

# Incidence of Anaphylaxis to Neuromuscular Blocking Drugs

## Confirming Comparative Rates and Implications to Practice



ST JOHN OF GOD  
Subiaco Hospital

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### A Known Risk

Neuromuscular blocking drugs (NMBDs) are associated with a risk of intraoperative anaphylaxis resulting in escalation of care, including transfer to the Intensive Care Unit, which may be complicated by significant morbidity and possible mortality.

Abandonment of surgery can result in its postponement until the causative agent is identified via allergy testing.

### Published Rates

Published rocuronium anaphylaxis rates in Western Australia have been higher than other neuromuscular blockers<sup>1</sup>, however incidence rates were obtained via manipulation of crude data. The aim was to establish more accurate incidence rates to influence future prescribing habits.

### Data Collection

From March 2018 to July 2022, the Intensive Care Unit clinical pharmacist at St John of God Subiaco Hospital recorded details of patients who have been referred for allergy testing following intraoperative anaphylaxis.

Results of skin testing were noted once received from the Western Australian Anaesthetic Drug Reaction Clinic (located at Sir Charles Gairdner Hospital).

### Correspondence from the Western Australian Anaesthetic Drug Reaction Clinic

Once a patient's allergy testing results have been received, the clinical pharmacist submits this information into the patient's cover page of their St John of God Subiaco Hospital Scanned Health Record.



EXAMPLE OF AN ALLERGY CLINIC LETTER RECEIVED CONCERNING A PATIENT WHO EXPERIENCED ROCURONIUM INDUCED ANAPHYLAXIS WITHIN THE DATA COLLECTION PERIOD

Anaesthesia was induced with ketamine, hydromorphone, propofol, rocuronium, granisetron, dexamethasone and cephazolin. She states that she remembers losing consciousness but feeling a sensation of impending doom as anaesthesia was induced. Post-induction she was initially stable, but after positioning prone developed rash and evidence of reduced cardiac output (low SpO<sub>2</sub>). Her blood pressure was 55mmHg, with a PR of approximately 130bpm. Bronchospasm was not a feature. There was no response to metaraminol, but adrenaline (50mcg boluses times 6), were effective. She was transferred intubated to intensive care, and made a full recovery without complications.

Due to the urgency of the operation, intradermal testing was arranged rapidly without the usual 4-6 week embargo. After informed consent and abstaining from antihistamines, I conducted intradermal testing with appropriate dilutions of propofol, cephazolin and rocuronium. A positive control (0.8% histamine SPT) indicated normal skin sensitivity for interpretation of the skin tests. All were negative except rocuronium, which produced a definite erythematous 10mm wheal (but no surrounding flare). Cross-sensitivity testing indicated that she is also hypersensitive to mivacurium, suxamethonium, vecuronium and suxamethonium. Only cisatracurium and atracurium were negative. Specific IgE investigations and baseline MCT are still pending.

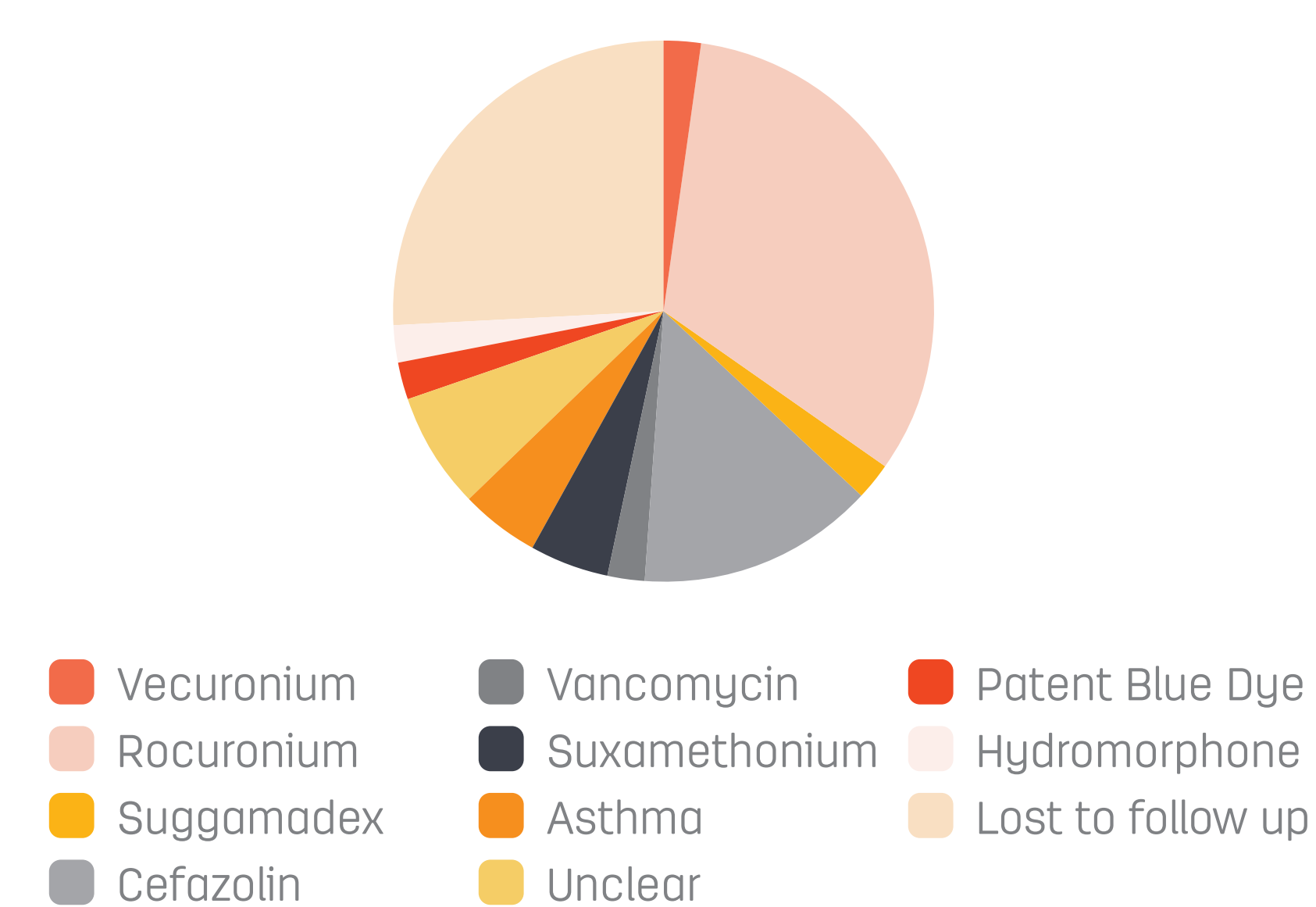
In summary, Julie is allergic to rocuronium, vecuronium, suxamethonium and mivacurium. I would suggest atracurium or cisatracurium for future surgery if indicated. She should also be premedicated with an antihistamine (eg. Phenergan) and inhaled ipratropium. I have completed a hospital MedAlert notification and sent Julie an application form for a Medic Alert bracelet.

### Data Analysis

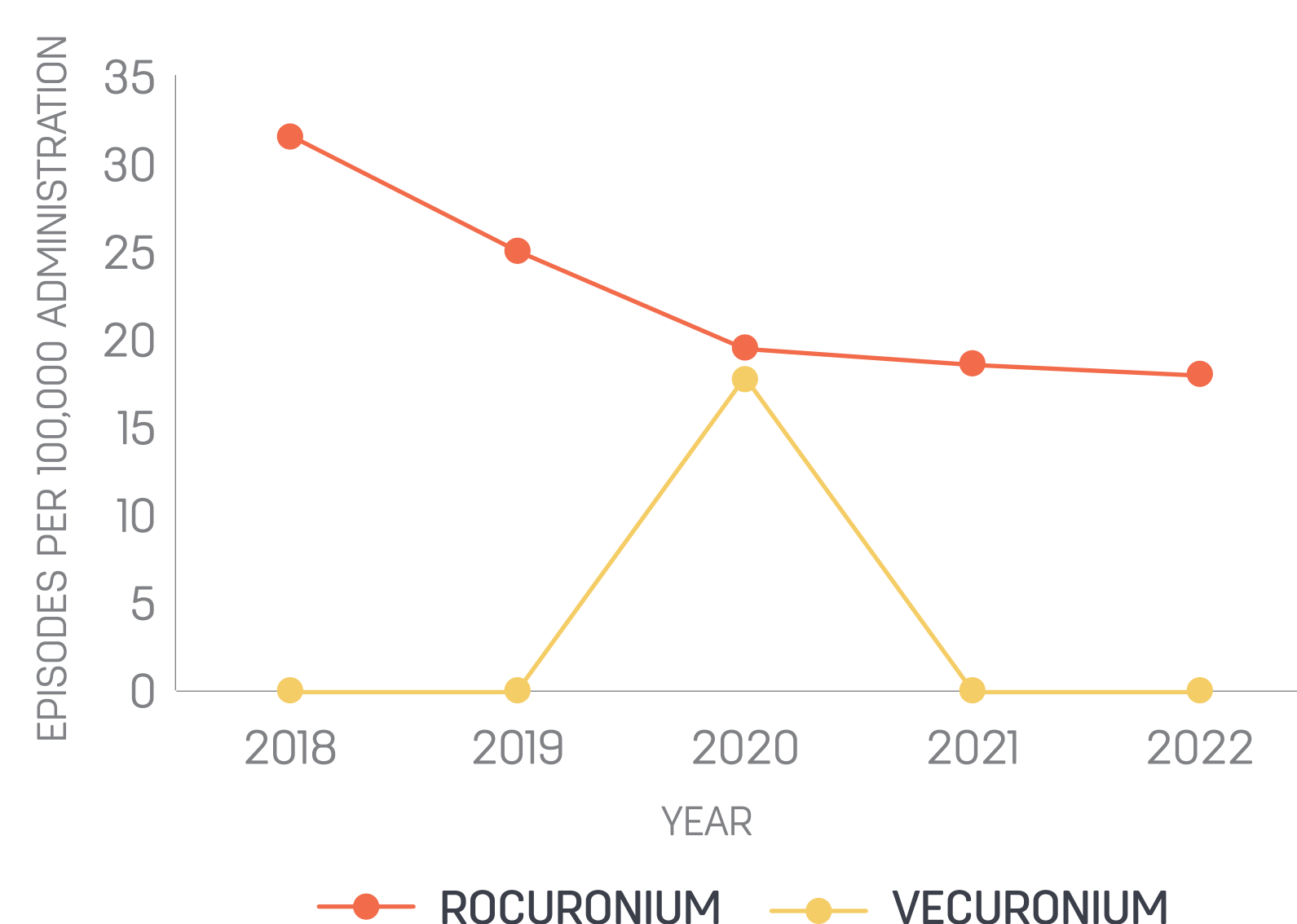
- Total of 43 reactions recorded.
- 32 detailed allergy clinic letters received.
- Anaphylaxis was reported to:
  - rocuronium (14 patients),
  - suxamethonium (2 patients),
  - vecuronium (1 patient),
  - cefazolin (6 patients), vancomycin (1 patient), sugammadex (1 patient), patent blue dye (1 patient), and hydromorphone (1 patient).
- Of the remaining 16 patients:
  - 3 patients had no allergic cause found,
  - 2 were deemed to have had an asthma exacerbation,
  - 11 patients did not attend their WA anaesthetic drug reaction clinic appointment.

Using number of anaphylaxis cases as the numerator and number of vials distributed to theatres as the denominator (assuming 1 vial = 1 exposure), the average incidence of anaphylaxis to rocuronium was calculated as 22.8 episodes per 100,000 administrations. Comparatively the average incidence of anaphylaxis to vecuronium was calculated as 4.4 episodes per 100,000 administrations.

CAUSATIVE AGENT (2018-PRESENT)



INCIDENCE OF ANAPHYLAXIS TO ROCURONIUM AND VECURONIUM AT ST JOHN OF GOD SUBIACO HOSPITAL



A 5 fold greater risk of intraoperative anaphylaxis from rocuronium administration was found compared with vecuronium.

### Checking prior pholcodine use at the pre-admission stage has the potential to decrease this risk.

Pholcodine has been demonstrated to be an IgE-sensitizing agent, sensitizing patients to epitopes common to NMBDs<sup>1</sup>. This link prompted Norway to withdraw pholcodine in 2007, after noting a 10 fold higher rate of rocuronium anaphylaxis in Norway when compared with Sweden, where pholcodine was not available<sup>1</sup>.

### References

1. Sadlier PHM, Clarke RC, Hunning DL, Platt PR. Anaphylaxis to neuromuscular blocking drugs: incidence and cross-reactivity in Western Australia from 2002 to 2011

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