

Characteristics of Opioid Errors Reported in Palliative Care Inpatient Services

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“...since prescribing and administration errors account for about three-fourths of medication errors, on average, a hospital patient is subject to at least one medication error per day.”¹



1. Institute of Medicine. Preventing Medication Errors: Quality Chasm Series. In: Aspden P, Wolcott J, Bootman JL, et al., eds. Washington DC: The National Academies Press, 2007.

Project background

In the Australian acute care setting, medication incidents are the 2nd most frequent incident reported after falls¹

Table 1: Top medications involved in Clinical Incidents, January 2013 – December 2016²

Top 15 Medication*	2013**		2014		2015		2016	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
Oxycodone***	606	590	654	395	685	613	658	687
Morphine****	485	513	477	492	539	479	497	515
Paracetamol	373	362	363	377	446	412	479	448
Insulin	249	266	373	424	479	456	380	375
Fentanyl	294	296	317	339	405	324	342	353
Other	202	283	233	207	326	328	331	315
Hydromorphone	118	139	146	172	170	226	227	301
Methadone	244	312	287	351	354	344	278	264

1. Roughead EE & Semple SJ. (2009) Medication safety in acute care in Australia: where are we now? Part 1: a review of the extent and causes of medication problems 2002-2008. *Australia and New Zealand Health Policy*, 6:18.
2. Clinical Excellence Commission. (2016). Clinical Incident Management in the NSW public health system – Medication. Retrieved Nov 1 2017, from <http://www.cec.health.nsw.gov.au/clinical-incident-management>

Opioids

- Classified as high risk medicines¹
- Primary pharmacological treatment for cancer pain
- Management of symptoms at end of life, e.g., pain, coughing, dyspnoea
- One of the most frequently reported drug classes in medication errors causing patient harm^{2,3}



1. Clinical Excellence Commission. (2014). High Risk Medicines. Retrieved Jun 30, 2017, from <http://www.cec.health.nsw.gov.au/programs/high-risk-medicines>
2. Colquhoun M, Koczmara C, Greenall J. Implementing system safeguards to prevent error-induced injury with opioids (narcotics): an ISMP Canada collaborative. Healthcare quarterly (Toronto, Ont). 2006;9 Spec No:36-42.
3. Hicks RW. MEDMARX Fifth Anniversary Data Report A Chartbook of 2003 Findings and Trends 1999-2003. Medical Benefits. 2005;22(4):10-1.

Medication errors - Patients at risk

- For some patients, heightened risk of harm again due to¹:
 - patients age
 - co-morbidities
 - complexity of illness
 - increased exposure to medication
 - more serious effects from errors



1. Myers, S. S., & Lynn, J. (2001). Patients with eventually fatal chronic illness: their importance within a national research agenda on improving patient safety and reducing medical errors. *Journal of Palliative Medicine*, 4(3), 325-332.

Opioid errors in palliative care

- Clinician driven project - senior palliative and cancer care clinicians identified addressing opioid errors as quality improvement priority¹

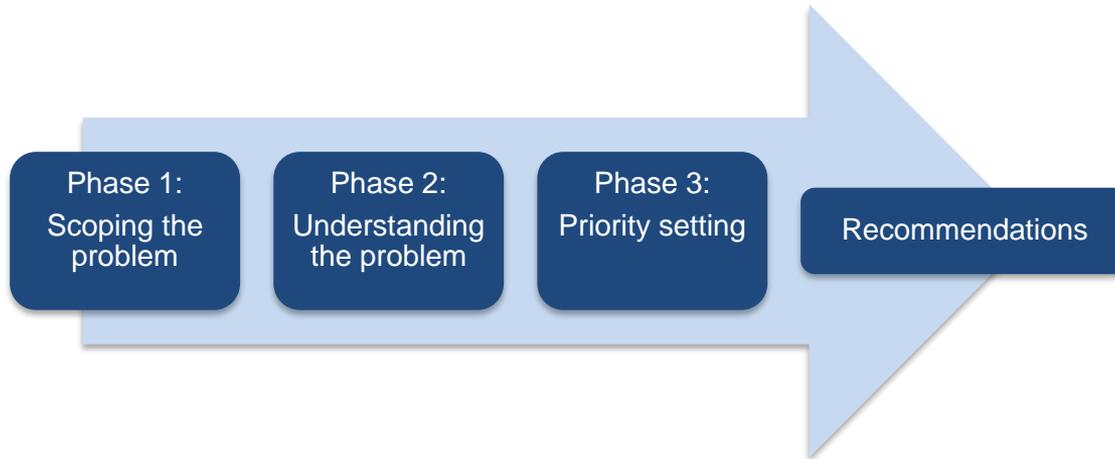
Palliative care clinicians' perceptions of opioid errors:

- occur regularly and are under-reported
- cause patient harm
- underpinned by human factors and gaps in skills and knowledge
- are a priority area for quality improvement

1. Heneka N, Shaw T, Azzi C, and Phillips JL. (2018). COMMENTARY: Clinicians' perceptions of medication errors with opioids in cancer and palliative care services. *Supportive Care in Cancer* (Under review)

Opioid errors in palliative care

- Study design: sequential, three phase, mixed methods study



Project Aims

- To identify the incidence, types and patient impact of medication errors with opioids reported in palliative care services.
- To explore palliative care clinicians' and service managers perceptions of, and attitudes towards, opioid errors.
- To identify and prioritise changes that are required to strengthen and/or reinforce safe opioid delivery processes and error reporting practices.
- To develop recommendations supporting safe opioid delivery processes within palliative care services.

Phase 1 – Scoping the problem

1. Systematic literature review
2. Identifying opioid errors reported at a state wide (NSW) level
3. Retrospective review of reported opioid errors at local specialist palliative care services



Study findings – Literature review¹

- Very little empirical research published (n=5)
- Deviation from opioid prescribing guidelines predominant error type reported
- Opioid administration errors not reported in the clinical setting
- Patient harm resulting from opioid errors not comprehensively reported
- Error incidence varied widely due to differing error focus of studies

1. Heneka, N., Shaw, T., Rowett, D. & Phillips, J.L. (2015). Quantifying the burden of opioid medication errors in adult oncology and palliative care settings: a systematic review. *Palliative Medicine*, 30(6), 520-532.

Study findings – Local services¹

Local opioid error review

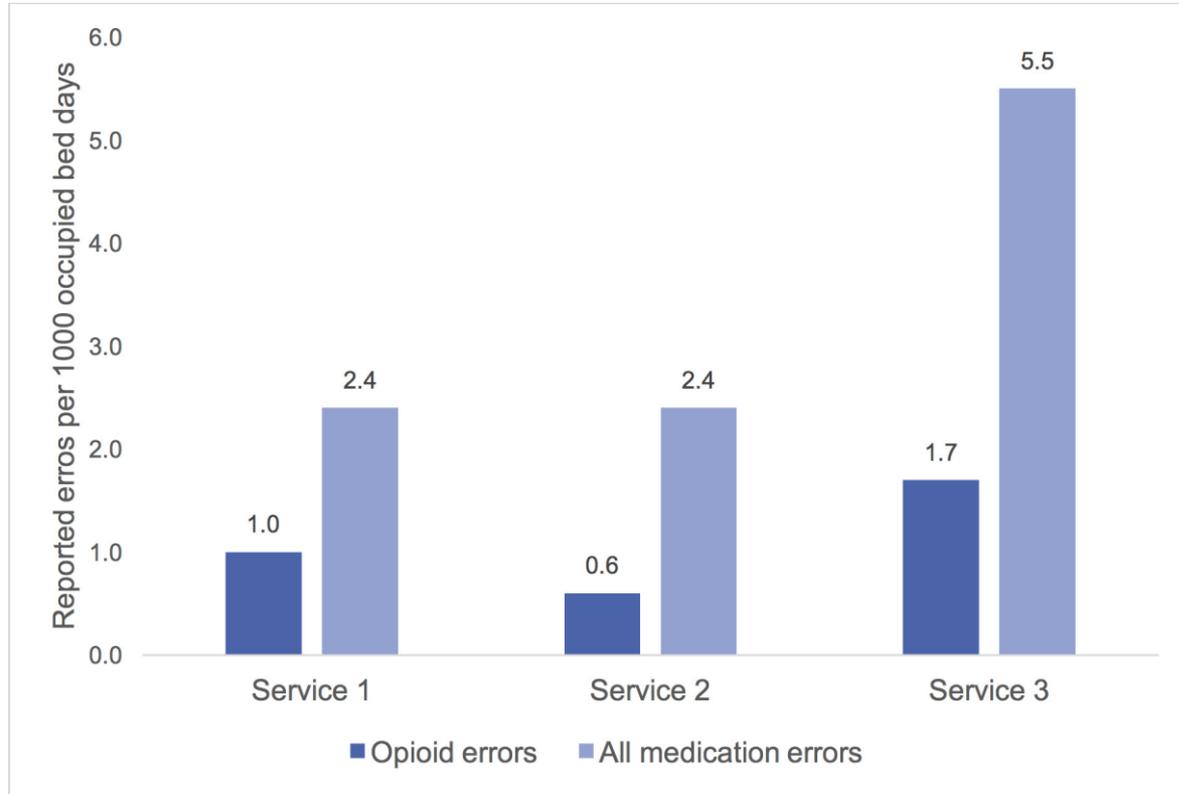
- Three specialist palliative care services in NSW
- Inclusion criteria: errors involving a Schedule 8 opioid ('opioid'); reported via the services' internal incident management system; and an inpatient aged ≥ 18 years
- Quantitative data: number of opioid errors and types
- Qualitative data: description of error as reported in incident management system and patient chart



1. Heneka, N., Shaw, T., Rowett, D., Lapkin, S., & Phillips, J. L. (2018). Opioid errors in inpatient palliative care services: a retrospective review. *BMJ Support Palliat Care*, 8(2), 175-179. doi:10.1136/bmjspcare-2017-001417

Local review - results

- Audit period: March 1, 2013 - February 28, 2015
- Opioid errors (N=55) accounted for 32% of all reported medication errors
- 0.9 (± 1.5) errors per 1000 occupied bed days
- Most errors involved morphine (35%) or hydromorphone (29%)
- Errors more likely with regular (78%) than PRN orders (22%)
- More errors with oral (49%) than subcutaneous (36%) or transdermal administration (15%)



Patient demographics

- 84% of errors (n=46) reached the patient
- Male: 51% (n=28); Mean age: 71.3 years ($SD\pm 10.7$)
- **Mean length of stay: 27.2 days ($SD\pm 20.0$)**
- Died during admission: 62% (n=34)
- Cancer diagnosis: 84% (n=46)
- Reason for admission:
 - Symptom management: 56% (n=31)
 - Pain control: 15% (n=8); End of life care: 15% (n=8)

Local review – error types

- Administration errors: 76% (n=42)
 - Omitted dose 33%
 - Wrong dose 24%
 - Transdermal patch error 19%
- Prescribing errors: 15% (n=8)
 - Medication charting errors 50%
 - Opioid conversion errors 25%
 - Wrong drug errors 25%
- Near miss: 5% (n=3)
- Dispensing: 4% (n=2)



MS Contin® Tablets
(morphine sulfate controlled-release)



Supplementary Table 2: Overview of reported opioid incidents by problem type

Problem type	Incident type	Service 1		Service 2		Service 3		Total	
		N=22	(100%)	N=14	(100%)	N=19	(100%)	N=55	(100%)
Administration	Total	13	(59.1)	12	(86.7)	17	(89.5)	42	(76.4)
	Omitted dose	9	(69.2)	0	0	5	(29.4)	14	(33.3)
	Wrong dose	3	(23.1)	4	(33.3)	3	(17.6)	10	(23.8)
	Transdermal patch error – missing or not removed	0	0	3	(25.0)	5	(29.4)	8	(19.1)
	Wrong drug	1	(7.7)	3	(25.0)	2	(11.8)	6	(14.3)
	Wrong patient	0	0	1	(8.3)	2	(11.8)	3	(7.1)
	Device – wrong rate	0	0	1	(8.3)	0	0	1	(2.4)
	Total	7	(31.8)	1	(7.1)	0	0	8	(14.5)
Prescribing	Medication charting	3	(42.9)	1	(100)	0	0	4	(50.0)
	Opioid conversion error	2	(28.6)	0	0	0	0	2	(25.0)
	Wrong drug	2	(28.6)	0	0	0	0	2	(25.0)
	Total	2	(9.1)	0	0	1	(5.3)	3	(5.4)
Near miss	Wrong patient	2	(100)	0	0	1	(100)	3	(100)
	Total	0	0	1	(7.1)	1	(5.3)	2	(3.6)
Dispensing	Drug preparation error	0	0	0	0	1	(100)	1	(100)
	Expired medicine dispensed	0	0	1	(100)	0	0	1	(100)
	Total	0	0	1	(7.1)	1	(5.3)	2	(3.6)

Local review – patient impact

- One-third (33%, n=18) of opioid errors resulted in patient harm requiring clinical intervention
- One-fifth (20%, n=11) of patients required monitoring and/or a clinical intervention to preclude harm following an opioid error

National Coordinating Council for Medication Error Reporting and Prevention error category ¹	N=55 (100%)
Category B - error occurred, did not reach patient	9 (16.4)
Category C - error reached patient, no patient harm ^a	11 (20.0)
Category D - error reached patient, required monitoring ^b and/or intervention ^c to preclude harm ^a	11 (20.0)
Category E - error resulting in temporary patient harm ^a which required intervention ^c	18 (32.7)
Error reached patient - patient impact/outcome not documented	6 (10.9)

^a Harm: Impairment of physical, emotional, or psychological function or structure of the body and/or pain resulting from error.

^b Monitoring: observation or recording of relevant physiological or psychological signs.

^c Intervention: change in therapy or active medical treatment.

1. Hartwig SC, Denger SD, Schneider PJ. Severity-indexed, incident report-based medication error-reporting program. *Am J Hosp Pharm* 1991;48(12):2611-6.

Local review – patient impact

- Opioid underdose due to error: 57% (n=26) of patients
 - 42% (n=11) of these patients required PRN opioids to manage increased pain (n=9) or shortness of breath (n=2) immediately following the error
- Opioid overdose due to error: 39% (n=18)
 - 1.5-fold to 11-fold overdose
 - Opioid toxicity documented in 39% (n=7) of patients; nil required naloxone
 - All opioid prescribing errors that reached the patient resulted in an over-dose

Table 1 Reported opioid error types and dosage characteristics

Opioid overdose characteristics

Error category	Error type	Opioid ordered	Opioid administered	Overdosage ¹⁰	
Prescribing	Medication charting— duplicated dose	Morphine subcutaneous 20 mg PRN	Additional morphine subcutaneous 20 mg PRN over 24 hours	Twofold	
	Medication charting	Hydromorphone orally 0.5 mg regular intended/2 mg recharted in error	Hydromorphone orally 2 mg	Fourfold	
	Conversion error	Morphine orally to hydromorphone subcutaneous Fentanyl transdermal to hydromorphone subcutaneous		1.5-fold Twofold	
Administration	Wrong dose	Oxycodone orally 20 mg PRN	Additional oxycodone orally 20 mg PRN	Twofold	
		Morphine orally 20 mg regular	Morphine orally 40 mg	Twofold	
		Oxycodone orally 10 mg PRN	Oxycodone orally 20 mg*	Twofold	
		Hydromorphone orally 5 mg regular	Hydromorphone orally 10 mg	Twofold	
	Wrong drug	Morphine subcutaneous 60 mg via syringe driver	Morphine subcutaneous 60 mg via two syringe drivers	Twofold	
		Morphine subcutaneous 5 mg regular	Hydromorphone subcutaneous 5 mg	Sixfold	
		Morphine subcutaneous 10 mg regular	Hydromorphone subcutaneous 10 mg	Sixfold	
	Transdermal patch—not removed	Fentanyl subcutaneous 350 µg (via syringe driver)	Morphine subcutaneous 400 mg (via syringe driver)	11-fold	
		Fentanyl 12 µg	Fentanyl 12 µg patch in situ 7 days	Unable to determine	
		Fentanyl 25 µg	Buprenorphine 5 mg patch in situ 6 days	Unable to determine	
		Fentanyl 25 µg	Buprenorphine 25 mg patch in situ 3 days	Unable to determine	
	Wrong patient	Endone orally 5 mg regular	Fentanyl 37 µg	Patch in situ 3 days following order to remove	Unable to determine
			Oxynorm orally 10 mg	Twofold	

Opioid underdose characteristics

Problem type	Error type	Opioid ordered	Opioid administered	Underdosage (% of ordered dose) ¹⁰	
Administration	Wrong dose	Morphine subcutaneous 40 mg regular	Morphine subcutaneous 4 mg	10	
		Hydromorphone orally 80 mg regular	Hydromorphone orally 8 mg	10	
		Morphine orally 120 mg regular	Morphine orally 60 mg	50	
	Wrong drug	Oxycodone/naloxone 10/5 regular	Oxycodone/naloxone 5/2.5	50	
		Hydromorphone subcutaneous 5 mg regular	Morphine subcutaneous 5 mg	12	
		OxyContin orally 10 mg regular	MS Contin subcutaneous 5 mg	33	
		Hydromorphone subcutaneous 1.5 mg PRN	Fentanyl subcutaneous 60 µg	50	
		Error type Omitted dose	Number of doses omitted	Frequency	
			1	9	
	2		3		
	3	2			

*Two instances of same wrong dose error in different patients.

Heneka, N., Shaw, T., Rowett, D., Lapkin, S., & Phillips, J. L. (2018). Opioid errors in inpatient palliative care services: a retrospective review. *BMJ Support Palliat Care*, 8(2), 175-179. doi:10.1136/bmjspcare-2017-001417

Phase 2 – Qualitative study

- Palliative care clinicians (N=58): nurses (n=44), doctors (n=12) and pharmacists (n=2)
- Semi-structured interviews (n=20) and focus groups (n=8)
- Exploring clinicians' perceptions of:
 - Opioid error characteristics and error reporting practice
 - Factors contributing to opioid errors
 - Opioid safety culture

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