

# A Critical review of surgical logbook applications for the android and iOS platforms in the Australian setting

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## RESEARCH

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## ABSTRACT

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### Background

Smartphones have become pervasive in all aspects of modern life and the health care industry is not immune. Currently smartphone applications (apps) are used by 85–87 per cent of physicians. Surgical logbooks are a mandatory part of training and time consuming to maintain.

### Aims

We conducted a critical review of available logbooks apps in the Australian market for Android and iPhone and reported our findings.

### Methods

A critical search through the Google Play Store's (Android) and Apple's App Store's (iOS) Australian marketplace was conducted with keywords of "logbook" and other suitable variations in January 2017. Apps were critically reviewed and against the Royal Australasian College of Surgeons'

Minimum Dataset (MDS) and Extended Dataset (EDS). Apps were included if they could be utilised to record clinical procedures.

### Results

Seven apps were available and fit the criteria of our search: Surgeons Logbook, eLogbook, LogBox Academic, SurgCase, T-Res 2, Surgeon Log Book Free, and SurgiLog. None of the apps completely satisfied the requirements of maintaining a surgical logbook as stipulated by RACS. However, Surgeon's Logbook provided ability to customise the logbook fields, which allows users to modify their logbook app to meet the requirements. Furthermore, the lack of connection to hospital electronic medical records, or RACS, limits the usability of these apps for Australian trainees.

### Conclusion

The current apps available in the market do not meet the requirements of Australian trainees. However, with the advancing technology and rapid progress of smartphones and their apps, this is likely to change in the future.

### Key Words

Medical education, Surgical specialties, Operative procedures, Surgical logbook

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### What this study adds:

#### 1. What is known about this subject?

Smartphones are pervasive in all aspect of modern life and have been utilised in surgical education. Mobile health sector would be worth US\$31 billion by end of 2020.

#### 2. What new information is offered in this study?

Current technologies available to Australian trainees do not meet the requirements set by Royal Australasian College of Surgeons (RACS).

### 3. What are the implications for research, policy, or practice?

Currently 85–87 per cent of doctors use smartphones and more than 50 per cent use clinical apps in their practice. There is room for improvement of logbook apps in terms of better tailoring to capture operative data, and by connecting to both hospital and RACS servers.

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#### Background

With the advancement of technology, smartphones have become pervasive in all aspect of modern life and field of surgery is not immune. Mobile phone applications (Apps) have a range of functions relevant to surgery, such as education, drug interaction, and organisation. It is estimated that mobile health sector would be worth more than US\$31 billion by end of 2020<sup>1</sup>. The most commonly used smartphones worldwide are Samsung's Galaxy (Android) and Apple's iPhone (iOS) with their respective App store (Google Play and Apple's App Store).<sup>2</sup> Health related apps can be available free of cost or for a premium utilising inbuilt hardware.<sup>3</sup> Current data demonstrates 85–87 per cent of doctors use smartphones and 56 per cent reported use of clinical apps in their clinical practice.<sup>4,5</sup>

One use of smartphone apps is maintaining surgical logbooks. Surgical logbooks are a mandatory part of training for Royal Australasian College of Surgeons (RACS) and other surgical boards across the world<sup>6</sup> and RACS's Professional Development and Standards Board (PDSB) developed a Minimum Data Set and Expanded Data Set for surgical logbooks.<sup>7</sup>

Logbooks are an important part of surgical practice for record keeping, follow-up and billing purposes.<sup>8</sup> Furthermore, logbooks allow for accreditation bodies like RACS to monitor trainees progress.<sup>9</sup> While it is flawed to consider surgical log numbers as equal to competency in technical areas, to date there is no better system of reflecting the day-to-day experience of a trainee.<sup>10,11</sup> Surgical logbooks can also be utilised to predict manpower requirements of rotations and recognise deficiency in training and exposure to reduce number of 'first-time' operations carried out by junior consultants.<sup>12-14</sup> Merry et al. demonstrated that an ideal surgical logbook would be easy to maintain with automatic population of data from hospital records, transportable and report generating functionality.<sup>15</sup> RACS introduced the Morbidity Audit and Logbook Tool (MALT) as a mandatory part of training to maintain surgical logbooks for trainees.<sup>6</sup> It utilises both the Minimum Data Set (MDS) and Expanded Data Set (EDS) recommended by RACS PDSB (Table 1).<sup>7</sup> However, due to expanding

smartphone usage, there are numerous digital logbooks readily available on handheld devices via multiple platforms. The advantage of smartphone logbook applications would be that record keeping will be quick and relatively easy to do, and thus reduce time burden constraint on trainee and surgeon, while allowing easier reflection of data.

The aim of this study is to critically evaluate surgical logbooks available in the Australian market. We identified the top available logbook apps on the two-dominant mobile operating systems (iOS and Android) and evaluate benefits, deficiencies, future improvement, and functionality as an audit tool (Table 2).

#### Method

A comprehensive search of Australian Apple's App Store and Australian Google Play Store for all medical applications that had capacity to document procedures in January 2017. Apps that did not have the capacity to log surgical procedures were excluded. Apps that were not in English or only available to trainees of specific colleges were also excluded as they could not be analysed by the authors. Online reviews and user ratings were utilised to identify popular Apps. Recommendation of Watters et al. (Surgical Audit Taskforce of RACS) were utilised to objectively analyse the functionality of Apps.<sup>10</sup> Applications were also analysed based on last updated, cost and in-App costs.

#### Results

Seven Apps were identified through our search of Australian Apple's App Store (iOS) and Australian Google Play app store (Android). The apps Surgeon's LogBook, eLogbook and LogBox Academic were available in both app stores. T-Res 2 and SurgCase, were only available through Apple's App store (iOS) while Surgeon Log Book Free and Surgilog were only available through Google Play app store (Android).

##### Surgeons LogBook (iOS and Android)

The Surgeons LogBook (Figure 1) is developed by KATEEL Software private limited and is a user-friendly app for entry of data points. It contains most information required by the MDS except for admission date, discharge date, operation category, and peri-operative complications. This app does not have any data points for EDS, except for pathology. However, there is an option for customisation of data fields where more data points can be added. This would allow the user to customise their log to be compatible with both MDS and EDS requirements of RACS. The app does have a function of generating a report to excel and further options of adding attachments and photos. Furthermore, there are

options to include bed-side procedures, academic presentation/posters and rotations.

#### **eLogbook (iOS and Android)**

The Pan-surgical Electronic Logbook (Figure 2) for United Kingdom and Ireland has been developed into an app called eLogbook for both iOS and Android. While this app is user-friendly, it misses a few key points from MDS. There is no option for inserting name of patient, gender, diagnosis, admission date and discharge date. Despite the option of including complications, it does not grade them, but rather relies on free text. Out of the EDS data points, only ASA is included in this app. Also, as this app was set up for the UK and Irish setting, there are limited Australian hospitals in its input and very few (if any) Australian consultants as supervisors. This app also has the option of synchronising with the relevant UK and Irish colleges of surgery, but not to RACS. This app also has the added security of security code required on opening the app, to maximise patient privacy.

#### **LogBox Academic (iOS and Android)**

LogBox Academic (Figure 3) was developed by was developed by an orthopaedic surgeon in South Africa and is distributed by EPI-USE Africa (Pty) Ltd. It was first trialled at Wits Donald Gordon Medical Centre and currently used by College of Medicine South Africa. This app is free to use, however users need to register. This app has most data points included in MDS, apart from discharge date, admission date and diagnosis. However, it should be noted that urgency and complications are recorded in binary yes/no format. There are options to record rotation operation done in and attachments, but none of the EDS data points are included into this database.

#### **SurgCase (iOS)**

SurgCase (Figure 4) was designed by Luciano Moreira and is a simple logbook app that allows data input pre-, peri- and post-operatively. It collects basic demographic data such as medical record number, date of birth and gender. There is no option to record diagnosis, admission date, discharge date, urgency of operation or operating surgeon. While it allows for recording complications, it only allows for binary recording of this data point as "yes"/"no". This app does not record any EDS data points, but has the option for attaching pictures and recording patient and surgeon satisfaction post-operatively.

#### **T-Res 2 (iOS)**

T-Res 2 (Figure 5) is developed by Resilience Software Inc. which is in partnership with American College of Surgeons to develop a Surgeon-Specific Registry. This app is available

to Australian customers as a free trial and is limited in terms of available data points from MDS and EDS with only date, supervisor, procedure and operating role. This limits the use and functionality of this app in an Australian setting.

#### **Surgeon Log Book Free (Android)**

Surgeon Log Book Free (Figure 6) app is developed by AppsLand and is available only on Android. It is available in both Free and Pro Version (AUD\$10.66). It contains most data points for MDS except for operation urgency and complications, and like other apps, there are limited data points for EDS. The advantage of this app over others is the ability to insert patient centric variables including presenting complaint, comorbidities, indication for operation and pathology. Like most other apps, there are opportunities to insert attachments for various fields including operation notes. While both the Free and Pro version allow for exporting reports, the Pro version is only one that allows for importing of excel sheet and unlimited storage.

#### **SurgiLog (Android)**

SurgiLog is an IQject Product and while there are both iOS and Android versions available, only the Android app could be accessed in Australia. This app requires free registration. It provides most MDS data points with exception of diagnosis, admission date, discharge date and complications. In terms of EDS, it only allows logging of type of anaesthetic used during procedure. The benefits of this app are the ability to insert attachments and logging of surgical technique used intra-operatively. It also provides a clear breakdown of procedures as well as the ability to log academic progress within the app for continuing professional development (Figure 7).

### **Discussion**

Electronic surgical logbooks are the future of surgical auditing. They can reduce time constraints for trainees, produce versatile reports and be easily transported.<sup>15</sup> This is demonstrated by the acceptance of electronic logbooks by RACS with their development of MALT.<sup>6</sup> The Pan-surgical Electronic Logbook has over 31,000 surgeons registered and is a collaborative project between the four surgical colleges in UK and Ireland.<sup>16</sup> Surgical logbooks can also improve transparency with easier comparison of case volume across different training sites.<sup>17</sup>

Due to advances in technology, there is a greater availability of apps that allow logging of procedures. However, there is significant variability between software. As shown by our results, most apps fall short of the MDS as recommended by

RACS's PDSB.<sup>7</sup> Furthermore, all the apps fall well short of expectations of recording data points of EDS. Out of the apps reviewed, Surgilog (iOS) and Surgeon Log Book Free (Android) are the two that meet most of the Minimum Data Set recommendations. The discrepancy between RACS's requirements for surgical logbook and available mobile apps does limit the usability of these apps in Australian setting.

Another limitation of these apps, is the ability to synchronise with the RACS MALT tool. Of the apps reviewed, only Mobile eLogbook (iOS and Android) and eLogbook (Android) had ability to synchronise with a surgical college. However, both apps do not synchronise with RACS MALT and thus limit usability for training purposes in the Australian setting. In addition, none of the apps auto-populate patient demographic data from hospital servers or consultant list from Australian sources.

While the current MALT system can be utilised on smartphone or tablet, this is done via the RACS website. The MALT mobile website is relatively user-friendly; however, the limitation is the need for internet, which can be haphazard in most theatre complexes, and convoluted access to page via navigation through the college website. A more easily accessible system can be utilised to allow better efficiency of surgical log record keeping.

## Conclusion

Mobile apps for logbook data collection are a growing resource for surgeons and trainees. While, they have demonstrated their advantages in accessibility and usability, there is room for improvement, especially in the Australian setting. Currently, they do not meet the needs of Australian trainees by providing a logbook that meets RACS minimum data set recommendations and accessibility for auto-population of patient data from hospital servers. The current college logbook system, the MALT website, is relatively user friendly; however access is difficult via a smartphone or tablet. A future development of a MALT app would improve access for trainees and fellows of the college to better record logbooks. Furthermore, better connection to hospital servers would allow for better loading of demographic data and easier review of logbook data.

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## PEER REVIEW

Not commissioned. Externally peer reviewed.

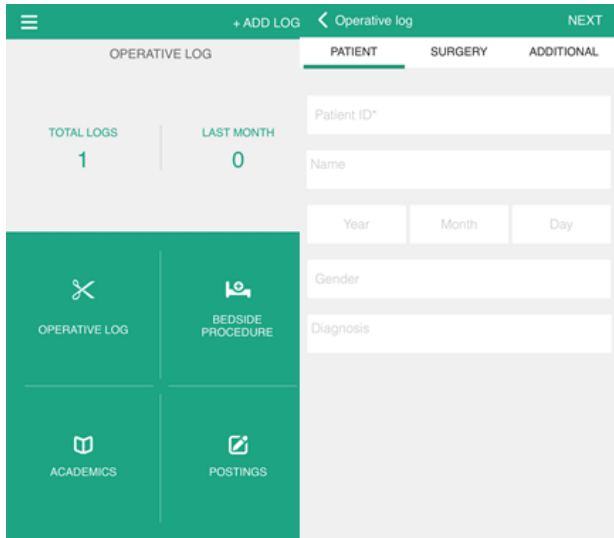
**CONFLICTS OF INTEREST**

The authors declare that they have no competing interests.

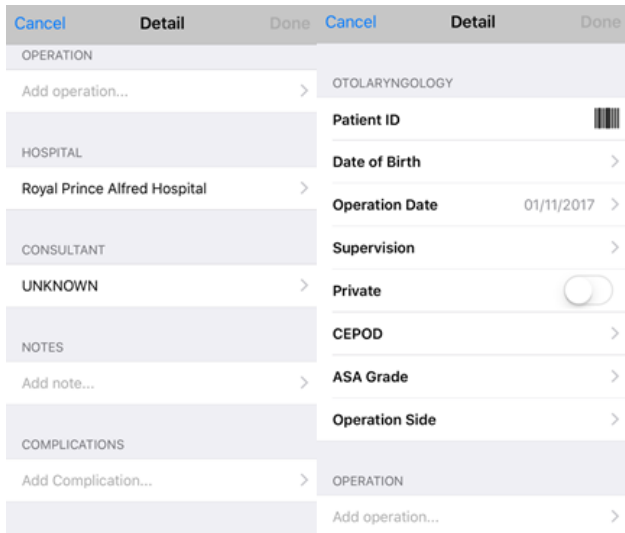
**FUNDING**

None

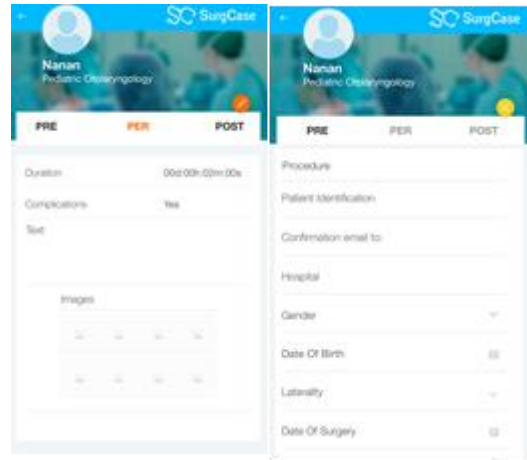
**Figure 1: Screenshot of Surgeons LogBook. Made by KATEEL Software**



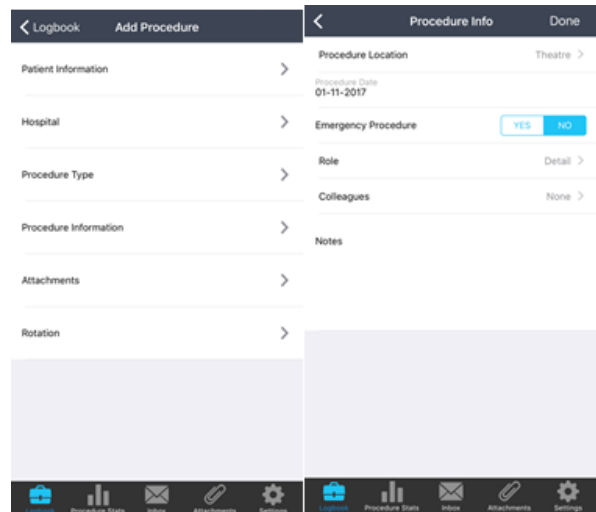
**Figure 2: Screenshot of eLogbook by National Electronic Data Capture Services Limited**



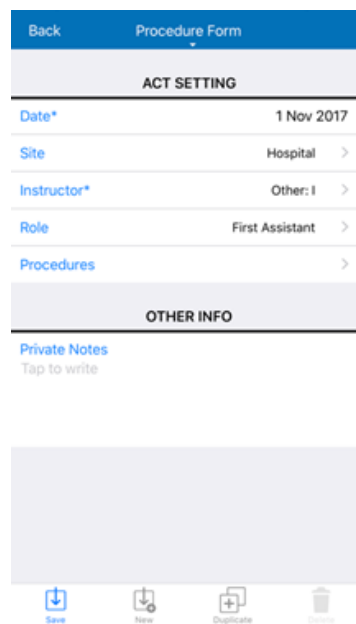
**Figure 3: Screenshots of LogBox Academic by LogBox/EPI-USE**



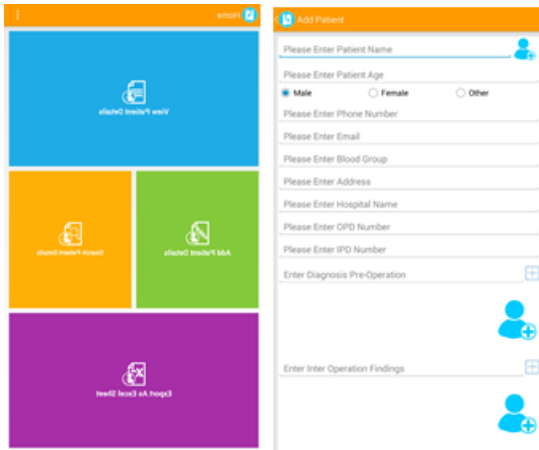
**Figure 4: Screenshot of SurgCase by Luciano Moreira**



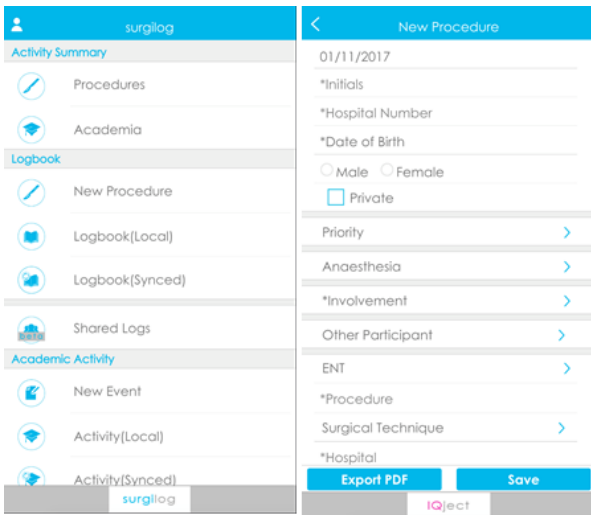
**Figure 5: Screenshot of T-Res 2 by Resilience Software**



**Figure 6: Screenshot of Surgeon Log Book Free by AppsLand**



**Figure 7: Screenshot of SurgiLogby IQject Product**



**Table 1: Minimum and expanded datasets for Surgical Logbooks.<sup>7</sup> ASA – American Society of Anesthesiologists Score**

Minimum Dataset	Expanded Dataset
Name	Admission Type
Medical Record Number	Presenting Complaint
Date of Birth (Age)	Comorbidities
Sex	Wound Infection Risk
Diagnosis	ASA Grading
Admission Date	Indication for Operation
Discharge Date	Anaesthetic (General/Local/Regional)
Operation/Procedure	Operating Magnitude
Operation Date	Pathology Information and Diagnosis
Operation Category (Urgency)	Discharge Type
Graded Complications	
Operating Surgeon	

Table 2: Features of logbook applications on the minimum dataset and extended dataset.<sup>7</sup> \*Only partial capture of data available

Name	Surgeon's Logbook (iOS & Android)	eLogbook (iOS & Android)	LogBox Academic (iOS & Android)	SurgCase (iOS)	T-Res 2 (iOS)	Surgeon Log Book Free (Android)	SurgiLog (Android)
<b>Minimum Dataset</b>							
Name	✓		✓			✓	✓
ID	✓	✓	✓	✓		✓	✓
DOB/Age	✓	✓	✓	✓		✓	✓
Sex	✓		✓	✓		✓	✓
Final Diagnosis	✓					✓	
Admission Date						✓	
Discharge Date						✓	
Operation/Procedure	✓	✓	✓	✓	✓	✓	✓
Op Date	✓	✓	✓	✓	✓	✓	✓
Op Urgency		✓	✓ *				✓
Complications and grade	✓	✓ *	✓ *	✓ *			
Surgeon	✓	✓ *	✓		✓	✓ *	✓ *
<b>Extended Dataset</b>							
Admission Type							
Presenting Complaint						✓	
Comorbidities						✓	
Wound Infection Risk							
ASA Grading		✓					
Indication for Operation						✓	
Anaesthetic (GA/LA/RA)							✓
Operating Magnitude							
Pathology Information and Diagnosis	✓					✓	
Discharge Type							