

Contents IMIA Yearbook of Medical Informatics 2016

| | | |
|---|---|----|
| President's Statement | H.-A. Park Are We Ready for the Fourth Industrial Revolution? | 1 |
| Obituary | M. Ball, J. Symonds A Celebration of the Life of Ian Symonds, MNZM (2 January 1937 – 12 September 2016) | 4 |
| Editorial | C. U. Lehmann, B. Séroussi, M.-C. Jaulent Troubled Waters: Navigating Unintended Consequences of Health Information Technology | 5 |
| Keynote | D. F. Sittig, A. Wright, J. Ash, H. Singh New Unintended Adverse Consequences of Electronic Health Records | 7 |
| <hr/> | | |
| Special Section: Unintended Consequences: New Problems and New Solutions | | |
| Survey | K. Zheng, J. Abraham, L. L. Novak, T. L. Reynolds, A. Gettinger A Survey of the Literature on Unintended Consequences Associated with Health Information Technology: 2014–2015 | 13 |
| Working Group Contributions | E. Borycki, J. W. Dexheimer, C. Hullin Lucay Cossio, Y. Gong, S. Jensen, J. Kaipio, S. Kennebeck, E. Kirkendall, A. W. Kushniruk, C. Kuziemsy, R. Marcilly, R. Röhrig, K. Saranto, Y. Senathirajah, J. Weber, H. Takeda Methods for Addressing Technology-induced Errors: The Current State | 30 |
| | S. B. Gogia, A. Maeder, M. Mars, G. Hartvigsen, A. Basu, P. Abbott Unintended Consequences of Tele Health and their Possible Solutions | 41 |
| | S. Hors-Fraile, S. Atique, M. A. Mayer, K. Denecke, M. Merolli, M. Househ The Unintended Consequences of Social Media in Healthcare: New Problems and New Solutions | 47 |
| | C. E. Kuziemsy, R. Randell, E. M. Borycki Understanding Unintended Consequences and Health Information Technology | 53 |
| | F. Magrabi, E. Ammenwerth, H. Hyppönen, N. de Keizer, P. Nykänen, M. Rigby, P. Scott, J. Talmon, A. Georgiou Improving Evaluation to Address the Unintended Consequences of Health Information Technology | 61 |
| | C. Otero, A. Almerares, D. Luna, A. Marcelo, M. Househ, H. Mandirola Health Informatics in Developing Countries: A Review of Unintended Consequences of IT Implementations, as They Affect Patient Safety and Recommendations on How to Address Them | 70 |
| | M. Schukat, D. McCaldin, K. Wang, G. Schreier, N. H. Lovell, M. Marschollek, S. J. Redmond Unintended Consequences of Wearable Sensor Use in Healthcare | 73 |
| Synopsis | R. Koppel, Y. Chen Unintended Consequences: New Problems, New Solutions. Contributions From 2015 | 87 |

| | | |
|-----------------------------|--|----|
| Best Paper Selection | Content summaries of: | |
| | Campos-Castillo C, Anthony DL. The double-edged sword of electronic health records: implications for patient disclosure. <i>J Am Med Inform Assoc</i> 2015;22(e1):e130–e140 | 92 |
| | Cifuentes M, Davis M, Fernald D, Gunn R, Dickinson P, Cohen DJ. Electronic Health Record Challenges, Workarounds, and Solutions Observed in Practices Integrating Behavioral Health and Primary Care. <i>J Am Board Fam Med</i> 2015;28 Suppl 1:S63–S72 | 92 |
| | Georgiou A, Prgomet M, Lymer S, Hordern A, Ridley L, Westbrook J. The Impact of a Health IT Changeover on Medical Imaging Department Work Processes and Turnaround Times: A mixed method study. <i>Appl Clin Inform</i> 2015;6(3):443–53 | 91 |
| | Graber ML, Siegal D, Riah H, Johnston D, Kenyon K. Electronic Health Record-Related Events in Medical Malpractice Claims. <i>J Patient Saf</i> 2015 Nov 6 | 92 |

Section 1: Health and Clinical Management

| | | |
|-----------------------------|---|-----|
| Survey | J. Lewis, P. Ray, S.-T. Liaw Recent Worldwide Developments in eHealth and mHealth to more Effectively Manage Cancer and other Chronic Diseases — A Systematic Review | 93 |
| Synopsis | E. Conchon, N. Bricon-Souf Will mHealth Revolutionize Health and Clinical Management and Open up New Horizons for Mental Health? | 109 |
| Best Paper Selection | Content summaries of: | |
| | Akl A, Taati B, Mihailidis A. Autonomous unobtrusive detection of mild cognitive impairment in older adults. <i>IEEE Trans Biomed Eng</i> 2015;62(5):1383-94 | 111 |
| | Lanata A, Valenza G, Nardelli M, Gentili C, Scilingo EP. Complexity index from a personalized wearable monitoring system for assessing remission in mental health. <i>IEEE J Biomed Health Inform</i> 2014;19(1):132-9 | 111 |
| | Simplicio MA, Iwaya LH, Barros BM, Carvalho TC, Näslund M. SecurHealth: a delay-tolerant security framework for mobile health data collection. <i>IEEE J Biomed Health Inform</i> 2015 Mar;19(2):761-72 | 111 |

Section 2: Human Factors and Organizational Issues

| | | |
|-----------------------------------|---|-----|
| Survey | G.A. Wildenbos, L.W. Peute, M.W.M. Jaspers Impact of Patient-centered eHealth Applications on Patient Outcomes: A Review on the Mediating Influence of Human Factor Issues | 113 |
| Working Group Contribution | A. Kushniruk, C. Nohr, E. Borycki Human Factors for More Usable and Safer Health Information Technology: Where Are We Now and Where do We Go from Here? | 120 |
| Synopsis | S. Pelayo, R. Santos Human Factors and Organizational Issues in 2015: The Increasing Complexity of the Healthcare Domain Calls for More Comprehensive Approaches | 126 |
| Best Paper Selection | Content summaries of: | |
| | Ammenwerth E. Evidence-based Health Informatics: How Do We Know What We Know? <i>Methods Inf Med</i> 2015;54(4):298-307 | 128 |
| | Furniss D, Masci P, Curzon P, Mayer A, Blandford A. Exploring medical device design and use through layers of Distributed Cognition: How a glucometer is coupled with its context? <i>J Biomed Inform</i> 2015;53:330-41 | 128 |
| | Jensen S, Kushniruk AW, Nohr C. Clinical simulation: A method for development and evaluation of clinical information systems. <i>J Biomed Inform</i> 2015;54:65-76 | 129 |

| | |
|---|-----|
| Singh H, Sittig DF. Measuring and improving patient safety through health information technology: The Health IT Safety Framework. <i>BMJ Qual Saf</i> 2015;0:1-7 | 129 |
| Vincent CJ, Blandford A. Usability standards meet scenario-based design: Challenges and opportunities. <i>J Biomed Inform</i> 2015;53:243-50 | 129 |

Section 3: Clinical Information Systems

| | | |
|-----------------------------------|--|-----|
| Survey | U. Sax, M. Lipprandt, R. Röhrig The Rising Frequency of IT Blackouts Indicates the Increasing Relevance of IT Emergency Concepts to Ensure Patient Safety | 130 |
| Working Group Contribution | H. Liyanage, S.-T. Liaw, C. T. Di Iorio, C. Kuziemyk, R. Schreiber, A. L. Terry, S. de Lusignan Building a Privacy, Ethics, and Data Access Framework for Real World Computerised Medical Record System Data: A Delphi Study | 138 |
| Synopsis | W. O. Hackl, T. Ganslandt New Problems - New Solutions: A Never Ending Story | 146 |
| Best Paper Selection | Content summaries of: | |
| | Pickering BW, Dong Y, Ahmed A, Giri J, Kilickaya O, Gupta A, Gajic O, Herasevich V. The implementation of clinician designed, human-centered electronic medical record viewer in the intensive care unit: a pilot step-wedge cluster randomized trial. <i>Int J Med Inform</i> 2015 May;84(5):299-307 | 150 |
| | Slight SP, Eguale T, Amato MG, Seger AC, Whitney DL, Bates DW, Schiff GD. The vulnerabilities of computerized physician order entry systems: a qualitative study. <i>J Am Med Inform Assoc</i> 2016 Mar;23(2):311-6 | 151 |
| | Varpio L, Rashotte J, Day K, King J, Kuziemyk C, Parush A. The EHR and building the patient's story: A qualitative investigation of how EHR use obstructs a vital clinical activity. <i>Int J Med Inform</i> 2015 Dec;84(12):1019-28 | 150 |
| | Wright A, McCoy AB, Hickman TT, Hilaire DS, Borbolla D, Bowes WA 3rd, Dixon WG, Dorr DA, Krall M, Malholtra S, Bates DW, Sittig DF. Problem list completeness in electronic health records: A multi-site study and assessment of success factors. <i>Int J Med Inform</i> 2015 Oct;84(10):784-90 | 151 |

Section 4: Sensor, Signal and Imaging Informatics

| | | |
|-----------------------------|---|-----|
| Survey | J. Kabil, L. Belguerras, S. Trattig, C. Pasquier, J. Felblinger, A. Missoffe A Review of Numerical Simulation and Analytical Modeling for Medical Devices Safety in MRI | 152 |
| Synopsis | C. Hughes, S. Voros, A. Moreau-Gaudry Unintended Consequences of Sensor, Signal, and Imaging Informatics: New Problems and New Solutions | 159 |
| Best Paper Selection | Content summaries of: | |
| | Chen Z, Strange H, Oliver A, Denton ER, Boggis C, Zwigelaar R. Topological Modeling and Classification of Mammographic Microcalcification Clusters. <i>IEEE Trans Biomed Eng</i> 2015;62(4):1203-14 | 162 |
| | Ha S, Mueller K. Low dose CT image restoration using a database of image patches. <i>Phys Med Biol</i> 2015;60(2):869-82 | 161 |
| | Liu C, van Netten JJ, van Baal JG, Bus SA, van der Heijden F. Automatic detection of diabetic foot complications with infrared thermography by asymmetric analysis. <i>J Biomed Opt</i> 2015;20(2):26003 | 162 |
| | Mert S, Özbek E, Ötünçtemur A, Çulha M. Kidney tumor staging using surface-enhanced Raman scattering. <i>J Biomed Opt</i> 2015;20(4):47002 | 162 |

Section 5: Decision Support

| | | |
|----------------------|--|-----|
| Survey | E. Coiera, J. Ash, M. Berg The Unintended Consequences of Health Information Technology Revisited | 163 |
| Synopsis | V. Koutkias, J. Bouaud Computerized Clinical Decision Support: Contributions from 2015 | 170 |
| Best Paper Selection | Content summaries of: | |
| | Anand V, Carroll AE, Biondich PG, Dugan TM, Downs SM. Pediatric decision support using adapted Arden Syntax. <i>Artif Intell Med</i> 2015 Oct 1 | 176 |
| | Cho I, Lee JH, Choi SK, Choi JW, Hwang H, Bates DW. Acceptability and feasibility of the Leapfrog computerized physician order entry evaluation tool for hospitals outside the United States. <i>Int J Med Inform</i> 2015 Sep;84(9):694-701 | 176 |
| | Marcilly R, Ammenwerth E, Vasseur F, Roehrer E, Beuscart-Zéphir MC. Usability flaws of medication-related alerting functions: A systematic qualitative review. <i>J Biomed Inform</i> 2015 Jun;55:260-71 | 177 |
| | Shalom E, Shahar Y, Parmet Y, Lunenfeld E. A multiple-scenario assessment of the effect of a continuous-care, guideline-based decision support system on clinicians' compliance to clinical guidelines. <i>Int J Med Inform</i> 2015 Apr;84(4):248-62 | |

Section 6: Knowledge Representation and Management

| | | |
|----------------------|---|-----|
| Survey | M. Barros, F. M. Couto Knowledge Representation and Management: a Linked Data Perspective | 178 |
| Synopsis | L. F. Soualmia, J. Charlet Efficient Results in Semantic Interoperability for Health Care | 184 |
| Best Paper Selection | Content summaries of: | |
| | Alonso-Calvo R, Perez-Rey D, Paraiso-Medina S, Clearhout B, Hennebert P, Bucur A. Enabling semantic interoperability in multi-centric clinical trials on breast cancer. <i>Computer Methods Programs Biomed</i> 2015;118:322–9 | 187 |
| | Chi YL, Chen TY, Tsai WT. A chronic disease dietary consultation system using OWL-based ontologies and semantic rules. <i>J Biomed Inform</i> 2015;53:208–19 | 187 |
| | Groza T, Köhler S, Moldenhauer D, Vasilevsky N, Baynam G, Zemojtel T, Schriml LM, Kibbe WA, Schofield PN, Beck T, Vasant D, Brookes AJ, Zankl A, Washington NL, Mungall CJ, Lewis SE, Haendel MA, Parkinson H, Robinson PN. The Human Phenotype Ontology : semantic unification of common and rare disease. <i>Am J Hum Genet</i> 2015;97:111–24 | 187 |
| | Mortensen JM, Minty EP, Januszyk M, Sweeney TE, Rector AL, Noy NF, Musen MA. Using the wisdom of the crowds to find critical errors in biomedical ontologies : a study of SNOMED CT. <i>J Am Med Inform Assoc</i> 2015;22:640–8 | 187 |

Section 7: Consumer Health Informatics

| | | |
|-----------------------------|---|-----|
| Synopsis | L. Fernandez-Luque, P. Staccini All that Glitters is not Gold: Consumer Health Informatics and Education in the Era of Social Media and Health Apps | 188 |
| Best Paper Selection | Content summaries of: | |
| | Huckvale K, Prieto JT, Tilney M, Benghozi P-J, Car J. Unaddressed privacy risks in accredited health and wellness apps: a cross-sectional systematic assessment. <i>BMC Med</i> 2015;13(1):214 | 192 |
| | Lau AY. Why Didn't it Work? Lessons From a Randomized Controlled Trial of a Web-based Personally Controlled Health Management System for Adults with Asthma. <i>J Med Internet Res</i> 2015;17: e283 | 191 |
| | Minto C, Bauce B, Calore C, Rigato I, Folino F, Soriani N, Hochdorn A, Iliceto S, Gregori D. Is Internet use associated with anxiety in patients with and at risk for cardiomyopathy? <i>Am Heart J</i> 2015;170(1):87–95 | 192 |
| | Rozental A, Boettcher J, Andersson G, Schmidt B, Carlbring P. Negative Effects of Internet Interventions: A Qualitative Content Analysis of Patients' Experiences with Treatments Delivered Online. <i>Cogn Behav Ther</i> 2015;44(3):223–36 | 192 |
| | Zhang Z, Zhang Z, Li H. Predictors of the authenticity of Internet health rumours. <i>Health Info Libr J</i> 2015;32(3):195–205 | 193 |

Section 8: Bioinformatics and Translational Informatics

| | | |
|-----------------------------|---|-----|
| Survey | N. Pouladi, I. Achour, H. Li, J. Berghout, C. Kenost, M. L. Gonzalez-Garay, Y. A. Lussier Biomechanisms of Comorbidity: Reviewing Integrative Analyses of Multi-omics Datasets and Electronic Health Records | 194 |
| Synopsis | H. Dauchel, T. Lecroq Findings from the Section on Bioinformatics and Translational Informatics | 207 |
| Best Paper Selection | Content summaries of: | |
| | Gurdasani D, Carstensen T, Tekola-Ayele F, Pagani L, Tachmazidou I, Hatzikotoulas K, Karthikeyan S, Iles L, Pollard MO, Choudhury A, Ritchie GR, Xue Y, Asimit J, Nsubuga RN, Young EH, Pomilla C, Kivinen K, Rockett K, Kamali A, Doumatey AP, Asiki G, Seeley J, Sisay-Joof F, Jallow M, Tollman S, Mekonnen E, Ekong R, Oljira T, Bradman N, Bojang K, Ramsay M, Adeyemo A, Bekele E, Motala A, Norris SA, Pirie F, Kaleebu P, Kwiatkowski D, Tyler-Smith C, Rotimi C, Zeggini E, Sandhu MS. The African Genome Variation Project shapes medical genetics in Africa. <i>Nature</i> 2015 Jan 15;517(7534):327–32 | 209 |
| | Leiserson MD, Vandin F, Wu HT, Dobson JR, Eldridge JV, Thomas JL, Papoutsaki A, Kim Y, Niu B, McLellan M, Lawrence MS, Gonzalez-Perez A, Tamborero D, Cheng Y, Ryslik GA, Lopez-Bigas N, Getz G, Ding L, Raphael BJ. Pan-cancer network analysis identifies combinations of rare somatic mutations across pathways and protein complexes. <i>Nat Genet</i> 2015 Feb;47(2):106–14 | 209 |
| | Korthauer KD, Kendziorski C. MADGiC: a model-based approach for identifying driver genes in cancer. <i>Bioinformatics</i> 2015 May 15;31(10):1526–35 | 209 |
| | Zhu Y, Xu Y, Helseth DL Jr, Gulukota K, Yang S, Pesce LL, Mitra R, Müller P, Sengupta S, Guo W, Silverstein JC, Foster I, Parsad N, White KP, Ji Y. Zodiac: A Comprehensive Depiction of Genetic Interactions in Cancer by Integrating TCGA Data. <i>J Natl Cancer Inst</i> 2015 May 8;107(8) | 210 |

Section 9: Clinical Research Informatics

| | | |
|----------------------|---|-----|
| Survey | C. Weng, M. G. Kahn Clinical Research Informatics for Big Data and Precision Medicine | 211 |
| Synopsis | C. Daniel, R. Choquet Clinical Research Informatics Contributions from 2015 | 219 |
| Best Paper Selection | Content summaries of: | |
| | Gray EA, Thorpe JH. Comparative effectiveness research and big data: balancing potential with legal and ethical considerations. <i>J Comp Eff Res</i> 2015 Jan;4(1):61-74 | 223 |
| | Huser V, Sastry C, Breymaier M, Idriss A, Cimino JJ. Standardizing data exchange for clinical research protocols and case report forms: An assessment of the suitability of the Clinical Data Interchange Standards Consortium (CDISC) Operational Data Model (ODM). <i>J Biomed Inform</i> 2015 Oct;57:88-9 | 222 |
| | Kho AN, Cashy JP, Jackson KL, Pah AR, Goel S, Boehnke J, Humphries JE, Kominers SD, Hota BN, Sims SA, Malin BA, French DD, Walunas TL, Meltzer DO, Kaleba EO, Jones RC, Galanter WL. Design and implementation of a privacy preserving electronic health record linkage tool in Chicago. <i>J Am Med Inform Assoc</i> 2015 Sep;22(5):1072-80 | 222 |
| | Kreuzthaler M, Schulz S, Berghold A. Secondary use of electronic health records for building cohort studies through top-down information extraction. <i>J Biomed Inform</i> 2015 Feb;53:188-95 | 222 |

Section 10: Natural Language Processing

| | | |
|----------------------|---|-----|
| Survey | D. Demner-Fushman, N. Elhadad Aspiring to Unintended Consequences of Natural Language Processing: A Review of Recent Developments in Clinical and Consumer-Generated Text Processing | 224 |
| Synopsis | A. Névél, P. Zweigenbaum Clinical Natural Language Processing in 2015: Leveraging the Variety of Texts of Clinical Interest | 234 |
| Best Paper Selection | Content summaries of: | |
| | Li Q, Spooner SA, Kaiser M, Lingren N, Robbins J, Lingren T, Tang H, Solti I, Ni Y. An end-to-end hybrid algorithm for automated medication discrepancy detection. <i>BMC Med Inform Decis Mak</i> 2015 May 6;15:37 | 238 |
| | Luo Y, Xin Y, Hochberg E, Joshi R, Uzuner O, Szolovits P. Subgraph augmented non-negative tensor factorization (SANTF) for modeling clinical narrative text. <i>J Am Med Inform Assoc</i> 2015 Sep;22(5):1009-19 | 238 |
| | Ni Y, Kennebeck S, Dexheimer JW, McAnaney CM, Tang H, Lingren T, Li Q, Zhai H, Solti I. Automated clinical trial eligibility prescreening: increasing the efficiency of patient identification for clinical trials in the emergency department. <i>J Am Med Inform Assoc</i> 2015 Jan;22(1):166-78 | 238 |
| | Ornoz M, Gojenola K, Pérez A, de Ilarraza AD, Casillas A. On the creation of a clinical gold standard corpus in Spanish: Mining adverse drug reactions. <i>J Biomed Inform</i> 2015 Aug;56:318-32 | 238 |
| | Prud'hommeaux E, Roark B. Graph-Based Word Alignment for Clinical Language Evaluation. <i>Computational Linguistics</i> 2015 Dec;41(4):549-78 | 239 |

Section 11: Public Health and Epidemiology Informatics

Survey A. Flahault, A. Bar-Hen, N.Paragios
Public Health and Epidemiology Informatics 240

Synopsis L. Toubiana, N. Griffon
Some Innovative Approaches for Public Health and Epidemiology Informatics 247

Content summaries of:

Best Paper Selection Hu Z, Jin B, Shin AY, Zhu C, Zhao Y, Hao S, Zheng L, Fu C, Wen Q, Ji J, Li Z, Wang Y, Zheng X, Dai D, Culver DS, Alfreds ST, Rogow T, Stearns F, Sylvester KG, Widen E, Ling XB. Real-time web-based assessment of total population risk of future emergency department utilization: statewide prospective active case finding study. *Interact J Med Res* 2015 Jan-Mar;4(1):e2 249

Jafarpour N, Izadi M, Precup D, Buckeridge DL. Quantifying the determinants of outbreak detection performance through simulation and machine learning. *J Biomed Inform* 2015 Feb;53:180-7 250

Lejeune G, Brixtel R, Doucet A, Lucas N. Multilingual event extraction for epidemic detection. *Artif Intell Med* 2015 Oct;65(2):131-43 250

IMIA Award Articles

E. Coiera
A New Informatics Geography 251

P. Degoulet
The Virtuous Circles of Clinical Information Systems: a Modern Utopia 256

Research & Education

M. R. Cummins, A. V. Gundlapalli, A. V. Gundlapalli, P. Murray, H.-A. Park, C. U. Lehmann
Nursing Informatics Certification Worldwide: History, Pathway, Roles, and Motivation 264

Information on IMIA

Information on IMIA 272

Honorary Fellows 275

IMIA Member Societies 276

Institutional Members 277

Addresses of IMIA Member Societies 279

Information on IMIA Regions

Information on APAMI (Asia Pacific Association for Medical Informatics) 295

Information on Helina (African Region) 299

Information on IMIA-LAC (Federation of Health Societies in Latin America) 301

Information on MEAHI (Middle East Association for Health Informatics) 303

Information on North-American Medical Informatics (NAMI) 304

Information on EFMI (European Federation For Medical Informatics) 309

Information on EFMI Working Groups 311

Miscellaneous

Contributors 326

MIA Yearbook Special Topics 327