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Uso de Plataformas Miniaturizadas en la Fase Analítica de Pruebas de Laboratorio

Maria Elizabeth Menezes, MsC _ PhD

EVOLUÇÃO DAS PLATAFORMAS

DÉCADA DE 1980
- Engenharia genética
- Testes rápidos
- Reação em cadeia da polimerase (PCR - HIV)

DÉCADA DE 1990
- Automação do sequenciamento do DNA

DÉCADA DE 2000
- Miniaturização de plataforma na área de alimentos e doenças infecciosas
- POCT

DÉCADA DE 2020
- Pandemia SarCov-2 – sequenciamento rápido

EXAMES PERSONALIZADOS

A **medicina laboratorial** desempenha um papel integral na saúde, fornecendo aos profissionais de saúde **dados objetivos** para orientar a **prevenção** de doenças, **avaliação de risco**, **diagnóstico**, **prognóstico**, **tratamento** e **monitoramento** de pacientes, o que garante uma **tomada de decisão clínica** segura, adequada e eficaz. Nos últimos anos, grandes avanços tecnológicos na medicina laboratorial melhoraram muito o diagnóstico e o monitoramento do laboratório clínico, aumentando ainda mais a **qualidade do atendimento** ao paciente. Por sua vez, essas inovações tecnológicas agregaram valor reconhecível à medicina laboratorial no setor de saúde.

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Study on the Fourth Industrial Revolution and Clinical Laboratory Science Techniques

Korean J Clin Lab Sci 2019;51:386-395
https://doi.org/10.15324/kjcls.2019.51.3.386
Published on September 30, 2019

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ORIGINAL RESEARCH

Competitiveness of a clinical laboratory within the Fourth Industrial Revolution

Blessing T. Kadira; Dirk Rossouw

Department of Business Management, College of Business and Economics, University of Johannesburg, Johannesburg, South Africa

Correspondence

ABSTRACT

ORIENTATION: A clinical laboratory supports research for drugs, vaccine and device development. These laboratories in developing countries seem not to fully use technology arising from the Fourth Industrial Revolution (4IR) to enhance their competitiveness and, consequently, market share
RESEARCH PURPOSE: The purpose was to explore how a clinical laboratory in a developing country may become more competitive by implementing strategies in support of 4IR advancements.
MOTIVATION FOR THE STUDY: This study attempted to reflect literature on the topics of 4IR and competitiveness and also to acquire an understanding of how a clinical laboratory in a developing country can use 4IR technology to improve its competitiveness.
RESEARCH DESIGN, APPROACH AND METHOD: This study followed an interpretive paradigm and a qualitative enquiry, supported by a case study strategy. Data were collected by means of semi-structured interviews with 20 purposively selected stakeholders from the clinical laboratory. Conventional content analysis was applied to create codes, groups and themes.
MAIN FINDINGS: It was found that a clinical laboratory in a developing country can be competitive within the 4IR environment, and a link was established between strategy, 4IR and the improvement of competitiveness of the clinical laboratory.
PRACTICAL/MANAGERIAL IMPLICATIONS: The clinical laboratory has to build a strategy around the latest technology to ensure competitiveness and growth in its operations. The 4IR will also require continuous upgrades of new technology, and staff should be made part of this process.
CONTRIBUTION/VALUE-ADD: The developing world has to catch up with the advanced economies. To assist in this, this study concludes that strategies supporting 4IR technology advancements can improve the competitiveness and sustainable growth of a clinical laboratory.

Keywords: strategy; competitiveness; Fourth Industrial Revolution; technological advancements; clinical laboratory.

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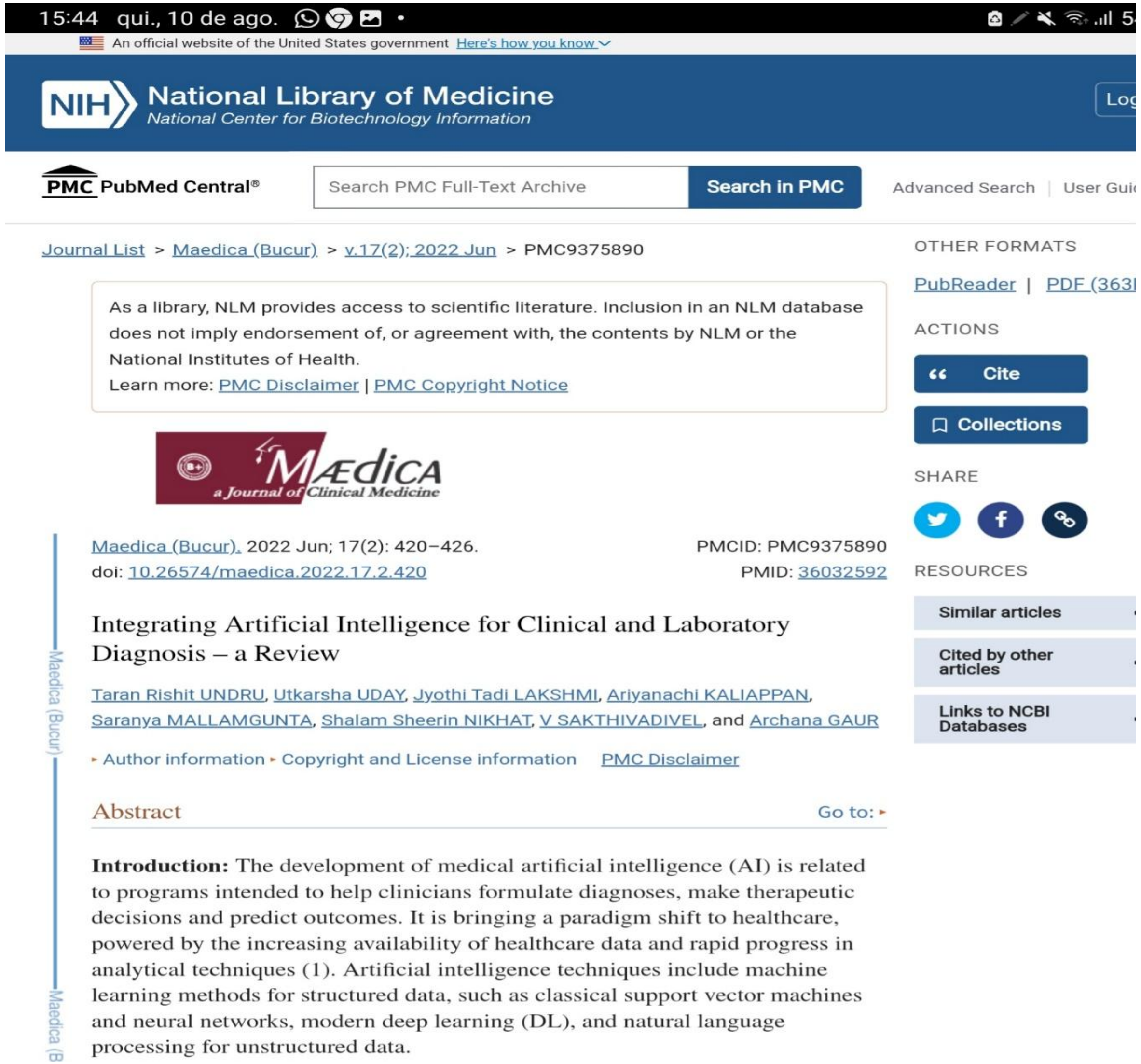
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doi: 10.26574/maedica.2022.17.2.420
PMCID: PMC9375890
PMID: 36032592

Integrating Artificial Intelligence for Clinical and Laboratory Diagnosis – a Review

Taran Rishit UNDRU, Utkarsha UDAY, Jyothi Tadi LAKSHMI, Ariyanachi KALIAPPAN, Saranya MALLAMGUNTA, Shalam Sheerin NIKHAT, V SAKTHIVADIVEL, and Archana GAUR

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Abstract

Introduction: The development of medical artificial intelligence (AI) is related to programs intended to help clinicians formulate diagnoses, make therapeutic decisions and predict outcomes. It is bringing a paradigm shift to healthcare, powered by the increasing availability of healthcare data and rapid progress in analytical techniques (1). Artificial intelligence techniques include machine learning methods for structured data, such as classical support vector machines and neural networks, modern deep learning (DL), and natural language processing for unstructured data.

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MEDICINA DE PRECISÃO

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Review Article

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The future of laboratory medicine in the era of precision medicine

Giuseppe Lippi[1], Antonella Bassi[1,2], Chiara Bovo[3]

[1]Section of Clinical Biochemistry, University of Verona, Verona, Italy; [2]Laboratory of Clinical Chemistry and Hematology University Hospital of Verona, Verona, Italy[3]Medical Direction, University Hospital of Verona, Verona, Italy

Contributions: (I) Conception and design: G Lippi, C Bovo; (II) Administrative support: None; (III) Provision of study materials or patients: None; (IV) Collection and assembly of data: All authors; (V) Data analysis and interpretation: G Lippi, A Bassi; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Prof. Giuseppe Lippi. Section of Clinical Biochemistry, University Hospital of Verona, P.le LA Scuro 10, 37134 - Verona, Italy. Email: giuseppe.lippi@univr.it.

Abstract: Medical science has undergone a substantial revolution in recent years, wherein the traditional approach to diagnosing and treating many human diseases has gradually evolved from a generalized conception of health and disease to an individualized approach entailing decisions and interventions tailored to the single patient according to individual responses or risk of disease. This axiom has evolved from concept to practice, and has been translated into the notion of "personalized" or "precision" medicine. Although precision (personalized) medicine will be the core opportunity for effective care in the anticipatable future, many political, economic and cultural challenges need to be overwhelmed, and these include some ongoing healthcare reforms around the globe, cost containment strategies, consolidation of laboratories and *in vitro* diagnostic testing, as well as the impact of new technologies and tests on the existing laboratory organization. Therefore, the aim of this article is to discuss some of the several changes which may ultimately drive or challenge the future of laboratory medicine in the era of precision medicine.

Keywords: Laboratory medicine; precision medicine; personalized medicine

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PLATAFORMAS ANALÍTICAS MINIATURIZADAS

Requires Authentication Published by De Gruyter December 23, 2010

Miniaturization and globalization of clinical laboratory activities

Murilo R. Melo, Samantha Clark and Daniel Barrio

From the journal Clinical Chemistry and Laboratory Medicine
https://doi.org/10.1515/CCLM.2011.092

Abstract

Clinical laboratories provide an invaluable service to millions of people around the world in the form of quality diagnostic care. Within the clinical laboratory industry the impetus for change has come from technological development (miniaturization, nanotechnology, and their collective effect on point-of-care testing; POCT) and the increasingly global nature of laboratory services. Potential technological gains in POCT include: the development of bio-sensors, microarrays, genetics and proteomics testing, and enhanced web connectivity. In globalization, prospective opportunities lie in: medical tourism, the migration of healthcare workers, cross-border delivery of testing, and the establishment of accredited laboratories in previously unexplored markets. Accompanying these impressive opportunities are equally imposing challenges. Difficulty transitioning from research to clinical use, poor infrastructure in developing countries, cultural differences and national barriers to global trade are only a few examples. Dealing with the issues presented by globalization and the impact of developing technology on POCT, and on the clinical laboratory services industry in general, will be a daunting task. Despite such concerns, with appropriate countermeasures it will be possible to address the challenges posed. Future laboratory success will be largely dependent on one's ability to adapt in this perpetually shifting landscape.

International Journal of Nanomedicine
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REVIEW

Aspects of Point-of-Care Diagnostics for Personalized Health Wellness

This article was published in the following Dove Press journal:
International Journal of Nanomedicine

Sandeep Kumar[1]
Monika Nehra[1]
Sakina Khurana[1]
Neeraj Dilbaghi[1]
Vanish Kumar[2]
Ajeet Kaushik[3]
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Abstract: Advancements in analytical diagnostic systems for point-of-care (POC) application have gained considerable attention because of their rapid operation at the site required to manage severe diseases, even in a personalized manner. The POC diagnostic devices offer easy operation, fast analytical outcome, and affordable cost, which promote their advanced research and versatile adoptability. Keeping advantages in view, considerable efforts are being made to design and develop smart sensing components such as miniaturized transduction, interdigitated electrodes-based sensing chips, selective detection at low level, portable packaging, and sustainable durability to promote POC diagnostics according to the needs of patient care. Such effective diagnostics systems are in demand, which creates the challenge to make them more efficient in every aspect to generate a desired bio-informatic needed for better health access and management. Keeping advantages and scope in view, this mini review focuses on practical scenarios associated with miniaturized analytical diagnostic devices at POC application for targeted disease diagnostics smartly and efficiently. Moreover, advancements in technologies, such as smartphone-based operation, paper-based sensing assays, and lab-on-a-chip (LOC) which made POC more sensitive, informative, and suitable for major infectious disease diagnosis, are the main focus here. Besides, POC diagnostics based on automated patient sample integration with a sensing platform is continuously improving therapeutics interventions against specific infectious disease. This review also discussed challenges associated with state-of-the-art technology along with future research opportunities to design and develop next generation POC diagnostic systems needed to manage infectious diseases in a personalized manner.
Keywords: point-of-care devices, infectious diseases, lateral flow strips, microfluidics

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Mike Williams - Feb. 25, 2021

Chip simplifies COVID-19 testing, delivers results on a phone

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MINIATURIZAÇÃO DO PROCESSO ANALÍTICO

MINIATURIZAÇÃO DE PLATAFORMAS X TEMPO DE GERAÇÃO DO RESULTADO

FASE PRÉ-ANALÍTICA › lidando com a seleção de uma abordagem apropriada para o teste, bem como a coleta de amostras

FASE ANALÍTICA › lidando com a detecção de sinais biológicos direcionados e posterior transformação em sinal mensurável

FASE PÓS-ANALÍTICA › preocupada com a análise de dados e exibição de resultados seguidos por armazenamento ou transmissão adicional

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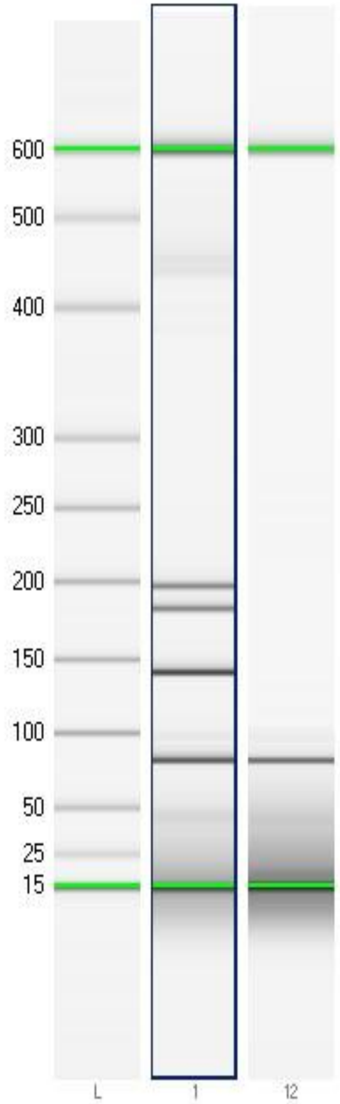
APLICAÇÕES

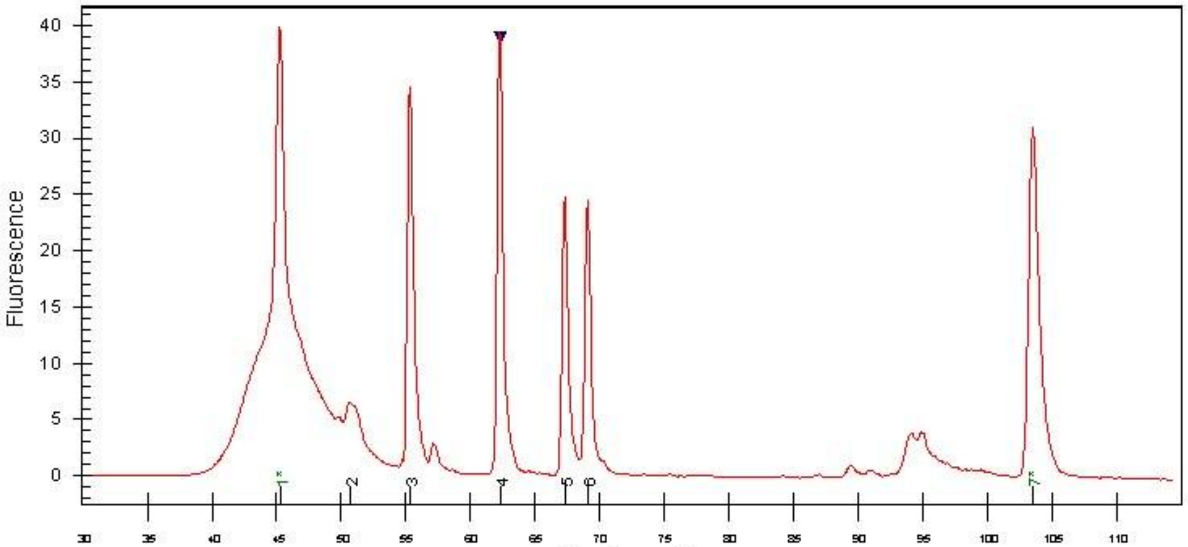
BIOQUÍMICA, GENÉTICA, HEMATOLOGIA, IMUNOENSAIOS

MINIATURIZAÇÃO DAS PLATAFORMAS

- Sistema fechado X Biossegurança
- Sistema de reagentes
- Redução de custos
- Tempo de geração de resultados
- Detecção simultanea

DNA LABCHIP





Peak	Mig.Time(secs)	Corr.Area	Size(bp)	Conc.(ng/ul)	Molarity(nmol/l)
1	45,30	206,82	15	4,2	424,24
2	50,65	17,03	44	1,5	52,04
3	55,30	37,33	82	3,1	57,29
4	62,30	35,91	142	2,7	29,05
5	67,30	21,44	183	1,5	12,74
6	69,05	20,14	197	1,4	10,90
7	103,50	29,91	600	2,1	5,30

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- Protocolo de definição do ensaio (ADF)

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- Posições de reagentes: **9**
- Cubetas on board: até **240**

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- Posições de amostras: **144**
- Posições de reagentes: **15**
- Cubetas on board: até **720**
- Conectável a esteira automática Inpeco

MAGLUMI® 2000Plus
Direcionado para grandes cadeias de laboratórios ou hospitais
- Throughput: até **180** testes/h
- Posições de amostras: **144**
- Posições de reagentes: **25**
- Cubetas on board: até **720**
- Conectável a esteira automática Inpeco

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- Monitoramento do status dos reagentes e consumíveis
- Conexão LIS bidirecional por TCP/IP e COM

Áreas de amostras
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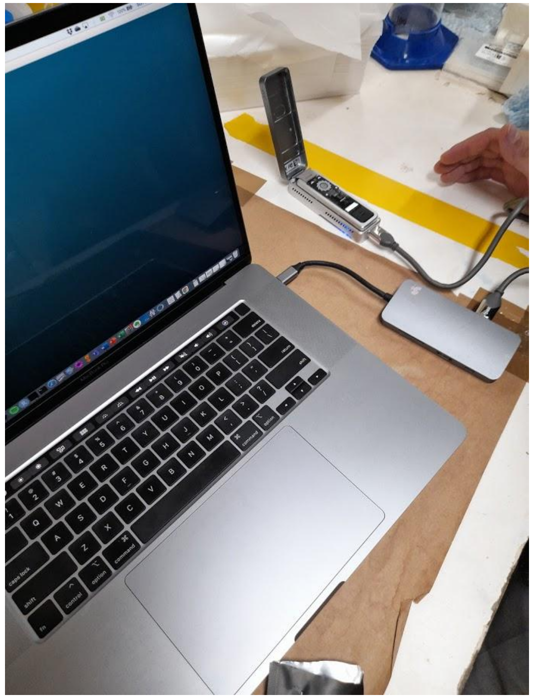

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