

Evaluation of physical compatibility of Intravenous (IV) oxycodone with selected drugs, co-administered via Y-type connectors

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Background

IV Oxycodone is frequently used for pain management in acute-care settings, often requiring co-administration with other medications, usually via Y-site connectors (fig 1).

Unfortunately, limited data is available for Y-site compatibility of IV Oxycodone with commonly co-administered drugs, making medication administration challenging.



Fig 1: Y-site IV connectors

Aims

Determination of physical compatibility of selected parenteral oxycodone combined with a selection of frequently co-administered medications

Methods

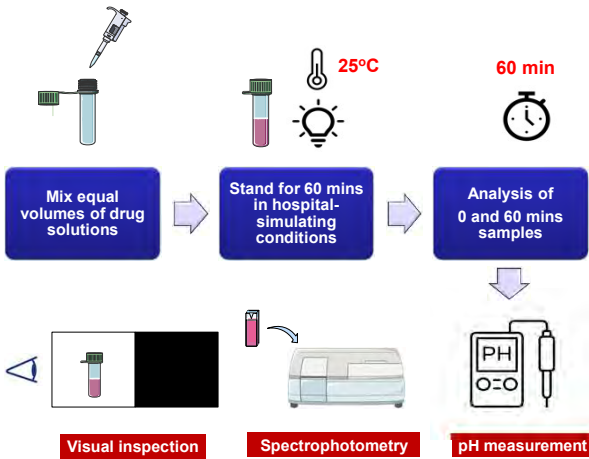
A range of drugs that are frequently required to be administered at the same time as oxycodone was selected to be studied (table 1). The concentration of drug solutions to be tested were based on local IV administration guidelines and ICU practices

Table 1: A list of studied combinations and their doses

Drug 1	Concentration*	Drug 2	Concentration*
Oxycodone	1 mg/mL	Ketamine	4 mg/mL
		Clonidine	30 microgram/mL
		Tramadol	50 mg/mL
		Vancomycin	12 mg/mL
		Piperacillin / Tazobactam	200 mg/mL
		Dexmedetomidine	8 microgram/mL
		Gentamicin	40 mg/mL
		Cefotaxime	100 mg/mL

*Concentrations of tested drug mixtures were based on local IV administration guidelines and ICU practices

The methodology chosen was to simulate co-administration via a Y-type connector. As per the literature physical compatibility assessment is a suitable methodology to simulate a 10 minute dwell time of the co-administered drugs within a Y-type connector [1].



Data collected after mixing at times 0 and 60 mins were compared, and the physical compatibility was determined according to the criteria in table 2 [2,3].

Table 2: Assessment criteria for determining physical compatibility

Parameter	Result	Physical compatibility
Visual inspection against white and black backgrounds		
Color change	No	Yes
Turbidity	No	Yes
Precipitate	No	Yes
Effervescence	No	Yes
Spectrophotometry [#]	Overlapping spectra with no extra or missing peaks	Yes
pH changes [#]	< 0.5	Yes

[#]The consistency of pH values and spectra data confirm the presence of the mixed drugs in their intact forms and an absence of newly formed degradation products

Results

Table 3: Visual observations of tested combinations after mixing at times 0 and 60 mins against white and black backgrounds

Time: 0 min	Mixture	White background			Black background			Compatibility (Yes/No)
		Color Change	Precipitation	Effervescence	Color Change	Precipitation	Effervescence	
1	Ketamine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
2	Clonidine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
3	Tramadol / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
4	Vancomycin / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
5	Dexmedetomidine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
6	Piperacillin and tazobactam/Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
7	Gentamicin / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
8	Cefotaxime / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES

Time: 60 mins	Mixture	White background			Black background			Compatibility (Yes/No)
		Color Change	Precipitation	Effervescence	Color Change	Precipitation	Effervescence	
1	Ketamine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
2	Clonidine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
3	Tramadol / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
4	Vancomycin / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
5	Dexmedetomidine / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
6	Piperacillin and tazobactam/Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
7	Gentamicin / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES
8	Cefotaxime / Oxycodone	(-)	(-)	(-)	(-)	(-)	(-)	YES

(+) change observed (-) No change observed

Table 4: pH differences of the tested combinations between times 0 and 60 mins

Mixtures	pH Difference	Compatibility * (Yes/No)
1 Ketamine / Oxycodone	0.05	YES
2 Clonidine / Oxycodone	0.04	YES
3 Tramadol / Oxycodone	0	YES
4 Vancomycin / Oxycodone	0.06	YES
5 Dexmedetomidine / Oxycodone	0.09	YES
6 Piperacillin and tazobactam/ Oxycodone	0.06	YES
7 Gentamicin / Oxycodone	0.19	YES
8 Cefotaxime / Oxycodone	0.21	YES

* Compatibility was confirmed if the pH difference between times 0 and 60 mins was less than 0.5

Table 5: Spectrophotometric change in the tested combinations between times 0 and 60 mins (200 – 800 nm)

Mixtures	Identical spectra with no extra peaks	Compatibility (Yes/No)
1 Ketamine / Oxycodone	Confirmed	YES
2 Clonidine / Oxycodone	Confirmed	YES
3 Tramadol / Oxycodone	Confirmed	YES
4 Vancomycin / Oxycodone	Confirmed	YES
5 Dexmedetomidine / Oxycodone	Confirmed	YES
6 Piperacillin and tazobactam/ Oxycodone	Confirmed	YES
7 Gentamicin / Oxycodone	Confirmed	YES
8 Cefotaxime / Oxycodone	Confirmed	YES

Conclusion

This study provides evidence supporting co-administration (via Y-site) of IV Oxycodone with the tested medications. This data will enable clinicians to use these drugs in combination providing the patient best possible tailored medication regime.

References

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