IMIA Exposome Informatics WG 2020 Report

presented as part of the VP WG & SIG Annual Report for:

- **IMIA Board Meeting, November 22, 2020,**
- **IMIA General Assembly Meeting, December 6, 2020**

Fernando Martin-Sanchez, Chair (2017-2020)
Riccardo Bellazzi, Co-Chair (2017-2020)
Chirag Patel, Co-Chair (2017-2020)

Website: https://imia-medinfo.org/wp/exposome-informatics/ ;
https://exposomeinformatics.wordpress.com/

Report for the Period July 2019 – June 2020

Date: Nov 11, 2020

1. **Brief Background- current mandate, historical background, etc.**

The IMIA WG on Exposome Informatics was created during MedInfo 2017 (August).

Background

Most diseases result from the complex interplay between genetic and environmental factors. The exposome is a new concept that seeks to define biotechnical approaches to systematically measure comprehensively a large subset of environmental exposures of an individual from conception to end of life and associate it with health and disease status. In its broadest sense, the exposome encompasses not only exposures to environmental stressors, but also the physical environment, the built environment, socio-economic factors, access to health care and life habits or behaviors.

While the environment and exposome has impact on health, health informaticians have a limited awareness about the contribution of environmental factors to individual health (environmental epidemiology has focused on the impact of the environment, but at aggregated, population level). There is a need for new digital methods and resources that select, annotate, organize and present

reliable and updated information about environmental factors affecting our health on both a population and individual/patient scale. The exposome demands a systematic research effort equivalent to what has been done to characterize the human genome (and also the human phenome).

To address these problems, IMIA created this Working Group on informatics aspects related to the exposome. Its main aim is to support investigators, clinicians and consumers navigate throughout the entire "data to knowledge" lifecycle: data collection, knowledge representation, annotation, integration with genomic and phenomic data, analytics, and visualization.

Main objectives

- To provide a forum to enhance collaboration, share experiences, and promote research in this field.
- To liaise with other working groups at IMIA, AMIA, EFMI and other organizations relevant to exposome informatics, including groups with an emphasis on environmental health and informatics from the biomedical community, computing research and bioinformatics as relevant.
- To establish itself as a scientific reference on issues related to informatics projects in exposome sciences.

Work Plan

- To provide a directory of existing large exposomics initiatives at the national and international level
- To organize and support tutorials and master classes on all topics related to exposome data processing, at national and international medical informatics meetings (e.g.: http://www.chiragjpgroup.org/exposome-analytics-course/)
- To contribute to the IMIA Yearbook of Medical Informatics and seek opportunities to contribute review articles and perspectives to special issues and conferences about its topics of research interest.
- To organize at least one yearly business meeting. We will try to schedule this in major health and biomedical informatics conferences (MEDINFO, AMIA, EFMI, APAMI). If this were not possible, we will organize online meetings.

2. **Achievements - Events and projects conducted and publications completed**

Note. Besides the disruption caused by COVID-19 crisis, from Feb 2020 to September 2020, the Chair of the WG interrupted his academic career to work for the Spanish Government (as Director of Artificial Intelligence). In September he returned to his tenured professorship at the Instituto de Salud Carlos III of Spain, and is willing to reactivate the WG activities.

- Panel: "Progress in characterizing the Human Exposome: a key step for Precision Medicine". XVII World Congress on Health and Biomedical Informatics. MEDINFO 2019. 25-29 Agosto 2019. Lyon, Francia.

Projects

- “Desarrollo del procedimiento de sistematización de datos del exposoma para el desarrollo de una plataforma de expotipado computacional”. Funded by IMIENS. 2019-2020. UNED. Madrid.
- Preparation of the proposal iCOMPEXP, submitted to the Human Exposome Call of the European Commission. Horizon 2020. (Not funded)

Publications:

- Martin-Sanchez F, Bellazzi R, Casella V, Dixon W, Lopez-Campos G, Peek N. Progress in Characterizing the Human Exposome: a Key Step for Precision Medicine. Yearb Med Inform. 2020 Aug;29(1):115-120.
- Martin-Sanchez F. 2019**. “**Big Data Challenges from an Integrative Exposome/Expotype Perspective”. In “Big Data, Big Challenges: A Healthcare Perspective” Eds (Househ M, Kushniruk A, Borycki E). Springer. 127-140 .

3. **Describe WG/SIG Participation - Engagement and participation in IMIA and health informatics events and activities in the past year**

- The WG was present and very active during MEDINFO - Lyon. We organized a well-attended panel, as a continuation of a previous event held at MIE-Gothenburg.
- As a result, we were invited to submit a paper to the Yearbook, illustrating the main findings from the panel. The paper was revised and accepted for publication.

4. **Provide details of the WG/SIG’s Outreach - Recruitment and engagement of new members and target communities, publicity, and representation at major events and/or on social media.**

- The Web site of the working group is accessible at: https://exposomeinformatics.wordpress.com/

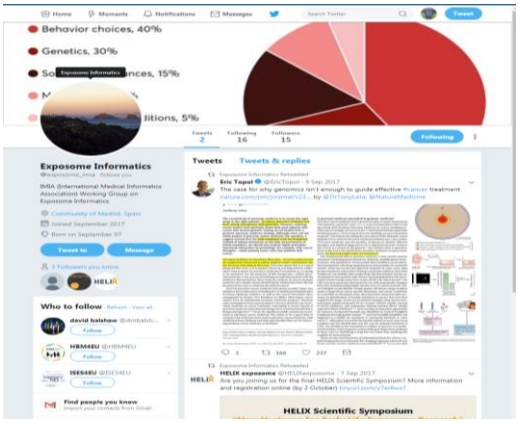
This site contains a section (Data resources) where we track progress in new Databases,

ontologies and analytics methods related to Exposome Information. There is also a collection of relevant published papers classified by topic (informatics, partial exposomes, biomarkers and omics, sensors, education, precision medicine, epidemiology). We are planning to conduct a major update and reorganization of these contents in the next weeks.

- The Working Group has a Linkedin group at: (https://www.linkedin.com/groups/10353025) which currently has 20 members.

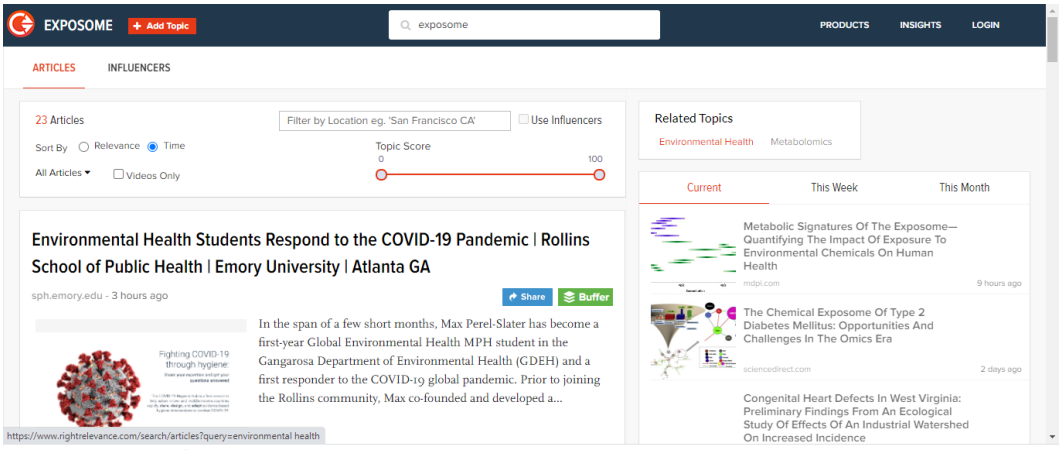
- There is also a closed Facebook group: (https://www.facebook.com/groups/153308108588844/).

- The WG has a twitter account: @exposome_imia, currently with 27 followers.

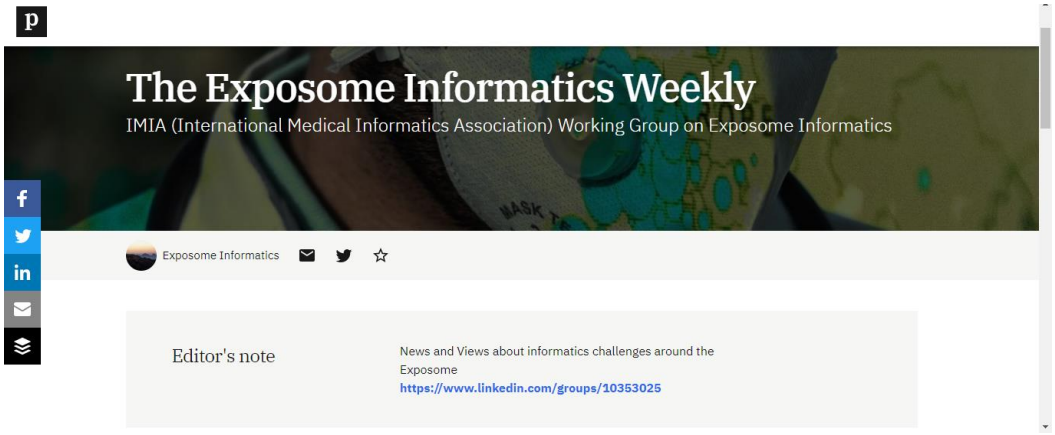


- The working group also maintains a number of freely accessible online channels on Exposome Informatics where relevant news and research developments in this field are curated, filtered, posted and regularly circulated through social media channels (Facebook, Twitter and Linkedin WG page):

    - Right **Relevance**: https://www.rightrelevance.com/search/articles?query=exposome



- Paper.ly: https://paper.li/exposome_imia/1505122927#/



4.a Current number of members: 20

4.b. List of WG/SIG members:

1. **Norman Viner**. Consultant. Ontario, Canada.
2. **Pei-Yun Sabrina Hsueh**. Senior manager of Viome Inc. NY. USA.
3. **Ted Alexander**. VP, The eHealth Centre of Excellence. Ontario, Canada.
4. **Luis Fernandez-Luque**. Salumedia Labs. Seville. Spain.
5. **Enrique Carrillo de Santa Pau, PhD**. Associated Professor at Universidad Autonoma de Madrid. Spain.
6. **Carlos Luis Parra-Calderón**. Hospital Virgen del Rocio. Seville. Spain
7. **Arriel Benis.** Head, AURIS lab (Automation, Robotics, IoT & Analytics Intelligence for Smart Industry), Holon Institute of Technology. Israel.
8. **Swetha Nagapuri**. Researcher Ph.D. Candidate
9. **Kathleen Gray**. Associate Professor, Health Informatics at University of Melbourne. Australia
10. **Guillermo Lopez**. Lecturer at the Wellcome-Wolfson Institute for Experimental Medicine. Queen's University Belfast
11. **Mary Regina Boland**. Assistant Professor of Informatics at University of Pennsylvania. USA
12. **Vanessa Aguiar-Pulido**. Assistant Prof. & Head of Lab at University of Miami.USA
13. **José Luis Oliveira**. Full Professor at University of Aveiro. Portugal
14. **Riccardo Bellazzi**. Department Chair at Department of Electrical, Computer and Biomedical Engineering, University of Pavia, Ital.
15. **Chirag Patel**. Associate Professor at Harvard Medical School
16. **Mark Merolli**. Senior Lecturer & Research Fellow. Physiotherapist, Digital Health (MAPA, FAIDH, CHIA) at University of Melbourne - Australia
17. **Marcia Ito**. Knowledge Engineer | Health Informatics Researcher | Software Engineering Professor. Brazil.
18. **Shabbir Syed Abdul**. Associate Professor at Taipei Medical University
19. **Abdul Roudsari**. Professor at University of Victoria. Canada
20. **Fernando Martin-Sanchez**. Full Professor Biomedical Informatics. Instituto de Salud Carlos III