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Review**Norovirus introduction routes into nursing homes and risk factors for spread: a systematic review and meta-analysis of observational studies**

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SUMMARY

Norovirus causes substantial morbidity and mortality in nursing homes, with high attack rates in residents and staff. Immediate implementation of infection control measures is crucial. The aim of this review was to assess the evidence for sources and modes of introduction of norovirus, and factors contributing to spread. A systematic review of the literature was performed, including peer-reviewed original studies on outbreaks confirmed by reverse transcriptase–polymerase chain reaction. Data on source, index case, transmission mode, attack rate, outbreak duration, and risk factors were extracted. Attack rate and outbreak duration were compared by mode of introduction. Based on the selection criteria, 40 outbreak reports and 18 surveillance studies were included. There is little systematic information available on norovirus introduction into nursing homes, but, from evidence obtained from outbreak reports, it was determined that outbreaks often start with single index cases (57.5%), associated with higher attack rates among residents ($P = 0.02$). Foodborne introduction was described for 7% of outbreak reports that were characterized by finding multiple index cases. In surveillance studies only 0.7% of outbreaks was reported to be foodborne, 28.5% as person-to-person, and 70.8% remained unknown or not mentioned. Risk factor analyses suggested that transmission was associated with bedside care and exposure to vomit. These findings lead to the following recommendations: (i) to standardize outbreak reports; (ii) to improve early detection and isolation of sporadic cases; (iii) to improve personal hygiene of

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