

# Symposium on Diffusion, Adoption, and Maintenance of Psychiatric Treatment Algorithms

White Paper:

## Blueprint for Collaboration

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## Executive Summary

### Background

A group of physicians, educators, and informaticians gathered in Buffalo on May 5-6, 2006 at the Invitational Symposium on Diffusion, Adoption, and Maintenance of Psychiatric Treatment Algorithms. Their goal was to explore ways to develop and facilitate use of treatment guidelines to dramatically improve patient care. The Symposium, co-sponsored by the International Psychopharmacology Algorithm Project (IPAP) and the School of Informatics, University at Buffalo SUNY, focused on opportunities to improve these outcomes through easy access to high quality treatment guidelines available at the point-of-care. "The main purpose of the Symposium was to share knowledge, expertise, and learning across disciplines with the intent of improving algorithms and their usefulness to care providers," said Dr. Ken Jobson (IPAP) and co-host of the Symposium, "and proved to be a deeply rewarding experience for attendees." Dr. W. David Penniman, University at Buffalo, and co-host agreed that "this conference has heightened awareness among disparate, yet complementary disciplines, thereby fostering a 'community of interest,' significantly increasing opportunities for success in achieving our goals."

This position paper reviews the essential factors presented at that Symposium for the successful utilization of psychiatric treatment guidelines and algorithms, including:

- why this topic is important,
- key factors in developing computerized guidelines,
- valuable insights from experts attending the IPAP Symposium,
- major factors in diffusion and adoption, and
- the appropriate use of computers as persuasive technology.

This is intended as a working document to share highlights from the IPAP Symposium and to promote further work on guidelines, their successful adoption and use, and to suggest reasons to pursue additional research into guideline development and use in point-of-care settings, by functioning as:

- A Call to Action
- A Vehicle for Sharing Information from the IPAP Symposium
- A Means of Promoting Further Collaboration on Guideline Development and Implementation
- A Review of the State-of-the Art and Potential Additional Funding Opportunities to Advance Improvements in Psychiatric Treatment Decision Support

Based upon the presentations of the speakers at the General Meeting, their PowerPoint slide presentations and those of the Pre-Symposium Session presentations of algorithm developers are also available on the IPAP Website.

([www.ipap.org](http://www.ipap.org))

### Implications: Successful Use and Integration at the Point-of-Care

The following is a distilled list of recommendations for successful integration and adoption of guidelines and treatment algorithms for decision support and in conjunction with decision support systems (DSS) at the point-of-care (POC).

1. **Appropriate Use.** While guidelines strive to provide expert treatment recommendations, due to the large number of variables, environmental conditions and differences in patients, they still represent knowledge to inform the decision-making process. Their best use is 'to

guide, not to decide.’ B.J. Fogg’s work on persuasive technology also emphasizes the need for ‘appropriate reliance.’ The power of guidelines is as a means of providing distilled knowledge and recommendations on the assumption that the care provider also brings knowledge, skills, experience, and contextual information to bear on treatment decisions.

2. ***Three-tiered development.*** Guidelines should address levels of use and the ability to provide both concise guidelines and access to appropriate reasoning and research.
  - Algorithms enabling integration in patient care workflow and with Electronic Health Records (EHR);
  - Additional text explanations to offer reasoning in support of decision-making and the potential for web/print versions; and
  - References and links to evidence and deeper research.
3. ***Multiple audiences.*** There are three major audiences for guidelines, with guidelines optimally adapted for the different context and use by:
  - Specialists in treatment of psychiatric conditions,
  - Primary care physicians, nurse-practitioners, and
  - Lay persons / patients.
4. ***Team composition.*** Creating guidelines for each audience influences the composition of the team creating the guidelines. In addition, each audience operates in a different decision-making environment, context, and exhibits different behaviors in using guidelines. Guidelines that address each of these audiences will achieve a three-pronged impact on successful adoption.
5. ***Impact on care.*** Guideline adoption by primary care physicians is likely to have the most far-reaching and beneficial impact on quality and consistency of care and significantly advance communication between psychiatrists, primary care physicians and patients. This consistency and continuity of care is likely to engender greater patient trust, a major factor in successful psychiatric treatment.
6. ***Importance of standards.*** Adopting standards for vocabulary and clinical guidelines will enable easier conversion, updating, and integration of guidelines in computerized systems. Furthermore, involvement in developing standards for guidelines and in sharing technological specifications with vendors will significantly advance adoption and use through integration with electronic medical records (EMR), computerized physician order entry (CPOE), and decision support systems (DSS).
7. ***Transformative knowledge-base.*** New requirements to design guidelines for integration with computerized systems also means guidelines may be integrated with additional patient information, knowledge of relevant clinical trials, and a greater degree of knowledge and evidence that can be brought to bear in real-time upon specific patient care.
8. ***CME implications.*** The use of guidelines and treatment algorithms as part of medical education in medical school and CME offers the opportunity to provide a change from passive to active learning that may have far more direct impact in improving patient care than traditional, more passive forms of learning.
9. ***Iterative development.*** Creating feedback loops and update cycles to enable guideline developers to engage in iterative development with colleagues in patient care settings is crucial. In some ways, it’s where the real work of adoption and diffusion begins, working

with leaders and leading institutions, providing for ongoing improvements based on clinical environments and allowing for local adaptation.

10. **Organizational context.** Research into how guidelines can be further adapted to improve usage, further studying how context affects their use, the impact of additional environmental factors, the role they play when used in combination with patient data and other information to improve knowledge could have some far-reaching consequences for improving treatment of psychiatric conditions.
11. **Improving evidence.** Increasingly detailed guidelines that are closely linked to medical evidence reveals gaps in the existing evidence, which can lead researchers to the most useful areas for future investigations. Guidelines that are embedded in point of care CPOE systems and linked to EMR systems open opportunities for generating both the specifications for better guidelines and the collection of more detailed outcomes data that will supply the needs of researchers.
12. **Collaborative benefits.** The collaboration of IPAP participants has the potential to serve as a model of how to leverage expert knowledge with application on treatment of some serious and some widespread psychiatric conditions, leveraging this working group to provide decision support and the ability to study conditions and treatment results affecting a much larger primary care setting and with application to leverage this knowledge base in low resource countries.

The body of this paper outlines the essential factors in successful guideline development, adoption, and maintenance as presented at the Symposium.

Finally, our thanks to the conveners of this event, the International Psychopharmacology Algorithm Project (IPAP) and the School of Informatics at the University at Buffalo. In addition, we thank the supporters of this symposium including Blue Cross Blue Shield of Western New York, The Dean Foundation, Welch-Allyn, and the Corporate Circle of supporters of the School of Informatics.

## Part One: Guidelines for Psychiatric Care: Trends and Overview

### Trends Fueling Innovation

"Take the mega database of knowledge and information that is overwhelming, whittle it down and make it convenient for clinical use and decision support."

- Shortliffe

"We wrestle with contextualizing guidelines, making them patient-based instead of disease-based, the sheer number of variables in psychiatric treatment and using guidelines to guide decision-making, not prescribe. As they become integrated with systems at the point of care we need to learn from those using guidelines in practice settings to close Shannon's Loop and integrate this feedback into new iterations. This represents amazing untapped potential to improve patient care through access to targeted, highly relevant knowledge in an iterative, ongoing educational process."

- Jobson

A convergence of trends focused on improving healthcare and knowledge access at the point-of-care is creating an increased interest in treatment guidelines and algorithms that can be integrated and delivered to the care provider via computerized media, as well as via more traditional print mediums. These trends include:

- A greater focus on evidence-based medicine to improve consistently high quality of care based on best available knowledge.
- A knowledge overload and the need for intensely relevant information targeted to practical clinical needs and applications.
- The increasing role of computers and information technology in providing ubiquitous, timely information access and clinical decision support.
- Pressures to reduce medical errors.
- The attractiveness of using clinical information technology to improve continuing medical education.

These trends add up to a major culture change in a healthcare system characterized by a knowledge explosion, a shift from passive to active learning, and the opportunity to take advantage of computers to deliver highly relevant, timely, expert knowledge when and where it will be most useful to the physician, other care providers, and patients.

### Role of Guidelines & Algorithms

"Guidelines can influence the way care is practiced, using technology routinely to enhance the decision-making process, while not replacing the skills of human beings."

- Shortliffe

Guidelines, and computerized treatment algorithms, represent a solution, a means of filtering the knowledge overload and delivering targeted, highly relevant expert knowledge to the physician at the point-of-care. Medical guidelines may be recommendations on screening, diagnosis, workup, referral and management of patients, drug selection, or whether to recommend surgery.

With this context in mind, leaders from medicine, informatics, cognitive psychology, psychiatry, medical education, information technology, and world public health who participated in the IPAP

Symposium gathered to share cross-disciplinary knowledge, laying the groundwork for further collaboration and to spark further development of solutions aimed at increasing the quality of care in the area of psychopharmacology, with implications for healthcare far beyond one specialty.

Ways that guidelines play a role in improving treatment include:

<b>Goal</b>	<b>Role of Guidelines</b>
Improving patient care and treatment outcomes through easy access to latest and best expert medical knowledge to improve consistency of care and reduce medical errors.	Knowledge is filtered and processed, incorporated in recommendations. This often includes reasoning and the ability of a physician to use the guidelines in an immediate application and further explore the evidence, recommendations, and reasoning as time permits.
Lower health care costs by improving effectiveness of care with attendant efficiency, lowering hospitalization rates, and lower cost of medical errors and side effects. Higher return on investments in computers through effective use in the clinical care setting, including access to patient data, guidelines as part of workflow.	As EHR and EMR (Electronic Health Records; Electronic Medical Records) become increasingly employed, patient data, clinical trials data, and guidelines can all be integrated to inform each other and provide optimum knowledge for the care provider at the point of care.
Improving continuing medical education by offering knowledge and learning of high relevance for practicing clinicians	Expert specialists may use guidelines as reminders. General practitioners guidelines may to frame and target up to date, expert knowledge and recommendations.
Optimizing the use of human resources in health care, patient interactions, and decision-making.	Expert knowledge becomes the background for clinical decision support systems, allowing the physician to focus on the patient's unique situation and care decisions.

### Unique Significance for Psychiatry and Psychopharmacology

"According to the World Health Organization, there are 450 Million people with psychiatric and brain disorders worldwide and approximately 1 Million known to commit suicide yearly. And there are other ravages of mental illness that have not been treated."  
- Jobson

"With concern that primary care management of psychiatric disease is resulting in a preponderance of sub-optimal care, psychiatrists developing guidelines for primary care settings becomes hugely important for the quality of care for patients needing psychopharmacology to help them."  
- Shortliffe

Speakers at the IPAP Symposium, which focused specifically on guidelines and algorithms for the use of psychopharmacology, suggested that the field of psychiatry can uniquely benefit from improved use of guidelines.



- While psychiatric guidelines tend to be more consensus-based than evidence-based, Dr. Shortliffe suggested this is also a problem for other medical specialties. Creating feedback loops as part of the guideline development process is particularly important, but not exclusive to psychiatry, offering opportunities to learn from, improve, and inform consensus and evidence-based guidelines across specialties.
- Consistency of treatment fosters patient trust, particularly important to improving psychiatric care. Two psychiatrists may arrive at completely different diagnoses and treatments, resulting in mistrust, especially for highly mobile patients, like those treated at the Veteran's Administration.
- With increasing treatment of psychological and psychiatric disorders by general practitioners, expert written guidelines and algorithms supports both experts and general practitioners and increases effective communication between generalists and specialists.

## History of Guidelines

### Print Origins

Dr. Shortliffe reminded the audience that today's computerized guidelines began in the 1970's as an aid in triage. While intended to be used electronically, they were often simply easier to print out and were then used by non-physicians for screening. Flowcharts and diagrams became part of written guidelines, often used as illustrations to accompany guidelines that were published in journal and book formats. Interest in integrating computerized guidelines at the point-of-care is a relatively recent phenomenon of the last ten years (since the decade of the 90's).

### Towards Evidence-Based Medicine

"While evidence-based guidelines are the current ideal, the majority of existing guidelines deal with topics for which there is a lack of the kinds of data necessary to support a solid evidence-based approach."

- Shortliffe

Attendees all agreed that most psychiatric guidelines are consensus-based due to lack of substantial evidence, or even the 'eminence-based,' expert knowledge that has been the basis of medicine in the past. Many also saw guideline integration as a means of collecting and studying data as one important means of moving towards greater evidence-based medicine. The sheer number of variables in psychiatric care and the need to adapt decision-making to local conditions, patient considerations, and other factors suggests the likely continuation of consensus-based guidelines, but with increasing quality of data on which to base recommendations.

### Guidelines & Culture Change

"Guidelines can influence the way care is practiced. Technology can be used routinely to enhance the decision-making process without replacing the skills of human beings, which should not be lost in the process."

- Shortliffe

"You cannot make a change by focusing on just one aspect of the care environment... Nor can you apply culture changes in business directly to medical field. For instance, if the physician turns their back on the patient to enter a prescription into a computer, it stops the interview. This is much more important in psychiatry than in some other biomedical fields."

- Davis

Addressing the unique cultural factors will influence successful guideline adoption. Dealing effectively with a knowledge explosion, moving from passive to active learning, and taking advantage of computers in the care environment is likely to impact the way physicians work, their access to medical knowledge, and the way care is offered to patients. According to Dr. Patel, experts, primary care physicians, and patients all not only have different purposes in using guidelines; using guidelines changes their perceptions and the way they think about diagnosis and treatment.

This process of change in culture is likely to be both ongoing and involve two-way interaction, with guidelines acting as an evolutionary change-agent.

### **Guidelines and Guideline Usage in Continuing Medical Education (CME)**

“CME is in trouble. According to the New England Journal of Medicine (May 4, 2006), appropriate treatment is given [in] only 50% of physician visits, suggesting needed changes in how CME is delivered.”

- Jobson

“CME tends to be passive. There are big problems with how CME is regulated, how physicians receive credit. One solution is using information technology so it is easier to link CME to patient care using the best evidence delivered in ways that can positively impact patient care, providing CME credit for using guidelines.”

- Davis

“To merge IT with CME, it’s also important to start teaching guideline use with med students, to teach them about evidence-based thinking, encouraging evidence discernment, a process of evolution.”

- Osser

The working definition of CME includes “educational activities that serve to maintain, develop, or increase the knowledge, skills and professional performance and relationships a physician uses to provide services for patients, the public, or the profession.” (American Medical Association). Guidelines are, by their very nature, designed to educate and inform, to improve the clinical knowledge of the care provider. Effective guideline development and adoption therefore becomes part of a solution that CME requirements and programs are intended to address. Working with medical educators to incorporate guidelines and algorithms delivered electronically at the point of care increases the positive impact of knowledge access and skills acquisition for care providers, with guideline usage as a potential CME credit.

“Reminders are powerful, merging patient care and learning around a particular complaint.... IT [information technology] allows us to submerge continuing medical education in the practice environment, providing the best evidence, epidemiologic indicators, and population health indicators.... Clinicians aren’t trained, or don’t have the data, to do that.”

- Davis

In essence, there are themes in using IT to improve education in the clinical care setting which include integration of knowledge with EHR, patient education websites, reminders at the point of care and computerized decision support. Dr. Davis and David Osser also mentioned that, even with guidelines, there may be a need for training, for someone to figure out how to facilitate use in the practice setting, to be an educator and champion, and to sit beside someone less familiar.

## Part Two: Creating Guidelines

“The process involves distilling knowledge and into manageable bits, creating executable versions with ability to access electronically and find answers efficiently, briefly, summarized in a way that is reliable, non-biased, trusted experts in a form so the physician can get an answer to a clinical question at the point of service. There are currently huge numbers of guidelines that are very long, complicated, and not effectively indexed. Top experts need to stay on top of this process as a job worth doing for sake of patient care, and assuming we can get clinicians to access them.”  
- Osser

### Types of Guidelines by Medium

#### Via Print

Many guidelines have followed traditional routes of information dissemination, finding their way into journal articles and books, sometimes with accompanying flow charts and diagrams. These guidelines are removed from immediacy or easy access in the care environment, often requiring an extra step of research to locate. In addition, it is harder to keep printed and published guidelines up-to-date.

#### Web Availability

Like journal articles, text-based guidelines can be computerized and made available via the web. Warehousing on the web provides for easier access to guidelines, but reading and selecting them is still a research process that is not easily integrated into practice.

Text-based guidelines available via the web have potential as an interim knowledge resource. Warehousing them falls short of the need to provide highly relevant knowledge at the point of care because of the additional research required to locate and select appropriate guides. In addition, reading a text-based guideline is an offline learning pursuit, ‘when the doctor has time.’

#### Point-of-Care: Workflow Integrated

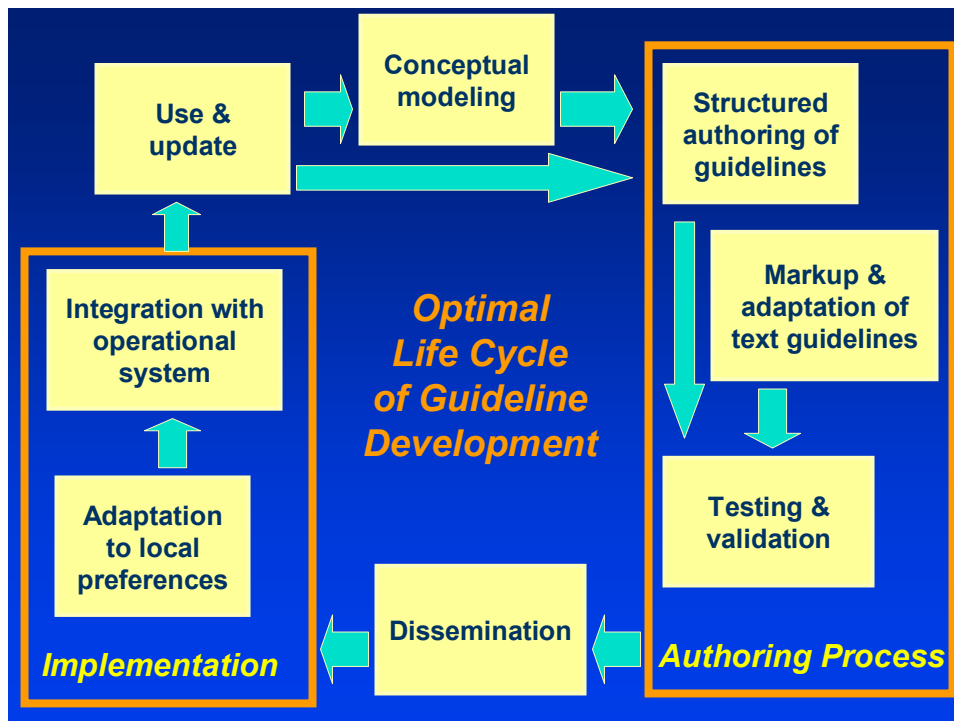
“There is a thirst for highly relevant guidelines at the point-of-care. Physician reluctance may be overstated. The real problem is one of presenting it in a format and with tools they can actually use day to day.”  
- Harrison

For guidelines to have their greatest impact as a resource for considering treatment options, they need to be readily available at the time when a physician has the greatest need to know, within the practice setting. Integrating guidelines in with computerized systems offers the additional advantage of offering care providers access to:

- Electronic Health / Medical Record patient information
- Guideline information
- Access to clinical trial information
- Gateway to additional research

The capability of offering this full range of highly relevant information to bear on the treatment of every patient has the potential to transform healthcare, improving the quality and consistency of care, offering solution-based CME, and offering the means to advance research and knowledge of situation-based effective treatments.

Dr. Shortliffe presented the following visual model of fully integrated guideline development and use, including an update cycle, and ongoing improvements:



From Shortliffe, Edward H., Columbia University, “Clinical Guidelines and the Computer: Assuring that Guidelines Guide,” PowerPoint presentation. IPAP Symposium, SUNY at Buffalo, 6 May 2006. Reprinted with permission.

## Types of Guidelines by Levels of Information

### 1. *Algorithms*

According to Vimla Patel and Edward Shortliffe, experiences during the Intermed Collaboratory Project (Stanford, Harvard, Columbia), in which print/text guidelines were converted to computerized algorithms, the process of conversion revealed inconsistencies and gaps in the guidelines that resulted in substantive changes. Based on this experience, their recommendation is that, if one intends to make a guideline available electronically, one should develop the computerized version first. For computerized applications, the algorithm may suffice.

### 2. *Text and Reasoning*

Physicians want and need to know the reasoning behind each step/recommendation. This reasoning can be included in a computerized version, or become the basis of a text / print version of a guideline. Within an EHR, this may be broken down and take form of something like the ability to expand to reveal more detailed reasoning, a pop-up menu, or the guideline content in its entirety can be printed out as a text document.

### 3. *Links to Further Research & Evidence*

Finally, it is highly useful to offer a guideline that references (in print) and links to (via computer) further evidence and research.

The value of this approach was discussed at length at the IPAP Symposium. Indeed, it assumes the group's commitment to both workflow integration and direct, qualitative impact on CME as a means of significantly improving patient care. It was the consensus of the group that writing guidelines is only valuable to the degree they are actually used, and providing for multiple uses maximizes effectiveness.

### **Audiences**

IPAP Symposium participants recognized the need for guidelines for three major audiences:

- Psychiatrists, the Expert Specialists  
Guidelines as reminders
- Primary Care Physicians handling psychiatric care  
Guidelines provide rapid orientation and education regarding care options.
- Patients and Lay Audience  
Guidelines help improve physician / patient communication and decision-making.  
"There is the possibility of drawing the patient into a discussion using [computerized materials]."  
- Davis.

The guidelines will be different in both content and function for each audience. Dr. Patel also reported that guidelines are used differently by each type of physician, as well as by consumers.

The IPAP Symposium participants ended up agreeing that guidelines for each audience require unique expertise in terms of the team that creates them. For instance, it is important to have primary care physicians represented on the team creating primary care guidelines. While more problematic to include patient representatives, participants recognized the need to provide input on consumer usage for the guidelines for lay audiences.

A recurring theme at the conference centered around the value and importance of using guidelines developed by experts that could help primary care physicians, thereby successfully leveraging specialist experience and expertise for the greater good.

### **Environmental Implications**

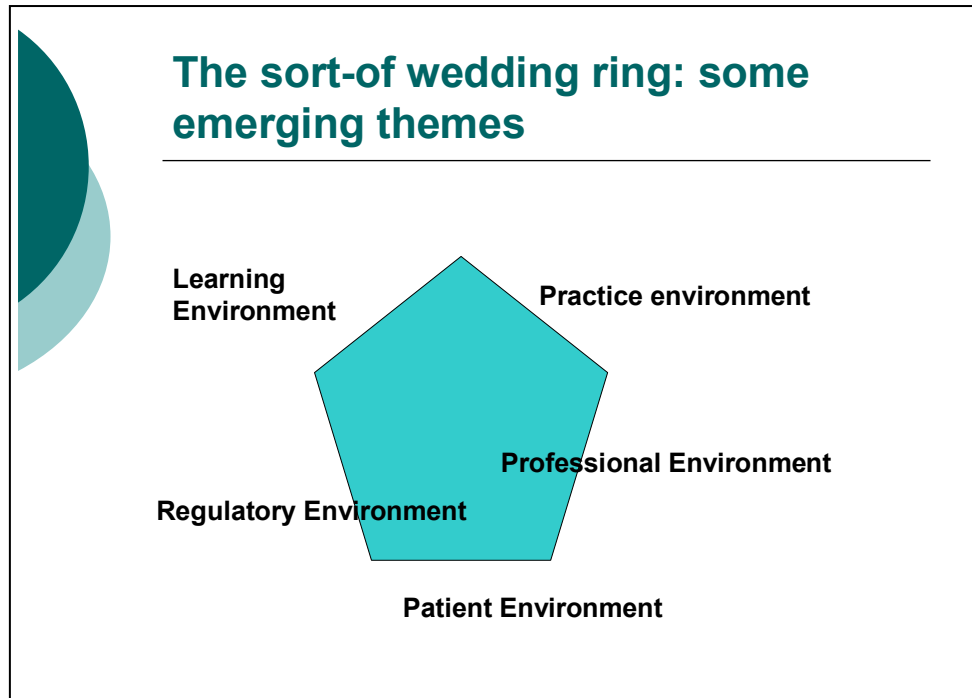
"[Advocating] best practice is not sufficient because adoption also requires environmental and cultural support for behaviors. Whether something is adopted also depends on whether it is acceptable to the community, is part of the cultural landscape."  
- Patel

"One cannot make a change by focusing on just one aspect of the care environment. It is important to look at the full [care] environment, and factor this into guideline development as a means of improving use."  
- Davis

"We don't always realize that there is an over-reliance on biomedical indicators and under-emphasis on psycho-social, organizational, and financial considerations relevant to guideline adherence. Issues of what is going on in the organization are going to affect usage."  
- Harrison

To make sure guidelines are used, both Davis and Harrison focused their discussions on ways organizational structure and the practice environment can not only effect guideline adoption, but also should be considered when creating guidelines. An example of this is making sure primary care physicians are on a team to develop guidelines for primary care physicians, with the ability to test the guideline use in real-world settings.

Dr. Davis effectively explored five environments that need to be addressed to improve the healthcare system, CME, and patient care, facilitated by solutions involving information technology.



*From Davis, Dave, University of Toronto, "The Marriage of Continuing Medical Education and IT," PowerPoint presentation. IPAP Symposium, SUNY at Buffalo, NY. 6 May 2006. Reprinted with permission.*

He breaks these issues down as follows:

- The Practice Environment (EMR's, Reminders, Links to Health Professionals, i.e. pharmacies, etc.)
- The Professional Environment (Collegial Communication, Tele-Consultations, Learning Management Systems, Simulations; Virtual Patients, etc.)
- The Patient Environment (Patient Education, Websites, Self-Care, etc.)
- The Regulatory Environment, currently little or no emphasis on patient care or performance (Performance measurement, Reporting Mechanisms, Accountability, etc.)
- The Learning Environment (Principles of Best Practice, Interactive, Multiplicity of methods, Enabling Materials, etc.)

## **Process**

The process of creating guidelines has been evolving from the publishing of printed guidelines to be referenced and read offline, to developing computerized versions that can be more readily available at the point-of-care. This evolution to a more active role for guidelines for active support is placing new demands on guideline developers and on understanding exactly how they are likely to be used, how they can best support the care provider.

### Guideline Selection

According to Vimla Patel, the American College of Physicians has a process for selecting guidelines. Only after this screening process will the guideline be reviewed, updated, and/or drafted:

1. Determining potential topics for guidelines
2. Creating priorities for updating existing guidelines
3. Reviewing guidelines to see if they require updating
4. Deciding on potential new guidelines

### Creating and Managing a Development Plan

Jennifer Padberg's extensive experience with developing guidelines for multiple organizations, including ASCO, ASTRO, and IDSA was the basis for these recommendations for predominantly printed guidelines, with application to computerized guidelines as well.

1. Team building, additional recommendations.
  - a. Involve individuals early in their career, potentially researching the evidence.
  - b. Call in an expert if needed as a contractor or member of the panel.
  - c. When collaborating, simply agree on the process to use, the timeline, how guidelines will be reviewed and approved.
2. Project management
  - a. Agree up front on methods for developing consensus. For instance, the team may decide to include recommendations like 'insufficient evidence,' or whether dissenting opinions are going to be allowed (Padberg discourages this.)
  - b. Set reasonable timelines and stick to them, setting strategies for meeting them.
  - c. Communicate with the panel, sharing frequently via a multiplicity of means: email, conference calls, meetings at conferences for all those attending, etc.
3. Reviewing the evidence. Multiple options for this review are possible
  - a. Split this up amongst the panel members
  - b. Contract out for this
  - c. Suggest the guideline topic to AHRQ for review
4. Drafting and the 'death grip.' There is always a risk that the primary drafter may hold on to the document. Anticipate setting expectations regarding the commitment up front, gently pester with reminders, and consider accountability to meet agreed upon deadlines.
5. Updating
  - a. Dangers of going out of date prior to publication. Ask for one last review before published.
  - b. Plan on an update cycle as part of the initial guideline plan.

"Keeping guidelines up to date is important because it is necessary to keep up with the ever-changing knowledge base. [To not do so] represents a potentially substantial risk

to the patient. The time frame can be 12 months, 18 months, or even every 2 years depending on the guideline, but no longer. This involves looking at the evidence to see if there is anything new that might result in changes to the guidelines.”

- Padberg

### Computerizing Guidelines Changes Process

“An IT person wants short rules and this is what is required to make a computer program work. Physicians like additional information [explanations, and to see the logic] that is useful to them in making decisions, but which is not necessary for the IT person. Collaboration between the IT person and the clinician can make a big difference in the quality of the final results.”

-Patel

“In this process of guideline development, the physicians may be assuming a lot of knowledge that is tacit and skipping many steps. The additional text is also necessary for the practicing physician. It provides another knowledge layer for decision-making; should the recommendations seem ambiguous, the information is available and transparent.”

-Patel

Dr. Patel focused attention on exploring the importance of human factors and cognitive analysis as part of computerized guideline development and use. Encoding for computers often involves a different process of uncovering and enabling resolution of ambiguities in guidelines. Team members will have different perceptions of what a guideline should be and do. Experts, primary care physicians, and patients will have different purposes in using guidelines. Successful adoption includes developing awareness of these differences and harmonizing them for best results.

She recommends:

1. Develop flowchart and diagrams first, then
2. Write a narrative from the flow chart to see what discrepancies are revealed, and to resolve them.

### **IPAP Experiences with Algorithm Development**

As an example of algorithm development, IPAP experiences with algorithm development evolved over two decades.

#### *IPAP Timeline*

1985: Preliminary international algorithm creation

- Delphi method, expert-based

1992: Founding of IPAP

- Added Operations Research (“The Science of Better”) to the mix
- Experimented with revised algorithm creation methodologies

1997: Web conference

- Created two expert-based algorithms
- Analyzed the process
  - Information science, Informatics, Operations Research, Library Science, Pharmacoeconomics, Technology, & Medical Practice
  - Recommended modifications to the process
  - Recommended changes to better emphasize evidence

1998-2002: Held several international conferences

2003: Shifted to evidence-based algorithms

2006: Involved in Diffusion, Adoption, & Maintenance



According to Dean Hartley III, PhD and Principal of Hartley Consulting and longtime IPAP consultant, IPAP learned the following lessons from their experiences:

- ◆ Organization is critical for algorithm creation
  - Chairman for a particular algorithm
    - Must be willing and capable to drive the process, own the results
    - Must be expert on the disease
    - Must be internationally respected
- ◆ Faculty
  - Must be experts on the disease
  - Contain a diversity of viewpoints
  - Must be willing to work
- ◆ Scheduling structure
  - Don't try to do everything in committee
  - Call for inputs – “pre-work”
  - Executive committee builds “alpha” version
  - Faculty comments and revises during 1 ½ hour teleconferences
- ◆ Administrative structure
  - Secretarial group handles scheduling, mailing, etc.
  - Technical group revises and posts diagrams

Other IPAP conclusions:

1. Ownership is critical for algorithm Maintenance
  - IPAP holds the copyright
  - But faculty must be self-motivated to address new research and correct their algorithm
2. Presentation is important for algorithm Use
  - The algorithm diagram has to have clarity and impact
  - The explanatory details have to be
    - Easily accessible
    - Understandable
    - Complete
  - The algorithm surround (e.g., web site, paper format) must be
    - Authoritative
    - Attractive
    - Available
3. Diffusion & Adoption lessons are to be learned

*See Appendix B for samples of algorithms from IPAP.*

### Part Three: Creating Computer Readable Guidelines: Additional factors

“Informatics is a way of thinking about a problem.... It clarifies the requirements, allows for the standard representation of empirical data, and for unanticipated use of resources. It allows for the conversion of data, easier updating.”  
-McCray

Adapting guidelines successfully for integration with computerized applications creates not only a new set of requirements; it becomes a catalyst for change in how guidelines are developed. Some of these new requirements are discussed below.

#### Standards

One of the major enabling factors in adoption of guidelines for computerized systems is conforming and using existing standards. Awareness and/or involvement in standards-setting organizations provide the opportunity to develop effective guidelines that can be more easily integrated with computerized systems now and in the future.

At the IPAP Symposium, enabling computer-readable guidelines included a discussion of the importance of standards with regard to:

- Semantic language
- Guidelines development
- EHR & EMR implications

#### Semantic Language

“I encourage you to use a medical term when referring to a condition. If consistent vocabulary is used, you can use data standards and vocabulary validation to resolve inconsistencies in data.”  
- McCray

In her talk on *Knowledge Management for Computer-based Information Resources*, Dr. Alexa McCray talked about the process used to build the Clinical Trials database ([www.clinicaltrials.gov](http://www.clinicaltrials.gov)) and the importance of developing consistent vocabularies, of building semantic networks. Using a common vocabulary is essential to making sure guidelines, patient information, and clinical trial information can be interoperative and form a pool of rich information and data key in creating a feedback loop in the creation of evidence-based guidelines. An example of this from her talk is Unified Medical Language System (ULMS) that integrates over 100 vocabularies:

- clinical terms (SNOMED)
- information sciences (MeSH, CRISP)
- administrative terminologies (ICD-CM, CPT-4)
- genomics (Gene Ontology, NCBI organism taxonomy)
- medical devices (UMD)
- anatomy (UWDA, Neuronames)

[HL7 also recommends adherence to the following ‘coding systems:’ SNOMED International, CPT, ICD-9CM, ICD-10, UMLS Metathesaurus, LOINC, Read codes, NDC codes, etc. This category includes tables that define Universal Service IDs, Observation IDs, Drug ID, Component Drug ID, etc.]

Dr. McCray emphasized the fact that guidelines in computerized form will be living on systems that will ideally offer additional patient information and access to clinical trials information, and using medical terminology and standard vocabularies enables greater data integration.

### Standards for Guidelines

Dr. Shortliffe emphasized that Health Level Seven (HL7), a not-for-profit standards setting group focusing on clinical and administrative data, is also active in more than just creating standards for electronic medical records. The Clinical Guidelines Special Interest Group (as well as the Arden Syntax SIG), is sponsored by the Clinical Decision Support Technical Committee of HL7, a key standards-setting group for healthcare guidelines. The goals of this SIG include addressing the functional requirements for computerized guideline communication, and also identifying tools and resources for guideline development, education in the potential for integration and working to make sure that guideline standards conform to other HL7 work / standards for computerized healthcare data.

([www.hl7.org](http://www.hl7.org))

### EHR & EMR Implications

Since the backbone of most computerized systems in healthcare will be the Electronic Health or Medical Records, guidelines that can interface or be integrated with EHR's will be more likely to achieve integration with workflow. In addition, the ability to link guidelines with patient information and other highly relevant, targeted information (like clinical trials information), creates offers both care providers and researchers with the ability to bring new levels of information and data to bear on patient care.

### **Updating Requirements**

In the past, the end goal of guideline creation was publication. As this relatively static, passive form of information dissemination gives way to computerized access, guidelines become not only easier to update, but there is an assumption of updating inherent in the computerized media. Developers will therefore need to address the appropriate timeframe for updating as part of guideline creation, and anticipate a procedure for same.

### **Adapting to Local Requirements**

"When implementing guidelines, many institutions will need to have a local process for adapting such guidelines, at least to make sure they conform to the local vocabulary conventions.... After the adaptation work is done, then they can be integrated with local applications, i.e. EMR's, Order Entry Systems, or other Decision Support Systems."  
- Shortliffe

"Different uses may mean different flavors of standards, each with the aim of interoperability."  
- Shortliffe

In the late 1990's, the InterMed Collaboratory Project focused on developing standards for encoding logic of guidelines that also encouraged local adaptation. Brigham & Women's, Stanford Medical Informatics, Columbia, McGill, ACP all participated. InterMed focused on guideline dissemination issues, and the ability to share guidelines across systems and institutions, supported by.nlm, AHRQ, U.S. Army. Other groups have proposed other models. (see [www.glif.org](http://www.glif.org) for results)

Dr. Davis also shared experiences in Canada with selecting guidelines for particular places. The implication for development is to conform to standards that allow for easy adaptation of guidelines to different places and purposes.

### **Sharing with Vendors**

“There is little sharing of experience or capabilities among healthcare systems. Vendors have basically ignored guidelines and focused on alerts because guideline infrastructure -- the standards for guideline implementation in medical record systems or order entry systems -- doesn't exist yet.”

-Shortliffe

As one example of preliminary integration, Columbia University has added a web-based 'info' button to get to American College of Physicians guidelines from PIER, Physicians Information and Educational Resource, so guidelines integrated at point making decision. To date, this is just access to a web page version of a guideline, but it offers an opportunity to access guidelines.

For guidelines to be used as part of the decision-making process, they will need to be available via computerized systems at the point of care. Guideline developers need to share their plans, the importance, and need, exchanging technical requirements with vendors to facilitate this process.

## Part Four: Diffusion & Adoption

Many IPAP speakers saw parallels between guideline adoption and the process of diffusion and adoption of Electronic Medical Records. This included learning from mistakes made in EMR implementation.

“There is a negotiation process with any new technology. EMR’s are going through this, you can’t just implement because mistakes can result in a downward spiral. You have to do the diffusion work.”

- Arun Vishwanath

Dr. Shortliffe referenced articles about the state of healthcare information technology in Health Affairs magazine (September / October 2005), in which failure / barriers to implementation fall into three broad categories:

1. Cultural challenges. Getting technology embraced in practice environments.
2. Business case. Inability to make strong business case for the technology.
3. Structure of US healthcare. Fragmentation leading to difficulty centralizing decision-making and coordination when everyone is competing.

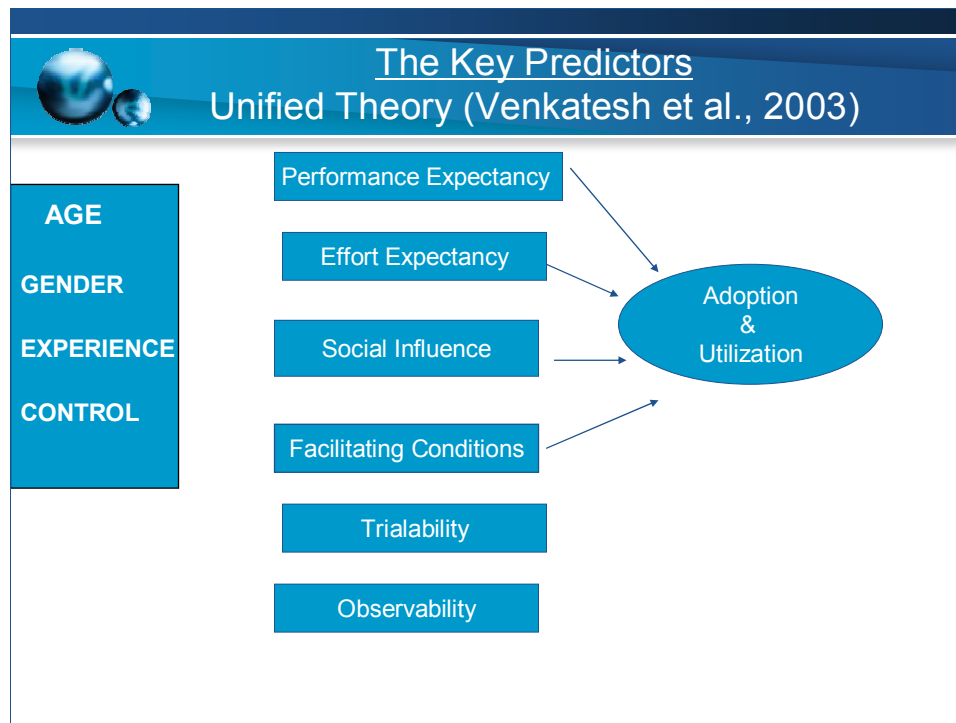
Dr. Wang also mentioned that other factors like insurance issues, or concerns over spending more time with computers than with patients. While using computers can be more time-consuming than paper initially, care providers can learn that it saves time elsewhere.

Dr. Vishwanath reiterated that there are always early adopters, later adopters, and 10% who never will adopt. One aims to capture the early adopters, and successfully use that base to reach critical mass.

### Successful Diffusion

#### Predicting Adoption

According to Arun Vishwanath, the key to successful adoption of any innovation includes communicating its usefulness. If it is viewed as useful, then value often follows. One cannot just implement and assume success because mistakes can result in a downward spiral. A successful implementation involves doing the ‘diffusion’ work. There are six or seven factors in predicting 80% of successful adoptions. Once use of an innovation achieves critical mass, it will become self-sustaining.



*From Vishwanath, Arun, SUNY at Buffalo, "Fundamentals of Diffusion," PowerPoint presentation. IPAP Symposium, SUNY at Buffalo, 6 May 2006. Reprinted with permission.*

**First Tier.** The four most important factors in achieving successful adoption are:

1. Performance Expectancy. What is the utility, the usefulness of the innovation?  
Dr. Vishwanath emphasized this is the most important consideration for technology adoption. "If the technology is useful, people will learn it. If you cannot communicate the usefulness to the physician, then performance becomes the overriding problem, because there is no motivation to learn it."  
- Vishwanath
2. Effort Expectancy. What is it going to take to learn how to use it, and what is the perceived cost, both financial and in terms of time?  
Contrary to popular opinion, physicians will take the time to learn how to use technology if they value it.  
  
"Studies have also shown that if you tell people a product is 'complex,' they will hate it, so don't tell them. If it is useful, they are not likely to see it as complex."  
-Vishwanath
3. Social Influence. Who else is using it?  
This includes physician networks of peers, hospital settings, people they respect. "Physician networks are informal and horizontal, with influence working both ways. Nursing staffs are more formal networks with innovations driven more by physicians and a hierarchical top down structure."  
- Vishwanath

4. Facilitating conditions at individual level. Is use of the innovation encouraged by the environment? Is there cooperation and support?  
"If the utility is clear, and the ease of use or complexity of the innovation is reduced (by design), then most of the other factors affecting adoption disappear."  
-Vishwanath

**Second Tier.** Additional factors that may be an influence and can be addressed to improve adoption, but do not usually become dominant factors as long as the primary factors are addressed:

5. Demographic factors like age, gender.  
While these factors in adoption are often noted and can play a role, they tend to not stand alone as barriers.
6. Control.  
Dr. Vishwanath again emphasized that, while a perceived loss of control can be a factor with physicians, it is more likely to be apparent if the case has not been made for the benefits a physician will gain from using an innovation, be they performance, value for effort, social, or cultural.

### Strategies for Achieving Successful Adoption

1. Identifying Tipping Point.  
What does it take to achieve critical mass for a particular innovation? This involves identifying:
  - o Networks of influence
  - o Ways to spread contagion
  - o Any other potentially external influencesAdoption of EMR's is a good example of the impact of influences on adoption.
2. Managing the Influence Process.  
This involves recognizing the communication and influence networks within the organization or system . For instance, recognizing the horizontal network of physicians and hierarchical network of nurses.
3. Fostering Championship.  
While effective, it can be difficult to identify an appropriate champion. This person is generally not the person who approaches the vendor. The 'champion' is characterized instead by a certain 'boundarylessness' within an organization, someone with strong links internally and often, externally.
4. Engaging Product Definition  
How a product is defined, named, conceptualized and communicated to the user community is key. In terms of adoption, perception of usefulness and value can make or break acceptance and use.  
  
"Technology is interpreted; use is negotiated. Technology cannot just be implemented."  
-Vishwanath
5. Communicating Affiliation  
Framing social influence by communicating about other people/institutions who have successfully used an innovation, one communicates that the technology was perceived as useful by others, and probably for them by inference.

## Persuasive Technology

“The goal of using persuasive technology is to build appropriate reliance and trust in the system. If the design is good, if it looks good, then this can lead to a perception of trust and credibility. Usually, someone who invests in good design and good usability are often smart enough to also be accurate and trustworthy.”

- Danielson

Captology, an acronym for Computers as Persuasive Technology, is a term coined By B.J. Fogg In his book, BJ Fogg defines captology as:

- An attempt to change attitudes or behaviors, or both
- Involving human / computer interaction (interactions with computers, as opposed to interactions mediated through computers)
- Planned
- Built into the computerized system
- Can involve both macrosuasion and microsuation (either overall intent to persuade, or persuasion through smaller events that reinforce usage)

(see Persuasive Technology: Using Computers to Change What We Think and Do, Morgan Kaufmann, 2002).

These persuasive advantages of computers over humans (defined as their ability to change behavior), are summarized as follows:

1. Persistence, the ability to continuously make recommendations
2. Anonymity
3. Storage, the ability to collect, access, and manipulate lots of data
4. Many modalities and interactivity
5. Ubiquity
6. Scalability

Applying this to guidelines, Danielson talked about the importance of recognizing the need for appropriate reliance. With guidelines, there is a relative need for autonomy.

“There can be a decrease in compliance as users understand your underlying procedures [that may be desirable.] The guideline developer will still want to collect data even if the user is not going to comply with results, because the data increases evidence.”

- Danielson

Using the principles of diffusion, successful adoption, and persuasive technologies offers guideline developers the opportunity to leverage the knowledge and experience from information and computer technology fields.

Participants at the IPAP Symposium further discussed the implications for guideline usage, where the intent is to share knowledge, recognizing that psychiatric care involves many variables and environmental factors, not to prescribe treatment. Danielson reiterated this as a concern with expert systems in general.

“Errors that result from expert system advice are more catastrophic than those resulting from human advice. People are able to understand the extent of their knowledge better than computers and so mitigate risk.”

- Danielson



### **Measurement & Evaluating Usability at the Point of Care**

“We can’t just develop guidelines. We have to go out to the end users who are using them and study how these guidelines can be implemented to advantage in a physicians practice for the betterment of patient care.”

- Shortliffe

“Cognitive analysis provides insights into mental models of how people represent and use information. It’s not just about how people do things; it’s also about how people think about things that relate to what people do....”

-Patel

We are clearly at the frontier of studying the value of integrating guidelines and algorithms into computerized systems in the clinical care setting. For instance, Dr. Patel observed that specialists and primary care physicians use guidelines differently.

1. Primary Care Physicians: With guidelines, they quickly understand treatment options.

“Because it is not their area of expertise, primary care physicians may use guidelines to help them understand alternatives much more quickly than without the guidelines.”

- Patel

2. Specialists: use guidelines as reminders.

“Experts, favor succinct guidelines that may remind them of things they have forgotten. It may help prevent omissions from over familiarity.”

- Patel

Identifying these usage behaviors will continue to inform usefulness and value of guidelines, and shape ongoing development.

## Conclusion

Members of the IPAP Symposium were keenly aware that integrating guidelines into the clinical care setting is one part of the solution to information overload, a means of shifting towards greater evidence-based medical practice, and part of what will amount to a culture change in how care is practiced when facilitated by computerized knowledge systems.

Properly integrated and adopted, guidelines provide an opportunity to:

- Remind
- Inform and Educate
- Improve communication between psychiatrists, primary care physicians, and patients
- Become a focal point for turning data into evidence
- Generate a feedback loop to continually improve guidelines and treatment recommendations

By using a multidisciplinary approach and leveraging the expert knowledge of physicians, informaticists, and information technology, IPAP Symposium members are engaged in optimizing access to medical knowledge at the point of greatest need in the clinical practice, while anticipating ways to improve data collection for research. In addition, creating computerized access to guidelines offers mechanisms for ongoing feedback and updating that will both use computer technology and also provide the opportunity to study how using computer technology impacts the practice and quality of care.

### **Solutions to the Medical Care Crisis in America**

*[For this concluding section, Kenneth O. Jobson, Chairman of IPAP, has provided the following succinct summary statement.]*

Guidelines have a potentially significant role in offering a critically important solution to lowering costs and improving healthcare in America.

#### ***The Problem***

1. Exploding complexity and cost. There is a Niagara Falls of new medical information coming together with a 2<sup>nd</sup> Niagara Falls (torrent) of escalating costs of medical care operating with today's rules & systems, regulations, subsidies and information systems and delivery care models.
2. Limits. Clinical care is limited by time, the physician's human capacity for processing and storing information and delivery of care to each unique idiosyncratic patient, one at a time.
3. The current Continuing Medical Education (CME) system is failing to get the latest, best-evidence information to physicians in a useful form when and where it is needed.
4. The result of 1, 2, and 3 is suboptimal (non-evidenced-based) care and massive, increasing and unnecessary expense, limited access and a broken CME system.

#### ***The Solution***

This conference assumes that the solution to this crisis is delivering the right information for decision-making when and where it is needed:

- in a form that is useful (processed medical content),
- received by the caregiver who adopts and applies the information to the benefit of the patient and to the practice of the clinician, and

- in an improved system with rules, subsidies, incentives, limits and collaborative teams to further best care.

Three-fourths of the solution for the transformation of healthcare is being addressed by:

1. Electronic Health Records (EHR) and related standards and technology. The development of this system will facilitate the delivery of patient records, and also is necessary for the revolution in CME and clinical care.
2. A revolution in Continuing Medical Education (CME). See Dave Davis, cited earlier in this report, for status of this revolution and clarification of needs.
3. Revised and restructured rules, regulations, systems, subsidies, and incentives within the U.S. health care system. The debate on these issues is in the public forum with the congress, regulatory bodies, policy planners, medical administrations, insurance providers, etc., involved in this process.

Unfortunately, this is analogous to a three-legged chair.

### ***The Fourth Factor***

This symposium and ongoing IPAP initiatives, conferences, and programs focus on the fourth, critical component, processed medical content. This includes data such as best practices, guidelines and algorithms where the information is winnowed down, brought around and made convenient and usable, diffused and adopted, then kept current by expert faculty for each disease with clerical, administrative and financial support. Information for this processed medical content includes data from the growing Niagara Falls of latest information in the literature (e.g., approximately 30,000 articles a week registered with the National Library of Medicine) as well as from feedback of the results of the use of the algorithms.

Without this knowledge brought to bear at the point of care, the other three parts of the solution, i.e. EHR, CME, and more effective rules, systems subsidies, incentives and limits will not deliver significant improvements in health care.

Why this has not been done:

1. Most guidelines and algorithms are not kept current, nor have they been developed in formats to be maximally useful and fitted for EHR / EMR systems. A system is not in place to connect usable algorithms to end users. The end users are unaware of, or not ready, to receive this type of information, hence the conference emphasis on innovation diffusion.
2. The absence of required multidisciplinary teams:
  - a) Guideline / algorithm development faculties
    - Clinical content experts
    - Informatics experts
    - Vendors
    - Management and support staff
  - b) Clinical psychologists, experts in medical decision-making
  - c) Experts in innovation diffusion
3. Financial support inadequate to fully implement guidelines / algorithms as core solution.

The benefits of developing programs that transform guidelines from documents on the shelf to the infrastructure to bring knowledge to bear on practice include:

- Better quality of medical care, utilizing best, evidenced-based medicine
- Lower cost of care to patient and system
- More rapid advance of medicine
- Improved medical education
- Information for management and Innovation Technology that can be used to further improved cost, quality of and access to care.

The IPAP Symposium offers one example of information sharing designed to support and promote these goals, with continued efforts advance solutions in the field of psychiatry and psychopharmacologic applications, understanding that this has implications and benefits far beyond this specialty.

### **Next Steps: IPAP Symposium Follow Up**

*(See also Appendix G for merged action items from Breakout Sessions.)*

1. Continue proactively engaging in information sharing, education, and participation with IPAP participants, the psychiatric community, informatics and IT professionals, medical educators and others to advance understanding of the usefulness and importance of guidelines and algorithms as knowledge infrastructure.
2. Confirm a coalition of algorithm developers, practitioners, informaticians and consultants who are willing to work together to seek funding for a major ongoing project regarding the development, use, and maintenance of algorithms/guidelines.
3. Begin the development of the proposal to obtain funding for the above project, including the identification of funding sources, the preliminary contact with those sources and the development of a concept paper to show to these potential sources. Use the white paper as the context and background for the funding document.
4. Begin a wholesale review and evaluation of tools for processing medical content of the "Niagara Falls" of information currently being generated that should be influencing the development and the revision of guidelines/algorithms. Look especially at how feedback can be incorporated from electronic medical record systems where outcomes can be tracked based on specific treatment methods.
5. Work with current algorithm developers to evaluate and incorporate guidelines for algorithm/guideline development with a special focus on guidelines that allow for integration of algorithms into EHR / EMR systems, and other enabling technologies, as well as print counterparts. This includes focusing on GLIF specifications and other standards to leverage existing work.
6. Continue to evaluate the requirements and communication potential of integrated guidelines that serve three audiences: psychiatric specialists, general practitioners, and consumers, recognizing that IPAP initiatives provide a unique opportunity for a small group of specialists to have a major impact on primary care practice as well as specialized psychiatric care.
7. Explore further development and funding of infrastructure to manage collaborative initiatives, including guideline development, continual updating, diffusion, and adoption and the development of data collection from the ongoing use of guidelines. This could develop and/or support the multidisciplinary teams that are necessary and currently not available to guideline programs and act as a reticulist to spread best practices in this field.

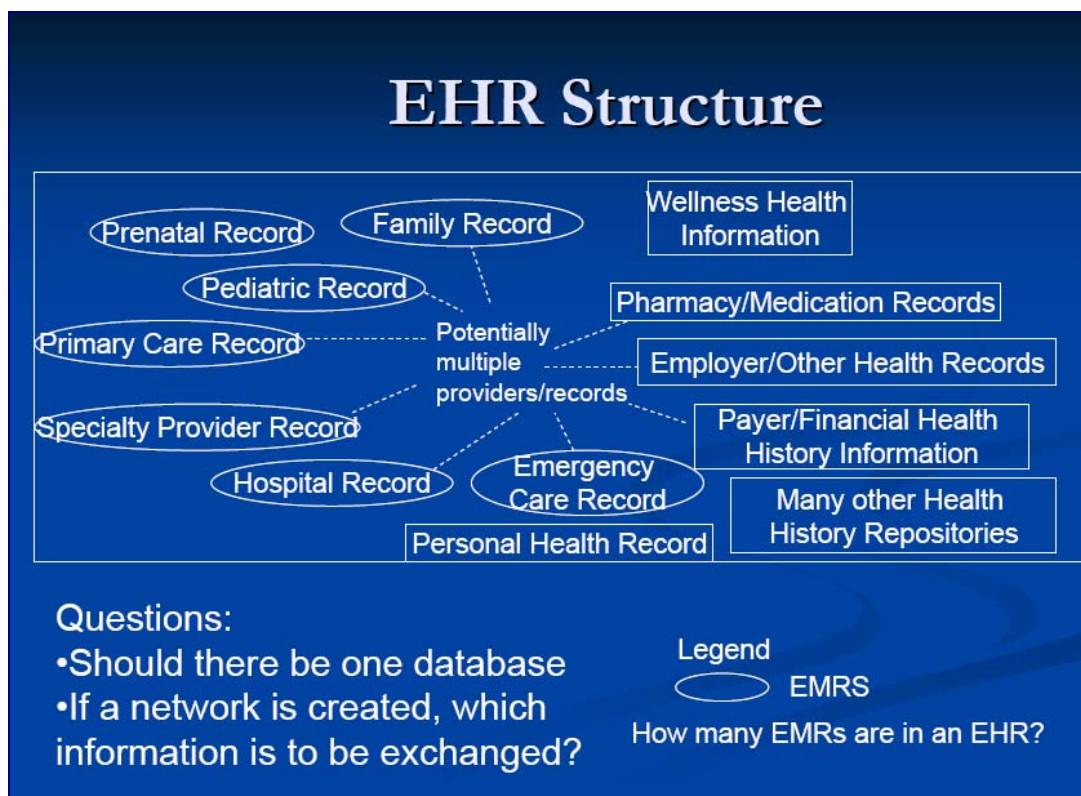
## Appendix A: Key Healthcare Information System Terminology

There are currently multiple terms for electronic patient records, and many more definitions about what constitutes them. The two most commonly used appellations are Electronic Health Records (EHR) and Electronic Medical Records (EMR). There are also two related close-cousins in terms of electronically recorded patient data - Continuity of Care Records (CCR), and Computerized Physician Order Entry (CPOE), grouped here due to frequency of reference. There is also Personal Health Record (PHR). There is particular confusion between EHR, which refers generally to the entire umbrella infrastructure of electronic health records, and EMR's which refers to a specific subset often tied to software, organizational implementation, and functionality. Whatever they are called, there is confusion about appropriate naming conventions and their function.

### *Electronic Health Records (EHR) and Electronic Medical Records (EMR)*

The terms EHR and EMR are sometimes used interchangeably, but they have two different meanings. EHR used increasingly to describe all electronic health records, as the umbrella concept. EMR technically refers to "sharing patient information among authorized healthcare professionals within an organization" assuming interoperability at the enterprise-wide level. EHR includes these functions, and more, often with the assumption of multi-enterprise interoperability.

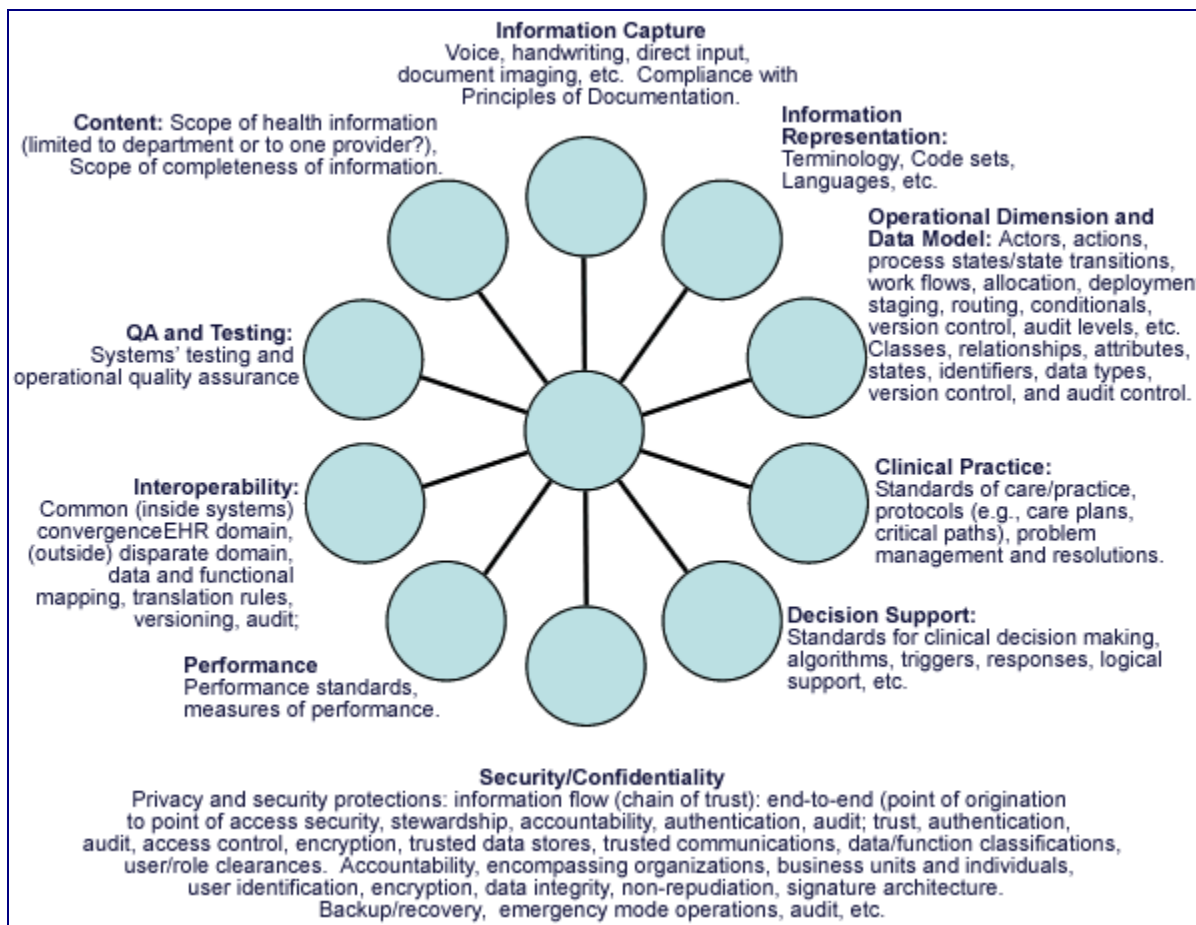
C. Peter Waegemann, CEO of the Medical Records Institute, clearly illustrates this relationship between EHR, EMR's, and other types of electronic data in the following diagram:



From Waegemann, C. Peter, CEO Medical Records Institute, "e-Health: the Cure?" PowerPoint Presentation. Keynote address at MMIS Conference, Providence, RI September 25, 2006. Reprinted with permission.

In terms of IPAP, it is also useful to look at his breakdown of the functional requirements of EHR, noting the nodes on the wheel that refer to decision support functions, etc.

### 10 Functional Requirements of the EHR



From Waegemann, C. Peter., CEO Medical Records Institute (2006) "EHR vs CCR: What is the difference between the electronic health record and the continuity of care record?" Retrieved November 14, 2006 from <http://www.medrecinst.com/pages/libArticle.asp?id=42>  
Reprinted with permission.

Following precise definitions, EHR is still in development. In fact, accelerated by requests from CMS (Center for Medicare & Medicaid Services) and private payers, draft standards EHR have been developed by Health Level Seven (HL7), an ANSI accredited, not-for-profit standards developing organization, providing some standards for EHR baseline functionality and to enable interoperability and sharing of electronic health records. See [www.hl7.org](http://www.hl7.org)

#### Continuity of Care Record (CCR)

Another trend that deserves mention in this context is the CCR, which is an XML standard developed jointly by ASTM International, the Massachusetts Medical Society (MMS), and the Health Information Management and Systems Society (HiMSS). It presents the core data set of facts about a patient's healthcare that can be sent either ahead of, or with the patient as they

move through the healthcare system, potentially from hospital to clinic to agency to physician's practice, etc. It is designed to be a subset of all medical information, transmitted in either paper or electronic form, with providers deciding what is most relevant for practitioners at the next point of patient care

### ***Computerized Physician Order Entry (CPOE)***

According to the Leapfrog Group, an organization of more than 150 public and private organizations that provide health care benefits and major supporter of CPOE adoption, CPOE systems "are electronic prescribing systems that intercept errors when they most commonly occur – at the time medications are ordered.... Orders are integrated in with patient information, including laboratory and prescription data, then ... automatically checked for potential errors or problems."

### ***Clinical Decision Support Systems***

Historically, Clinical Decision Support Systems were defined as "active knowledge systems, which use two or more items of patient data to generate case-specific advice. Clinical DSSs are typically designed to integrate a medical knowledge base, patient data and an inference engine to generate case specific advice." (Handbook of Medical Informatics, 1999).

Clinical Decision Support, and Clinical Decision Support Systems, have looser working definitions, and are perhaps the hardest to define, because it is still an evolving field that includes a broad range of potential features and functionality. More recently, Clinical Decision Support has been broadly defined as "providing clinicians or patients with clinical knowledge and patient related information, intelligently filtered or presented at appropriate times, to enhance patient care." (Clinical Decision Support Implementers' Workbook, HiMSS 2004)

### ***Personal Health Records (PHR)***

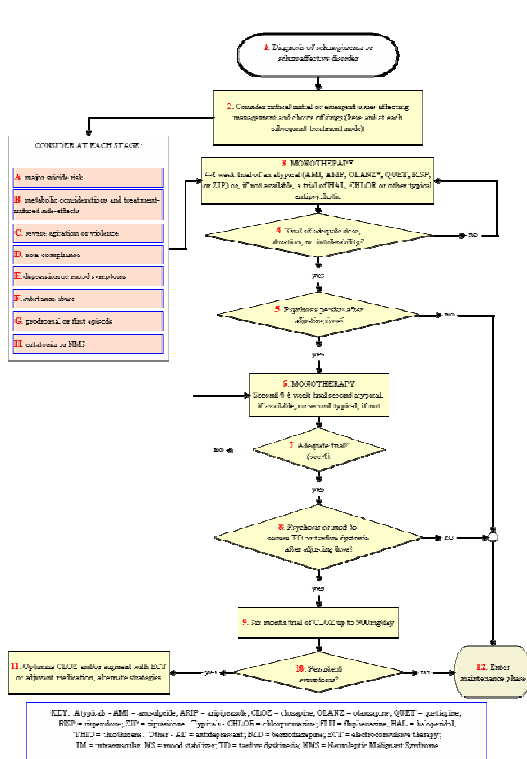
The personal health record is intended for use by, and intelligible to, the consumer. It can include any type of information or documents useful to the individual patient in pursuit of healthcare. "The personal health record (PHR) is an electronic, universally available, lifelong resource of health information needed by individuals to make health decisions. Individuals own and manage the information in the PHR, which comes from healthcare providers and the individual. The PHR is maintained in a secure and private environment, with the individual determining rights of access. The PHR is separate from and does not replace the legal record of any provider."

When standardized, it must include the following common elements to ensure interoperability: personal demographic information, general medical information, allergies and drug sensitivities, conditions, hospitalizations, surgeries, medications, immunizations, clinical tests, pregnancy history. (American Health Information Management Association, [www.ahima.org](http://www.ahima.org))

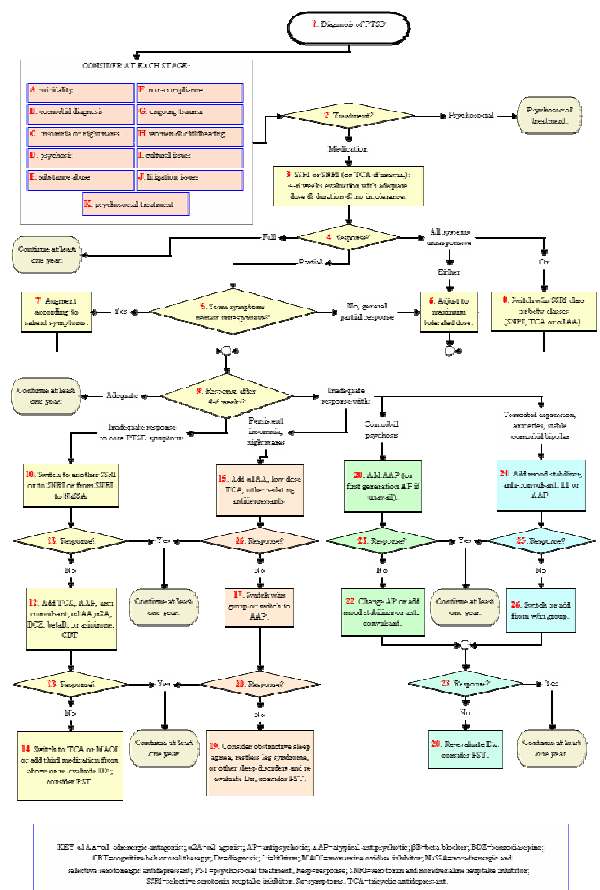
*[Text adapted and updated from report by M. Adamson, "Transformation of Healthcare in the U.S.: New Publisher Roles; New Market Relationships," EPS Focus Report, August 2004. Used with permission. Use of Visuals compliments of Peter Waegemann, CEO of Medical Records Institute.]*

Appendix B: Two IPAP Algorithm Samples

Schizophrenia



Post Traumatic Stress Disorder





## Appendix C: Psychiatric Treatment Guidelines and Algorithm Projects

*[Tables created by David N. Osser, MD. Associate Professor of Psychiatry, Harvard Medical School at the Brockton VA Medical Center and Taunton State Hospital.]*

<b>Project Name</b>	<b>IPAP</b>	<b>US Dept of VA</b>	<b>TMAP</b>
<b>Web URL</b>	<a href="http://www.ipap.org">www.ipap.org</a>	www.oqp.med.va.gov/cpg/cpg.htm	www.dshs.state.tx.us/mhprograms/TMAP.shtm
<b>Creator</b>	IPAP	Dept of Veterans Affairs, Department of Defense	Texas Department of Mental Health, University of Texas Psychiatry and Pharmacy Departments
<b>Organization Description</b>	Not-for-profit corporation to design algorithms	US Government	University - State collaboration to find ways of utilizing State resources for pharmacotherapy cost-effectively
<b>Contributors</b>	international faculty	Working groups	Creators, plus NAMI and other consumer groups
<b>Funding</b>	Dean Foundation	Veterans Administration, U.S. Department of Defense	State grants, Federal grants, Robert Wood Johnson & many drug companies
<b>Objectives</b>	health professionals and researchers	Educational tool for Federal practitioners. Designed to cover all aspects of care: prevention, diagnosis, acute and maintenance treatment - psychosocial and psychopharmacological interventions.	TMAP is a disease management program that promotes an "algorithm-driven treatment philosophy" to improve quality and outcomes "per dollar of resource expended. Includes decision-support for clinicians, forms for documentation of patient outcomes, and patient/family educational materials to support implementation.
<b>Category</b>	Evidence-based (some expert-based)	Evidence-based (expert consensus when necessary)	Evidence-based with much expert consensus
<b>Disorders</b>	Schizophrenia, PTSD, GAD	PTSD (2003), Major Depressive Disorder (2000), Psychoses (2004), Substance Use Disorder (2001)	Depression (1999), Bipolar (2005 flowchart, manual withdrawn), Schizophrenia (2006 flowchart, Jan2003 manual)
<b>Local Applications</b>	Global	Available for consultative use in facilities of the Dept of Veterans Affairs, Department of Defense. Primary care and mental health specialist care.	"Implemented" in State of Texas public mental health system. Being used in some other states, sometimes in locally modified forms.
<b>Currency</b>	All created or updated in 2006	2000-2004	1999-2006 for algorithm flowcharts, 1999-Jan2003 for manuals
<b>Presentation</b>	Interactive web & downloadable print media	Interactive web & downloadable print	Website with flowcharts (non-interactive) and downloadable text documents.
<b>Other</b>		Some guidelines take into account cost-effectiveness, but these comments get out-of-date quickly	Procedure manuals give great detail on "tactics" for prescribing, including exactly how to titrate doses, how long to wait between dose changes.

<b>Project Name</b>	<b>Psychopharmacology Algorithm Project at the Harvard South Shore Department of Psychiatry</b>	<b>APA Practice Guidelines</b>	<b>Expert Consensus Guideline Series</b>
<b>Web URL</b>	www.mhc.com/Algorithms	http://psych.org/psych_pract/treatg/pg/prac_guide.cfm	<a href="http://www.psychguides.com">www.psychguides.com</a>
<b>Creator</b>	Consolidated Department of Psychiatry, Harvard Medical School. Mental Health Connections, Inc. (MHC)	American Psychiatric Association	Expert Knowledge Systems, Inc.
<b>Organization Description</b>	Academic department and private collaboration to design computerized algorithms	U.S. Organized Psychiatry	Non-profit to develop and publish these academic products
<b>Contributors</b>	Creators and university faculty, mostly from Harvard	Working groups, the APA assembly, and Board of Trustees	Senior editors and working groups
<b>Funding</b>	Own-time contributions of faculty, with technology support from MHC. No drug company support.	American Psychiatric Association	Many drug companies
<b>Objectives</b>	Provide evidence-supported consultative advice to clinicians and tools for psychopharmacology training	Assist psychiatrists in clinical decision-making and to improve patient care. It is "not a standard of care." Generally, there are few algorithms offered. The narrative descriptions describe the scope of knowledge and are minimally prescriptive.	Present practical clinical information based on a survey of experts. Panels of experts who frequently publish and/or are experienced clinicians answer a series of questions designed to go beyond the evidence base and determine the opinion of the experts in clinical scenarios. Results are tabulated and summarized. Sometimes, flowchart-style algorithms are proposed based on the editors' interpretation of the respondents' opinions on the individual questions.
<b>Category</b>	Evidence-based with much expert consensus	Evidence-based with much expert consensus	Expert consensus.
<b>Disorders</b>	Depression (major, psychotic, bipolar) - (1996), Schizophrenia (1998), Anxiety Disorders in patients with a history of substance abuse (1999).	Schizophrenia (2004), Major Depression (2005), Bipolar (2005), PTSD (2004), Panic (2006), Eating Disorders (2006), and 8 others	Schizophrenia (1994), Bipolar (2000), PTSD (1999), Pediatric Epilepsy (2005), Antipsychotics in Older Patients (2004), Behavioral Problems in Mental Retardation (2004) and 9 others
<b>Local Applications</b>	Downloads have been registered from 66 countries. Translations of parts of the algorithms into Chinese, Greek, Russian, and Spanish.	Distributed to all subscribers to American Journal of Psychiatry. Available for purchase as a compendium (2006) for \$89.	Published as supplements to Postgraduate Medicine, Journal of Clinical Psychiatry, and others. Sold for \$5 to \$20 each online.
<b>Currency</b>	Full algorithms current to 2003-4, but flow diagrams have been updated to 2006 for all.	1997-2006. "Guidelines Watch" document anticipated changes to next editions (2005-6)	1997-2005
<b>Presentation</b>	Interactive web. For Version 4 (depression, anxiety) consultations can be saved, retrieved, printed as a written consultation.	Available in hard copy. Online educational programs available for training in the content of individual guidelines.	Hard copy only. Sold online. Not downloadable.
<b>Other</b>	HTML text files can be printed. General editor and technology director receive no personal support from any drug companies.		Brief "Pocket Guides" available online.

<b>Project Name</b>	<b>Stanford Psychotic Depression Algorithm</b>	<b>British Association of Psychopharmacology Consensus Statements</b>	<b>National Institute for Health and Clinical Excellence (NICE)</b>
<b>Web URL</b>	<a href="http://psychoticdepressionalgorithm.stanford.edu/">http://psychoticdepressionalgorithm.stanford.edu/</a>	<a href="http://www.bap.org.uk">www.bap.org.uk</a>	<a href="http://www.nice.org.uk">www.nice.org.uk</a>
<b>Creator</b>	Stanford University Department of Psychiatry plus one outside contributor.	British Association of Psychopharmacology (BAP)	The Health Development Agency, of the Department of Health of Great Britain,
<b>Organization Description</b>	Academic department of psychiatry	G.B. Organized Psychiatry	Government Agency
<b>Contributors</b>	Creators	Members of BAP	Many experts, mostly from the British Commonwealth of nations
<b>Funding</b>	The Dean Foundation and IPAP.	BAP	Government of Great Britain
<b>Objectives</b>	"To increase the consistency of the treatment of psychotic major depression and to improve the outcomes of patients with the disorder."	Provide guidance for clinicians	"To develop the evidence base to improve health and reduce health inequalities. It worked in partnership with professionals and practitioners across a range of sectors to translate that evidence into practice."
<b>Category</b>	Evidence-based with expert consensus	Evidence-based	Evidence-based, with meticulous attention to the implications of the available evidence
<b>Disorders</b>	Psychotic Major Depression	Depression (1993), Bipolar (2003), Addiction (2004), Anxiety Disorders (2005)	All major medical and psychiatric disorders. Enormous amount of information on this website.
<b>Local Applications</b>	Reports 11,000 "hits" to the web site since it was opened in 2002.	Great Britain	Extensively used in Great Britain, Canada, Australia.
<b>Currency</b>	"Jan. 20, 2003"	2000-2005	Many are 2006. New material is added daily.
<b>Presentation</b>	Interactive web.	Published in the Journal of Psychopharmacology and PDF's can be downloaded from the web site.	Interactive web. Much of the material is patient-centered, but much of the professionally centered material is at a very high level of sophistication, requiring a good understanding of evidence-based medicine terminology.
<b>Other</b>			

<b>Project Name</b>	<b>Chinese Psychopharmacology Algorithm Project</b>	<b>National Guideline Clearinghouse</b>
<b>Web URL</b>		<a href="http://www.guideline.gov">www.guideline.gov</a>
<b>Creator</b>	Peking University Institute of Mental Health and the Ministry of Health of the People's Republic of China	The Agency for Healthcare Research and Quality (AHRQ), American Medical Association, and the American Association of Health Plans
<b>Organization Description</b>	Patient care, teaching and research institute.	US Federal Agency and other contracted agencies.
<b>Contributors</b>	Faculty from departments of psychiatry from the major universities throughout China	Extremely various. The creators take no responsibility for nor do they endorse the content of the guidelines published.
<b>Funding</b>	Chinese government.	ARHQ.
<b>Objectives</b>	To improve care through the development, dissemination and implementation of guidelines and algorithms for the diagnosis and pharmacotherapy of major psychiatric disorders, especially those that produce significant disability in the population.	"Provide an accessible mechanism for obtaining objective, detailed information on clinical practice guidelines and to further their dissemination, implementation, and use."
<b>Category</b>	Evidence-informed, with much expert consensus	
<b>Disorders</b>	Schizophrenia, Major Depression, Bipolar disorder, and ADHD	1,271 guidelines are listed that have been updated - plus an additional list that have not been updated., dealing with a wide range of medical problems
<b>Local Applications</b>	Government-sponsored implementation processes throughout China.	Data not provided on extent of use. Guidelines are obtainable from their own publishers by individual arrangement. Costs vary.
<b>Currency</b>	About 2004	Many are 2006.
<b>Presentation</b>	Text documents, algorithm flowcharts are widely disseminated. English translations are available for the depression and schizophrenia guidelines	Text documents, obtained from their publishers.
<b>Other</b>		There is a tool for putting two guidelines up side-by-side to compare them.

## Appendix D: Sample of Other Important Guidelines-Related Initiatives

### InterMed Collaboratory

<http://smi.stanford.edu/projects/intermed-web/>

“One of the central objectives of InterMed has been to develop sets of tools and resources for disseminating clinical guidelines across medical disciplines and settings. The development of the [GuideLine Interchange Language](#) (GLIF 2.0), a computer-based format that can be used to distribute guidelines across different institutions and systems has been the primary product of this undertaking.”

*For more information, see the Intermed Collaboratory website, listed above.*

### National Guideline Clearinghouse

[www.guidelines.gov](http://www.guidelines.gov)

The National Guideline Clearinghouse™ (NGC) is a comprehensive database of evidence-based clinical practice guidelines and related documents. NGC is an initiative of the [Agency for Healthcare Research and Quality \(AHRQ\)](#), U.S. Department of Health and Human Services. NGC was originally created by AHRQ in partnership with the [American Medical Association](#) and the [American Association of Health Plans](#) (now America's Health Insurance Plans [AHIP]).

The [NGC mission](#) is to provide physicians, nurses, and other health professionals, health care providers, health plans, integrated delivery systems, purchasers and others an accessible mechanism for obtaining objective, detailed information on clinical practice guidelines and to further their dissemination, implementation and use.

*Quoted from website, listed above.*

### Yale Center for Medical Informatics

<http://ycmi.med.yale.edu/projects.html>

Clinical Informatics Projects include:

[Trial/DB](#) is a generic, flexible system for management of clinical study data.

[GEM](#) (the Guideline Elements Model) is an XML- based guideline document model that can store and organize the heterogeneous information contained in practice guidelines.

[The Guideline Implementation Project](#) has explored the use of mobile, pen-based devices that incorporate guideline knowledge to provide clinical decision support and overcome challenges to user acceptance.

[The SEURAT project](#) involves scanned entry of structured data for a pediatric health maintenance record system

[The COGS](#) (Conference on Guideline Standardization) Project seeks to identify key elements that should be included in clinical guidelines and to understand factors that influence guideline implementability.

*Quoted from website, listed above.*

## Appendix E: Key Organizations

The organizations are listed here as additional references and links not noted elsewhere in this report, with thanks for their participation and representation at the Symposium and other IPAP activities, meetings, and web conferences. They are referenced here only to recognize their significant involvement in psychiatric guidelines and IPAP activities and to express appreciation for their leadership roles. This does not constitute statement of an official or formal relationship.

For more information about conferences and activities, see [www.ipap.org](http://www.ipap.org)

### **American Psychiatric Association (APA)**

[www.psych.org](http://www.psych.org)

The American Psychiatric Association is active in promoting guideline development and use. "APA practice guidelines are intended to assist psychiatrists in clinical decision-making and to improve patient care. They also document evidence available to determine appropriate care. A practice guideline is not a "standard of care." The ultimate judgment regarding a particular clinical procedure or treatment plan must be made by the psychiatrist in light of the clinical data presented by the patient and the diagnostic and treatment options available."

(From website, [http://www.psych.org/psych\\_pract/treatg/pg/prac\\_guide.cfm](http://www.psych.org/psych_pract/treatg/pg/prac_guide.cfm))

### **Chinese Psychopharmacology Algorithm Project (CPAP)**

*IPAP has co-sponsored events. Contact Ken Jobson for additional contact information.*

### **Collegium Internationale Neuro-Psychopharmacologicum (CINP)**

[www.cinp.org](http://www.cinp.org)

*The CINP Board of Directors endorsed the IPAP algorithm for Schizophrenia.*

### **Japanese Psychopharmacology Algorithm Project (JPAP)**

*IPAP has co-sponsored events. Contact Ken Jobson for additional contact information.*

### **Harvard Southshore Psychopharmacology Algorithm Project**

<http://mhc.com/Algorithms>

### **Texas Medication Algorithm Project (TMAP)**

<http://www.dshs.state.tx.us/mhprograms/TMAPtoc.shtm>

### **World Health Organization (WHO)**

[www.who.int/en](http://www.who.int/en)

*WHO recommends use of the CINP/IPAP Schizophrenia Algorithm.*

## Appendix F: Key Enabling Technologies

Three different examples of enabling technologies are listed below:

### ***GLIF***

"GLIF is a specification for structured representation of guidelines. It was developed by the InterMed Collaboratory in order to facilitate sharing of clinical guidelines (Ohno-Machado, Gennari et al. 1998). The InterMed collaboratory was a joint project of medical informatics laboratories at Harvard (the Decision Systems Group at Brigham and Women's Hospital and Laboratory of Computer Science at Massachusetts General Hospital), Stanford, Columbia, and McGill Universities (Shortliffe, Barnett et al. 1996). That work is being continued under new funding by a subgroup of the InterMed collaborators, including the Decision Systems Group at Harvard, McGill, Columbia, Stanford, and the American College of Physicians-American Society of Internal Medicine."

See [www.glif.org](http://www.glif.org)

### ***Protégé***

"Protégé is a free, open-source platform that provides a growing user community with a suite of tools to construct domain models and knowledge-based applications with ontologies.... Protégé was developed by [Stanford Medical Informatics](#) at the [Stanford University School of Medicine](#)."

Protégé software allows for easy development of computerized algorithms and guidelines.

See <http://protege.stanford.edu>

### ***Duke University Medical Center CRIS***

" Clinical Research Information System (CRIS) is a comprehensive electronic behavioral health care management system. CRIS seamlessly integrates clinical care at all levels, clinical and regulatory management, and clinical research. CRIS also employs a clinical rules engine to help guide clinical practices and creates a clinical outcomes data warehouse for retrospective decision support."

Dr. Gersing, Medical Director of Information Services, presented at IPAP Conference. Provided intriguing insights into the efficacy of using guidelines as part of a dedicated psychiatric EMR.

See <http://psychiatry.mc.duke.edu/CMRIS/CMRIndex.htm#Introduction>

## Appendix G: Summary of Breakout Sessions: Merged Action Items

The final portion of the symposium consisted of six breakout groups charged with considering the information presented at the previous sessions and summarizing the conclusions and potential next steps for moving the use of algorithms forward. There was considerable overlap in the highlights gleaned by each group as well as strategies for moving ahead. Summarized below are the highlights of those sessions in merged format.

### Decision Making and Tools

- The doctor is the decision maker. Tools such as guidelines or treatment algorithms should be suggestive not prescriptive in nature.
- At the same time, such tools will increase in importance as electronic health records (EHR) and decision support systems (DSS) become more effective and widely adopted.

### Audience

- The final algorithm must be capable of being presented in multiple formats to accommodate a range of users as well as different learning patterns.
- Likewise, multiple formats will be required for different levels of care (primary, secondary, tertiary, specialty) and audience (e.g. experienced clinician, residents, general practitioner).
- The trade-off between simplicity and comprehensiveness must be considered based on audience.
- Presentation must be discussed at the local level to assure acceptance and possible adjustment to local conditions and settings.
- Guidelines or algorithms must be flexible to accommodate psycho-social and cultural variables.

### Development Process

- Need guidelines for developing guidelines (see section on standards below). These should cover both creation and evaluation factors.
- Need software tools to support the development, housing, and presentation of the final product (a knowledge-organizing and transformation package such as GLIF).
- Such tools must allow ready sharing of the knowledge base used by content experts.
- Even with such tools, both formal and informal communication is essential
- Team structures must be highly inclusive and have both a project manager (overall responsibility) and a team leader (content expert). Specialists in the domain as well as information and information technology experts, pharmacists, end user representatives, and consumers should be included.
- Where international teams are employed, an expert at translation must be a member of the team.
- Implementation must be considered a part of the development process.
- Credible organizations should be employed in the process (e.g. APA).
- IPAP should position itself as a community of algorithm/guideline developers who are experienced in this process.

### Standards

- Just as with guidelines, standards must be developed via the use of multidisciplinary teams.
- Standards are needed with respect to policy and funding as well as development and presentation of guidelines. Note that this effort could come from HL-7 or from some government agency.



- Standards should address the need for ongoing, formal evaluation and the “life cycle” of such creations.
- Likewise, such standards must address dissemination issues as an integral part of guideline development and presentation.

#### Guideline Content and Format

- Structure should be hierarchical in approach in both data presentation and intervention strategies.
- All components should be time-stamped to indicate latest update information
- All elements should be evidence based where possible.
- Need explicit dimensions and categories for diagnosis and definitions and measurements for outcomes.
- Mechanisms for evaluation at the individual patient level should include adherence, deviation, and outcomes.

#### Funding

- The process of guideline development cannot rely solely on volunteers.
- Funding base for the development process must be neutral.
- Funding must include the cost of updating and dissemination as well as development.

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