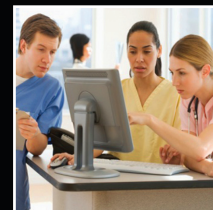
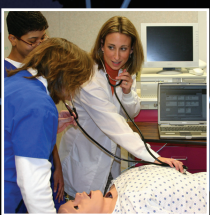


Nursing and Informatics for the 21st Century

An International Look at Practice, Education and EHR Trends

Second Edition



EDITED BY

Charlotte A. Weaver

Connie White Delaney

Patrick Weber

Robyn L. Carr

HimSS[®]

AMIA American Medical
Informatics Association
The professional home for biomedical and health informatics

NURSING AND INFORMATICS
for the 21st Century
An International Look at Practice,
Education and EHR Trends
Second Edition

Edited by
Charlotte A. Weaver
Connie White Delaney
Patrick Weber
Robyn L. Carr

HimSS[®]

AMIA **American Medical
Informatics Association**
The professional home for biomedical and health informatics

HIMSS Mission

To lead healthcare transformation through effective use of health information technology.

AMIA Mission

AMIA advances the informatics professions relating to health and disease. To this end it advances the use of health information and communications technology in clinical care and clinical research, personal health management, public health/population, and translational science with the ultimate objective of improving health.

© 2010 by Healthcare Information and Management Systems Society (HIMSS).

All rights reserved. No part of this publication may be reproduced, adapted, translated, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher.

Printed in the U.S.A. 5 4 3 2 1

Requests for permission to make copies of any part of this work should be sent to:

Permissions Editor
HIMSS
230 E. Ohio, Suite 500
Chicago, IL 60611-3269
nvitucci@himss.org

The inclusion of an organization name, product or service in this publication should not be considered as an endorsement of such organization, product or service, nor is the failure to include an organization name, product or service to be construed as disapproval.

ISBN 978-0-9821070-4-1

For more information about HIMSS, please visit www.himss.org.

About the Editors

Charlotte Weaver, PhD, RN, MSPH, FHIMSS, is Senior Vice President and Chief Clinical Officer for Gentiva Health Services, Atlanta, GA, and serves as Adjunct Professor at the University of Kansas School of Nursing and the University of Minnesota School of Nursing. Previously, she was with Cerner Corporation from 1999 to 2008 where she served as the first Chief Nurse Officer in the IT industry until May 2007. Dr. Weaver then moved into the position of Vice President and Executive Director for Nursing Research—a new and uniquely created role to foster nursing research. Her informatics career started in academia at the University of Hawaii in 1981 and over the intervening three decades has covered every side of the industry—software supplier, consulting and provider in the United States, UK, Europe, Canada and Australia. Dr. Weaver has served as part of the TIGER Initiative (Technology Informatics Guiding Education Reform) since its inception in 2004. She has been a long standing AMIA and NIWG member and is currently NIWG chair. She has served as corporate member to the International Medical Informatics Association, Nursing Informatics Working Group (IMIA-NI) from 2004-2008; she currently chairs IMIA-NI's evidence-based nursing practice working group. Dr. Weaver is a HIMSS Fellow, a member of HIMSS' Nursing Informatics (NI) Community and served as NI Committee chair for 2007-2008. A frequent presenter at national and international conferences, Dr. Weaver is widely published in informatics, patient safety and quality, and evidence-based practice.

Connie White Delaney, PhD, RN, FAAN, FACMI, is Professor and Dean of the School of Nursing at the University of Minnesota. Dr. Delaney is the first nurse informatician Fellow in the American College of Medical Informatics to be selected as dean for a major university in the United States, a position she has held since August 2005. She also holds an appointment in the Institute for Health Informatics, University of Minnesota. Dr. Delaney has held a professorship at the University of Iceland, Faculty of Medicine and Faculty of Nursing, with focused activities in health informatics for 10 years. Prior to her deanship position, she held a full professor position at the University of Iowa, College of Nursing, where she led the nursing informatics graduate program, directed the Institute for Knowledge Discovery, and served as director/co-director of research teams; these teams included the International Nursing Minimum Data Set, USA Nursing Management Minimum Data Set, and USA Nursing Minimum Data Set. In addition, she led development of evidence-based nursing protocols translated to automated clinical information systems and data mining of large data sets. Dr. Delaney currently serves on numerous boards, including the LifeScience Alley, a Minnesota-based trade association in the Upper Midwest focused on the life sciences; the American Medical Informatics Association (AMIA), and the American Association of Colleges of Nursing, Premiere Quest National Advisory Panel. She serves as the U.S. Government Accountability Office (GAO) appointee to the Health Information Technology Policy Committee, which is charged with making policy recommendations related to the nation's health information technology infrastructure. Most recently, she co-edited the October 2008 special issue of *Nursing Outlook*; this issue focused on Nursing Informatics as a strategic initiative of the American Academy of Nursing.

Patrick Weber, MA, RN, is Director and Principal of Nice Computing in Lausanne, Switzerland. He has more than 30 years of healthcare experience, with more than 20 years in the field of health informatics. Mr. Weber has served as his country's national representative to IMIA-Nursing Informatics for over ten years and is a recognized informatics leader across Europe. He has been a pivotal leader in the European Federation for Medical Informatics

(EFMI) holding numerous offices in EFMI and in Switzerland's Nursing Association. Mr. Weber works extensively across Europe and is a frequent collaborator on informatics projects across the European Union countries. He has numerous publications in both English and French and is a frequent presenter at national and international conferences.

Robyn L. Carr, RGON, is Director of Informatics Project Contracting at IPC & Associates, Cambridge, New Zealand. Prior to starting her own IT consulting company in the Asia-Pacific Rim countries, Ms. Carr served in various clinical management and administrative positions in New Zealand Health Services for over 35 years. In her consulting business, she has served as an international consultant for IT initiatives in countries as far ranging as Taiwan and South Africa. She was a founding member of the Health Informatics New Zealand in 1991 and has been a member and active leader since that time. In addition, Ms. Carr has served as New Zealand's country representative into the International Medical Informatics Association (IMIA) Nursing Informatics – Special Interest Group for the past 15 years. Her leadership on the international level resulted in her winning host country bid for the International Nursing Informatics Congress of 2000, and holding numerous board positions within IMIA-NI-SIG, including chair (2006-09). Ms. Carr is widely networked and well respected internationally. Ms. Carr co-authored *NINZ the first 10 years*, published in 2000, and is co-editor of “*One Step Beyond: The Evolution of Technology and Nursing*,” the 7th International Congress Nursing Informatics Proceedings.

Contributors

Outi Ahonen, MNSc

Senior Lecturer
Department of Social Services, Health and
Sports
Laurea University of Applied Sciences

**Suzanne Bakken, DNSc, RN, FAAN,
FACMI**

Alumni Professor of Nursing
School of Nursing
Professor of Biomedical Informatics
Department of Biomedical Informatics
Columbia University

**Marion J. Ball, EdD, FACMI, FCHIME,
FHIMSS, FAAN**

Senior Advisor
Healthcare and Life Sciences Institute
IBM Research
Professor Emerita
Johns Hopkins University School of
Nursing

Cristina Barrios, BSN

Department of Nursing Direction
Favaloro Foundation – University Hospital

Claudia Bartz, PhD, RN, FAAN

Coordinator, International Classification for
Nursing Practice (ICNP[©])
International Council of Nurses (ICN)
College of Nursing
University of Wisconsin-Milwaukee

Lejo Bouma, RN

Department of Youth Health Care
CARE

**Suzanne Brown, MSc Health Informatics,
BNS**

Assistant Nurse Coordinator, Computer
Sciences
Department of Information Management
Mater Misericordiae University Hospital

**Claire Buchner, MSc Health Informatics,
BSc(Hons) Nursing Studies**

Teaching Fellow
School of Nursing & Midwifery
Queens University Belfast

Laura J. Burke, PhD, RN, FAAN

Director
Department of System Nursing Research
& Scientific Support, c/o Aurora Sinai
Medical Center
Aurora Health Care

Helen K. Burns, PhD, MN, BSN, RN, FAAN

Associate Dean for Clinical Education
School of Nursing
University of Pittsburgh

Andrew F. Carlson, BS Systems Analysis

Strategic Program Manager
Department of Information Systems
Aurora Health Care

Anne Casey, MSc, RN, FRCN

Royal College of Nursing, UK

Mary Chambers, PhD, BED(Hons)

Professor of Mental Health Nursing
Faculty of Health and Social Care Sciences
St. Georges University of London/Kingston
University

Polun Chang, PhD

Associate Professor
Institute of BioMedical Informatics
National Yang-Ming University

Insook Cho, PhD

Professor
Department of Nursing, School of Medicine
Inha University

Lynn M. Choromanski, MS, RN

Nursing Informatics Specialist
Department of Nursing Administration
Gillette Children's Specialty Healthcare

Thomas R. Clancy, PhD, MBA, RN

Clinical Professor
School of Nursing
University of Minnesota

Amy Coenen, PhD, RN, FAAN

Director, International Classification for
Nursing Practice (ICNP[®])
International Council of Nurses (ICN)
College of Nursing
University of Wisconsin-Milwaukee

Beverly J. Collins, MS, RN

Research Fellow
Institute for Health Informatics
University of Minnesota

Rita W. Collins, PhD, MEd, BNS, RN, RM

Lecturer
School of Nursing, Midwifery & Health
Systems
University College Dublin

Jennifer Conner, BA

Engagement Leader, Consulting
Cerner Corporation

Helen R. Connors, PhD, DrPS (Hon), RN, FAAN

Executive Director
Center for Health Informatics
E. Jean M. Hill Professor
School of Nursing
University of Kansas

Robyn Cook, MBA, BBus, RN

Honorary Associate
Faculty of Nursing & Midwifery
University of Technology, Sydney

Karen L. Courtney, PhD, RN

Assistant Professor
Department of Health and Community
Systems
University of Pittsburgh School of Nursing

Grace T.M. Dal Sasso, Nursing Informatics PhD, RN

Adjunct Professor
Department of Nursing
Federal University of Santa Catarina

Kelly Marie Damon, MAL, BSN, RN

Director
Department of Nursing
Oasis Hospital

Walter De Caro, MNs, DAI

Head, Nursing and Health Profession
Service
Minister of Defense (Italy) – General Direc-
torate Military Health Services
Public Health Department
University Sapienza Roma (Italy)

Elizabeth C. Devine, PhD, MSN, RN

Professor
College of Nursing
University of Wisconsin-Milwaukee

Charles Docherty, PhD, MN, MBCS, BN, RN, RNT

Royal College of Surgeons in Iceland (RCSI)

Beth A. Donahue, MA, BAN, RN-BC

Assistant Professor
School of Nursing
The College of St. Scholastica

Donna B. DuLong, BSN, RN

Nancy E. Dunton, PhD
Research Associate Professor
School of Nursing
University of Kansas Medical Center

Nighat Ijaz Durrani, MPH(PAK), Dip in Administration & Teaching, Ophthalmic Nursing UK, RN, RM

Registrar
Pakistan Nursing Council

Patricia C. Dykes, DNSc, MA, RN

Corporate Manager, Nursing Informatics
and Research
Department of Clinical Informatics
Research and Development/Information
Systems
Partners HealthCare

Margareta Ehnfors, PhD, Dipl NEd, RN

Professor
School of Health and Medicine
Orebro University

Anna Ehrenberg, PhD, RN

Associate Professor
School of Health and Social Sciences
Dalarna University

Scott W. Eising, BS

Director, Product Management
Department of Global Products and
Services
Mayo Clinic

Anneli Ensio, PhD, RN

Research Director
Department of Health Policy and
Management
University of Kuopio

Firdevs Erdemir, PhD, RN

Associate Professor
Department of Nursing
Baskent University

Sally K. Fauchald, PhD, RN

Associate Professor and Chair
Department of Graduate Nursing
The College of St. Scholastica

Myriam Martin Fernández, PhD, MSN, RN

IA, Nurse Leader
Spain Services
Cerner Iberia

Daniel Flemming, Dipl. Kaufmann, RN

Faculty of Business Management and
Social Sciences
Health Informatics Research Group
University of Applied Sciences Osnabrueck

**Joanne Foster, GradDipCIEdn, MEdTech,
DipAppSc (NsgEd), BN, RN**

School of Nursing
Queensland University of Technology

**Yoadis Cuesta Garcia, Master of Science
in Health Informatics, Teacher in Health
Informatics, BSN, BCN**

Department of Health, Education
Cybernetics Center Applied to Medicine
(CECAM)

Ayala Gonen, PhD, RN

Nursing Informatics Manager
Department of Nursing
Tel Aviv Souraski Medical Center

William T.F. Goossen, PhD, RN

Director
Results 4 Care B.V.

A.T.M. Goossen-Baremans, MSN, RN

Results 4 Care B.V.

Brian Gugerty, DNS, MS, RN

Owner
Gugerty Consulting, LLC

Herdís Gunnarsdóttir, MSc, MBA, BSc, RN

Project Manager
Department of Development, Nursing
Chief Executive Officer Office
Landspítali University Hospital

Kathryn J. Hannah, PhD, RN

Executive Project Leader
Canadian Health Outcomes for Better
Information and Care
Health Informatics Advisor
Canadian Nurses Association

Nicholas R. Hardiker, PhD, RN

Senior Research Fellow
School of Nursing
University of Salford

Ellen Harper, MBA, RN

Senior Director, CNO Lighthouse
Cerner Corporation

Marceline Harris, PhD, RN

Nurse Administrator and Senior Associate
Consultant
Department of Nursing and Health Sciences
Research
Mayo Clinic

Colleen M. Hart, MS, RN

Research Assistant/PhD Student
School of Nursing
University of Minnesota

Kristiina Hayrinen, MSc

Researcher
Department of Health Policy and
Management
University of Kuopio

Maria Heimisdóttir, PhD, MD, MBA

Director
Division of Economics, Budgeting and
Information
Landspítali University Hospital

**Michelle LL Honey, PhD, MPhil (Nursing),
RN, FCNA (NZ)**

School of Nursing
University of Auckland

Mary L. Hook, PhD, RN, PHCNS-BC

Research Scientist
System Nursing Research
Aurora Health Care

Derek Hoy, MSc, BSc

SnowCloud

Ursula Hübner, PhD

Professor
Department of Business Management and
Social Sciences
University of Applied Sciences

Susan C. Hull, MSN, BSN, RN

Vice President, Business Strategies
Clinical Practice Model Resource Center
Elsevier

Susan I. Hyndman, EdD, RN

Chair, Non-Traditional Nursing
Department
Director, RNI BS Nursing Program
School of Nursing
College of St. Scholastica

Helena Ikonen, MSc

Project Manager
Laurea University of Applied Sciences

Rafat Jan, PhD, RN

School of Nursing
Aga Khan University Karachi

Melinda J. Jenkins, PhD, RN, FNP

Consultant, Primary Care and Consumer
Informatics

Luis Cibanal Juan, PhD, BPsy, RN

Cateobatico – Escuela Universitaria
Enfermería en Salud Mental
Universidad de Alicante

Alain Junger, MPA, RN

Department of Nursing Administration
CHUV

Premarani Kannusamy, PhD, RN

Department of Nursing
Institute of Mental Health

**Karlene M. Kerfoot, PhD, RN, NEA-BC,
FAAN**

Vice President and Chief Clinical Officer
Department of Administration
Aurora Health Care

**Karolyn Kerr, PhD Information Systems,
MHSc, RN**

Informatics Consult

Rosaleen Killalea, MSc Nursing, BNS, RN

Department of Information Management
Services
Mater Misericordiae University Hospital

Hyeoneui Kim, PhD, MPH, BSN, RN

Informatician
UCSD

Tae Youn Kim, PhD

Assistant Professor
College of Nursing
University of Wisconsin-Milwaukee

Pirkko Kouri, PhD, PHN, RN

Principal Lecturer
Department of Health Professions, Kuopio
Savonia University of Applied Sciences

Margaret Ross Kraft, PhD, RN

Assistant Professor
Niehoff School of Nursing
Loyola University Chicago

Arusa Lakhani, MScN, BScN, RN, RM
Senior Instructor
School of Nursing
Aga Khan University

Norma M. Lang, PhD, RN, FAAN, FRCN
Wisconsin Regent Distinguished Professor
Aurora Distinguished Professor of
Healthcare Quality Informatics
College of Nursing
University of Wisconsin-Milwaukee

Laura Heermann Langford, PhD, RN
Director, Nursing Informatics
Department of Medical Informatics
Intermountain Healthcare

Martin LaVenture, PhD, MPH
Director
Center for Health Informatics
Minnesota Department of Health

Carlos Hugo Leonzio, PhD(c), BSN
Department of Education and Research
Favaloro Foundation – University Hospital

**Nancy M. Lorenzi, PhD, MS, MA, AB,
FACMI**
Assistant Vice Chancellor for Health Affairs
Informatics Center
Vanderbilt University Medical Center

**Sally P. Lundeen, PhD, MSN, BSN, RN,
FAAN**
Dean and Professor
College of Nursing
University of Wisconsin-Milwaukee

Merete Lyngstad, MSN, RN
Special Adviser
Department of Policy Issues
Norwegian Nurses Organisation

**Shirley Eichenwald Maki, MBA, RHIA,
FAHIMA**
Assistant Professor
Department of Healthcare Informatics and
Information Management
The College of St. Scholastica

**John Mantas, PhD, MSc, BSc (Hons),
Professor**
Faculty of Nursing
University of Athens

**Heimar De Fatima Marin, PhD, MS, RN,
FACMI**
Professor
Department of Nursing
Federal University of Sao Paulo

**Sana Daya Marini, PhD(c), BSN, BS, RN,
HCC**
Clinical Assistant Professor
School of Nursing
American University of Beirut

Anna Rita Marucci, MsNs, BaNsc, RN
Head Nurse
Pediatric and Hematology Pediatric Ward
San Cahillo – Forlanini Hospital – Rome

Susan Matney, MSN, RN
Senior Content Engineer
Department of Health Sciences IT
University of Utah

**Nagendra Prakash Mattur, PhD, MA,
M.Phil**
Professor
Manipal Institute of Management
Manipal University

Angela Barron McBride, PhD, RN, FAAN
Distinguished Professor-University Dean
Emerita
School of Nursing
Indiana University

Mary N. Meyer, MSN, RN
Assistant Professor, Director of Clinical
Learning Laboratory
School of Nursing
University of Kansas

**Susan Meyer, B.Soc.Sci (Nursing) Diploma
Paediatrics**

Kathryn Møelstad, RN
Senior Adviser
Department of Policy Issues
Norwegian Nurses Organisation

David N. Mohr, MD, FACP
Chair, Information Technology Committee
Department of Internal Medicine
Mayo Clinic

Erika Mayela Caballero Munoz, MEd
Instructional Design, RN-BC
 Dean
 San Sebastián University Nursing School
 Vice President
 Virtual Community of Infantile Health
 Treasurer
 Chilean Health Informatics Association

Judy Murphy, BSN, RN
 Vice President, Information Services
 Aurora Health Care

Peter J. Murray, PhD, MSc, RN
 Director and Founding Fellow
 Centre for Health Informatics Research and
 Development (CHIRAD)

Lynn M. Nagle, PhD, MScN, BN, RN
 Assistant Professor
 Laurence S. Bloomberg Faculty of Nursing
 University of Toronto

Nancy C. Nelson, MS, BSN, RN
 Data Manager
 Intensive Medicine Clinical Program
 Intermountain Healthcare

Elina Ora-Hyytiainen, PhD, MNSc, RN
 Principal Lecturer
 Laurea University of Applied Sciences

Mary E. Paden, MSN, RN, CPNP
 TIP-NEP Program Coordinator
 School of Nursing
 Duke University

Hyeoun-Ae Park, PhD, RN
 Associate Dean and Professor
 College of Nursing
 Seoul National University

**Filipe Suares Pereira, ND (PhD), MNSc,
 BN, RN**
 Associate Professor
 Oforto College of Nursing

Heloísa Helena Ciqueto Peres
 Professor Doutor
 Orientacao Profissional – ENO
 Escola de Enfermagem da USP

Rutja Phuphaibul, DNS, RN
 Professor
 Department of Nursing, Faculty of
 Medicine
 Ramathibodi Hospital, Mahidol University

**Ratna Prakash, PhD, MSc, BSc, BScN, PG
 DH.Ed**
 Dean and Professor
 College of Nursing
 Manipal University

Vesna Prijatelj, MSc, RN
 Consultant Director in the Field of
 Organization and Informatics
 Department of Management
 General Hospital Celje

David Printy, MS
 President and CEO
 Oasis Hospital

Patricia Pruden, RN
 Nurse Consultant
 Children's Cancer Hospital Egypt
 Foundation 57357

Elina Rajalahti, MNSc
 Senior Lecturer
 Department of Social Services, Health and
 Sports
 Laurea University of Applied Sciences

Sripriya Rajamani, PhD, MBBS, MPH
 Senior Project Consultant
 Center for Health Informatics
 Minnesota Department of Health

Uroš Rajkovič, MSc
 Faculty of Organizational Sciences
 University of Maribor

Vladislav Rajkovič, PhD
 Professor
 Faculty of Organizational Sciences
 University of Maribor

Roberto A. Rocha, PhD, MD
 Senior Corporate Manager, Knowledge
 Management and Clinical Decision
 Support
 Department of Clinical Informatics
 Research and Development (CIRD)
 Partners HealthCare System, Inc.

April J. Roche, MBA, CPEHR
Project Manager
Center for Health Informatics
School of Nursing
University of Kansas

Julita Sansoni, PhD, MScN, RN
Professor
Nursing Area Department of Public Health
University “Sapienza” of Rome

Kaija Saranto, PhD, RN
Professor
Department of Health Policy and
Management
University of Kuopio

Bjoern Sellemann, Dipl.-Pfleger, RN
Faculty of Business Management and Social
Sciences
Health Informatics Research Group
University of Applied Sciences Osnabrueck

**Joyce Sensmeier, MS, RN-BC, CPHIMS,
FHIMSS**
Vice President, Informatics
Healthcare Information and Management
Systems Society

Walter Sermeus, PhD, RN
Professor
School of Public Health
Catholic University Leuven

**Abel Paiva e Silva, ND (PhD), MNSc,
BN, RN**
Coordinator Professor
Oporto College of Nursing

Denise Tolfo Silveira, PhD, MS, RN
Professor
School of Nursing
Federal University of Rio Grande do Sul
(UFRGS)

Roy L. Simpson, RN,C, DPNAP, FAAN
Vice President, Nursing
Cerner Corporation

Diane J. Skiba, PhD, FAAN
Professor and Coordinator of the Health
Informatics Specialty
Department of Nursing
University of Colorado Denver

Deirdre M. Stewart, Dip HCl, RGN, RPN
Healthcare Executive
Cerner Middle East

**Heather Strachan, MSc, MBCS, Dip. N,
RGN**
Clinical eHealth Lead (NMAHP)
eHealth Directorate
Scottish Government

Amarnath Subramanian, MD, MS
Medical Director, Pathology Informatics
Department of Pathology and Lab Medicine
Regions Hospital

Olga Šušteršič, PhD, RN
Associate Professor
Department of Nursing, Faculty of Health
Sciences
University of Ljubljana

**Francesco Tarantini, MSN, BSN, RN
Dott.**
Transplant Operating Theatre
Fondazione IRCCS Ospedale Maggiore
Policlinico, Mangiagalli e Regina Elena

Teri L. Thompson, PhD(c), RN, CPNP
Director, Pediatric Nurse Practitioner
Program
School of Nursing
University of Missouri-Kansas City

Asta Thoroddsen, PhD(c), MSc, RN
Associate Professor and Academic Chair of
Nursing Informatics
Department of Nursing
University of Iceland and Landspítali Uni-
versity Hospital

Jane A. Timm, MS, RN
Informatics Nurse Specialist
Department of Nursing
Mayo Clinic

Barbara S. Turner, DNSc, RN, FAAN
Professor
School of Nursing
Duke University

Catherine E. Vanderboom, PhD, RN
Clinical Nurse Researcher
Department of Nursing
Mayo Clinic

Irene van Middelkoop, Hons. BA(Cur)
CAPRISA
University of KwaZulu-Natal

Elmarie Venter, Mcom (Informatics), Bcur
SAP Research, Pretoria

Philipp Vetter, PhD
Head of Strategy
Health Authority of Abu Dhabi

Kanittha Volrathongchai, PhD (Nursing), RN
Assistant Professor
Faculty of Nursing
KhonKaen University Thailand

Janelle Wapola, MA, RHIA
Assistant Professor
Department of Healthcare Informatics and
Information Management
The College of St. Scholastica

**Judith J. Warren, PhD, RN-BC, FAAN,
FACMI**
Christine A. Hartley Centennial Professor
and Director of Nursing Informatics,
Center for Health Informatics
School of Nursing
University of Kansas

Tera J. Watkins, MS, RN
Senior Solution Designer, Lighthouse
Cerner Corporation

John M. Welton, PhD, RN
Associate Professor
College of Nursing
Medical University of South Carolina

**Lucy Westbrooke, GDipBus (Health
Informatics), DipNg, RCpN**
Department of Information Management
and Technology Services
Auckland District Health Board

Bonnie L. Westra, PhD, RN, FAAN
Assistant Professor
School of Nursing
University of Minnesota

Peggy White, MN, BA, RN
National Project Director
Canadian Health Outcomes for Better
Information
Canadian Nurses Association
Care Project and Program Manager
Health Outcomes for Better Information
and Care
Ontario Ministry of Health and Long-Term
Care

Barbara J. Wills
Assistant Director
Division of Health Policy
Minnesota Department of Health

Marty Witrak, PhD, RN, FAAN
Professor and Dean
School of Nursing
The College of St. Scholastica

Dedication

This is for those life-long friends who have stayed in my life throughout the decades—Gail Mitchell, Ann Schmella and Mikelle Streicher—they are treasures beyond all measure. And as always—to my son, Kevin Kauth.

— *Charlotte A. Weaver*

To my family who unselfishly supports my professional focus and giving of time—especially son Jeremy & Jessica and granddaughters Ashley, Aana, Skye, & Storme Jade; Betty White, Sue, E. Clark, Lora & Randy, Loren & Wendy, Ann, and Chris and Pat; and my late father and brother, E. N. and Craig.

— *Connie White Delaney*

To my ever-supportive family—my wife, Marie-France, and my daughters, Delphine and Chloé, to all my friends and colleagues in Europe, and to Charlotte Weaver for having been a very helpful support.

— *Patrick Weber*

To my supportive husband Peter for his understanding of the English language and to my colleagues in Health Informatics New Zealand (HINZ).

— *Robyn L. Carr*

Acknowledgments

In preparing this book, we have incurred many debts. First and foremost, we would like to express our appreciation to Mary Kelly and Becky Thompson for their tireless editing and project management of the many moving parts that make up this book. Nancy Vitucci, our HIMSS editor, has worked through weekends and holidays burning the midnight oil with us as we have all pushed to narrow the window between authors' completion and time to print. From conception to "book on the street," this second edition has been produced in less than two years. This accomplishment is due primarily to HIMSS' commitment to supporting this body of work and demonstrated through the hard work of Mary, Becky and Nancy. To all three of you, we bow our heads in thanks!

Fran Perveiler, chief editor at HIMSS, is due our deep appreciation for having the vision and courage to publish this second edition just four years after the first edition. Fran recognized immediately the importance of continuing to capture the seismic changes that are happening in nursing, as countries' adoption of EHR technologies accelerates.

And finally, Charlotte Weaver would like to express her gratitude to her employer, Gentiva Health Services, for supporting this book initiative when, for all apparent purposes, it would not appear to have much relevancy to a U.S. home healthcare organization.

Charlotte A. Weaver
Connie White Delaney
Patrick Weber
Robyn L. Carr
Editors

Table of Contents

Foreword by Edward H. Shortliffe, MD, PhD	xxiii
Preface.....	xxv

SECTION I

Revolutionizing Nursing: Technology's Role

Section I Introduction—Charlotte A. Weaver, PhD, MSPH, RN, FHIMSS.....	3
CHAPTER 1. Informatics and the Future of Nursing Practice	5
Angela Barron McBride, PhD, RN, FAAN	
CHAPTER 2. TIGER: Technology Informatics Guiding Educational Reform— A Nursing Imperative.....	17
Donna B. DuLong, BSN, RN; and Marion J. Ball, EdD, FACMI, FCHIME, FHIMSS, FAAN	
CHAPTER 3. Informatics for Personal Health Management	25
Melinda J. Jenkins, PhD, FNP; Pirkko Kouri, PhD, PHN, RN; and Charlotte A. Weaver, PhD, MSPH, RN, FHIMSS	
CHAPTER 4. International Initiatives in Nursing Informatics.....	45
Heimar De Fatima Marin, PhD, MS, RN, FACMI; and Nancy M. Lorenzi, PhD, MS, MA, AB, FACMI	
CHAPTER 5. Growth in Nursing Informatics Educational Programs to Meet Demands.....	53
Diane J. Skiba, PhD, FAAN; Helen R. Connors, PhD, DrPS (Hon), RN, FAAN; and Michelle LL Honey, PhD, MPhil (Nursing), RN, FCNA (NZ)	
CHAPTER 6. The Impact of Health Information Technology (I-HIT) Survey: Results from an International Research Collaborative.....	69
Patricia C. Dykes, DNSc, MA, RN; Suzanne Brown, MSc Health Informatics, BNS; Rita W. Collins, PhD, MEd, BNS, RN, RM; Robyn Cook, MBA, BBus, RN; Charles Docherty, PhD, MN, MBCS, BN, RN, RNT; Anneli Ensio, PhD, RN; Joanne Foster, GradDipCIEDn, MEdTech, DipAppSc (NsgEd), BN, RN; Nicholas R. Hardiker, PhD, RN; Michelle LL Honey, PhD, MPhil (Nursing), RN, FCNA (NZ); Rosaleen Killalea, MSc Nursing, BNS, RN; and Kaija Saranto, PhD, RN	

SECTION II

Nursing Education and IT

Section II Introduction—Connie White Delaney, PhD, RN, FAAN, FACMI.....	91
CHAPTER 7. Faculty Competencies and Development.....	93
Helen R. Connors, PhD, DrPS (Hon), RN, FAAN	
Case Study 7A. University of Pittsburgh—Faculty Development Program: Emerging, Learning, and Integrated Technologies Education (ELITE).....	104
Helen K. Burns, PhD, MN, BSN, RN, FAAN; and Karen L. Courtney, PhD, RN	
Case Study 7B. University of Kansas School of Nursing—Faculty Development Program: Health Information Technology Scholars (HITS)	110
Helen R. Connors, PhD, DrPS (Hon), RN, FAAN	

Case Study 7C. Technology Integration Program for Nursing Education and Practice (TIP-NEP)	118
Barbara S. Turner, DNSc, RN, FAAN; and Mary E. Paden, MSN, RN, CPNP	
Case Study 7D. Health Informatics and Continuing Education: The Italian Case	123
Julita Sansoni, PhD, MScN, RN; Anna Rita Marucci, MsNs, BaNsc, RN; Francesco Tarantini, MSN, BSN, RN; and Walter De Caro, MNs, DAI	
CHAPTER 8. Informatics Competencies for Nurses Across Roles and International Boundaries	129
Brian Gugerty, DNS, MS, RN; and Joyce Sensmeier, MS, RN-BC, CPHIMS, FHIMSS	
CHAPTER 9. Transforming Nursing Education: Integrating Informatics and Simulations	145
Judith J. Warren, PhD, RN-BC, FAAN, FACMI; Mary N. Meyer, MSN, RN; Teri L. Thompson, PhD(c), RN, CPNP; and April J. Roche, MBA, CPEHR	
Case Study 9A. The ATHENS Project: Advancing Technology in Healthcare Education Now at St. Scholastica	162
Shirley Eichenwald Maki, MBA, RHIA, FAHIMA; Marty Witrak, PhD, RN, FAAN; Sally K. Fauchald, PhD, RN; Beth A. Donahue, MA, BAN, RN-BC; Susan I. Hyndman, EdD, RN; and Janelle Wapola, MA, RHIA	
Case Study 9B. Learning by Developing	169
Elina Ora-Hyytiäinen, PhD, MNSc, RN; Helena Ikonen, MSc; Outi Ahonen, MNSc; Elina Rajalahti, MNSc; and Kaija Saranto, PhD, RN	

Section III

Innovation Through Applied Informatics

Section III Introduction—Patrick Weber, MA, RN	177
CHAPTER 10. Use of Data by Nursing to Make Nursing Visible: Business and Efficiency of Healthcare System and Clinical Outcomes	179
John M. Welton, PhD, RN; and Walter Sermeus, PhD, RN	
Case Study 10A. Standardizing the Electronic Nursing Summary: Motivation, Methods, and Results	193
Ursula Hübner, PhD; and Daniel Flemming, Dipl. Kaufmann, RN	
Case Study 10B. Improving Patient Safety, Increasing Nursing Efficiency, and Reducing Cost through Technology-Supported Pull Systems	200
Thomas R. Clancy, PhD, MBA, RN; and Susan C. Hull, MSN, BSN, RN	
CHAPTER 11. ICNP®: Nursing Terminology to Improve Healthcare Worldwide	207
Amy Coenen, PhD, RN, FAAN; and Claudia Bartz, PhD, RN, FAAN	
Case Study 11A. A Process for Standardizing Documentation Contents for Electronic Documentation Systems	217
Hyeoneui Kim, PhD, MPH, BSN, RN; Patricia C. Dykes, DNSc, MA, RN; and Roberto A. Rocha, PhD, MD	
CHAPTER 12. Building an Intelligent Clinical Information System for Nursing: The Aurora, Cerner, and University of Wisconsin, Milwaukee, Knowledge-based Nursing Initiative—Part II	225
Karlene M. Kerfoot, PhD, RN, NEA-BC, FAAN; Sally P. Lundeen, PhD, MSN, BSN, RN, FAAN; Ellen Harper, MBA, RN; Norma M. Lang, PhD, RN, FAAN, FRCN; Laura J. Burke, PhD, RN, FAAN; Mary L. Hook, PhD, RN, PHCNS-BC; Judy Murphy, BSN, RN; Elizabeth C. Devine, PhD, MSN, RN; Tae Youn Kim, PhD; Andrew F. Carlson, BS Systems Analysis; Jennifer Conner, BA; and Tera J. Watkins, MS, RN	

Case Study 12A. The USA National Veterans Administration Clinical Information System	242
Margaret Ross Kraft, PhD, RN	
Case Study 12B. Canadian Health Outcomes for Better Information and Care (C-HOBIC)	247
Kathryn J. Hannah, PhD, RN; and Peggy White, MN, BA, RN	
CHAPTER 13. International Standards to Support Better Information Management	253
Nicholas R. Hardiker, PhD, RN; Suzanne Bakken, DNSc, RN, FAAN, FACMI; William T.F. Goossen, PhD, RN; Derek Hoy, MSc, BSc; and Anne Casey, MSc, RN, FRCN	
Case Study 13A. Application of iNMDS using ICNP®	262
Bonnie L. Westra, PhD, RN, FAAN; William T.F. Goossen, PhD, RN; Lynn M. Choromanski, MS, RN; Beverly J. Collins, MS, RN; Colleen M. Hart, MS, RN; and Connie White Delaney, PhD, RN, FAAN, FACMI	
Case Study 13B. Update of the NMMDS and Mapping to LOINC	269
Bonnie L. Westra, PhD, RN, FAAN; Susan Matney, MSN, RN; Amarnath Subramanian, MD, MS; Colleen M. Hart, MS, RN; and Connie White Delaney, PhD, RN, FAAN, FACMI	
Case Study 13C. Nursing Quality Measures: National Database of Nursing Quality Indicators®	276
Nancy E. Dunton, PhD	

SECTION IV

EHR Initiatives Across the Globe

Section IV Introduction—Robyn L. Carr, RGON	283
CHAPTER 14. The Americas: Overview of EHR National Strategies and Significance for Nursing	285
Lynn M. Nagle, PhD, MScN, BN, RN; Heimar De Fatima Marin, PhD, MS, RN, FACMI; and Connie White Delaney, PhD, RN, FAAN, FACMI	
Case Study 14A. Canada's Journey Toward an Electronic Health Record: Nursing's Role	294
Lynn M. Nagle, PhD, MScN, BN, RN; and Peggy White, MN, BA, RN	
Case Study 14B. Mayo Clinic	300
Marceline R. Harris, PhD, RN; David N. Mohr, MD, FACP; Jane A. Timm, MS, RN; Catherine E. Vanderboom, PhD, RN; and Scott W. Eising, BS	
Case Study 14C. Intermountain Healthcare	306
Laura Heermann Langford, PhD, RN; and Nancy C. Nelson, MS, BSN, RN	
Case Study 14D. Minnesota Statewide e-Health Initiative	312
Bonnie L. Westra, PhD, RN, FAAN; Martin LaVenture, PhD, MPH; Barbara J. Wills; and Sripriya Rajamani, PhD, MBBS, MPH	
Case Study 14E. Redirecting the Development of the Electronic Registry for Nursing in Cuba	323
Yoadis Cuesta Garcia, MS Health Informatics, Teacher in Health Informatics, BSN, BCN	
Case Study 14F. A Historical Account and Current Status of Nursing Informatics in Argentina	332
Carlos Hugo Leonzio, PhD(c), BSN; and Cristina Barrios, BSN	
Case Study 14G. Brazil	337
Grace T.M. Dal Sasso, Nursing Informatics PhD, RN; Denise Tolfo Silveira, PhD, MS, RN; Heloisa Helena Ciqueto Peres; and Heimar De Fatima Marin, PhD, MS, RN, FACMI	

Case Study 14H. The Electronic Health Record in Chile	343
Erika Mayela Caballero Muñoz, MEd Instructional Design, RN-BC	
CHAPTER 15. Information Technology Strategies in the United Kingdom and Ireland	347
Anne Casey, MSc, RN, FRCN	
Case Study 15A. Ireland	358
Rita W. Collins, PhD, MEd, BNS, RN, RM; and Rosaleen Killalea, MSc Nursing, BNS, RN	
Case Study 15B. Northern Ireland's Information and Communications Technology Strategy: A Case Study of Nursing Activity	363
Mary Chambers, PhD, BED(Hons); and Claire Buchner, MSc Health Informatics, BSc (Hons) Nursing Studies	
Case Study 15C. Clinical eHealth Lead (NMAHPs), Scotland	369
Heather Strachan, MSc, MBCS, Dip.N, RGN	
CHAPTER 16. Electronic Health Initiatives: European View	375
Patrick Weber, MA, RN; and John Mantas, PhD, MSc, BSc(Hons)	
Case Study 16A. The Development and Implementation of the EHR in Iceland	382
Asta Thoroddsen, PhD(c), MSc, RN; Herdís Gunnarsdóttir, MSc, MBA, BSc, RN; and Maria Heimisdóttir, PhD, MD, MBA	
Case Study 16B. Finland's National EHR	389
Kristiina Häyrynen, MSc; Pirkko Kouri, PhD, PHN, RN; and Kaija Saranto, PhD, RN	
Case Study 16C. National Leadership in eHealth: The Norwegian Case	397
Kathryn Møelstad, RN; and Merete Lyngstad, MSN, RN	
Case Study 16D. Development of Health Informatics to Support Nursing Care in Sweden	404
Margareta Ehnfors, PhD, Dipl NEd, RN; and Anna Ehrenberg, PhD, RN	
Case Study 16E. The Netherlands: Virtual Electronic Health Records Based on Safe Data Exchange	412
William T.F. Goossen, PhD, RN; A.T.M. Goossen-Baremans, MSN, RN; and Lejo Bouma, RN	
Case Study 16F. Toward Integrating Nursing Data into the Electronic Patient Record: Current Developments in Germany	421
Ursula Hübner, PhD; Björn Sellemann, Dipl. Pflegewirt, RN; and Daniel Flemming, Dipl. Kaufmann, RN	
Case Study 16G. Spain: The Growth and Development of Nursing and Information Systems—An Update from 2006 to 2009	429
Myriam Martin Fernández, PhD, MSN, RN; and Luis Cibanal Juan, PhD, BPsy, RN	
Case Study 16H. Information Technologies and Nursing Practice: The Portuguese Case	435
Filipe Soares Pereira, ND (PhD), MNSc, BN, RN; and Abel Paiva e Silva, ND (PhD), MNSc, BN, RN	
Case Study 16I. Nursing and Informatics Past, Present, and Future in Switzerland	442
Alain Junger, MPA, RN	
Case Study 16J. Reengineering of Nursing Process: e-Documentation Case	447
Vesna Prijatelj, MSc, RN; Uroš Rajkovič, MSc; Olga Šušteršič, PhD, RN; and Vladislav Rajkovič, PhD	
CHAPTER 17. Healthcare Information Technology and Electronic Health Records: A View from the Middle East	455
Roy L. Simpson, RN,C, DPNAP, FAAN; and Deirdre M. Stewart, Dip HCI, RGN, RPN	
Case Study 17A. Israeli Healthcare	459
Ayala Gonen, PhD, RN	

Case Study 17B. Lebanon/Beirut Healthcare	465
Sana Daya Marini, PhD(c), BSN, BS, RN, HCC	
Case Study 17C. United Arab Emirates (UAE) Healthcare	472
David Printy, MS; Philipp Vetter, PhD; and Kelly Marie Damon, MAL, BSN, RN	
Case Study 17D. The EHR Initiatives in Turkey	477
Firdevs Erdemir, PhD, RN	
Case Study 17E. Challenge, Change, Hope, Excellence-Oriented: Children’s Cancer Hospital Egypt 57357—Icon of Change	482
Patricia Pruden, RN	
CHAPTER 18. Nursing Informatics in South Africa: From a Historical Overview to the Emergence of EHRs, Telehealth, and m-Health	491
Peter J. Murray, PhD, MSc, RN; Irene van Middelkoop, Hons. BA (Cur); Elmarie Venter, Mcom (Informatics), Bcur; and Susan Meyer, B.Soc.Sci (Nursing) Dipl. Paediatrics	
CHAPTER 19. Nursing and the Electronic Health Record in Asia, Australasia, and the South Pacific	505
Karolyn Kerr, PhD Information Systems, MHSc, RN; and Polun Chang, PhD	
Case Study 19A. The Nursing Informatics Renaissance in Taiwan	517
Polun Chang, PhD	
Case Study 19B. Current Status and Evolution of Nursing Informatics in South Korea	524
Hyeoun-Ae Park, PhD, RN; and Insook Cho, PhD	
Case Study 19C. Nursing and the EHR in Thailand	532
Kanitha Volrathongchai, PhD (Nursing), RN; and Rutja Phuphaibul, DNS, RN	
Case Study 19D. Australia: Developing the Electronic Health Record, A Continuing Nursing Challenge	535
Robyn Cook, MBA, BBus, RN; and Joanne Foster, GradDipCIEdn, MEdTech, DipAppSc (NsgEd), BN, RN	
Case Study 19E. The New Zealand Approach to the Electronic Health Record	541
Lucy Westbrooke, GDipBus (Health Informatics), DipNg, RCpN	
Case Study 19F. Electronic Health Record National Strategies and Significance for Nursing (Singapore)	548
Premarani Kannusamy, PhD, RN	
Case Study 19G. Health and Nursing Informatics in Indian Context: A Futuristic Perspective of e-Healthcare	556
Ratna Prakash, PhD, MSc, BSc, BScN, PG DH.Ed; and Nagendra Prakash Mattur, PhD, MA, M.Phil	
Case Study 19H. Health and Nursing Information Technology: A Case Study of Pakistan	566
Rafat Jan, PhD, RN; Arusa Lakhani, MScN, BScN, RN, RM; and Nighat Ijaz Durrani, MPH(PAK), Dip in Administration & Teaching, Ophthalmic Nursing UK, RN, RM	
Section V	
The Near Future and Nursing	
Section V Introduction—Charlotte A. Weaver, PhD, MSPH, RN, FHIMSS	573
CHAPTER 20. Nursing and Nursing Informatics: Current Context to Preferred Future	575
Charlotte A. Weaver, PhD, MSPH, RN, FHIMSS; Connie White Delaney, PhD, RN, FAAN, FACMI; Patrick Weber, MA, RN, and Robyn L. Carr, RGON	
Index	595

Foreword

Those of us who have been involved with biomedical and health informatics for most of our professional lives are amazed and gratified by the growing recognition, support, and enthusiasm for our field. The pace of change has been particularly remarkable in the last decade, spurred on in the United States by a Secretary of Health and Human Services, Tommy Thompson, who made health information technology (IT) a key element in his strategy for addressing the problems with the U.S. healthcare system. Reflected also in frequent comments by President George W. Bush, support for health IT innovation and investment became even more evident in the administration of President Barack Obama, who worked with Congress to make health IT a key element in the American Recovery and Reinvestment Act of 2009. The Office of the National Coordinator for Health Information Technology (ONC), now formally codified in law, has new leadership and a large stimulus budget to invest heavily in a variety of programs intended to enhance the adoption, “meaningful use,” and acceptance of electronic health records and related components of the health information infrastructure. Recognizing the dearth of trained professionals who understand both the technology and the cultural milieu into which health IT must be introduced, ONC is also investing in a variety of workforce development programs, ranging from certification courses and validation of competencies to degree programs in universities and professional schools.

Throughout the evolution of our field, the nursing community has provided remarkable leadership in defining the role of informatics in the nursing profession, in bringing informatics knowledge to nursing practitioners, and in building an international community of nursing educators and informaticians that has been a role model for the other health professions. The first edition of this volume, appearing only four years ago, has been a stimulus to the cohesion of the nursing community regarding informatics education, scholarship, and the effective application of the field’s principles. Yet, as mentioned, those same four years have seen impressive change in the societal interest and investment in health information technology, and thus, it is now highly appropriate to update the volume with a second edition that reflects the current momentum and investment. Nursing itself is evolving, in part due to what is happening in the information management arena, and this volume reflects and enhances those changes as well.

As we pursue “meaningful use” of health information technology, a key element is clearly the extent to which health professionals understand and embrace the role of such systems in their work, while appreciating their limitations and the need for ongoing research and innovation. No health profession has been as effective as nursing in bringing a knowledge of informatics concepts and applications to the routine education of practitioners. Section II in this volume describes key elements in such educational programs for nurses, including evolving expectations, curricular components, and the competencies that graduates must demonstrate. Other schools in the health professions have much to learn from the extensive experience and success described in these pages.

But the rest of the book is inspiring as well. Using scenarios and case studies to make the concepts concrete, the editors and chapter authors have nicely demonstrated the wide ranging and international role that informatics is playing in nursing practice, as well as the important contributions of nursing informatics innovation. Those of us who have attended the triennial Nursing Informatics (NI) conferences (sponsored by the International Medical Informatics Association) can attest to the energy, enthusiasm, and accomplishment that is routinely demonstrated in the scientific sessions and policy panels. It is small wonder that an involvement with informatics is often identified as a key indicator of the intellectual rigor and pragmatic orientation of the leaders in the nursing profession, whether in academia or in practice settings.

This volume is also evidence of the recognized synergies between the American Medical Informatics Association, the professional home for those in biomedical and health informatics (including a strong component representing the nursing informatics community), and the Healthcare Information and Management Systems Society (HIMSS), the membership organization that focuses on providing global leadership for the optimal use of health IT. We at AMIA are delighted to be collaborating with HIMSS on the co-publication of the second edition of a volume that we know will continue to inform and inspire a generation of nurses and other professionals who turn to nursing for examples of excellence in informatics education, scholarship, and application.

— Edward H. Shortliffe, MD, PhD
President and Chief Executive Officer
American Medical Informatics Association
Bethesda, MD USA

Preface

Since the publication of this book's first edition in 2006, the fundamentals set out in the preface have not changed. Governments still struggle to balance available funding against optimum quality care, as evidence of value for money spent. Many governments, ever challenged to place funding for health against financial demands from education, social welfare infrastructure and, for some, defense, find additional squeezing of their budgets. This financial imperative brings with it a greater need for enhanced technical support in cross-discipline communications and care options to enhance quality, safety, access, and efficiency.

What has notably changed is that nursing informatics per se, originally with European and American initiatives, is now being practiced in an ever increasing number of countries on the Asian, Australasian, South American and African continents, although firm evidence of the latter is sparse. Therefore, in this edition, we have attempted to embrace qualitative evidence from a number of the more recent sources of informatics practices in the countries entering into the wider group. While some of these new entrants may be perceived to be in the embryonic stage of advancement, there is a common theme—the basic education of nurses must include informatics competencies and the capacity to prepare informatics specialists.

While this second edition has substantial changes in the content covered in comparison to the first edition, the essence of the international “snapshot” of current state remains the same. These past four years have brought such rapid change in information and communication technologies, governments' IT strategies and their implementations, that we felt it was imperative to capture the state of nursing internationally as we go into the second decade of the 21st century. Major geopolitical changes have also occurred over these intervening years. China and India have emerged on the international stage as major economic and geopolitical powers. The health indicators of both countries show a rapid ascent that parallels their economic rise and gains in standards of living. And importantly, the health indicators of China and India are now matching those of EU countries, indicating their full emergence status. While India is represented in the country case studies and Taiwan has been added, we were not able to secure a contributor from mainland China. This omission reflects a lack of professional integration with our Chinese counterparts through international collaborations such as the International Medical Informatics Association (IMIA). It is through the editors' networks made possible by IMIA-NI that the majority of authors have been recruited for this book. Given that together China and India's citizens account for about 2.5 billion of the world's near 7 billion population,¹ we recognize that any international trend analysis without both of these superpowers included is seriously remiss.

This second edition book is organized into five sections, and while it has a heavy U.S. perspective, each section and most chapters have international content and authors. Section I carries the same title as in the first edition: “Revolutionizing Nursing: Technology's Role.” Dr. Angela McBride's opening Chapter 1 provides a penetrating overview of how extensively informatics has already permeated nursing practice in the United States. Dr. McBride poses the question to professional nursing as to how we will use the quantitative nursing data that emanates from EHR systems. Dr. McBride notes that EHR systems and their data allow nursing's contribution to outcomes to be visible for the first time in our history. The interesting twist in Dr. McBride's observations is that with this visibility comes accountability, and she counsels: “It can be scary to get what you wished for, but, most of all, it can be enormously energizing. Let us all move to seize the opportunities before us that will not come this way again.” Dr. McBride's chapter is a *must* read for all nurses regardless of role or country.

There are four additional strong chapters included in Section I. DuLong and Ball's Chapter 2 is an up-to-date summary of the TIGER Collaborative, a grassroots initiative in the United

States originally formed to address nursing workforce competencies and educational reforms. In Chapter 3, Jenkins and colleagues address the emergence of person empowerment in self management enabled by new Internet technologies and government health policies. In Chapter 4, Marin and Lorenzi use their long-standing leadership involvement in international informatics circles to give an overview on key informatics initiatives currently in process. This is followed by Skiba, Connors, and Honey in Chapter 5, who present a powerful description of nursing education, IT competencies needed in core curriculum and document the rapid growth in nursing informatics programs occurring in different parts of the world. In the closing chapter, Dykes and colleagues report on a three-year survey study looking at international comparisons of nurses perspectives on the helpfulness of information technology in acute care settings.

Section II focuses on nursing education, including IT competencies in basic curriculum. The new topic introduced here is a description of formal programs for nursing faculty development in IT competencies being conducted in many countries today; the chapters and case studies explore examples from Italy, Finland, and the United States. Section III is dedicated to new developments in international standards for information management, terminologies, and minimum data base sets. This section also includes an update from the University of Wisconsin-Milwaukee, Aurora Health and Cerner Corporation's research team on their 6+ year project to develop and embed evidence-based nursing content into an automated nursing clinical documentation system with the generation of nursing outcomes.

Section IV presents the international overview on the current state of nursing and adoption of EHR technologies. Section IV entitled *EHR Initiatives Across the Globe* is the core of the book, with 6 chapters representing the following geographic regions: The Americas, The United Kingdom and Ireland, Europe, Middle East, South Africa, and Asia, Australasia, and the South Pacific. There are 35 country case studies under these six geographic chapters. And, as mentioned above, we have been able to include a number of new areas and countries in this edition. Chapter 17 focuses on the Middle East and includes case studies from Egypt, Israel, Lebanon, the United Arab Emirates, and Turkey. In Europe, we have added Portugal and a contribution from Slovenia for Eastern Europe. In Southeast Asia, we are very pleased to have been able to include new case studies from Thailand, Singapore, and Pakistan, in addition to India.

The final section is a single chapter written by the four editors and presents an overview on the current state of nursing and nursing informatics identifying common themes, structural indicators in nursing status within a country, and correlation of educational levels to professional autonomy. We close this critique with a projected vision for the near future that includes opportunities, challenges, and questions for nursing leaders to ponder.

This second version of *Nursing and Informatics for the 21st Century* is bringing brand new contributions. Each author, empowered by the success of the first edition, has given his or her best to provide the latest up-to-date information and to propose a realistic vision of the near future of information and informatics in the field of health and nursing. This book affords the widest view of the most recent developments in this field. The best known experts in the nursing informatics world have contributed to this volume. We hope it becomes one of your most used, referenced, read, and reread books over these next years.

Charlotte A. Weaver
Connie White Delaney
Patrick Weber
Robyn L. Carr
Editors

Reference

1. Central Intelligence Agency. The World Factbook—China. <https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html>. Accessed December 8, 2009.

SECTION I

Revolutionizing Nursing: Technology's Role

SECTION I

Introduction

By Charlotte A. Weaver, PhD, MSPH, RN, FHIMSS

The six chapters that make up Section I provide a framework for a current state assessment of the degree to which the use of information and communication technologies have permeated nursing practice, educational curricula, and nursing science. While coverage of recent developments in the United States dominates the content in most of these chapters, there is an international focus in five of the six chapters. We recognize that many countries are much further advanced in the adoption of electronic health record (EHR) technologies than the United States and have achieved automation that extends across all levels and venues of care, including to the home and the individual, e.g., Finland, Norway, and Denmark. The value provided from these international perspectives and authors is that it allows us to step back and see the common themes, the variations, and the significance of these factors for the status of professional nursing and its practice in a given country. The power of our ability to do these comparisons and contrasts is that they enable us to clearly identify the differentiators that allow nurses in one country to be included in their country's EHR strategies and to be recognized as professional members of the healthcare provider community, while in another country, nurses are excluded.

Today, we have tremendous variation in the professional status and level of nursing practice across nations. This variation is inevitably grounded in the historic beginnings of nursing, but the most telling predictor is whether the country is in control of its own university-based degree programs in nursing, with nursing faculty prepared at a master's and doctoral level. Where university-based nursing degree programs are just beginning, nursing tends to be on the outside looking in, as it pertains to national healthcare IT strategies. In our increasingly interconnected global village, this extensive variation does our citizens a disservice, and it is in all our best interests to narrow these differences within our developed countries and to extend our collective hands to our colleagues beyond the countries of North America and the European Union.

This second edition again opens with Angela McBride's chapter in which she chronicles the resolute march toward EHRs throughout the world and the dramatic developments in the United States being marshaled in under the American Recovery and Reinvestment Act (ARRA) of 2009.¹ McBride calls out some of the key areas of nursing's challenges and notes that while the "informatics revolution in process has the potential to deliver what nurses have historically wished for in their profession," she poses the question of "what will nurses do with this opportunity?" McBride's ability to outline such a piercing overview of nursing's opportunities and challenges as we stand on the threshold of possibilities enabled by this IT era, makes this chapter a "must read" for all nurses.

In Chapter 2, DuLong and Ball describe the work that has been completed under the umbrella of the TIGER Collaborative (Technology Informatics Guiding Education Reform) since its conception as a burning imperative in July 2004. The accomplishments of this grassroots initiative are chronicled through two working summits and nine collaborative work teams that focused on nursing workforce, faculty competencies, educational curricula, leadership, standards, usability, consumer empowerment, national health IT agenda, and development of a virtual demonstration center.

The rapidly developing area of consumer empowerment, self-management, and personal health record technologies is the focus of Chapter 3. Contrasting strategies between approaches being taken in Finland and the United States are described. Jenkins, Kouri, and Weaver also review the national health strategies of numerous countries to show the common trend toward

patient empowerment and self-management enabled by new Internet technologies and online health information. The authors note that the focus of these national strategies especially target elderly populations and those with chronic illnesses, as countries struggle to contain costs by more effective care delivery.

In Chapter 4, Marin and Lorenzi give us an international overview on the state of nursing informatics from their positions as nursing leaders whose professional activities carry them across geographic boundaries. Chapter 5 chronicles the evolution, new developments, and current state of growth and maturity of nursing informatics as a recognized program specialty within nursing. Skiba, Connors, and Honey do a masterful job of capturing the progression of nursing informatics in the United States but also bring in new developments in Europe, South America, Australia, New Zealand, and Asia Pacific countries.

Chapter 6 is the summary report of a three-year, international collaborative study on the impact of health IT on nurses working in acute care settings. The work was funded under HIMSS and sponsored as an endorsed initiative of the International Medical Informatics Association, Nursing Informatics – Special Interest Group (IMIA-NI). Dr. Patricia Dykes' persistent leadership saw this complex research project through to completion. The findings are a reminder of the variation that exists between the United States and the rest of world in the way in which EHR adoption starts in acute care organizations and radiates outward. In other national IT strategies, countries have built their infrastructure from a community and primary care base. Within this chapter, each country's participating lead author is also the country representative into IMIA-NI, with the exception of Nicholas Hardiker who graciously led the effort for Great Britain.

Reference

1. American Recovery and Reinvestment Act.
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf.
Accessed November 20, 2009.