

Same day discharge for robot-assisted radical prostatectomy: a prospective cohort study documenting an Australian approach

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Introduction

Robot-assisted radical prostatectomy (RARP) is a safe and widely performed procedure for the treatment of prostate cancer worldwide.^{1–3} Since the introduction of surgical robotics to

Abstract

Background: The introduction of robotic surgical systems has significantly impacted urological surgery, arguably more so than other surgical disciplines. The focus of our study was length of hospital stay - patients have traditionally been discharged day 1 post-robot-assisted radical prostatectomy (RARP), however, during the ongoing COVID-19 pandemic and consequential resource limitations, our centre has facilitated a cohort of same-day discharges with initial success.

Methods: We conducted a prospective tertiary single-centre cohort study of a series of all patients ($n = 28$) – undergoing RARP between January and April 2021. All patients were considered for a day zero discharge pathway which consisted of strict inclusion criteria. At follow-up, each patient's perspective on their experience was assessed using a validated post-operative satisfaction questionnaire. Data were reviewed retrospectively for all those undergoing RARP over the study period, with day zero patients compared to overnight patients.

Results: Overall, 28 patients 20 (71%) fulfilled the objective criteria for day zero discharge. Eleven patients (55%) agreed pre-operatively to day zero discharge and all were successfully discharged on the same day as their procedure. There was no statistically significant difference in age, BMI, ASA, Charlson score or disease volume. All patients indicated a high level of satisfaction with their procedure. Median time from completion of surgery to discharge was 426 min (7.1 h) in the day zero discharge cohort.

Conclusion: Day zero discharge for RARP appears to deliver high satisfaction, oncological and safety outcomes. Therefore, our study demonstrates early success with unsupported same-day discharge in carefully selected and pre-counselled patients.

Australia in 2003, the robotic approach to prostatectomy has become the most common surgical technique in preference over open and laparoscopic approaches^{2,4} and is credited with shortening hospital length of stay (LOS) and reducing blood transfusion rates throughout its gradual adoption.²

As of 2016, the mean length of hospital stay in the Victorian public health system in Australia was 1.4 days.² Elsewhere in the world, there has been preliminary work investigating the safety and feasibility of performing RARP as a day procedure (day zero discharge from the acute hospital setting).^{5–12} There is published evidence that for the Australian population of patients undergoing radical prostatectomy, early mobilization and return to work are major priorities.¹³ With the absence of direct evidence, we can only infer from this that facilitating early discharge home will help accomplish these priorities.

The potential benefits of a safe, supported day zero discharge extend beyond the prospect of greater patient satisfaction. Australia is fortunate to have a well-resourced public health system, however, it is finite and there remains a responsibility to reduce unnecessary costs. With the general trend towards robotic surgery, there have been Australian publications documenting the higher costs when compared with traditional open and laparoscopic approaches.^{4,14} McBride *et al.* noted that in their centre, patients undergoing robotic procedures incurred only 44% of their total hospital stay cost in the operating room with the majority of costs associated with staffing (including ward nursing staff).⁴ An additional and equally noteworthy consideration for the hospitalized patient is the risk of iatrogenic complications including, but not limited to, nosocomial infections which have a current prevalence of almost 10% within Australia – this is of specific relevance at the time of writing during the ongoing COVID-19 pandemic.¹⁵

With early experience internationally in performing RARP as a day procedure and emerging evidence of its safety, we aim to document our early experience as a high-volume Australian centre with a cohort of appropriately selected patients who opted for a day zero discharge and to discuss the implications for Australian urology, now and into the future.

Methods

Patient population and data collection

In this prospective tertiary single-centre cohort study we collected data of a consecutive series of all patients ($n = 28$) undergoing RARP between January and April 2021. All patients were introduced to the idea of same-day discharge on the morning of their procedure at pre-operative consultation. Immediately following the procedure, if the surgeon determined a satisfactory intraoperative course and the involved anaesthetist was satisfied with intraoperative stability, ward staff were notified of the intention to facilitate same day discharge. For this cohort study, pre-, peri- and postoperative data were collected from a prospectively maintained database. Distance to hospital was calculated using Google maps from our hospital to each patient's home address as recorded in their respective chart. Prospectively collected complications were graded according to the Clavien-Dindo classification.¹⁶ Grades I and II complications were defined as minor and Grades IIIa to V as major.¹⁶

Ethics approval was obtained from our institution (Number: QA2021035) and patient demographic factors, disease factors, peri- and post-operative factors as well details regarding any complications were compiled and anonymized.

Patient selection criteria

Inclusion criteria for a day zero approach was consensus sign-off (operating surgeon, involved anaesthetist, ward nursing staff and patient), procedure completed on a morning operating list, tolerating fluids post-operatively, mobilising on the ward post-operatively, adequate pain control with oral analgesia and suitable support at home. Exclusion criteria comprised of patients that lived alone, poor pain control, uncontrolled nausea, or any concern from the involved parties. Perioperative continuation of aspirin was not considered an exclusion criteria.¹⁷

Surgical approach

All day zero patients entered the hospital at 0630 on the day of surgery and proceeded with their surgery on a morning theatre list (commencing at 0800) using a DaVinci[®] Si surgical system. In all procedures, a standard anterior approach with cut and oversew of the deep vascular complex, Rocco-suture, vesicourethral anastomosis and anterior reconstruction undertaken. Nerve sparing which represents the gold standard to maintain erectile function in patients undergoing RARP was attempted if feasible from an oncological standpoint, to improve functional outcomes.^{18,19} The institution in which this study was performed is a teaching hospital, and thus the primary surgeon in all cases was a fellow under the supervision of an experienced robotic surgeon. The fellow (MF) remained consistent for all cases performed and was supervised by two high-volume surgeons (BT, PD) who had both completed over 500 robotic cases each. No patients involved received pelvic lymph node dissection (PLND) or had a pelvic drain placed intra-operatively as is standard practice at the institution for uncomplicated cases.

Immediate postoperative care

Post-operative care involved early mobilisation and introduction of oral intake (tolerating fluids was mandatory, food was provided as desired) once safe from an anaesthetic perspective. Patients were reviewed in recovery and the next of kin was contacted for an update as per the routine post-operative pathway. Patients had a final review at 1700 on the day of surgery undertaken by the involved fellow. Upon final review patients were consulted again regarding their willingness for day zero discharge and if still willing, and all inclusion criteria were met, patients were discharged directly back to their place of residence with their next of kin. No patients involved required hospital in the home, medihotel or equivalent home support. Immediate phone support was available during business hours via our staff urology specialist nurse, via direct call, and all patients were provided contact details of on-call urology staff for out-of-hours support. All patients were called the following day by the performing fellow. The first post-operative in-person review was 7 days post-operatively for catheter removal and trial of void.

Short-term follow-up

At the first clinic follow-up, 1 month post-operatively, patients who had been discharged on day zero were counselled regarding their

Table 1 Comparison of patient demographics of all patients undergoing RARP at our institution during a 4 month period in 2021

	Total (n = 28)	Day Zero Discharge (n = 11)	Inpatient (n = 17)	P-value
Mean age in years (\pmSD)	64.3 (\pm 7.34)	63.5 (\pm 7.40)	64.8 (\pm 7.25)	0.667
Mean BMI (\pmSD)	27.4 (\pm 2.78)	27.8 (\pm 3.20)	27.17 (\pm 2.47)	0.961
Median distance from hospital in kilometres (range)	17.5 (5–159)	14 (5–159)	32 (8–121)	0.197
ASA score				0.051
1	3	3	0	
2	19	7	12	
3	6	1	5	
4	0	0	0	
Charlson score				0.313
2	0	0	0	
3	3	1	2	
4	15	8	7	
5	7	2	5	
6	3	0	3	
Prior abdominal surgery				0.527
Yes	4	1	3	
No	24	10	14	
Lives alone				<0.05
Yes	8	0	8	
No	20	11	9	

peri-operative course and satisfaction was assessed using the widely adopted and validated SSQ-8 Perioperative Satisfaction Questionnaire.^{20,21} At this visit, each patient was questioned to determine if they had presented elsewhere (i.e. to another hospital's emergency

department or a community GP) to ensure quality control for our complication rate analysis.

Calculations were performed using Stata/MP version 13.0 for Mac (StataCorp LP). Variables were checked for skewness and

Table 2 Comparison of disease factors for all patients undergoing RARP at our institution during a 4-month period in 2021

	Total (n = 28)	Day Zero Discharge (n = 11)	Inpatient (n = 17)	P-value
Mean Pre-Op PSA – ng/ml (\pmSD)	7.72	6.65 (3.81)	8.40 (4.19)	0.292
Biopsy ISUP				
1	5	2	3	
2	13	5	8	
3	2	1	1	
4	1	1	0	
5	7	2	5	
Mean MRI prostate volume in cc (\pmSD)	47.6 (24.9)	37.6 (16.1)	54.2 (26.7)	0.042
Clinical t stage				0.627
1c	14	6	8	
2a	8	2	6	
2b	3	1	2	
3a	3	2	1	
3b	0	0	0	
3c	0	0	0	
Median time diagnosis to intervention in days (range)	131 (21–772)	114 (21–197)	131 (75772)	0.187
Mean histopathological prostate volume in cc (\pmSD)	53.5 (23.7)	44.3 (15.9)	59.5 (25.9)	0.105
Median histopathological disease volume in cc (range)	6.7 (1.2–49.5)	5.8 (1.2–24.8)	7 (2.5–49.5)	0.435
T stage (histopathological)				0.996
2a	10	4	6	
2b	2	1	1	
2c	6	2	4	
3a	5	2	3	
3b	5	2	3	
Margin status				0.794
Positive	8	2	6	
Negative	20	9	11	
Histopathological evidence of EPE				0.591
Yes	11	5	6	
No	17	6	11	
Histopathological ISUP				0.244
1	2	2	0	
2	8	2	6	
3	11	4	7	
4	1	1	0	
5	6	2	4	

kurtosis to determine normality. Variables are presented as medians and means for non-parametric and parametric data respectively. Differences between continuous parametric variables were examined with the *t*-test; the Wilcoxon-Mann-Whitney test was used for non-normally distributed continuous and ordinal variables, while differences between dichotomous variables were evaluated with the χ^2 test or the Fishers exact test. *P*-values throughout the results were two-sided.

Results

Twenty-eight patients underwent RARP during the time period of this study (patient characteristics described in Table 1). Twenty patients (71%) fulfilled the pre-operative criteria for day zero discharge. Eleven of 20 patients (55%) agreed pre-operatively to day zero discharge, for those who did not agree, common reasons for opting to stay overnight included apprehension for the possibility of poor pain control and placing extra demand on carers at home. All 11 patients were successfully discharged on the same day of their operation representing 55% of those meeting objective preoperative inclusion criteria or 39% of all RARPs completed during the study period. Median time from completion of surgery to discharge was 426 min (7.1 h) in the day zero discharge cohort. There was no statistically significant difference between pre-operative variables other than mean MRI prostate volume (37.6 cc in the day zero cohort vs. 54.2 cc in the inpatient cohort with *P*-value of 0.042) between the two cohorts. Disease volume, T-stage, final ISUP grade, incidence of positive surgical margin and extra-prostatic were similar between both cohorts, disease characteristics of all patients are summarized in Table 2. No patient in either cohort was therapeutically anticoagulated perioperatively or taking any antiplatelet other than Aspirin.

No patients within either cohort experienced a major complication after their surgery. One patient in each cohort re-presented to the emergency department with a urinary tract infection

(Clavien-Dindo II) not requiring admission. One patient in each cohort was admitted with a minor wound infection (Clavien-Dindo II) treated with oral antibiotics and one patient in the overnight stay cohort required admission under a medical unit for an unrelated non-surgical issue. No patient contacted the on-call surgical team via the number provided overnight. When interviewed at the time of their first outpatient follow-up, no patient within the day zero cohort reported concerns relating to the timing of their discharge. All patients in the day zero cohort scored 7 or 8/8 in the SSQ-8 Perioperative Satisfaction Questionnaire. Mean Pain score on discharge measured on a 1–10 Likert Scale was similar between the day zero and overnight stay cohort (1.73 (\pm 2.14) vs. 1.59 (\pm 1.89)), *P* = 0.863, respectively. Peri-operative and post-operative outcomes are summarized in Table 3.

Discussion

This cohort study demonstrates that same-day discharge after RARP is safe and feasible in an Australian setting. In our initial single-centre experience, we have achieved success facilitating day zero discharge for appropriately selected patients. Our results highlight that all patients were satisfied with their care and all believed that their post-operative length of stay was appropriate.

This is, to our knowledge, the first published cohort study of day zero discharge for RARP in Australia. In the American context, there is published evidence that not only are a significant proportion of patients indicating preference of same-day discharge when asked pre-operatively,⁸ but also early studies indicating that adoption of a same-day discharge protocol is both safe and feasible in selected patients.^{5–7,9,11,12} It is emphasized that pre-operative counselling is the key to success.¹² There is also limited early evidence of this success reflected in a French cohort.¹⁰ When compared to international cohorts of a similar sample size, our rate of successful same-day discharge was similar¹¹ however when compared with larger

Table 3 Comparison of peri and post-operative factors for all patients undergoing RARP at our institution during a 4-month period in 2021

	Total (<i>n</i> = 28)	Day Zero Discharge (<i>n</i> = 11)	Inpatient (<i>n</i> = 17)	<i>P</i> -value
Mean operative duration in minutes (\pmSD)	214 (\pm 20.2)	205 (\pm 20.1)	219 (\pm 20.2)	0.09
Mean time from completion of surgery to discharge (DC) in minutes (\pmSD)	1014.5 (827)	426 (\pm 105)	1536 (\pm 797)	0.0002
Readmission				0.75
Yes	2	1	1	
No	26	10	16	
Early complication: within 7 days (0 = No, 1 = Yes)				0.41
Yes	1	0	1	
No	27	11	16	
Minor complication: Clavien-Dindo < 2 (0 = No, 1 = Yes)				0.98
Yes	5	2	3	
No	23	9	14	
Major complication: Clavien-Dindo > 2 (0 = No, 1 = Yes)				
Yes	0	0	0	
No	28	11	17	
SSQ-8 “Would you recommend this surgery to someone else?”				
Yes	28	9	14	
Maybe (probably yes)	5	2	3	
Unsure	0	0	0	
Do not think so	0	0	0	
Never	0	0	0	

international cohorts, our same-day discharge rate is slightly lower.^{5,6,10} This is likely reflective of our restrictive inclusion criteria and emphasizes the value of a protocol-driven approach. Again we would stress the importance of adequate pre-operative counselling as central to success in facilitating same-day discharge. We would predict better outcomes with introducing the idea of same day discharge earlier, perhaps at the time of initial consultation during the consent process rather than on the day of surgery as we did.

While the social and cultural differences are beyond the scope of our publication, the different health economic constructs have potential to prove significant. While the public health system in Australia supports hospital costs in their entirety, in the United States out-of-pocket costs are considered common and play an influential role in an individual's decision-making relating to health.⁸

Also of significance at the time of writing is the implications of the ongoing COVID-19 pandemic and the associated ramifications to inpatient care in urology.⁸ With at least 12.5% of all COVID-19 case acquired in hospital,²² the role of reducing exposure by shortening hospital stay for those patients who are well enough is indisputably valuable.

Furthermore, an aspect of public healthcare not yet discussed, but central to its validity, is that health professionals must maintain perspective that the public health system has limited, finite resources. In Australia, robotic surgical costs are well documented and substantial^{1,2,4,14} – only in high volume centres do they approach economic feasibility.² It is the perspective of the authors that saving the cost of an overnight hospital stay, avoiding the opportunity cost of occupying a patient bed that could potentially be utilised by another patient, may well present the next frontier in bringing gold-standard care to a larger population.

The COVID-19 pandemic has highlighted the importance of maintaining hospital capacity during such a major public health issue as the pandemic, without compromising the pathway for prostate cancer treatment, as has been essential elsewhere.^{23,24} Day zero discharge for RARP has also been particularly relevant during this time when there has been a degree of fear for patients to have treatment in hospital due to the potential nosocomial infection risk. Our centre's practice has extended to include day zero discharge for selected robot-assisted nephrectomy and the authors have had previous experience with day-stay robot-assisted pyeloplasty and retroperitoneal lymph node dissection.

A limitation of our study is the absence of a clearly defined day zero discharge protocol. This is somewhat accounted for with consistency in the surgical team, specifically the involved fellow, in counselling all patients before and after their surgery. Other limitations include the unknown impact of the ongoing COVID-19 pandemic on patient decision-making, a relatively small number of enrolled patients and the lack of randomization. To accurately compare long-term oncological outcomes in the two patient cohorts we would require greater numbers and adequate follow-up duration. However, the proven feasibility of our study creates an opportunistic window for a wide variety of clinical research, including prospective randomized trials.

Our study is unique in that it is the first Australasian series of same-day robotic procedures. Hence, our data are useful for

surgeon's decision-making with regards to accelerating patient's discharge post-operatively.

Likewise, it facilitates patient counselling in view of an outpatient radical prostatectomy with potentially improved outcomes by allowing patients to recover in their home environment.

Furthermore, it has a potential economic impact on healthcare systems as same-day discharge will likely decrease the cost of care provision, and outpatient procedures allow for distributing resources in the most efficient way possible; especially when faced with challenging times such as the ongoing COVID-19 pandemic.^{25,26} As to that consequently, shorter waiting lists will allow for optimization of timely cancer care.^{27,28}

In conclusion, day zero discharge for RARP in the Australian setting is safe while maintaining quality and timely care and gaining a high level of patient satisfaction. Therefore, our study demonstrates early success with unsupported same-day discharge in carefully selected and pre-counselled patients.

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Author contributions

Christopher Soliman: Data curation; formal analysis; investigation; software; writing – original draft. **Marc A. Furrer:** Conceptualization; methodology; supervision; writing – review and editing. **Niranjan Sathianathen:** Formal analysis; software; writing – review and editing. **Niall M. Corcoran:** Resources; supervision; writing – review and editing. **Belinda Schramm:** Investigation; writing – review and editing. **Evie Mertens:** Investigation; project administration; writing – review and editing. **Justin Peters:** Resources; supervision; writing – review and editing. **Anthony Costello:** Resources; supervision; writing – review and editing. **Nathan Lawrentschuk:** Resources; supervision; writing – review and editing. **Philip Dundee:** Resources; supervision; writing – review and editing. **Clancy Mulholland:** Data curation; formal analysis; investigation; software; writing – original draft. **Benjamin Thomas:** Conceptualization; investigation; methodology; supervision; writing – review and editing.

Conflict of interest

None declared.

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