

Technological Advances and Future Trends in Laboratory Medicine

Predicting the Lab of the Future!

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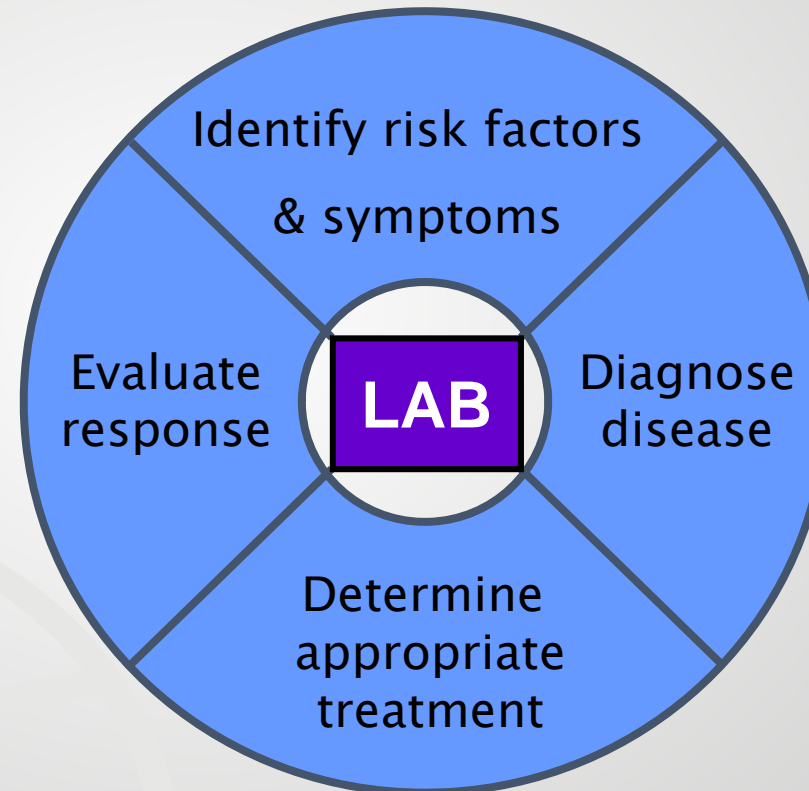


Evidence Supports the Central Role of Laboratory Medicine



Laboratory
Medicine

Laboratory Medicine is part of the multi-disciplinary team at the centre of healthcare



G Beastall



Laboratory medicine is *A hidden treasure in health care*



Laboratory
Medicine

94% objective data in medical records

60–70 clinical decisions influenced

37% of practice guidelines

23 % different disease areas & growing number of companion diagnostics

Sources: IMS Report 2003, www.VDGH.de / Forsman, R.W. (2002) *Clin. Leadersh. Manag. Rev.*, **16**, 370 / Forsman, R.W. (2000) *Clin. Leadersh. Manag. Rev.*, **14**, 292 / Gibler et al. 1992, *Annals of Emergency Medicine*, **21**, 504 / Herrmann et al., 2001 *Med. Klinik*, 144 / *Clinica* 19.7. + 13.9.2002, 11.04.2002



Importance of lab medicine



Laboratory
Medicine

- *Single highest-volume medical activity*
(Est 10-15 bn tests/year)
- Patient safety – *contributes to fast, accurate diagnosis*
- Essential to clinically cost-effective delivery of care
Often the principal basis for costly downstream care
- Spans primary/secondary care
- Added value at pre- & post-analytical phases

*Global IVD market valued at \$49.2 bn in 2012, growing at a rate of 7%
2012-2017 3-5% of healthcare costs*



Healthcare Professionals Need to be Educated on the Critical Role of Laboratory Medicine



Laboratory
Medicine

Key reasons why we need laboratory medicine:

- Integral to many clinical decisions on prevention, diagnosis, treatment, managing disease of patients
- Supplies health care professionals with **OBJECTIVE DATA** necessary to provide high quality, safe, effective and appropriate care to patients

Value of Laboratory Tests and Services Across Patient Care Continuum

Wolcott J, Schwartz A, Goodman C. Laboratory Medicine: A National Status Report. Prepared by: The Lewin Group.

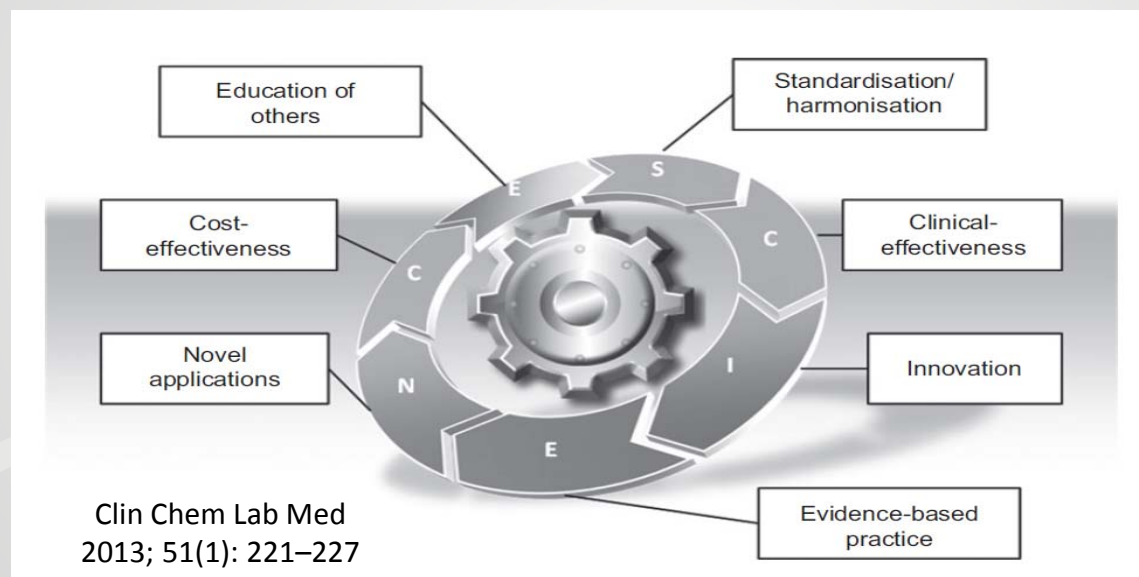


Adding value to laboratory medicine: *a professional responsibility*



Laboratory
Medicine

The leadership of laboratory medicine at local, national and international level needs to 'add value' to ensure the optimal delivery, use, development and evaluation of the services provided for individuals and for groups of patients.



The importance and true impact of laboratory medicine can only be achieved by **adding value** to laboratory tests, represented by their effectiveness in influencing **the management of patients and related clinical outcomes**



New Vision for Laboratory Medicine

IFCC Taskforce Report (Clinical Chemistry 2015)



Laboratory
Medicine

21st century lab medicine needs a flexible information resource:

- that facilitates **selection of the right test** on the right patient at the right time,
 - with **results delivered in a timely fashion** to the right place
 - accompanied by context-specific **interpretation**
 - linked to **guidance on agreed action** to be taken (where appropriate)
 - with **validated patient-oriented clinical and economic outcome measures**
-



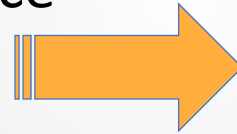
Changing Role of Lab Medicine



Laboratory
Medicine

From:

- Specimen-centred Clinical testing
- Laboratory performance
- Provider of results



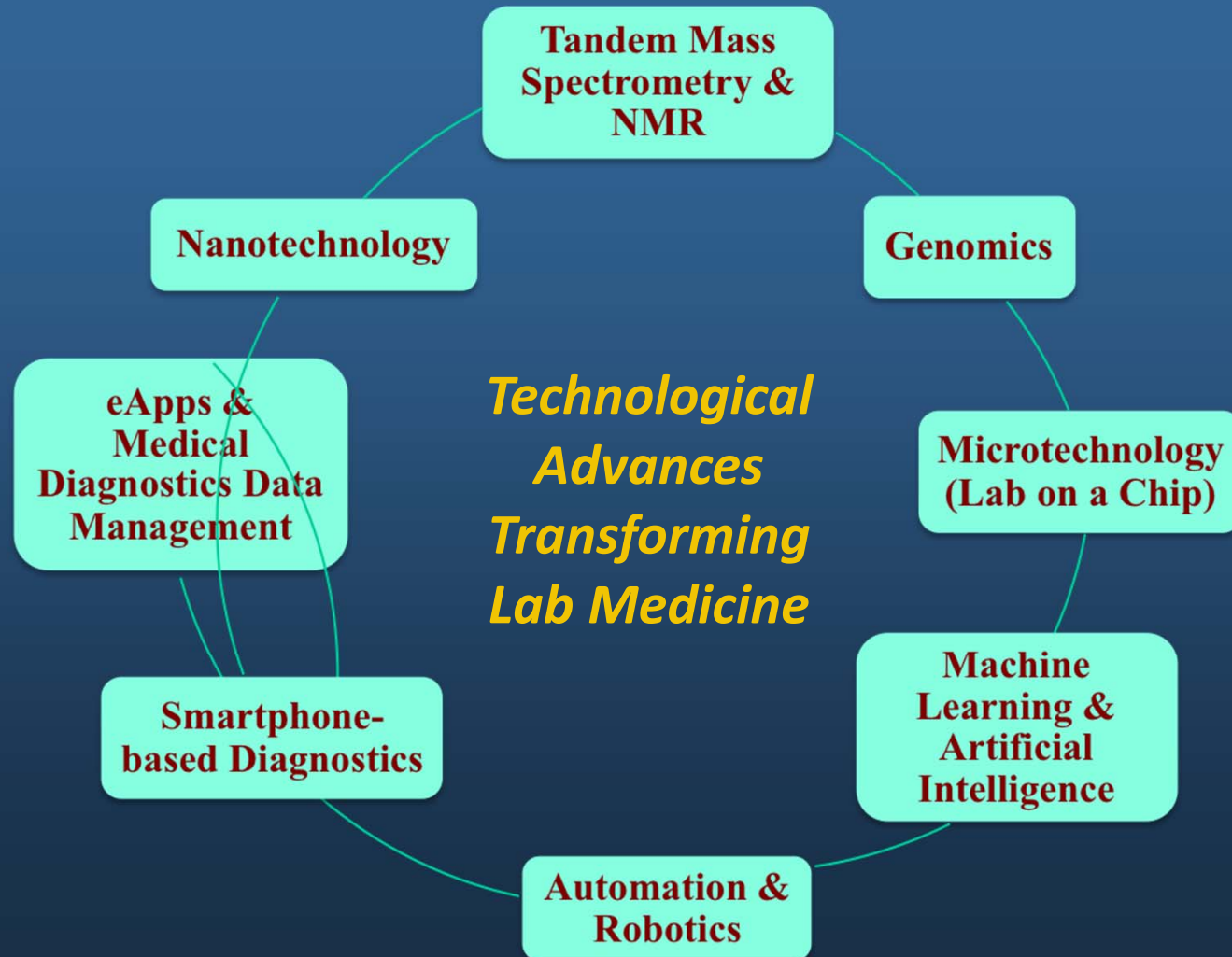
To:

- Patient-centred Clinical decision-making
- Patient outcomes
- Partner in care

*What is also needed to Transform the Role of Laboratory
Medicine in Future of Medicine & Patient Care?*

A Culture of Innovation in all areas of Lab
Medicine & Clinical Laboratory Service

Exciting New Developments *In Vitro* Diagnostics



Automation and robotics

- **Humanoid robots** are continuing to improve in their scope of capabilities (e.g., vision, tactile sensing, whole-body motion, manipulation).
- An obvious area for improvement is the simplification of the **analyzer–human user interface**.
- Simplification of the operator interface would provide both improvements in quality and the opportunity to employ less well-educated, and hence less costly, staff.



Advanced Robotics

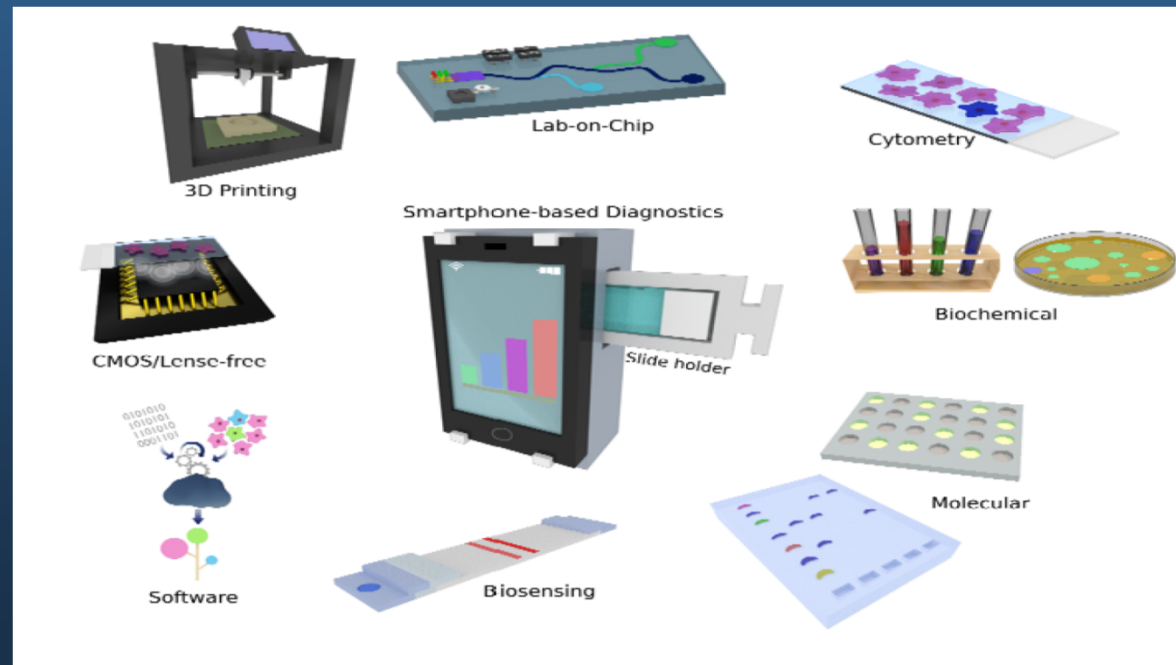
Future of Clinical Laboratory Testing



Mobile robot automating courier and transport services, courtesy Adept Technology Inc.

New Generation of POCT Devices: *Smartphone-based diagnostics*

The use of smartphones as read-out platforms for diagnostics has been enabled by parallel advancements in different fields including bioanalytical methods, microfluidics, biosensors and the engineering of optical attachments that interface assays with the smartphone hardware and software



Another type of wearable device is a **watch**. The GlucoWatch is an early example of a watch-like device designed to measure glucose. Recently, Samsung announced a smart watch that will monitor vital signs



Smartphones have become a platform technology perfectly suited for low-resource or remote settings within health networks. Continuing innovations in telecommunications and portable devices may one day render even the most sophisticated laboratory-based technologies obsolete



eApps & Medical Dx Data Management

- **Laboratory tests** are an important part of working up or managing a patient's health status ranging from common tests to specialized tests for differential diagnosis of various medical conditions
- Indeed, *laboratory medicine is a domain which offers a unique opportunity to analyze extremely large, rich and complex datasets of information concerning medical laboratory test results*
- In recent years, an increasing number of **web-based and mobile applications** has been developed to improve access to laboratory test information and test result interpretation
- Range from **simple apps** that provide reference lab value information to **complex medical diagnostics data management**

eApps for Medical Data Management



mobile
MedRecords



AirStrip
ONE



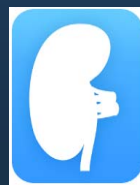
Hepaxpert



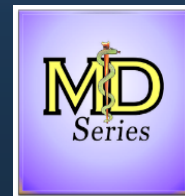
Anesthesia
Central



MD Series:
Anemia



eGFR
Calculator



MD Series:
AKI
(acute kidney injury)

Laboratory Medicine & *In Vitro* Diagnostics:

An Exciting Future Ahead!

Take Home Message:

*Laboratory Professionals must **PROMOTE, INNOVATE & TRANSFORM**
Ensure a Bright Future for Laboratory Medicine in Healthcare*

спасибо
danke 謝謝
ngiyabonga
teşekkür ederim
dank je
gracias tapadh leat
bedankt
hvala
maunuru
dziękuje
sagolun
obrigado
su
go raibh maith agat
arigato
takk
dakujem
merci
moichhakkeram
мерси
Köszönöm

Technological Innovations Leading to Improvements in Modern Laboratory Medicine

- Shortened turnaround time (*real-time results*) thanks to developments in analytical instruments and information technology.
- Availability of *more effective tests* (strongly influencing the clinical decision-making process).
- Biomarkers for an *early diagnosis* and risk factors for *disease prevention*.
- The era of '*omics*' (e.g., genomics and proteomics).
- The *nature of errors* in laboratory medicine and testing-associated diagnostic errors.