers in your institution (hospital), in Australia and other parts of the world. Examples include the numbers of procedures or the numbers of conversions from laparoscopic to open. If your outcomes is x%, SurgicalPerformance will tell you how well your outcomes compare with your peers. The figure above gives you an example how bar charts look like in SurgicalPerformance.



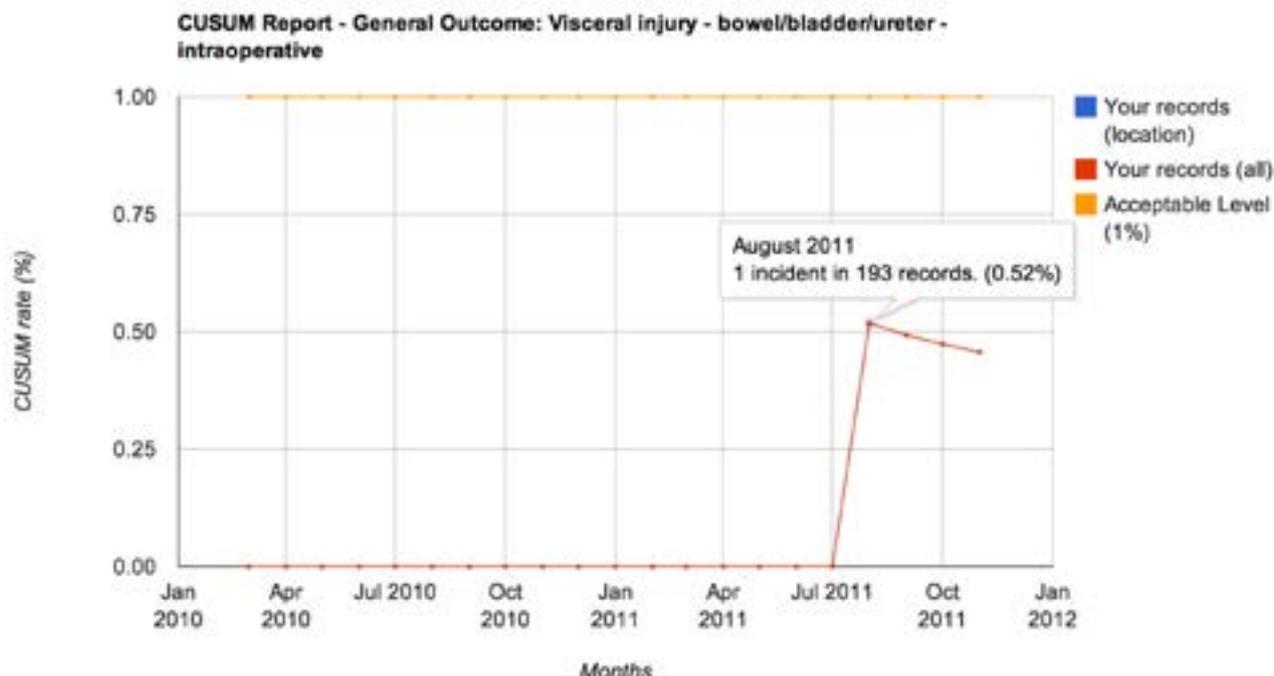
## CUSUM

CUSUM (or cumulative sum control chart) is a sequential analysis technique described by E. S. Page (University of Cambridge) and is used to monitor changes over time. The outcomes that are able to be analysed by CUSUM must be binary (yes/no). Outcome variables that are continuous or are expressed in more than two categories (nil, mild, moderate, severe) are not applicable for CUSUM analysis. In addition, CUSUM requires an upper and a lower limit of normal. CUSUM does not compare outcomes with your colleagues. It rather describes your outcomes over time.

### Where does analysis with CUSUM make sense?

If you are in a learning phase, at some stage you wish to demonstrate that you mastered the new technique and your learning curve flattened out. Initially you will make errors and unwanted outcomes may be more frequent. However, as you keep trying, your results will improve. CUSUM is the perfect graphical tool to show that.

You can plot a CUSUM chart yourself. For every procedure that you do, you will draw a dot and move the chart towards the right. If the procedure goes well (no adverse event) the dot will move sideways. For every procedure with an adverse event, the dot will move sideways and upwards one unit. An example on eye surgery is shown below:



In the above case, the surgeon had no visceral injury until August 2011. Then s/he had one complication that brings up the rate of intraoperative visceral injury to 0.52%. This type of curve is typical for a competent clinician. An incidence above the 1% mark would still be understandable if the number of procedures is low. One complication of only 20 cases will bring the complication rate to a whopping 5%. If a surgeon commences data capture with a complication case, it will be even 100% until a second procedure was been completed successfully.



However, if the trend line goes upwards, one would have to consider if the outcomes are still acceptable.

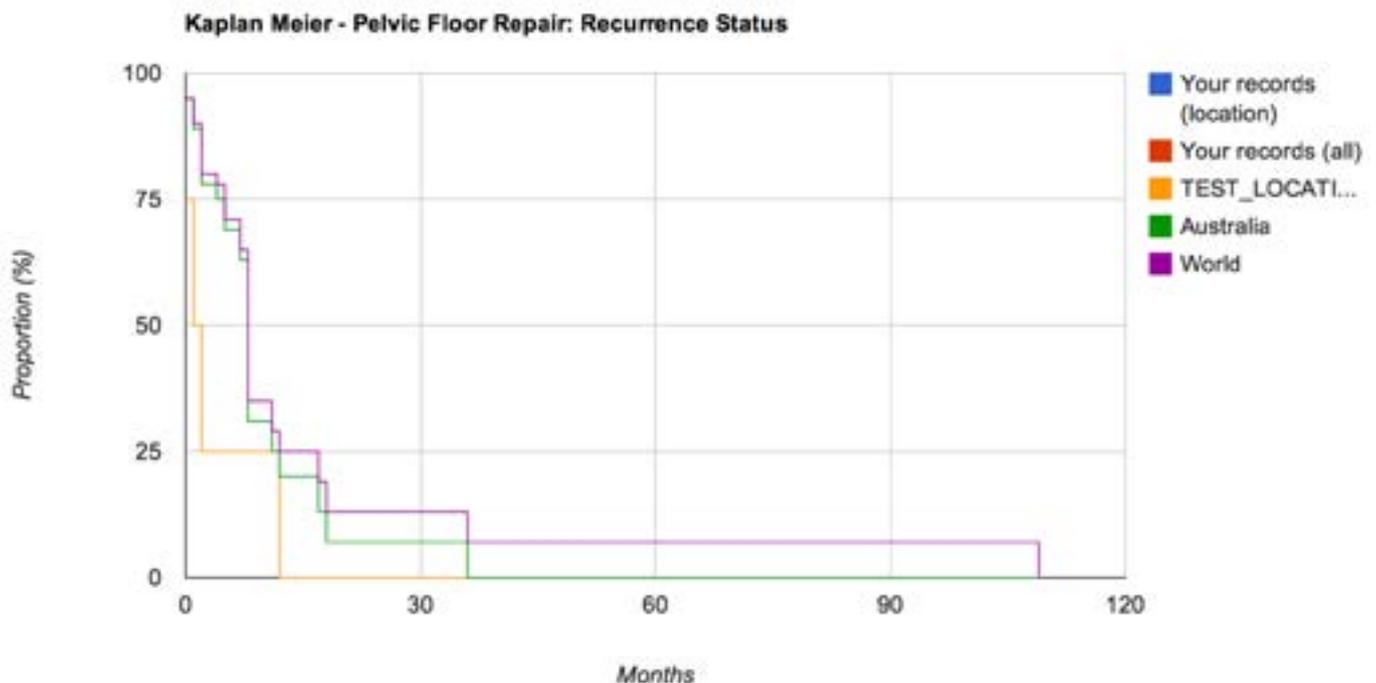
For surgical training this tool can be used to monitor a surgical trainee's progress. One would expect that the curve initially go up. However, once the learning curve has passed, the curve is expected to flatten out and fall consistently, thus indicating that our trainee now mastered the surgical skills necessary to practice independently.

While you can plot CUSDUM charts yourself, SurgicalPerformance does it for you within seconds.

## Kaplan Meier

Kaplan Meier (KM) estimates the time to an event and can break down those times for different patients groups. In our context, KM can analyse time to the recurrence of a symptom (urinary incontinence, recurrence of endometriosis) and in oncology we use KM curves to compare patients with different risk profiles (stage 1 vs. stage 3) or different treatments (surgery vs. surgery plus chemotherapy).

The example below is a KM curve comparing “time to recurrence” of patients who had surgery for pelvic organ prolapse. Similar curves can be calculated for patients who had surgery for endometriosis.



Theoretically, you could plot KM curves on a sheet of paper yourself. In practical terms, this would be way too complicated to do by hand. SurgicalPerformance will calculate real-time KM curves on time-dependent outcomes for you within split seconds.

**To learn more about SurgicalPerformance click here.**