

## University of Groningen

### Information technology and medication safety

van der Veen, Willem

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2018

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

van der Veen, W. (2018). *Information technology and medication safety*. [Groningen]: Rijksuniversiteit Groningen.

**Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

**Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# **INFORMATION TECHNOLOGY AND MEDICATION SAFETY**

**Willem van der Veen**

Cover concept:	Willem van der Veen
Cover design and layout:	© Evelien Jagtman <a href="http://www.evelienjagtman.com">www.evelienjagtman.com</a>
Printing:	Gildeprint <a href="http://www.gildeprint.nl">www.gildeprint.nl</a>
ISBN (e-book):	978-94-034-1137-8
ISBN (printed book):	978-94-034-1138-5

Printing of this thesis was financially supported by the Groningen Graduate School of Science and Engineering (GSSE), the University of Groningen, Stichting Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie (KNMP) Fondsen, and The Saxenburg Groep – Röpcke-Zweers ziekenhuis Hardenberg and is gratefully acknowledged.

© Copyright W. van der Veen

For articles published, the copyright has been transferred to the respective publisher. No part of this thesis may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the permission of the author or, when appropriate, the publisher of the manuscript.



rijksuniversiteit  
groningen

## INFORMATION TECHNOLOGY AND MEDICATION SAFETY

### Proefschrift

ter verkrijging van de graad van doctor aan de  
Rijksuniversiteit Groningen  
op gezag van de  
rector magnificus prof. dr. E. Sterken  
en volgens besluit van het College voor Promoties.

De openbare verdediging zal plaatsvinden op

vrijdag 21 december 2018 om 12.45 uur

door

**Willem van der Veen**

geboren op 16 mei 1952  
te Groningen

**Promotores**

Prof. dr. K. Taxis  
Prof. dr. P.M.L.A. van den Bemt  
Prof. dr. J.J. de Gier

**Beoordelingscommissie**

Prof. dr. J.G.W. Kosterink  
Prof. dr. H. Vermeulen  
Prof. dr. C. Wagner

## **Paranimfen**

dr. A.G. van der Veen

drs. W.A.M. van der Veen

first do no harm

01100110	01101001	01110010	01110011	01110100	00100000	01100100	01101111
00100000	01101110	01101111	00100000	01101000	01100001	01110010	01101101

Voor wie anders dan Wilma



# TABLE OF CONTENTS

<b>Chapter 1</b>	<b>11</b>
Introduction, overall aims, and thesis outline	
<b>Chapter 2</b>	<b>25</b>
Overview of strategies to improve the safety of medication administrations in hospitals	
<i>Safe medication administration in hospitals</i>	
<i>Nederlands Tijdschrift voor Geneeskunde 2017;161(0):D1778</i>	
<b>Chapter 3</b>	<b>43</b>
Classification of medication incidents associated with information technology	
<i>J Am Med Inform Assoc 2014;21:63-70</i>	
<b>Chapter 4</b>	<b>71</b>
Risk analysis and user satisfaction after implementation of computerized physician order entry in Dutch hospitals	
<i>Int J Clin Pharm 2013;35:195-201</i>	
<b>Chapter 5</b>	<b>97</b>
Associations between workarounds and medication administration errors in bar-code-assisted medication administration: Protocol of a multicenter study	
<i>JMIR Res Protoc 2017;6:e74</i>	
<b>Chapter 6</b>	<b>119</b>
Associations between workarounds and medication administration errors in bar-code-assisted medication administration	
<i>J Am Med Inform Assoc 2018;25:385-392</i>	
<b>Chapter 7</b>	<b>139</b>
Factors associated with workarounds in bar-code-assisted medication administration in hospitals	
<i>Submitted</i>	
<b>Chapter 8</b>	<b>157</b>
Summary and general discussion	

<b>Chapter 9</b>	<b>169</b>
From 'Lay summary' to 'About the Author'	
9.1 Lay summary	171
9.2 Publiek samenvatting	175
9.3 PhD portfolio	179
9.4 Dankwoord / Acknowledgements	183
9.5 About the Author (Dutch / English)	189

