

# On Morbidity and Mortality in Norovirus Infection

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av

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The thesis is based on the following papers:

- I. Lars Gustavsson, Lars-Magnus Andersson, Magnus Lindh, Johan Westin  
**Excess mortality following community-onset norovirus enteritis in the elderly**  
*Journal of Hospital Infection* 2011; 79:27-31.
- II. Lars Gustavsson, Lars-Magnus Andersson, Magnus Brink, Magnus Lindh, Johan Westin  
**Venous lactate levels can be used to identify patients with poor outcome following community-onset norovirus enteritis**  
*Scandinavian Journal of Infectious Diseases* 2012; 44:782-787
- III. Lars Gustavsson, Susann Skovbjerg, Magnus Lindh, Johan Westin, Lars-Magnus Andersson  
**Low serum levels of CCL5 are associated with longer duration of viral shedding in norovirus genogroup II infection**  
*In manuscript*
- IV. Lars Gustavsson, Johan Westin, Lars-Magnus Andersson, Magnus Lindh  
**Rectal swabs can be used for diagnosis of viral gastroenteritis with a multiple real-time PCR assay**  
*Journal of Clinical Virology* 2011; 51:275-278

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# On Morbidity and Mortality in Norovirus Infection

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## ABSTRACT

Norovirus causes epidemic gastroenteritis. The extent of excess mortality related to norovirus infections is not established and factors that influence the duration of viral shedding have not been determined. The aims of this thesis were (i) to describe the mortality among hospitalised patients with norovirus enteritis (NVE), (ii) to identify factors that indicate an increased mortality risk and a prolonged duration of viral shedding, and (iii) to examine if rectal swab samples can be used for the diagnosis of norovirus infection.

In **paper I**, we retrospectively studied 598 adult hospitalised patients with gastroenteritis and a stool sample positive for norovirus. For ages >80 years, 30-day mortality was higher among patients with community-onset NVE, compared to patients with hospital-onset NVE and to matched controls. In **paper II**, 82 patients with community-onset NVE were included. The adjusted odds ratio for death within 30 days was 2.5 for one mmol/L increase in the venous lactate measured on arrival to the emergency department. **Paper III** presents a prospective study of 28 patients admitted with NVE. Rectal swab samples were obtained weekly during follow-up. Slow clearance of norovirus was associated with low serum levels of the chemokine CCL5 and high viral load. In **paper IV**, PCR was performed on paired rectal swab and stool samples, obtained simultaneously from 69 patients with suspected viral gastroenteritis. In 38 sample pairs virus was detected in both samples. One pair was stool+/swab- and one pair was stool-/swab+.

In conclusion, norovirus infection may be associated with increased short-term mortality. Venous lactate can be used to identify patients with high mortality risk and a low level of CCL5 is associated with a long duration of viral shedding. Rectal swab samples can be used to diagnose norovirus infections.

**Keywords:** norovirus, mortality, lactate, viral shedding, CCL5, rectal swab

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