Khosrow Adeli  PhD, FCACB, DABCC, FAACC
Senior Scientist, Molecular Medicine,
Head, Clinical Biochemistry,
The Hospital for Sick Children
University of Toronto

IFCC President-Elect (2020-2023)
Past Chair, IFCC Communications &
Publications Committee (CPD)
Advancing excellence in laboratory medicine for better healthcare worldwide

>45,000 Laboratory specialists
93 Full members & 11 Affiliates
IFCC - Communications and Publications Division (CPD)

CDP - Executive Committee

From left to right: Eduardo Freggiaro, CPD EC Secretary, Publication Coordinator; Tahir Pillay, CPD Chair; Edgard Delvin, Past C-PR Chair; János Kappelmayer, eJIFCC Editor; Khosrow Adeli, past CPD Chair; Tricia Ravalico, Corporate Representative; Howard Morris, IFCC President.
CPD Publications & Media

- **IFCC eNewsletter** Editor, Katherina Psarra (GR)
- **IFCC eJournal** Editor, János Kappelmayer (HU)
- **IFCC Website** Web-Editor, Janine Grant (AU)
- **IFCC App** Coordinator, Janine Grant (AU)
- **IFCC eAcademy** (CPD & EMD)
- **IFCC eNews Flash** Editor, Katherina Psarra (GR)
- **DiV** Editor, Maria del Carmen Pasquel (EC)
- **IFCC Social Media** Coordinator, Rojeet Shrestha (NP)

[LinkedIn][FaceBook][Twitter]
IFCC App

- Offers direct communication of IFCC news and projects
- Plans to release an improved and more interactive version in year 2019/2020
Communication Strategies within and across the World of Laboratory Medicine
A New Era of Medical Laboratory Diagnostics
Effectively Communicating Laboratory Patient Data

Innovations in eCommunication Tools
New Vision for Laboratory Medicine

Changing Role in Delivery of Care

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

To:
- Patient-centred clinical decision-making
- Patient outcomes
- Partner in care
Patient-Centered Laboratory Medicine
The role of the lab in improving patient outcomes

- Define critical results
- Perform clinical audit
- Ensure follow-up
- Develop guidelines for use of tests
- Provide utilization data
- Educate in laboratory medicine
- Train undergraduates
- Decide test profiles
- Develop order-entry systems
- Harmonize test names
- Provide context-specific help in test requesting
- Ensure appropriate test repertoire/formulary
- Notify critical results promptly
- Help patients understand result
- Provide context-specific interpretation & advise on further testing
- Deliver meaningful report
- Ensure fast, accurate analysis
- Ensure analytical quality
- Provide appropriate transport/handling/storage - minimize preanalytical error
- Determine best location for analysis - establish and manage POCT if needed
- Ensure unique sample identification
- Optimize lab processes
- Establish appropriate reference intervals
- Harmonize methods
- Develop better methods
- Standardize units/report comments
- Choose best report format - paper/electronic
- Assist with management and treatment selection

Physician/Healthcare Professional
Sample
Test Request
Outcome
Best Patient
Pathologist

Communication is Key!

CLSI Standard for Electronic Exchange of Data

• The most important role of the clinical laboratory is to:
  ❖ accurately perform diagnostic tests
  ❖ generate reports of test results
  ❖ communicate them clearly and quickly to clinical decision makers

• As the clinical laboratory becomes more highly automated, the process of ensuring communication increases in complexity and poses more of a challenge

• Clinical and Laboratory Standards Institute (CLSI) published a document titled:

  *Laboratory Automation: Communications With Automated Clinical Laboratory Systems, Instruments, Devices, and Information Systems; Approved Standard—Second Edition (AUTO03-A2)*
Communication is Key!
Digital Communication & Medical Dx Data Management

- 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 – Increasingly AI Powered.

Simple Apps
- Provide reference lab value information

Complex Apps
- Aid in complex medical diagnostics data management
eApps for Medical Data Management

UpToDate
AirStrip ONE
Anesthesia Central
eGFR Calculator

MedRecords
Hepaxpert
MD Series: Anemia
MD Series: AKI (acute kidney injury)

Figure 1
PEPID
VisualDx (image recognition)
UpToDate is the leading clinical decision support resource with evidence-based clinical information – including drug topics and recommendations that clinicians rely on at the point of care.

Over 80 research studies suggesting that widespread usage of UpToDate is associated with improved patient care and hospital performance.
More than **37,800 hospitals and institutions** worldwide use UpToDate.

In 2011, researchers at Harvard University published a study which concluded that the use of UpToDate over a three year period was associated with:

- Improved quality of every condition on the Hospital Quality Alliance Metrics
- Shorter lengths of stay (372,000 hospital days saved per year)
- Lower mortality rates (saving 11,500 lives per three year period)

• mobile-MedRecords (mMR) manages, stores and displays entire clinical information of patients in real time at the point of care.

• mMR helps enhance patient care process with point-of-care access to end-to-end patient records – from a variety of backend data sources.
AirStrip ONE

- AirStrip ONE shatters barriers between disparate data sources from multiple vendors, bringing all live relevant data to the clinician’s mobile device to provide a more **complete picture of patient health**

- Customizes the user experience to each clinician’s specialty, usage patterns, workflows, and visual preferences,

- Safeguards privacy with secure transfer and presentation of patient data, removing uncertainty around security and regulatory compliance

*Cleared to use as a diagnostic aid!*
Hepaxpert

• It is a quick and easy way to get interpretive texts for hepatitis A, B, and C serology test results

• A total of **61,520 hepatitis test result** combinations are possible (most of them for hepatitis B)

• Hepaxpert’s automatically generated interpretive reports include a detailed analysis with regard to virus exposure, immunity, stage of illness, prognosis, and infectiousness.

Find suggestions for further testing!
MD Series Anemia

Allows the user to approach anemia, one of the most common hospital diagnoses through point of view of a hematologist

Effectively start the anemia workup before a hematology consult

- Algorithm delineating over 35 causes of anemia
- Index, both alphabetical and by red cell morphology
- Reticulocyte Production Index (RPI) Calculator
- Unique RPI Estimate for rapid use of the algorithm
- Descriptions of corresponding peripheral blood smears
MD Series: AKI
(acute kidney injury)

- Allows the user to approach AKI, one of the most common hospital diagnoses, through the point-of-view of a nephrologist
  Effectively start the AKI workup prior to ordering a nephrology consult

- Algorithm delineating over 40 causes of AKI
- Index, both alphabetical and by area of damage
- Fractional Excretion of Sodium (FENa) Calculator
- Descriptions of urine microscopy corresponding to the many diagnoses
- Examples of typical patients encountered
Artificial Intelligence

AI Powered Diagnostic Tools

- AI methods show promise for **multiple roles** in healthcare.
- AI-powered diagnostic apps are being rapidly developed to improve diagnostic power.
- Potential to **infer and alert patients** and their physicians about hidden risks of potential adverse outcomes, selectively guiding attention, care, and interventional programs and reducing errors in hospitals.
- Basic diagnosis of common ailments will **profoundly relieve pressure** on healthcare services for more common problems.

“Sleeping Giant in Healthcare”

*(Eric Horvitz, PhD, Director of Microsoft Research Labs)*
Artificial Intelligence

AI Powered Diagnostic Tools

• **WebMD**: one of the most famous symptom-checkers on the net. It is used by millions of people every day and now has an app to further extend its reach.

• **ADA the AI Doctor**: ADA is an AI-powered doctor application that has been in the making for over 6 years. It was developed by a London and Berlin-based health care startup that hopes relieve pressure on healthcare professionals.

• **Babylon Health App**: Babylon Health is another virtual AI-powered Doctor app. This and similar apps are beginning to make waves in the healthcare industry.
eApps for Laboratory Diagnostics

- Davis’s Lab & Diagnostic Tests
- OPKO Lab Mobile
- Lab Values+
- MolPath
- BiliApp
- CALIPER App

...and many more!
Davis’s Lab & Diagnostic Tests

• Contains 100s of diagnostic test descriptions to help understand and implement critical test procedures

• Each entry delivers details on test function, accurately interpreting normal and abnormal results, and preparing your patients

• Includes recommendations on pretest requirements, intratest procedures, and post-test care
OPKO Lab Mobile

- OPKO Lab Mobile lets clinicians securely review pathology & laboratory reports anywhere, anytime.

- OPKO Lab Mobile checks for new reports and makes them available on their Android phones and tablets for viewing.

- OPKO Lab Mobile also displays a list of pending laboratory tests.
MolPath Lab Mobile

• Designed to improve patient care by increasing the ease and speed of clinical molecular tests including RAS, BRAF, ALK, EGFR, HER2 etc.

• MolPath saves time and is convenient for oncologists, pathologists etc.

• Tests can be requested from any location
Medical Apps for Reference Lab Values

- MEDREF
- LAB TESTS
- POCKET LAB VALUES
- NORMAL LAB VALUES
- CALIPER WEB APP
- CALIPER MOBILE APP
eApps & Medical Diagnostics
Data Management

The “eLab” developed by Tru-Solutions Inc. is a comprehensive medical diagnostic center and lab management software that provides a user friendly interface and access control.

- Linked iMedDx.com to allow flexible patient search and selection
- Includes an eLab Dashboard on mobile/tablet, allowing patients and labs/hospitals access their reports online.

The Davis’s Laboratory & Diagnostic Tests medical app provides another useful app with a wide-breadth of tests, as well as guidance on how to counsel and collect tests.

- Geared towards those responsible for obtaining laboratory tests
- Available on multiple platforms including the iPhone/iPad, Android and Blackberry.

The “LabGear” is another medical lab reference app providing a pocket tool for medical laboratory test

- Integrated with MedCalc with normal lab value reference information.
- Over 200+ lab tests
The CALIPER App has been developed for laboratory specialists, paediatricians, family physicians, other healthcare workers

www.caliperdatabase.ca

A user friendly and easy tool to view latest reference value database developed based on thousands of healthy children and adolescents.

Full Tables of Age- and Gender-Specific Reference Intervals
CALIPER Mobile App
Available on Apple Store and Google Play

Targeted to community pediatricians and healthcare workers to facilitate easy access to CALIPER database.
Regulatory & Safety Considerations

The regulation of mobile medical applications
Ali Kermal Yetisen, a J. L. Martinez-Hurtado, a Fernando da Cruz Vasconcellos, a M. C. Emre Simsekler, b Muhammad Safwan Akram a and Christopher R. Lowe a

mHealth and Mobile Medical Apps: A Framework to Assess Risk and Promote Safer Use

Health-related smartphone apps: regulations, safety, privacy and quality

FDA Regulation of Mobile Medical Apps

Clinical Decision Support in the Era of Artificial Intelligence

Smartphone apps in microbiology—is better regulation required?

COMMENTARY
‘Trust but verify’ – five approaches to ensure safe medical apps

HIPAA
Health Insurance Portability and Accountability Act
The Future is Here!

An explosion of new Web-based and Mobile eApps allow communication of laboratory diagnostic data to healthcare professionals and patients.

Allow ready integration of laboratory data with other medical data records to increase clinical effectiveness and improve diagnostic speed and accuracy.

Unlimited applications in delivery of laboratory medicine and clinical laboratory diagnostics.
Thank you