GENERAL SURGERY

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# Getting back 'home' after emergency laparotomy: how many never make it?

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## Abstract

**Background:** Emergency laparotomy (EL) is performed on about 15 500 patients in Australia each year. Aside from mortality there is significant concern about the possibility that previously independent patients discharged after EL will become reliant on long-term dependent care. This study aimed to establish the proportion of patients not returning to their pre-admission residence, a proxy for dependent care, following EL.

**Methods:** Data were collected on all adult patients who underwent EL across four Australian hospitals over 2 years. A total of 113 data points were collected including pre-hospital residence, discharge destination, mortality and place of residence at 90 and 365 days.

**Results:** A total of 782 patients underwent EL, the mean age was 64 years. Pre-admission, 95.5% of patients were living in their own home. Inpatient mortality was 7.0% and at discharge 72.4% of patients returned directly back to their pre-hospital residence. At 90 days, mortality was 10.5%, and 87% of patients had returned to their pre-hospital residence, including all patients under 70 years of age. By 365 days, overall mortality was 16.8%, and only 1.5% of patients (all aged >70 years) had not returned to their pre-hospital residence.

**Conclusion:** Patients who survive 90 and 365 days following EL nearly all return to their pre-hospital residence, with only a very small proportion of previously independent patients entering dependent care. This should help inform shared decision-making regarding emergency laparotomy in the acute setting.

## Introduction

Emergency laparotomy (EL) remains a commonly performed high risk procedure, with around 15 500 being performed in Australia each year.[1] Poor outcomes following EL include death and the loss of independent living.

Increasing attention has been focused on improving outcomes by improving patient selection, using risk scores to aid in decision making, assessing frailty and estimating other pre-operative predictors of poor outcomes. Most studies have focussed on short term outcomes (most relevant to hospitals and hospital clinicians), particularly mortality at 30 and 90 days.[2,3]

The average age of patients undergoing EL is in the mid-late 60s, hence a large proportion of patients faced with a decision about emergency surgery are in the later years of their lives.[2,4] Apart from risk of perioperative death, a commonly held concern for these patients is the risk of not returning to independent living after surgery.[5] Indeed, many patients feel that postoperative quality of life, a key element of which is the ability to return to their own home, is more important than the risk of death when deciding to undergo emergency surgery.[6]

This study uses return to pre-hospital residence as a proxy for overall functional recovery to premorbid status. We aimed to establish the proportion of patients, following EL, who failed to reach this level of functional recovery.



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## Methods

Data were collected on all patients aged over 18 years who underwent an EL across four Australian hospitals between 1 January 2018 and 31 December 2019. The four hospitals include a 796 bed tertiary referral centre, two large urban hospitals of 195 and 196 beds and one 130 bed suburban hospital. The four hospitals provide the majority of emergency surgical services for the Lower Hunter region of NSW, with a mixed urban and semi-urban population of just under 665 000.[7]

Following our initial audit experience in 2016–2017,[8] the inclusion and exclusion criteria were modified from the NELA criteria to better reflect our regional case mix (Appendix A). 782 adult EL cases were identified for inclusion.

A retrospective review was performed of all included cases. A total of 113 data points were collected in a REDCap (Research Electronic Data Capture) database,[9] including patient demographics, pre-admission residence, discharge destination, mortality and place of residence at 90 and 365 days. This data is available from the digital medical record maintained by Hunter New England Local Health District, the local provider of public health services in this region.

In this study we defined Sheltered Living as living in a residence with continuous support services present, but where the resident was independent with all normal activities of daily living. Residential Care was defined as living in a facility with on-site personal care services to assist with activities of daily living. Nursing Care was defined as being a resident in a facility where, in addition to personal care, the resident received daily nursing care.

Statistical Analysis considered mortality and the proportions returning to place of residence by age group, at discharge, and 90 and 365 days post-discharge. Ages were grouped into those under 50 years of age (18–49) and decade of life thereafter.

Ethics approval for this project was obtained from the Hunter New England Human Research Ethics Committee, 2017.

## Results

A total of 782 patients underwent an EL during the two-year period. 50.8% of patients were female, mean age was 64 years (range 18–96) and median ASA score was 3. 91.3% of patients who underwent surgery were admitted directly through the emergency department or transferred from another hospital facility.

Prior to hospital admission, 95.5% of patients were living independently in their own home, the remainder resided in supported living facilities (Sheltered Living 1.3%, Residential Care 2.2%, Nursing Care 0.8%, Other 0.3%). Post-operative inpatient mortality was 7.0%. At discharge, 72.4% returned directly to their pre-hospital residence (own home or a supported living facility). 11.4% were transferred to another hospital for ongoing acute care and 9.1% were transferred to a rehabilitation facility. Only 0.4% of patients who had previously lived independently were directly discharged to a Residential or Nursing Care facility. At 90 days, mortality was 10.5%, and 86.9% of patients had returned to their pre-hospital residence. By 365 days, overall mortality was 16.8%, and 98.2% of surviving patients had returned to their pre-hospital residence, including 94% of patients who had returned to living in their own homes. (Table 1 and Fig. 1).

When comparing outcomes between those who came from their own home and those who came from other supported living arrangements pre-admission there were similar outcomes in terms of 90 and 365 day mortality and change in place of residence. (Table 2).

For those aged under 50 years there were very low 90 day (0.6%) and 365 day (3.2%) mortality rates, and all surviving patients had returned to their pre-admission residence at both time points. For patients aged 50–69 years, 90 and 365 day mortality was 7.7% and 14.1% respectively, however all surviving patients had returned to pre-admission residence by 365 days. 90 and 365 day mortality was highest for those aged over 70 years, at 17.1% and 25% respectively, however only 3.4% had not returned to live in their pre-admission residence, leaving 71.6% alive in their pre-admission residence at 365 days. (Tables 3 and 4).

## Discussion

This is the first study to present long term data on patient place of residence following EL. Overwhelmingly it found patients who survive EL return to their pre-admission residence by 90 and 365 days, regardless of whether they came from their own home or supported living arrangements.

Evidence suggests that older patients place a great deal of importance on quality of life as an outcome of emergency surgery,[6] however, limited data exists for longer term outcomes beyond 30 days other than for mortality. Data from elective major abdominal surgery suggests it takes 3–6 months for the majority of elderly patients to return to baseline dependency status, although a significant number will not have recovered to pre-operative status in that time.[10]

**Table 1** Pre-admission, discharge, 90 and 365 day place of residence

| | Pre-admission | At discharge | 90 day | 365 day |
|---|---|---|---|---|
| Own home | 747 (95.5%) | 542 (69.3%) | 651 (83.2%) | 612 (78.3%) |
| Sheltered living | 10 (1.3%) | 7 (0.9%) | 9 (1.2%) | 8 (1%) |
| Residential care | 17 (2.2%) | 14 (1.8%) | 19 (2.4%) | 21 (2.7%) |
| Nursing home | 6 (0.8%) | 4 (0.5%) | 13 (1.7%) | 9 (1.2%) |
| Rehab facility | 2 (0.2%) | 71 (9.1%) | 8 (1%) | 0 |
| Other hospital (acute care) | – | 89 (11.4%) | – | – |
| Deceased | – | 55 (7.0%) | 82 (10.5%) | 131 (16.8%) |
| Unknown | 0 | 0 | 0 | 1 |

**Fig. 1.** Residence and mortality over time.

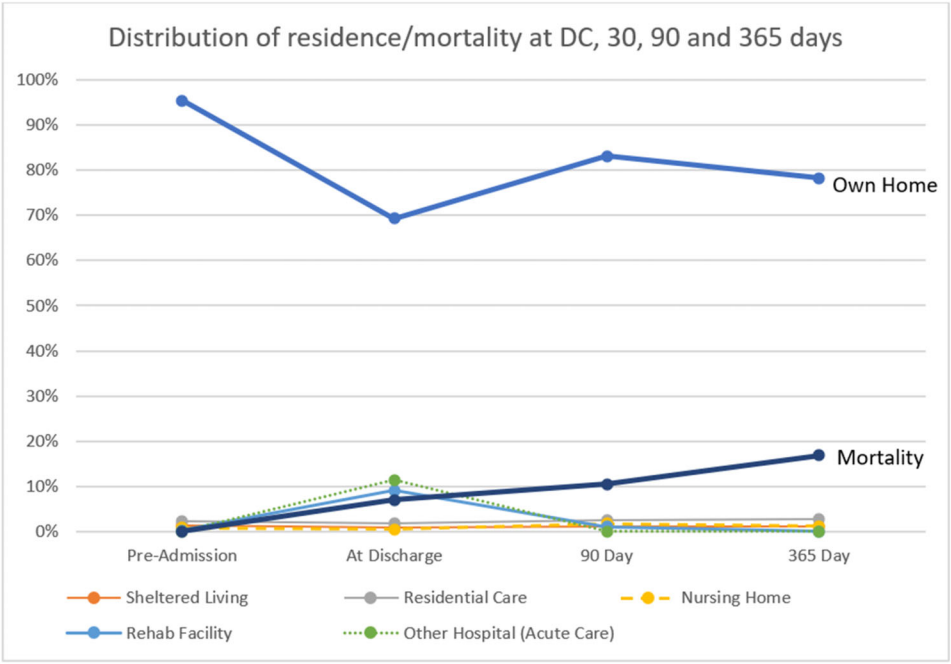


**Table 2** Outcome by pre-admission place of residence

| | 30 day mortality | 90 day mortality | 90 day change in residence | 365 day mortality | 365 day change in residence |
|---|---|---|---|---|---|
| Own home (747 pts) | 59 (7.9%) | 78 (10.4%) | 19 (2.5%) | 124 (16.6%) | 11 (1.5%) |
| Other supported living (35 pts) | 4 (11.4%) | 4 (11.4%) | 1 (2.9%) | 7 (20%) | 1 (2.9%) |

Tolstrup *et al*. found 45% of patients self-reported long-term (median 60 month) moderate to severe functional impairment after EL.[11] A small number of studies have looked at the feasibility of collecting patient reported outcome measures (PROMs) and morbidity data following EL, however no large-scale data has yet been presented.[12,13]

A significant percentage of patients in our cohort were not discharged directly to their pre-hospital residence. Return home involved transfer to a rehabilitation unit or another hospital for ongoing acute care. Alder *et al*., from a single centre in the UK, looked at dependence at discharge, noting that of just over 60% of patients aged over 70 discharged home, 13.1% were discharged with some level of support package. Recording 13.7% inpatient mortality, the remaining 25.5% not discharged to prehospital residence were discharged to a rehabilitation or intermediate care facility, residential care, nursing home or palliative care facility.[14] This was also reflected in the ANZELA-QI data with 72.7% of patients recorded as returning to their pre-hospital residence on discharge.[15] However, both ANZELA-QI and NELA have recorded 15% of patients whose discharge destination was unknown, reflecting the difficulty in accurately capturing this data on a large scale.[15,16] Looking at patients over the age of 65 years, the ELF study group found 37.4% required an increased level of care at discharge, principally due to pre-op frailty.[17]

Similarly to NELA, we found an increasing number of EL performed in older age groups, with 54.3% aged over 65 and 20.3%

**Table 3** Mortality by age

| Age group | Number of patients | Mortality at discharge | % | Mortality at 30 days | % | Mortality at 90 days | % | Mortality at 365 days | % |
|---|---|---|---|---|---|---|---|---|---|
| 18–49 | 156 | 1 | 0.6 | 1 | 0.6 | 1 | 0.6 | 5 | 3.2 |
| 50–59 | 130 | 5 | 3.8 | 6 | 4.6 | 7 | 5.4 | 14 | 10.8 |
| 60–69 | 140 | 10 | 7.1 | 11 | 7.9 | 13 | 9.3 | 23 | 16.4 |
| 70–79 | 197 | 16 | 8.1 | 20 | 10.2 | 28 | 14.2 | 47 | 23.9 |
| 80–89 | 141 | 23 | 16.3 | 25 | 17.7 | 31 | 22.0 | 38 | 27.0 |
| 90–96 | 18 | 0 | 0 | 0 | 0.0 | 2 | 11.1 | 4 | 22.2 |
| Total | 782 | 55 | 7.0 | 63 | 8.1 | 82 | 10.5 | 131 | 16.8 |

**Table 4** Change in place of residence by age

| Age group | Number of patients | Supported care facility at discharge | % | Supported care facility at 90 days | % | Supported care facility at 365 days | % |
|---|---|---|---|---|---|---|---|
| 18–49 | 156 | 8 | 5.1% | 0 | 0.0% | 0 | 0.0% |
| 50–59 | 130 | 17 | 13.1% | 3 | 2.3% | 0 | 0.0% |
| 60–69 | 140 | 21 | 15.0% | 2 | 1.4% | 0 | 0.0% |
| 70–79 | 197 | 55 | 27.9% | 9 | 4.6% | 6 | 3.0% |
| 80–89 | 141 | 53 | 37.6% | 6 | 4.3% | 6 | 4.3% |
| 90–96 | 18 | 7 | 38.9% | 0 | 0.0% | 0 | 0.0% |
| Total | 782 | 161 | 20.6% | 20 | 2.6% | 12 | 1.5% |

aged over 80 in our cohort.[2] Our 30 day (15.7%), 90 day (20.8%) and 365 day (26.4%) mortality in those over the age of 80 were comparable with the limited published international data.[2,16,18–21]

Two recent studies of mortality in EL have suggested that early post-operative mortality, is indicative of non-beneficial or otherwise futile care.[22,23] They found a significant early peak in mortality at 31.6% (48 h) and 38.1% (72 h). Chiu *et al.* looking at the extremely high risk (NSQIP mortality score of >75%), found futile surgery was most commonly performed on the elderly with multiple comorbidities who presented *in extremis*, but also noted that more than half of their cohort had a totally dependent functional status at admission.[22] While a much smaller proportion of our elderly patients came from a supported living environment, of the proportion who survived EL the vast majority returned to their pre-hospital residence. This suggests while increasing age undoubtedly increases the probability of a poor outcome following EL, for a large number of elderly patients there is still potential benefit in offering emergency surgery.

As EL is a morbid procedure, with high complication rates, a low mortality rate from the aggregate of a hospital's EL cases may represent outstanding care, incorporating expert decision making, operative intervention and peri-operative management, but may also represent the effects of case selection and risk avoidance. This data from our hospitals is challenging to interpret. The morbidity and mortality at 30, 90 and 365 days is low by comparison with international data, and the return to normal residency of the survivors is remarkably high. This challenges the assumption that significant numbers of EL patients will lose independence at 3 months or 1 year post surgery. For those who survive, almost all return to their original address. It could be concluded if a patient survives their initial operative challenge, and their underlying condition is not automatically progressive towards an early death (e.g., advanced malignancy) the outcome for the patient is most likely a return to something close to their pre-morbid condition.

There are a number of limitations to our study. The cohort is relatively small compared to other audited groups such as NELA and NSQIP. Comprehensive frailty scoring was not collected for our cohort, although multiple recent publications have shown it to be a stronger predictor of outcome than age alone. Like other groups studying EL, we have no comparator outcomes for patients who are potentially treatable with a laparotomy, but do not proceed to surgery, which may be more likely in the very elderly and more frail population. Our data showing fewer poor outcomes for patients aged over 90 years, is almost certainly due to case selection. This suggests that, potentially, some patients were not offered, or did not accept, surgical management. This may be due to fear of a high mortality rate on the part of the surgeons, and a fear of a high dependency rate if they survive on the part of the patients. Our study suggests that the fear of the latter may be significantly overestimated. Finally, although we have found return to pre-admission residence a measurable outcome, it remains unclear how accurate it serves as a proxy for full functional recovery.

## Conclusion

Patients who survive 90 and 365 days following emergency laparotomy nearly all return to their pre-hospital residence, with only a tiny proportion of previously independent patients entering dependent care. This should help inform shared decision-making regarding emergency laparotomy in the acute setting.

The need for complete and accurate outcome data for all those patients who present with an acute condition usually managed with an EL is critical. Without this complete denominator we cannot know the true morbidity and mortality achieved in this patient group. In parallel with patient reported outcomes and quality of life data, this constitutes one of the remaining unknowns in acute surgical care.

## Author contributions

**Merran Holmes:** Conceptualization; data curation; funding acquisition; investigation; methodology; project administration; writing – original draft; writing – review and editing. **Anya Rugendyke:** Data curation; investigation; writing – review and editing. **Yan Joyce Ming:** Data curation; writing – review and editing. **Peter Howley:** Formal analysis; writing – review and editing. **Jonathon Gani:** Conceptualization; supervision; writing – review and editing. **Peter Pockney:** Conceptualization; project administration; supervision; writing – review and editing.

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## Conflicts of interest

There are no conflicts of interest to declare.

## References


1. Burmas M, Aitken RJ, Broughton KJ. Outcomes following emergency laparotomy in Australian public hospitals. *ANZ J. Surg.* 2018; **88**: 998–1002.
2. NELA Project Team. Seventh Patient Report of the National Emergency Laparotomy Audit RCoA London 2021. https://www.nela.org.uk/reports. Accessed 2 Jan 2023.
3. Barazanchi A, Xia W, MacFater W *et al*. Risk factors for mortality after emergency laparotomy: scoping systematic review. *ANZ J.Surg.* 2020; **90**: 1895–902.
4. Palaniappan S, Soiza RL, Duffy S, Moug SJ, Myint PK, the Older People's Surgical Outcomes Collaborative (OPSOC), The Emergency Laparoscopic, Laparotomy Scottish Audit (ELLSA). Comparison of the clinical frailty score (CFS) to the National Emergency Laparotomy Audit (NELA) risk calculator in all patients undergoing emergency laparotomy. *Colorectal Dis.* 2022; **24**: 782–9.
5. Park B, Barazanchi A, Rahiri JL, Xia W, Taneja A, Hill AG. Patient experiences of the emergency laparotomy pathway: a qualitative study. *World J. Surg.* 2021 May; **45**: 1362–9.
6. Law J, Welch C, Javanmard-Emamghissi H *et al*. Decision-making for older patients undergoing emergency laparotomy: defining patient and clinician values and priorities. *Colorectal Dis.* 2020; **22**: 1694–703.
7. Australian Bureau of Statistics. Regional population, 2019, https://www.abs.gov.au/statistics/people/population/regional-population. Accessed 2 Jan 2023.
8. Eliezer DD, Holmes M, Sullivan G, Gani J, Pockney P. High-risk emergency laparotomy in Australia: comparing NELA, P-POSSUM, and ACS-NSQIP calculators. *J. Surg. Res.* 2020; **246**: 300–4.
9. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap) – a metadata-driven methodology and workflow process for providing translational research informatics support. *J. Biomed. Inform.* 2009 Apr; **42**: 377–81.
10. Lawrence VA, Hazuda HP, Cornell JE *et al*. Functional independence after major abdominal surgery in the elderly. *J. Am. Coll. Surg.* 2004; **199**: 762–72.
11. Tolstrup MB, Thorup T, Gögenur I. Chronic pain, quality of life and functional impairment after emergency laparotomy. *World J. Surg.* 2019; **43**: 161–8.
12. Saunders DI, Sinclair RCF, Griffiths B *et al*. Emergency Laparotomy Follow-Up Study (ELFUS): prospective feasibility investigation into postoperative complications and quality of life using patient-reported outcome measures up to a year after emergency laparotomy. *Perioper. Med. (Lond.)* 2021; **10**: 22.
13. Kwong E, Neuburger J, Murray D, Black N. Feasibility of collecting and assessing patient-reported outcomes for emergency admissions: laparotomy for gastrointestinal conditions. *BMJ Open Gastroenterol.* 2018; **5**: e000238.
14. Alder L, Mercer SJ, Carter NC, Toh SK, Knight BC. Clinical frailty and its effect on the septuagenarian population after emergency laparotomy. *Ann. R. Coll. Surg. Engl.* 2021; **103**: 180–5.
15. ANZELA-QI working Group. Second ANZELA-QI program summary report. RACS, 2022. https://www.surgeons.org/en/research-audit/morbidity-audits/morbidity-audits-managed-by-racs/anz-emergency-laparotomy-audit-quality-improvement. Accessed 2 Jan 2023.
16. NELA Project Team. Fourth Patient Report of the National Emergency Laparotomy Audit RCoA London, 2018. https://www.nela.org.uk/reports. Accessed 10 Jan 2023.
17. Carter B, Law J, Hewitt J *et al*. Association between preadmission frailty and care level at discharge in older adults undergoing emergency laparotomy. *Br. J. Surg.* 2020; **107**: 218–26.
18. Hajibandeh S, Hajibandeh S, Shah J *et al*. The risk and predictors of mortality in octogenarians undergoing emergency laparotomy: a multicentre retrospective cohort study. *Langenbecks Arch. Surg.* 2021; **406**: 2037–44.
19. Green G, Shaikh I, Fernandes R, Wegstapel H. Emergency laparotomy in octogenarians: a 5-year study of morbidity and mortality. *World J. Gastrointest. Surg.* 2013; **5**: 216–21.
20. Gazala S, Tul Y, Wagg A, Widder SL, Khadaroo RG, Acute Care and Emergency Surgery (ACES) Group. Quality of life and long-term outcomes of octo- and nonagenarians following acute care surgery: a cross sectional study. *World J. Emerg. Surg.* 2013; **8**: 23.
21. Vilches-Moraga A, Rowley M, Fox J *et al*. Emergency laparotomy in the older patient: factors predictive of 12-month mortality-Salford-POPS-GS. An observational study. *Aging Clin. Exp. Res.* 2020; **32**: 2367–73.
22. Chiu AS, Jean RA, Resio B, Pei KY. Early postoperative death in extreme-risk patients: a perspective on surgical futility. *Surgery* 2019; **166**: 380–5.
23. Aggarwal G, Broughton KJ, Williams LJ, Peden CJ, Quiney N. Early postoperative death in patients undergoing emergency high-risk surgery: towards a better understanding of patients for whom surgery may not be beneficial. *J. Clin. Med.* 2020; **9**: 1288.

# Appendix A

## A.1. Hela inclusion and exclusion criteria

| Inclusion criteria | Exclusion criteria |
|---|---|
| • Aged 18 years and over,<br>• Who undergo an expedited, urgent or emergency abdominal procedure on the gastrointestinal tract.<br><br>Including:<br>• Open, laparoscopic, or laparoscopically-assisted procedures<br>• Procedures involving the esophagus, stomach, spleen, liver, biliary tree, pancreas, small or large bowel, or rectum for conditions such as perforation, ischemia, abdominal abscess, bleeding, or obstruction.<br>• Washout/evacuation of intra-peritoneal abscess<br>• Washout/evacuation of intra-peritoneal hematoma<br>• Bowel resection/repair due to incarcerated incisional, umbilical, inguinal and femoral hernias.<br>• Laparotomy/laparoscopy with inoperable pathology (e.g., peritoneal/hepatic metastases) where the intention was to perform a definitive procedure. This does not include purely diagnostic procedures.<br>• Laparoscopic/Open adhesiolysis<br>• Return to theatre for repair of substantial dehiscence of major abdominal wound (i.e., "burst abdomen")<br>• Any reoperation/return to theatre for complications of elective general/upper GI surgery meeting the criteria above is included.<br>• Any returns to theatre for complications following non-GI surgery (vascular, renal, transplant, gynecological) with GI involvement for example, bowel injury. | • Patients aged under 18<br>• Elective laparotomy/laparoscopy<br>• Diagnostic laparotomy/laparoscopy where no subsequent procedure is performed<br>• Appendicectomy +/− drainage of localized collection unless the procedure is incidental to a non-elective procedure on the GI tract<br>• Cholecystectomy +/− drainage of localized collection unless the procedure is incidental to a non-elective procedure on the GI tract<br>• Non-elective hernia repair without bowel resection or division of adhesions<br>• Minor abdominal wound dehiscence, unless this causes bowel complications<br>• Non-elective formation of a colostomy or ileostomy as either a trephine or a laparoscopic procedure (unless a midline laparotomy is performed – then include)<br>• Laparotomy/Laparoscopy for pathology caused by blunt or penetrating trauma<br>• Vascular Surgery<br>• Gynecological Surgery; ruptured ectopic pregnancy or pelvic abscess due to PID<br>• Surgery to the renal tract<br>• Surgery relating to organ transplantation<br>• Surgery relating to sclerosing peritonitis<br>• Surgery for removal of dialysis catheters |

# Appendix B

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