Considerations Concerning
Computerized Physician Order Entry Implementation:

The 2001 Menucha Conference List*

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*Menucha is an old Hebrew word: like many of them, this word
has multiple meanings. It is a place of repose. It is a
place to gather energies and faculties to prepare for
whatever beauty or challenge tomorrow holds. It is a
familiar and relatively secure place in which to prepare to
set out for a destination that can only be dimly perceived.

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Computerized Physician Order Entry Implementation:

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Implementation of computerized physician order entry (POE) is being increasingly encouraged as an important solution to the challenge of medical error reduction. Use of POE is not widespread, however, in part because it has a reputation for being difficult to implement.

To identify success factors for implementing POE, a consensus conference of invited experts holding multiple perspectives was convened near Portland, Oregon on May 10 and 11, 2001. At a retreat center called Menucha, thirteen experts from around the world met with seven members of the Oregon Health & Science University's Physician Order Entry Team (POET) of researchers for the purpose of developing recommendations for POE implementation. Participants included Jos Aarts (social science and international perspective), Marilyn Davis (nurse and implementation specialist representing the first POE site, El Camino Hospital), Dick Gibson, Homer Chin, Paul Nichol, Marc Overhage, and Tom Payne (clinician leaders), Karen Hughart (nurse and implementation specialist at Vanderbilt), Janet Greenman (vendor representative), John Dulcey (physician and consultant), Gil Kuperman (director of R & D), Brian Churchill (project manager for POE implementation), and Jim Carpenter (clinical pharmacist). *(See Appendix 2 for more information on the participants.)*

Funded by a research grant from the National Library of Medicine, the 2001 Menucha consensus conference succeeded in its goals of identifying and agreeing on a list of 10 major and 36 minor considerations for successful implementation and outlining a set of issues that fostered debate within the group and deserve further exploration.

The members of the consensus panel encourage and invite comments and discussion on this document. Send any input to Joan Ash, Ph.D. via email at ash@ohsu.edu or

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Consideration #1: Motivation for Implementing POE

Consider what is motivating you and others in your organization to think about implementing POE.

1. Environment:
    A. *Regulations*: Are you predicting that POE will be required for your organization at some time in the future?
    For example, in the state of California, hospitals and surgical clinics must have a plan for adopting technology to reduce medical errors by January 1, 2002 and have implemented POE by January 1, 2005.
    B. *Labor shortages:* Will you have enough nursing and ancillary support personnel to staff clinical services?
    POE can save clinician time through streamlined processes.
    C. *Other pressure*: Do you sense other environmental pressure?
    The Institute of Medicine report To Err is Human, insurance company demand, the Leapfrog Group representing healthcare purchasers, and consumer demand all represent other pressures.

2. Workflow issues:
    A. *Administrative needs*: Are administrators pressing for POE implementation?
    Administrative needs may include response to the above environmental pressures plus billing, quality assurance, and accreditation needs.
    B. *Clinical needs*: Are clinicians pressing for POE implementation?
    Clinician needs may include the desire to apply information technology to improve patient care.
    C. *Efficiency needs*: Is there pressure to improve efficiency?
    These needs may include lowering costs and/or increasing revenue.

Consideration #2: Foundations Needed Prior to Implementing POE

There are several necessary but not sufficient conditions that must be in place before one should consider implementing POE. These are:

1. Vision: Is there an overall vision for the organization that would allow staff to embrace the concept of POE?

2. Leadership: Is there top-level leadership commitment that would provide unwavering support for POE?
   Institutions *per se* cannot commit; ultimately, it is people who commit.

3. Resources: Does the organization have adequate resources?
    A. *Infrastructure*: Is the technical network infrastructure appropriate?
    B. *People*: Is the staff available and ready?

4. Trust: Does the clinical staff trust administrative staff?

5. Learning organization: Is there a mental model throughout the organization that values feedback, change, quality, and continuous learning?

6. Sense of urgency: Is there a compelling sense of urgency about implementing POE?

7. Vendor readiness:
    A. *Quality*: Are you satisfied with the quality of the product?
    Consider the quality and maturity of the product and service offered by the vendor. Are sites similar to yours using the product as you plan to use it?
    B. *Stability*: Have you considered the long-term stability of the vendor in making your selection?
    C. *Relationship*: Can you put time and effort into forging a productive two-way relationship with the vendor?
    The vendor is your partner and helpmate in this endeavor.
    D. *Innovation:* Is this vendor likely to have more useful products over time than other vendors?
    Consider the speed with which the vendor is improving its product.
    E. *Flexibility*: How flexible is the vendor? Is the vendor able to integrate its systems with your existing suite of applications?
    F. *Reliability*: How reliable is the vendor in meeting deadlines and delivering high-quality code?

8. Maturity: Can the organization be considered mature and stable?

Consideration #3: Costs

1. Consider several economic aspects concerning the decision to implement POE:
    A. *Timing*: Can you take a long-term view?
    Financial benefits may not be realized for a long time and expenses short term may be significant. In the long term, the purpose of POE is to help patients.
    B. *Total cost of ownership*: Can you afford additional costs beyond those of hardware and software?
    C. *Productivity*: Can you afford a temporary loss of productivity?
    Consider that there will be a loss of productivity during training so that staff can take time to become comfortable with the new system; patient loads may need to be reduced or staffing increased.

2. Dollars and cents considerations:
    A. *Plan*: Do you have a good financial plan?
      Consider that by having a good financial plan, you will be ready to evaluate and address unexpected situations. The plan might take a broader view and look at other projects that may compete for money, time, and other resources.
    B. *Dedicated funds*: Are there funds put aside for POE?
      Consider the level of adequate financial backing needed and assure that it remains dedicated to the project at hand.

Consideration #4: Integration/Workflow/Health Care Processes

1. Time is of paramount importance to clinicians and there are several facets of it to be carefully considered:
    A. *Response time*: Is it good enough?
      Consider how fast the system's response time should be for it to be tolerable to clinicians.
    B. *Ordering time*: Is it time neutral?
      Weigh the tradeoffs so that the time spent entering an order is worth it or is at least time neutral for the clinician. These tradeoffs might be easier access to information, ordering from multiple locations, and fewer calls about legibility.
    C. *Communication time*: Will it be increased or decreased?
      Consider whether more (or less) total time will be spent gathering data and communicating using computerized POE rather than today's method.

2. Workflow issues also need careful consideration:
    A. *Process*: Has the impact of POE on the work process been considered?
      POE needs to be seen as part of one's job, it must be integrated into the individual's workflow and that of the order communication process necessary for the execution of orders, and used for all orders.
    B. *Work will change*: Is it understood that work will change as a result of POE?
      POE may cause a redistribution of work and changes in the communication and decision-making process, so people's work will change. Users need to visualize this change.
    C. *Strategy*: Is there an organization-wide change strategy?
      These workflow changes can be seen as a part of larger strategy of process change, an institutional strategy.

3. Integration must be planned carefully as well:
    A. *Scope*: Will all orders be done using POE?
      Consider the scope of POE to include the whole range of orders.
    B. *Retrieval:* Is retrieval of information easy?
      Retrieval of other information such as medical records and medical literature needs to be integrated seamlessly into the workflow.
    C. *Embedding POE*: How well does POE fit with other systems?
      POE needs to be embedded into other systems like the electronic medical record.

4. Readiness for integrating POE into the clinical workflow must be considered:
    A. *Readiness:* Are the users ready for POE?

Consider the level of physician readiness for POE and the communication and planning needed to increase readiness. At the same time, consider nursing readiness and staffing issues, plus the readiness of those who will receive orders generated by POE.

5. Other related considerations include:
   A. *Paper*: Have you decided how much paper can actually be eliminated in the process?
      Consider the role of paper and where in the ordering process its use might be tolerated.
   B. *Other projects*: What are other high priority projects?
      Consider other projects with which POE will compete, both technology and other resource intensive projects.
   C. *Fostering use of POE*: Is there a plan for promoting usage? Will the project be mandatory for all medical staff?
      Hybrid situations introduce frustrations and higher operating costs. Consider mechanisms you might be able to put in place to facilitate and incent physicians to use the system.

Consideration #5: Value to Users/Decision Support Systems

1. Consider the following high-level decisions related to providing value for clinicians:
   A. *Benefit*: How will clinicians benefit?
      The user must derive visible benefit in terms of improved workflow and a perception of "doing a better job" for the patient. The benefit of patient safety is a more intellectual and somewhat removed concept.
   B. *Results:* Have you implemented results review before POE?
      Experience with results reporting prepares users for POE.
   C. *Analyze needs*: Have you done a needs analysis?
      Analyze user needs carefully; do not just give people what they ask for.
   D. *Communication*: Have you considered the impact of POE on communication flow?
      Consider that POE decreases face-to-face communication.
   E. *Involvement*: Is there a plan for involving physicians?
      Physician involvement is needed from the start and throughout the process.

2. Being able to provide decision support is an important benefit of computerized POE. The following issues need consideration:
   A. *Content determination and maintenance*: Is there a plan for ongoing decision making about decision support content?
      Consider putting a process in place to determine the kind of decision support that should be implemented and how to oversee and maintain it.
   B. *Efficiency*: Will decision support improve efficiency?
      Consider how to implement decision support in such a way that physician efficiency can be improved. Examples are the use of order sets and therapies based on diagnoses.
   C. *Alerts*: Will you provide alerts?
      There is value to POE even without alerts and reminders. Decision support can help the clinician to make faster and more confident decisions; offering constrained choices is a form of decision support. Alerts can become noise and aggravate users. Drug-drug interactions and drug allergies alerts are useful and fairly easy to obtain.

    D. *Readiness:* Are users ready for decision support linked to POE?
        Consider decision support when assessing readiness for POE.

3. Other considerations concerning value to users:
    A. *Perception of efficiency*: What is in it for the individual physician?
        There needs to be a clinician perception that the software makes the physician more efficient.
    B. *Technology*: Is the proposed technology far enough advanced?
    C. *Benefit*: Are benefits for clinicians easy to see and describe?
        Demonstrable benefits are needed for continued sustained use.
    D. *Education*: Is there a plan for educating as well as training users?
        Educate users about the limitations of POE as well as its capabilities.
    E. *Patient care*: Are there clear benefits for patient care?
        Emphasize that POE is for the good of the patient, not the bill.
    F. *Order sets*: Is there a plan to implement order sets?
        Order sets provide local control as well as perceived benefit.
    G. *Intentions:* Is the system designed so that the clinician easily understands the status of an order?
        Make sure the system does what the user intended.

Consideration #6: Vision/Leadership/People

Effective leadership is needed at several levels in the organization: at the executive level to get funding, at the clinical level to get champions and buy-in, and the project manager level to make practical, effective, and useful decisions. Both the leadership and software need to be flexible enough to be able to make modifications that address identified concerns and problem. These leaders may or may not be the same person. A shared vision needs to underscore work at all levels.

1. Consider the existence of a shared vision:
    A. *Shared vision*: Is there a shared vision regarding the purpose of POE to improve patient care and are there stated goals for fulfilling the purpose? Do physicians regularly play a role in strategic planning and IT decisions?
    B. *Communication*: Are there physician leaders and champions who can effectively communicate the shared vision? Is there an ability at all levels to communicate the vision and articulate tangible objectives?
    C. *Current state*: Are there enough people who feel that the current state is intolerable and that change is needed?

2. Considerations at the highest level in the organization:
    A. *Commitment*: Is there real and visible financial and administrative commitment by leadership at the chief executive officer level?
    B. *Persistence*: Does the leadership exhibit persistence in striving toward ultimate project goals?

C. *Trust*: Is there a sense of trust, credibility, and communication between the administration, implementation team, and clinician users?

D. *Strength*: Is the leader someone who can make a decision on his or her own if strategies for reaching consensus fail?

E. *Function:* Can the leader differentiate between POE functionalities that clinicians want and those that they need for patient care?

F. *Urgency:* Does the leader sense a level of urgency, from either external or internal motivators, about implementing POE such that it is a top priority?

G. *Style:* Does top leadership understand its own leadership style?
Leadership does not need to be charismatic: different leadership styles can be equally effective.

H. *Value clinicians*: Does leadership have faith in, value, and depend on individual clinicians in the organization to make implementation succeed?

3. Considerations at the clinical leadership level:

A. *Ability*: How well do leadership skills fit different phases of implementation?
The clinical information technology leadership must have the ability to use the management style appropriate for needs at different stages of the project:
Pre-implementation: develop a vision, get funding, identify individuals who will be key for the implementation, elicit involvement from these key people, and exhibit other strategic and tactical planning skills.
Implementation: hire staff, deploy staff where and when most needed, keep up the spirit of the staff doing the work, and use other communication, publicity, and personnel management skills.
Post-implementation: establish the maintenance phase, create an environment for ongoing system improvement, and provide management systems for the long term.

B. *Attributes:* How well do leadership attributes fit the task?
This leader must have clinical credibility (be respected by physician peers), be persistent, consistent, accountable, and thick-skinned.

C. *Realism:* How realistic a view does the leader have?
This leader must maintain an organizational anticipation and excitement for the project without overselling it and creating unrealistic expectations.

D. *Educator*: Can the leader educate administrators?
The leader must be good at educating executives and keeping them up to speed.

E. *Feedback:* Will leaders listen to constructive feedback?
The decision makers need to come to user feedback sessions. They need to actively solicit negative as well as positive feedback and respond to it in a timely, demonstrable fashion. Identified problems must be addressed expeditiously.

F. *Golden rule*: Does leadership follow the golden rule?
This person should remember the golden rule when dealing with people: do unto others as the leader would have done to himself or herself.

G. *Teamwork*: Does the leader foster teamwork?
The person should be able to form a great team, foster clinician involvement, and be viewed as an advocate by clinicians.

4. Clinician or physician level champions and project leaders:

A. *Clinical skills*: Are they clinically trained?
At least one leader at this level needs to be a clinical person, but not necessarily a physician. This should be a paid person with visibility who is at least partially excused from competing clinical duties.

B. _Involvement_: How heavily involved in implementation should the clinical champions be?

> The clinician leader(s) may not be at the top of the project leadership hierarchy, but a clinician must be involved at a visible and influential level.

C. _Technical knowledge_: What is the leader's level of technical knowledge?

> At least one of the clinical project leaders must have enough technical knowledge to be able to challenge technical staff and vendors.

D. _Sympathy_: Is the leader sympathetic?

> Leaders need to be charismatic and clinically credible but not necessarily technically trained. It is most important that these individuals be seen as understanding of and sympathetic to the needs of clinicians.

E. _Opinion leaders_: Are there other opinion leaders identified?

> The effective clinician leader will enlist the assistance of both senior credible champions and people perceived to be technical opinion leaders.

F. _Role:_ Is there one identifiable top leader in this group?

> There must be only one clinical project leader: the roles and duties of the clinician leader must be clearly delineated.

Consideration #7: Technical Considerations

1. Strategic level considerations:

A. _Security:_ Is there a security plan?

> Data backup and disaster recovery are significant considerations for mid-level managers and higher. While downtime may be necessary for data backup, it should be minimal to cause the least disruption to clinical workflow.

B. _Customization:_ How customizable is the system?

> Consideration needs to be given to the amount and level of customization allowed by a particular POE system. It should be customizable by an analyst to accommodate variations in workflow and procedures from department to department, unit to unit, and shift to shift.

C. _Replacement:_ What are special considerations for replacing older systems?

> There are special considerations for replacing present POE systems: even sophisticated users may have difficulty adjusting to a new system that may not meet workflow needs as well as the older already customized system.

D. _Data:_ Is there assurance of high-level data quality?

> Accurate and reliable data must be maintained at the highest possible level to ensure clinician acceptance.

E. _Connections:_ Can the POE system interface with existing and planned systems?

> Interfacing capability among systems from different vendors is important. Interface engines or hubs and HL7 protocols need consideration.

F. _Access_: Has a risk analysis been done?

> Security of access and confidentiality issues must be seriously considered, especially with impending enforcement of HIPAA regulations. A risk analysis should be done. Advantages and disadvantages of a single sign-on need consideration.

G. _Remote access_: Is there a need for access from remote locations such as home, nursing home, etc.?

> If this is needed, does the vendor support this capability?

H. _Infrastructure:_ Is the network infrastructure stable?

2. User considerations:

    A. *Escapes*: Are there escape routes for frustrated users?

       Consider establishing escape mechanisms for non-standard, unusual, and complex orders. An example is allowing a section in the interface for plain free-text typing.

    B. *Interface:* How easy to use is the interface?

       There needs to be a consistent user interface which is intuitive, easy to navigate, and efficient. This should include a logical flow from one screen to the next.

    C. *Time*: How time consuming is the system from the user point of view?

       A new POE system will likely tax a clinician's time or be time neutral and, at the least, it needs to be secure, fast, and reliable.

    D. *Clerical tasks*: Will users view it as clerical work?

       Consideration should be given to how the rationale for a new system is communicated so that clinicians do not perceive it as clerical work.

3. Flexibility in task completion:

    A. *Style*: Can the system fit different work styles?

       Because individual work styles differ, consider allowing multiple ways to do the same thing. For example, keyboard equivalents for mouse actions help accommodate differing work styles.

    B. *Customization:* Can users customize some things themselves?

       In addition to allowing systems analysts to modify the system, there should be options for users to customize screens as well.

    C. *Decision support*: Has the addition of decision support been carefully considered?

       Carefully consider decision support to avoid overloading the clinician with messages. One approach to this is to allow tuning of a drug interaction alert to account for the severity of the interaction.

Consideration #8: Management of Project or Program/ Strategies/Processes from Concept to Implementation

1. Highest level considerations:

    A. *Impact*: Have you carefully considered the impact on workflow?

       Too narrow a concept of implementation can derail the project. Realize that re-engineering the order entry process will impact other clinical and ancillary processes.

    B. *Strategy*: Is there an overall strategy for improving care?

       POE needs to be part of a larger strategy to improve patient care.

    C. *Management*: Are people issues carefully considered?

       Sound project management during implementation and ongoing program management post-implementation must be planned with people issues in mind.

    D. *Scope*: Is there a defined scope to the project?

       An emphasis of sound project management is management of the scope of the project.

    E. *Treatment of others*: Do you adhere to the golden rule?

       Remember the golden rule: do unto others as you would have them do unto you.

    F. *Detail*: Are plans detailed enough but not overly so?

       Perfection is the enemy of the good; do not allow exaggerated attention to details to jeopardize the overall implementation goal. Keep it simple; strive for excellence, not perfection.

G. *Goals*: Are there clear and measurable goals?

H. *Communication*: Is there a plan for constant communication with users and implementation staff?

I. *Expectations*: Are expectations reasonable and achievable and do they also maintain excitement for the project?

J. *Relationships*: Have you anticipated significant changes in clinical relationships and planned accordingly?

K. *Ambition*: Have you carefully considered how ambitious your goals can realistically be?
Without disciplined project management, outside influences may force a project implementation pace that is too ambitious.

L. *Consensus*: Can you balance consensus with directive leadership?
Too much emphasis on consensus will slow project implementation; too directive an approach can decrease user involvement.

M. *Downtime:* Have the implications of downtime been considered and procedures been established?

2. Mid-level considerations:

A. *Consultant expertise*: How will consultants be used?
Weigh the need for internal expertise vs. consultants; avoid becoming too dependent on outside consultants by developing internal expertise.

B. *Critical mass*: Will you be ready for the important moment?
Recognize that a critical window of opportunity will arrive where a critical mass of users is using the system. It is vital that the implementation team capitalize on this important moment.

C. *Long-term view*: Can leaders adopt a long-term view?
The administration and information technology team need to take a long-term view of POE implementation.

D. *Early objectives*: Have you identified early wins?
Categorize implementation objectives as easy, hard, or hardest to implement; start where early success is expected. Consider gaining an early victory by making results reporting available early.

E. *Vendor*: How carefully have you chosen a vendor?
Choose an experienced vendor with care. Realize that the implementation's success may depend on cooperation, if not synergy, with the vendor. Expect and depend on a long term relationship with the people in the vendor organization.

F. *Clinicians*:   Is there a plan for involving clinicians?
Allow interested (and encourage uninterested) clinicians from all specialties to participate in product selection and local customization efforts. Turn ardent opponents into ardent supporters; convince the skeptics and curmudgeons.

G. *Users*: Have you considered all clinical users?
Carefully consider that the P in POE can stand for professional, physician, provider, or practitioner. Realize that the POE function will have impacts on organizational workflow beyond order entry alone and that other functions such as results reporting will also be impacted.

3. Lower level considerations:

A. *Workarounds*: Are workarounds available?
Provide simple workarounds for occasional users such as a text entry option, but provide some mechanism by which all users may improve their skills so that dependency on the workaround does not develop.

B. *People*: Are variations in people's ways of doing things being considered?
   People engineering needs to be concurrent with software engineering: realize that workflow redesign and attitude maintenance may be required with POE implementation.

C. *Metrics*: How good are your metrics?
   To do good project management, you must have specific metrics; it is vital to know what is working and what elements must be improved. Have "before" as well as "after" metrics.

4. Roles:

   A. *Accountability*: Who is accountable for what?
      Assign and expect personal accountability for all project tasks.

   B. *Clinician*: Is there clinical involvement at the leadership level?
      There must be a clinician representation within the project leadership. Recognize that providers play a pivotal role in the implementation's ultimate success.

   C. *Champions*: Have champions been identified?
      Clinician champions have to be identified early and supported and relieved of some other duties.

   D. *Leader*: Is there an identified clinical leader?
      There is need for a strong leader with a foot in both the clinical and technical camps, possibly someone with medical informatics training.

5. Localization:

   A. *Modification*: Can you modify the system on site?
      You need to be able to do some modification at the institutional level.

   B. *Customization*: Can users customize some things themselves?
      For a fast win, allow more individual customization.

   C. *Balance*: Have you considered the balance between customization and standardization?
      Consider how local modifications affect vendor upgrade paths. Too many local modifications may make it difficult to implement the vendor upgrade, as the upgrade may not support the modifications. Even if it does support the modifications, each modification will slow down the ability to upgrade.

Consideration #9: Training/Support/Help at the Elbow

Considerations for training and support include the concept of "help at the elbow." This means ongoing, readily available help.

1. Support:

   A. *Help*: Is there a plan to provide help at the elbow?
      Provide help at the elbow: skilled support staff available all the time during implementation and much of the time post-implementation; err on the side of too much user support.

   B. *Training*: Is there a training plan for support staff?
      Train as support staff high quality, patient, thick-skinned support people who have good people and communication skills and can teach others to use the application.

   C. *Translators*: Can support staff act as translators?
      Support staff should be able to translate between the clinical and technical realms.

   D. *Online help*: Are there provisions for online help?
      Also provide different mechanisms for help such as online help in addition to on-site help.

E. *Help Desk:* Does the Help Desk operate 24 x 7? Is it staffed by experienced technical support personnel? Are the processes and tools mature?

2. Training methods:
    A. *Training*: Will users train users?
    During implementation, consider using successful users to train the next set of users.
    B. *Tools*: Will multiple training methods be used?
    Provide multiple learning tools and methods, including computer-based training.
    C. *Plan*: Is there an initial plan?
    Plan to provide sufficient initial training, erring on the side of too much training.
    D. *Updates*: Will there be updates?
    Consider providing ongoing updates that also go back and reiterate prior information.
    E. *Monitoring*: Is there provision for monitoring proficiency?
    Consider monitoring proficiency and having continuous retraining to make sure that physicians are using systems effectively.

Consideration #10: Learning/Evaluation/Improvement

POE implementation is an ongoing effort that benefits from continuous improvement. It is important that mechanisms for feedback and modification of the system be in place.

1. Higher level considerations:
    A. *Problems*: How will problems be addressed?
    Consider carefully planning a process for problem identification and problem resolution involving the users.
    B. *Feedback*: What is the formal evaluation plan?
    As formal evaluation takes place, feed results of the evaluation back to the users so that they can gauge responsiveness.
    C. *Testing*: How will you test the system?
    Think about how you test whether it is good enough to go.
    D. *Continuous improvement*: How will you continuously improve the system?
    Understand that you are never done: continuous improvement is needed.
    E. *Learning*: How will your organization learn?
    Be a learning organization: learn from evaluations.
    F. *Revisiting*: Is there a plan to revisit decisions?
    Revisit strategic decisions on a regular basis.
    G. *Continued training:* Is there provision for regular training sessions (e.g., brown bag lunches)?

2. Strategies:
    A. *Response*: Is there a process for responding to problems?
    Provide a quick response to system flaws.
    B. *Escapes*: Is there an escape mechanism?
    Provide an escape mechanism such as free text entry: it can be a great source of feedback, allowing you to see how to improve the system.
    C. *Test*: How will the system be tested?

Have moonlighting house staff test the system. Have adequate integrated testing.

D. *Pilot*: How will pilots be conducted?

Pilot software in small groups and improve it if necessary before rollout.

E. *Mentoring*: Is there a mentoring system?

Set in place a buddy or mentoring system so that clinicians can share their expertise in developing order sets and templates and exchange tips.

Appendix 1: Summary of POE Issues Still Under Debate

Consider:

1. Is decision support a crucial part of POE?

Although decision support is considered one of the most positive contributions of POE, too many alerts can aggravate providers and provide "noise." How many alerts are appropriate to have a positive effect on behavior? How many alerts will users tolerate before beginning to ignore them? How important is it to link decision support to evidence from the literature?

2. How specific should goals be?

Good project management calls for specific metrics, but flexibility might be hampered by control that is too tight. Goals should be actionable but results do not need to reach scientific "significance."

3. Should you make it mandatory?

Although requiring usage guarantees success by some measures, mandates can be subverted even in situations like teaching hospitals.

4. Are escape mechanisms for avoiding POE necessary?

Even though allowing free text entry of orders and other workarounds makes providers happy, in some ways, it defeats the purpose of structured order entry systems. Consider the situation.

5. Do you give the clinicians what they say they want, or what you think they need?

If you merely ask them what they want, you may either limit the vision of what is possible or, on the other hand, you may create unrealistic expectations. Filter what you are told by considering the practicalities of technical implementation and cost.

6. What happens when legacy systems need to be replaced?

Often the new system will be an improvement in many respects but will lack some of the functionality of the old already somewhat customized old system.

7. Can you implement POE in isolation or does it need to be part of some other system?

Although POE is integrally related to results reporting and documentation, there is debate about the order in which they should be implemented.

8. What are the easy wins for a new installation?

Although medication ordering seems to have the greatest payoff in terms of error reduction, it is more difficult to implement than laboratory, radiology, and consult ordering.

9. What part of POE should be under local modification and control?

The vendor supplies standard software so that it can be easily updated, but local ways of doing things may necessitate modification.

Appendix 2: Participants at the 2001 Menucha Conference

Jos Aarts, M.S., Ph.D. candidate

Jos is an assistant professor of social medical sciences at the Department of Health Policy and Management at Erasmus University Rotterdam in the Netherlands. He is currently pursuing a Ph.D. on the successful design and implementation of clinical information systems in healthcare. Jos is also chairman of European Federation for Medical Informatics Working Group–9: 'Human and Organizational Issues of Medical Informatics'. He has published papers on educational and organizational issues in healthcare. In addition, Jos brings a valuable international perspective to this conference.

Jim Carpenter, R.Ph., M.S. candidate

Jim is a pharmacist with Legacy Health Systems, Good Samaritan Hospital in Portland, Oregon and a graduate of the Oregon Health & Science University's Medical Informatics Masters program. He presented a paper at AMIA 2001 titled: What's So Special About Medications: A Pharmacist's Observations from the POE Study. He has also participated in the POE study as a member of POET and has contributed an invaluable pharmacy perspective to this study.

Homer Chin, M.D.

Homer is the Medical Director for Clinical Information Systems for Kaiser Permanente Northwest. He has been responsible for overseeing the clinical information systems development for the Northwest region. Kaiser's comprehensive clinical information system (EpiCare) won the Davies Award for 1998 and allows clinicians to electronically document many of the information processes related to outpatient care. Homer is a board certified internist with formal training in Medical Informatics. He brings extensive expertise in outpatient implementation issues.

Brian Churchill, R.N. M.S., Ph.D candidate

Brian is the project lead of POE implementation at PeaceHealth Inc.'s five Pacific Northwest hospitals. He has been an R.N. for 24 years with clinical experience in the ICU. He is currently completing his Ph.D. in Public Health and Healthcare Informatics at Oregon State University. Brian has worked with clinical computer systems for nearly 15 years and has spent the last 7 years working on the implementation of the IDX product LastWord. Brian's active and leading involvement in a POE implementation will bring a current and unique perspective to this panel.

Marilyn Davis, R.N.

Marilyn is the Manager of Clinical Systems for IBM Global Services at El Camino Hospital in Mountain View, CA. She was a pivotal player in the first hospital-wide computerized medical information system (MIS) implementation in

the world at El Camino. Marilyn continues to be intimately involved with the success and maintenance of MIS. She has been credited by her colleagues as one of the key people responsible for the overall success of the system. Marilyn represents a critical perspective with her vast hands-on implementation experience.

John Dulcey, M.D.

John is an internist with 16 years clinical experience in primary care and 12 years experience using computerized clinical decision support systems at the point of care. He has worked for Shared Medical Systems (which became Siemens) developing and implementing clinical decision support and computer order entry systems. Presently, he is working for the ACP-ASIM as an independent consultant in the Medical Informatics Department and for Micromedex writing clinical rules in Arden Syntax. John's combined clinical and technical background brings a valuable broad perspective to this conference.

Dick Gibson, M.D., Ph.D.

Dick is Chief Medical Information Officer for the Providence Health System, which spans across a four-state area: Alaska, Washington, Oregon, and Southern California. He is an emergency physician and family physician who also trained in Medical Informatics in Salt Lake City, Utah. He moved to Portland, Oregon six years ago to take his present position and has been instrumental in implementing a variety of clinical information systems for Providence. He is presently involved in the planning of a POE implementation. Dick brings valuable clinical informatics and implementation expertise to this conference.

Janet Greenman

Janet works for IDX Corporation as Lead Software Designer (Order Communications). She has significant experience with the IDX product LastWord and has been involved in a number of POE implementations involving LastWord. Janet brings a unique and important vendor perspective to this conference.

Karen Hughart, R.N., M.S.N.

Karen is Director of Systems Support Services at Vanderbilt University Medical Center in Nashville, Tennessee. She was instrumental in the development and implementation of their home-grown Clinician Order Entry system called "Wiz Order". Her 15-member department is responsible for training and user support for 6 different clinical systems, including Clinician Order Entry (Wiz Order), Electronic Patient Record (MARS/Starchart) and a commercial ADT system. After an unsuccessful implementation of a proprietary system in 1992, her team responded with renewed efforts and a goal to develop a system that clinicians can actually use. They have now successfully implemented Wiz Order on all but two inpatient units and have approximately 67% of total orders entered by physicians. Karen's perspective will deliver valuable first-hand experience with both implementation failure and success.

Gil Kuperman, M.D., Ph.D.

Gil is the Director of Clinical Information System R&D at Partners HealthCare System in Eastern Massachusetts (including the widely recognized Brigham and Women's Hospital). In that capacity, he helps set the clinical systems direction for Partners. His evaluation work has included studying the epidemiology of adverse events and the ability of information systems to reduce the frequency of these events. The order entry application at Brigham and Women's Hospital has been recognized as an important example of how information systems can improve care. Gil will contribute valuable insight in knowledge-based systems, evaluation, and order entry applications.

W. Paul Nichol, M.D.

Paul is a general internist, former Director of Primary Care Programs and currently the Associate Chief Medical Officer for Clinical Information Management with the VA Puget Sound Health Care System (VAPSHCS). He has been with the VA for over 20 years and during this time has been involved in many aspects of the evolution of the VA's clinical information system, including the Computerized Patient Record System (CPRS). He has also worked closely with fellow Menucha participant, Tom Payne, under whose leadership the VAPSHCS was awarded the Nicholas C. Davies award for its implementation of CPRS. He brings both clinical and administrative perspectives to this conference, and is particularly interested in the integration of clinical information technology into health care systems and the lessons that can be learned from the VA's extensive experience in this area.

Marc Overhage, M.D., Ph.D.

Marc is Associate Professor of Medicine at Indiana University School of Medicine and Investigator at the Regenstrief Institute for Health Care. His research focuses on the application of clinical decision support at the point of care. He studies the development and use of patient reminders and suggested orders on the process and outcomes of care. His widely published expertise on the effects of computerized order entry and decision support will be a significant asset to this panel.

Tom Payne, MD, FACP

Tom is presently Medical Director of Medical Center Information Systems and Clinical Associate Professor at the University of Washington. He has won accolades for his leading effort as Associate Chief Medical Officer for Clinical Information Management at the VA Puget Sound Health Care System during the implementation of their computerized patient record system (CPRS). VA Puget Sound received the 2000 Davies Award for its implementation of CPRS and related software. He believes that many of the challenges of designing and implementing these systems involve changing the work patterns of health care professionals. Tom brings extensive expertise and experience in implementation issues as they relate to inpatient and outpatient care.

POE Research Team - POET

POET is led by Principal Investigator, Joan Ash Ph.D. At the time of this conference it consisted of a team of six researchers and a facilitator affiliated with Oregon Health & Science University (OHSU) and one each from the University of Virginia and VA Puget Sound. POET members include representatives from a variety of health care and related disciplines. The objectives of POET are to gather evidence regarding POE implementation success and failure factors, to evaluate, interpret and validate that evidence and, finally, to disseminate a document based on these findings. The methods of POET include cross-site comparisons of data gathering using a variety of qualitative and quantitative techniques. The team's paper "Multiple Perspectives on Physician Order Entry" won the first annual AMIA Diana Forsythe Award in 2000.

Members of the POET served as facilitators, organizers and recorders for the conference, thus allowing the expert panel to focus on the topic at hand.

POET members at the conference included Joan Ash Ph.D., Lara Fournier B.S., Paul Gorman M.D., William Hersh M.D., Mary Lavelle M.S.N., Jason Lyman M.D., and Zoë Stavri Ph.D.