Pathology Informatics as a Key Element in New Healthcare Delivery Models and Technologies

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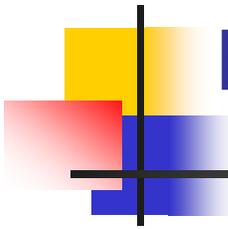
Overarching Goal for this Lecture: Preparing for Greater Role of Informatics

- Both healthcare & lab medicine/pathology have undergone major transformations in recent years after decades of stability

- The stimuli for this transformation have been varied, including economic, scientific, social, technical, and political forces

- Will start by listing *eight new healthcare delivery models/ technologies*, each with connection to lab/pathology industry

- Because of focus of conference, I will pay particular attention to the pivotal role of pathology informatics in each these models

- Goal is to stimulate discussion about significance of changes & prepare for those with most greatest impact on lab/pathology
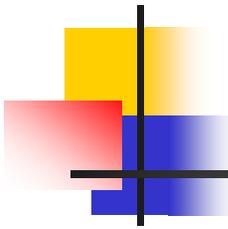
Lecture Outline

- List eight emerging healthcare delivery models that will have major effect on future of pathology and lab medicine

- Describe each in detail including relevance/role of pathology and lab informatics for successful execution & expansion

- Common themes of these eight emerging models; macro-trends in healthcare that will demand increasing attention

- Integrate/synthesize above information to generate a working agenda for pathology informatics for next five years

- Summary of take-home points; demonstrate why information management will be major part of all of our professional lives
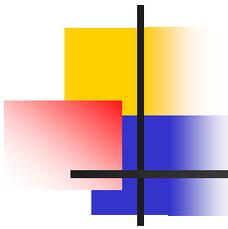
Eight Emerging Healthcare Delivery Models/Technologies

1. Direct access testing (DAT): consumer-managed testing

2. Personal health records (PHRs); relationship to patient portals

3. Cloud computing; healthcare computing moves to the web

4. Merger of lab/pathology/radiology into "diagnostic medicine"

5. Multiplex biomarkers and algorithms for screening & diagnosis

6. Home lab testing options; improved home kit testing & POCT

7. New healthcare venues; retail pharmacies and walk-in clinics

8. Health 2.0 & Medicine 2.0; web-enabled quality healthcare
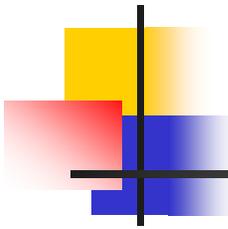
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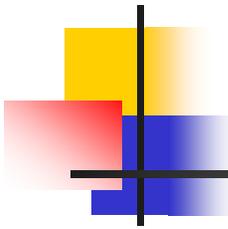
(1) Direct Access Testing; Empowering the Consumer to Manage Some Lab Testing

- Web-enabled DAT has emerged in last several years as option for consumers to order lab tests from reference labs

- Customers pay with credit cards; up-front cash has great appeal for lab providers; most lab business is discounted

- Because of increased co-pays, tests ordered on web may be less expensive than those ordered by physician from office

- Consumers directed to nearest reference lab patient service center for blood draws; national reference labs perform tests

- Test results as PDF files often accessible in ~24 hours; "controversy" about how abnormals managed by DAT clients
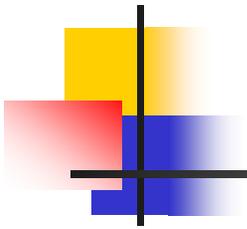
Broader Implications of Consumer-Managed Testing for the Lab Industry

- Lab testing has broad appeal for healthcare consumers; appeal of lipid testing is ability for them to "know numbers"

- Web-based DAT web site provide interpretive information about abnormal lab results or direct clients to other web sites

- Consumers getting accustomed to rapid TAT of test results as PDF attachments; service should be offered by all labs

- Consumers becoming more sophisticated about the true cost of lab testing; less tolerant of excessive mark-ups in future

- Some insurance plans offering discretionary accounts to members that can be used for wellness programs like DAT
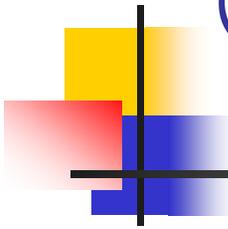
(2) Personal Health Records; Technology in Search of a Truly Useful Application

- On face of it, personal health records (PHRs) major breakthrough; places control in hands of consumers

- In practice, not so much; most consumers not motivated to maintain records; critical data controlled by hospitals/MDs

- Most of population healthy and not motivated to manage PHRs; many also don't have necessary technical expertise

- Recent entry into market by Microsoft (HealthVault) & Google (Google Health) has stirred interest in PHRs

- Like RHIOs, PHRs languishing because of lack of motivation to adopt and technical challenges for most consumers
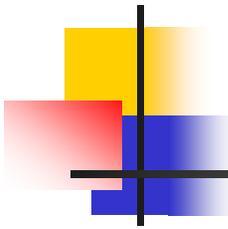
The Web-Based Patient Portal and eClinical Works; A Practical Path to the EHR

- eClinicalWorks most successful EMR/PM system; early & tight integration to reference labs/LISs without extra charges

- Company promoting web *patient portal* for health summary, appointments, lab, drug refills, intake history, & statements

- Patients given passwords that allow them to log into their MDs EMR/PM; view their own health records and input data

- Also outbound communication channel for physicians with patients for lab test results to minimize phone calls to office

- eCW president promoting patient portal as link to all major EHRs; efficient way to populate them with data from MD offices
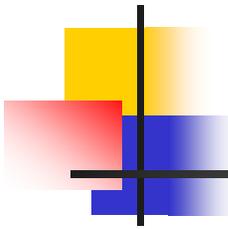
Pathology Informatics and the Three Major Healthcare Data Domains

- All clinical information stored in three separate data domains: health system, physician office/clinic, and consumer/home

- Lab test results unique as a critical component of each domain; lab portals early and successful effort to link hospitals to offices

- Consumer/home domain increasing in importance as data repository for DAT results + home glucose testing + home kits

- Web will be provide connectivity across these three domains; EMR/PMs will migrate to web with ASP/cloud hosting services

- Pathology informatics will lead way to the web for all of healthcare industry; lab outreach programs as key motivator
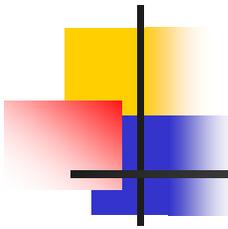
(3) Healthcare Computing Moves to "Cloud" with Pathology Informatics Leading the Way

- All healthcare computing will move to the web, better called the cloud; set of servers around world with single name space

- Cloud will have ability to ingest content from anywhere and move content anywhere depending on traffic and demand

- Storage of PACS already occurring in cloud because of computer storage demands; storage & bandwidth now commodities

- Cloud computing linked to idea of decline of shrink-wrapped software; will no longer buy software but purchase as service

- Healthcare computing will be last to move to cloud because technically backward; lab computing will need to show the way
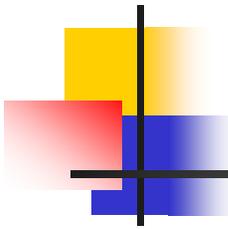
(4) Merging Pathology, Lab Medicine, and Radiology into Diagnostic Medicine

- Idea of merger circulating for about two years; stimulated in part by major purchases of IVD companies by GE/Siemens

- Part of impetus coming from overlap of radiology/pathology; molecular imaging beginning to deliver specific diagnoses

- *Molecular Summit* launched; conference devoted to merger two months ago in Philadelphia attracted more than 200 registrants

- Because of complexity of medicine, I predict that diagnostic specialists would concentrate on dx diseases of single system

- Because of their knowledge of genomics/proteomics, also predict that dx specialists will play major role in the selection of therapy
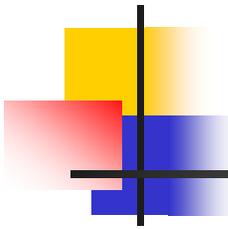
IT Consequences of the Emergence of the Specialty of Diagnostic Medicine

- Many shared functions across LISs, RISs, and PACS; would be easy to blend into a Diagnostic Information System (DIS)

- Radiologists have not adopted a coding system like SNOMED; merged reports would be easily retrievable with dx codes

- Pathologists need incentives to migrate to digital pathology dept.; merger + DICOM would accelerate this change

- I do not favor integration of "ancillary" systems into EMR; hospital EMR should only reporting conduit for clinicians

- Major goal to build complex dx network: LIS + RIS + PACS + reference labs linked to EMR with federated architecture
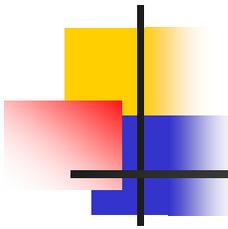
(5) Genomic, Proteomics, Metabolomics Usher in New Era of Lab Testing

- Lab industry now entering new "golden age" with previous analyte panels supplemented by multiplex biomarker assays

- Candidate biomarkers being discovered by analyzing patients with disease; identifying up- & down-regulated proteins

- Interpretation of these biomarker sets require the use of complex computer algorithms to interpret the test results

- FDA being drawn into process; goal is to regulate what they call IVDMIAs; provide physician knowledge of algorithms

- My preference is to avoid regulatory oversight over IVDMIAs; research and clinical diagnostics stifled by FDA regulation
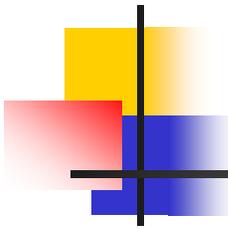
Linkage Between Emerging Biomarker Lab Testing and Early Health Model

- "Early health model" & "early detection/treatment of disease" have been promoted by GE & Siemens in their ad campaigns

- Ads for both companies also recognize and emphasize the criticality of information technology in the diagnostic process

- Basic idea behind both is that emerging molecular diagnostics will lead to pre-symptomatic/pre-clinical detection of diseases

- Radical concepts because makes standard health model obsolete; moves lab testing/medical imaging to center stage

- Additional influence for labs behind idea of companion diagnostics; link between lab test and biotech drug choices
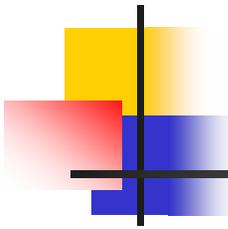
(6) Home POCT & Lab Kits as Emerging Information Management Challenge

- Move toward home care inexorable; analogous to migration from ICUs to general care units & ORs to surgi-centers

- Home care less expensive but also requires new support networks to replace the hospital/outpatient infrastructure

- Need to view all POCT, including home use of glucometers, as information management challenge for lab professionals

- For example, an important unmet need is the integration of home test results into hospital and office EMRs & PHRs

- Hospital labs could position themselves as managers/ integrators of consumers' lab data on subscription basis
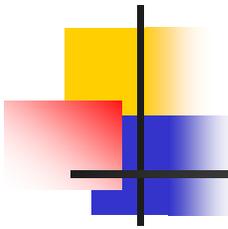
(7) Lab Testing in New Healthcare Venues: Retail Pharmacies and Walk-in Clinics

- Broad experiments in new healthcare venues like walk-in clinics in "big box" stores & expanded role for pharmacists

- Speaks to inadequacies of office/clinic practices and hospital-based ambulatory care services; often inefficient & expensive

- Pressure on Wal-Mart to develop new type of healthcare delivery system for its 1.2M employees & 100M customers

- Retail pharmacy chains like Walgreen's/CVS making major investments in healthcare to increase traffic & gain profits

- Should view all of this as healthy competition & ultimately clinical venues where POCT panels will be offered to patients
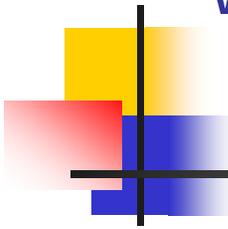
Walk-in-Clinics with Focus on Care of Chronic Diseases and Wellness Promotion

- One facet of "retail healthcare movement" focusing on care and support of patients with chronic diseases (e.g., diabetes, CHF)

- Perception that office-based MDs cannot allocate sufficient time to education & support of these resource-consuming patients

- Health insurers understand that large portion of benefits allocated to chronic disease care; some of costs avoidable

- Pharmacists stepping into care delivery void; Geisinger Health offers satellite clinics for monitoring anti-coagulation therapy

- Wellness and anti-aging medicine evolving into major industry; latter involves elaborate lab testing to assess "biologic age"
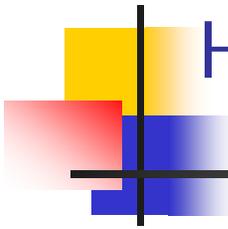
(8) Health & Medicine 2.0: Improved Healthcare Enabled by Web Data/Applications

- *Health 2.0*: all constituents focus on value & competition as the catalyst to improve safety, efficiency, & quality of care

- *Medicine 2.0*: web-based apps, services & tools to enable social networking, participation, collaboration, & openness

- Web provides an inexpensive, broad-reaching, sophisticated common meeting ground for consumers/professionals alike

- Largely preventable chronic diseases estimated to cause 86% of deaths in Europe; need more ownership of health

- Most radical component of movement is democratization of healthcare; consumers energized/enabled as participants
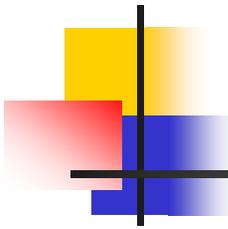
"Ownership of Health" by Consumers: Implications for the Clinical Lab

- Not overstating case to say that Health/Medicine 2.0 and "health web" set stage for more ownership of health status

- Consumers & patients bring to office/hospital deeper knowledge & responsibility for their own health maintenance

- Will require new generation of health practitioners who are more accustomed to having patients questioning their advice

- Lab testing one of the "centers of gravity" of the consumer health movement because accessable & understandable

- Lab personnel drawn into "retail health" through DAT, PHRs, home kit testing, walk-in clinics, web-based genetic testing
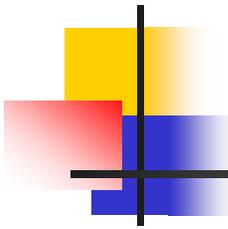
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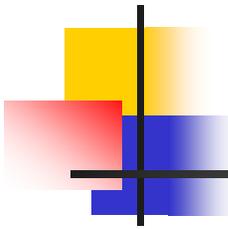
Common Themes of These New Models: Decentralized Healthcare Delivery Processes

- Historically, there have been two major healthcare delivery venues: (1) hospitals (inpatient & outpatient) & (2) MD offices

- These venues are now undergoing metamorphosis and being supplemented by four new healthcare delivery venues:

  - Single physician practitioners being replaced by multi-physician clinics with more sophisticated infrastructure

  - Specialized cardiovascular and orthopedic hospitals are siphoning off lucrative business from general hospitals

  - General care hospitals extending reach with enhanced ambulatory services; hospitalists assuming responsibility

  - Home healthcare expanding with visiting nurses and monitoring technology for support of more acutely ill pts.
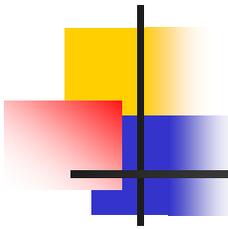
Common Themes of These New Models: Software as a Web-Based Service

- Moving rapidly to a SaaS (software-as-a-service) or "cloud" model; no longer need to purchase any shrink-wrap software

- Business software (word-processing, spread sheets) first to be affected with Google Apps; will then expand to other biz sectors

- Back-ups, software updates, & disaster recovery automatic; costs reduced because server time has become a commodity

- Ultimately, mobile devices (e.g. smart cell phones) will be devices-of-choice for cloud computing; ideal for healthcare apps

- Healthcare information technology will be *last* to adopt cloud computing EXCEPT for LIS/RIS/PACS; already used for PACS
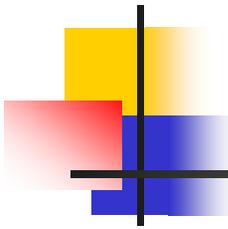
Common Themes of These New Models: Integration of Clinical Services

- Important integration model is the cancer hospital; individual specialty identities of MDs subservient to team decisions

- Patients derive benefit because of silo obliteration; quality of care and collaboration trumps overly focused specialty mentality

- I personally favor the merger (i.e., integration) of pathology, lab medicine, and radiology into department of diagnostic medicine

- In support of merged specialty, further favor blending of LIS, RIS, and PACS systems into diagnostic information system (DIS)

- Would accelerate movement toward digital pathology; as part of this process, also favor "catopsy"; autopsies preceded by CT scan
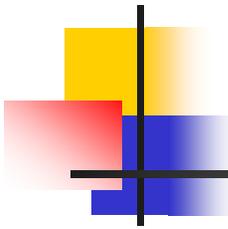
Common Themes of These New Models: More Competition for Consumer Dollars

- Examples of current trends introducing competition into system

  - Growth of specialty hospitals competing with general hospitals

  - Hospitals hiring salaries hospitalists to care for all inpatients

  - Hospitals expanding their ambulatory care services/networks

  - Increased health insurance co-payments to reduce exposure

  - Penalties for MDs ordering lab tests outside insurance network

  - Medical tourism; total hip replacement at 20% of cost in U.S.

  - Web-based systems for assessing quality of hospitals/physicians

  - Transparent pricing of services leading to price negotiations
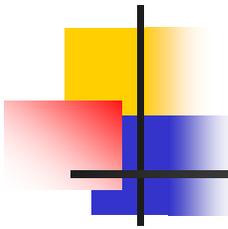
Common Themes of New Models: Increasing Power of Consumers

- Special focus on this because so novel in healthcare delivery and difficult to understand ramifications because so new

- Ideas of information access, choices, and power interconnected; older generations more used to decisions being made for them

- Lab testing, more that other disciplines, has real, or emerging links, to healthcare consumers: DAT, home devices/test kits

- Lab professionals/pathologists currently very insular with focus on clinicians as their primary clients; little attention to consumers

- Notion of "retail lab services" captures, mandate for labs to be more service oriented; critical for lab outreach & reference labs
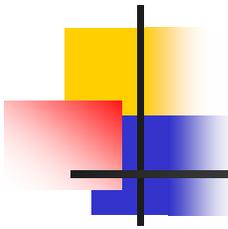
Common Themes of These New Models: Information Management as Key Task

- This slide is placed last because criticality of information technology runs through all of the eight emerging models

- Information technology annihilates time and distance; as health services decentralized, greater need for their integration by IT

- As consumerism takes hold, greater need to integrate three major health information domains: hospital, MD office, home

- With emergence of digital pathology department, anatomic pathology will place greater demands on informatics talent

- Cannot turf IT design and management issue to central IT shop in hospitals; these personnel working on the CIO/CEO agenda
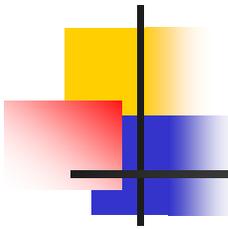
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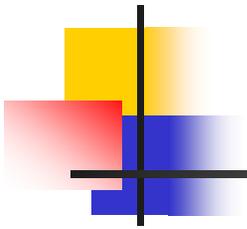
Succinct Working Agenda for Pathology Informatics for Next Five Years

- Recruit younger pathologists into field of pathology informatics

- Champion the conversion to digital pathology departments

- Support the Association for Pathology Informatics (API)

- Suggest informatics topics at general pathology meetings

- Lobby for hospital federated information system architecture

- Assist hospital CIOs in optimization of lab ordering/reporting

- Consider merger of pathology/clinical lab with radiology

- Suggest integration of DAT programs in your lab outreach

- Provide strong support for departmental research programs

- Embrace health consumerism; provide PDF lab reports to clients
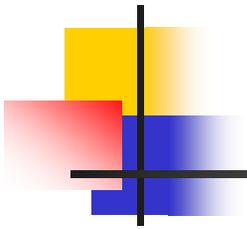
Summary and Take-Home Points

- Last 3-5 years has been period of intense ferment in healthcare lab medicine, stimulated in part by web & cost-containment

- Decentralization of healthcare & consumerism has spawned competition and more effective new types of healthcare delivery

- New models of healthcare delivery are highly dependent on web, information technology, & information transparency

- Merger of CP, AP, & radiology to create new discipline of diagnostic medicine; symbolic of potential of new alignments

- Although pathology informatics has matured (LITS as evidence), need to pursue more aggressive agenda to prepare for changes