Information Technology in the Healthcare System of the Future

A Brief History of Cybermedicine

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Division of Clinical Computing
Harvard Medical School
Beth Israel Deaconess Medical Center
Clinical Use

- Assists with requests (order entry)
Clinical Use

- Assists with requests (order entry)
- Provides clinical information upon request
Clinical Use

- Assists with requests (order entry)
- Provides clinical information upon request
- Gives support with decisions
Clinical Use

- Gives support with decisions
  - Advice and consultation
### Free Water Deficit or Sodium Deficit

**Free H₂O Deficit**

\[
\text{Free H₂O Deficit} = \text{TBW} \times (\text{Desired Na/Measured Na})
\]

**NA Deficit**

\[
\text{NA Deficit} = \text{TBW} \times (\text{Desired Na} - \text{Measured Na})
\]

**TBW**

\[
\text{TBW} = \text{WGT} \times [0.6 \text{ (Male)} \text{ or } 0.5 \text{ (Female)}]
\]

<table>
<thead>
<tr>
<th>Weight = 57 lbs or 25.86 kg</th>
<th>Male or Female? = Female</th>
<th>Current Serum Na = 160 mEq/L</th>
<th>Desired Na = 140 mEq/L</th>
</tr>
</thead>
</table>

**Free H₂O Deficit**

\[
\text{Free H₂O Deficit} = 3.6 \text{ Liters}
\]

**Notes:**

1. Correct about half of total deficit in first 24 hours
2. Correction rate should be 0.5 mEq/L/hr (12 mEq/day)
3. Recompile deficit frequently
4. Add insensible fluid losses to computed values

**Look at References?** N
Clinical Use

- Gives support with decisions
  - Advice and consultation
  - Bibliographic retrieval (PaperChase)
Clinical Use

- Gives support with decisions
  - Advice and consultation
  - Bibliographic retrieval (PaperChase)
  - Searching the clinical database

Please enter the year or range of years (e.g. 85-90) you are going to search.

Year(s): 1999
<table>
<thead>
<tr>
<th>Choice</th>
<th>Values</th>
<th>Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>&lt;= 0.9</td>
<td>5145</td>
</tr>
<tr>
<td>2)</td>
<td>1.0 - 9.9</td>
<td>1</td>
</tr>
<tr>
<td>3)</td>
<td>10.0 - 17.9</td>
<td>91</td>
</tr>
<tr>
<td>4)</td>
<td>18.0 - 19.9</td>
<td>261</td>
</tr>
<tr>
<td>5)</td>
<td>20.0 - 29.9</td>
<td>2723</td>
</tr>
<tr>
<td>6)</td>
<td>30.0 - 39.9</td>
<td>5614</td>
</tr>
<tr>
<td>7)</td>
<td>40.0 - 49.9</td>
<td>3427</td>
</tr>
<tr>
<td>8)</td>
<td>50.0 - 59.9</td>
<td>3602</td>
</tr>
<tr>
<td>9)</td>
<td>60.0 - 64.9</td>
<td>1847</td>
</tr>
<tr>
<td>A)</td>
<td>65.0 - 69.9</td>
<td>2009</td>
</tr>
<tr>
<td>B)</td>
<td>70.0 - 79.9</td>
<td>4278</td>
</tr>
<tr>
<td>C)</td>
<td>80.0 - 84.9</td>
<td>3961</td>
</tr>
</tbody>
</table>

Choices:

1) <= 0.9
2) 1.0 - 9.9
3) 10.0 - 17.9
4) 18.0 - 19.9
5) 20.0 - 29.9
6) 30.0 - 39.9
7) 40.0 - 49.9
8) 50.0 - 59.9
9) 60.0 - 64.9
A) 65.0 - 69.9
B) 70.0 - 79.9
C) 80.0 - 84.9
Clinical Use

- Gives support with decisions
  - Advice and consultation
  - Bibliographic retrieval (PaperChase)
  - Searching the clinical database
  - Alerts and reminders
Clinical Use

- Assists with requests (order entry)
- Provides clinical information upon request
- Gives support with decisions
- Assists with communication
Assists with requests (order entry)
Provides clinical information upon request
Gives support with decisions
Assists with communication
Assists with clinical practice
Clinician’s Option:

1. Admissions or Labs by Service, Firm or Team
2. Adverse Drug Reaction Reporting
3. Cross Coverage Options
4. Incomplete Medical Records
5. Personal Patient Lookup
6. Resident/Medical Student Log
7. View Clinician’s Hospitalized Patients
8. Confidential Counseling for House Staff
House Staff Support and Consultation

From time to time a House Officer or Fellow may have a personal matter that motivates him or her to seek professional counseling.

Psychiatric consultation and referral that is confidential and independent of administrative reporting is readily available.

Please feel free to call or page any of the psychiatrists listed on the next screen.

Your call will remain confidential.

Choose option(s), or ‘A’ for All:
Clinical Use

- Assists with requests (order entry)
- Provides clinical information upon request
- Gives support with decisions
- Assists with communication
- Assists with clinical practice
- Assists with education
Instructional Programs

Learning by Doing

In the tradition of John Dewey, cybermedicine promotes learning in the context of caring for real patients.
Evaluating Cybermedicine
Use of the system by voluntary users
Beth Israel Deaconess Use of Patient Lookup: Inpatients and Outpatients

Number of Lookups During a Typical Week

- **Inpatient Lookups**
  - 1984: 4,080
  - 1988: 13,229
  - 1992: 21,497
  - 1994: 27,023
  - 1998: 35,229

- **Outpatient Lookups**
  - 1984: 12,688
  - 1988: 27,707
  - 1992: 34,614
  - 1994: 30,264
  - 1998: 34,614
### Use of Patient Lookup According to Type of Inquiry at Beth Israel Deaconess, April 27-May 3, 1998

<table>
<thead>
<tr>
<th>Category</th>
<th>Inpatients</th>
<th>Outpatients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Labs – MostRecent Results</td>
<td>17,018</td>
<td>10,044</td>
<td>27,062</td>
</tr>
<tr>
<td>Demographics</td>
<td>3,277</td>
<td>9,420</td>
<td>12,697</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4,310</td>
<td>4,793</td>
<td>9,103</td>
</tr>
<tr>
<td>Radiology</td>
<td>2,681</td>
<td>6,028</td>
<td>8,709</td>
</tr>
<tr>
<td>Narrative Notes</td>
<td>1,163</td>
<td>3,893</td>
<td>5,056</td>
</tr>
<tr>
<td>Cardiology</td>
<td>1,548</td>
<td>2,697</td>
<td>4,245</td>
</tr>
<tr>
<td>Pathology</td>
<td>528</td>
<td>3,562</td>
<td>4,090</td>
</tr>
<tr>
<td>Microbiology</td>
<td>1,990</td>
<td>1,001</td>
<td>2,991</td>
</tr>
<tr>
<td>Hematology</td>
<td>1,014</td>
<td>1,786</td>
<td>2,800</td>
</tr>
<tr>
<td>Blood Bank</td>
<td>743</td>
<td>439</td>
<td>1,182</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>753</td>
<td>282</td>
<td>1,035</td>
</tr>
<tr>
<td>Neurophysiology</td>
<td>96</td>
<td>251</td>
<td>347</td>
</tr>
<tr>
<td>Pulmonary Function</td>
<td>108</td>
<td>187</td>
<td>295</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35,229</strong></td>
<td><strong>44,383</strong></td>
<td><strong>79,612</strong></td>
</tr>
</tbody>
</table>
Use of Patient Lookup

- Residents
- Students
- Fellows
- Staff Doctors
- Nurses
- Others

Lookups Per User Per Week

- Residents have the highest use of patient lookup, with around 45 lookups per user per week.
- Fellows follow, with approximately 25 lookups per user per week.
- Staff Doctors and Students have around 20 lookups per user per week.
- Nurses and Others have the lowest use, with about 10 lookups per user per week.

Lookups Per User Per Week range from 0 to 50.
- Use of the system by voluntary users
- Attitude toward the system
## Effect on Work

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
<th>Speed</th>
<th>Ease</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely worse</td>
<td>4</td>
<td>15</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Probably worse</td>
<td>13</td>
<td>24</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>No difference</td>
<td>88</td>
<td>54</td>
<td>48</td>
<td>147</td>
</tr>
<tr>
<td>Probably better</td>
<td>204</td>
<td>192</td>
<td>182</td>
<td>190</td>
</tr>
<tr>
<td>Definitely better</td>
<td>236</td>
<td>260</td>
<td>294</td>
<td>195</td>
</tr>
<tr>
<td>Total</td>
<td>545</td>
<td>545</td>
<td>545</td>
<td>545</td>
</tr>
</tbody>
</table>
- Use of the system by voluntary users
- Attitude toward the system
- Educational power of the system
- Use of the system by voluntary users
- Attitude toward the system
- Educational power of the system
- Effect of the system on quality of care
Indirect Evidence
Indirect Evidence

Computing that offers information requested and advice on how to use it, with more ease, speed reliability, and accuracy than otherwise possible, is improving the quality of care.
Direct Evidence
Direct Evidence

The time to act on important clinical events is significantly reduced when the physician is reminded or alerted by the computer of the need to act.
Clinician Response Time

- Reminders
- Alerts

(days)

Intervention
Control
Direct Evidence


Physicians at Brigham and Women’s Hospital, who now routinely use the computing system to request laboratory tests and prescribe medications...
Direct Evidence

...make significantly fewer errors.

(serious errors in medications have been reduced by 55%)
- Use of the system by voluntary users
- Attitude toward the system
- Educational power of the system
- Effect of the system on quality of care
- Cost of the system
- Use of the system by voluntary users
- Attitude toward the system
- Educational power of the system
- Effect of the system on quality of care
- Cost of the system
- Effect of system on hospital finances
Time needed to collect bills in relation to use of computing programs at Beth Israel Hospital.
Time needed to collect bills in relation to use of computing programs at Brigham & Women’s Hospital

<table>
<thead>
<tr>
<th>FISCAL YEAR</th>
<th>Registration Programs</th>
<th>Financial Programs</th>
<th>Clinical Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cybermedicine for the Clinician

Cybermedicine programs such as those in

Kaiser Permanente, University
Cybermedicine programs such as those in the Kaiser Permanente, University of Missouri, LDS, Regenstrief Institute, Columbia’s Presbyterian, Duke, and Vanderbilt, as well as BU, Tufts, MGH, Brigham and Women’s and BIDMC hospitals, have proved to be highly useful in the practice of medicine.
Cybermedicine for the Patient

Early experience
Fig. 6.1 The LINC (Laboratory Instrument Computer) in use in a medical interview in 1968. (Reproduced from Slack WV, Van Cura LJ. “Patient reaction to computer-based medical interviewing.” Computers and Biomedical Research 1 (1968): 527-531. Courtesy Elsevier, Inc., http://www.sciencedirect.com. Used with permission.)
Cybermedicine for the Patient

Long-Standing Problems:
Cybermedicine for the Patient

Long-Standing Problems:

1. Time limitations beyond the doctor's control
   > incomplete histories
   > insufficient counseling
Cybermedicine for the Patient

Long-Standing Problems:

1. Time limitations beyond the doctor’s control
   > incomplete histories
   > insufficient counseling

2. Handwritten record
   > laborious
   > incomplete and illegible
Cybermedicine for the Patient

More Recent Problems:
More Recent Problems:

3. Doctors are pressured by increasingly empowered patients who with good reason want and expect more personal attention.
Cybermedicine for the Patient

More Recent Problems:

3. Doctors are pressured by increasingly empowered patients who *with good reason* want and expect more personal attention.

4. Doctors are pressured by financially-pressured administrators, who *with questionable reason* schedule more and more patients in shorter and shorter intervals.
Cybermedicine for the Patient

Patient Power
Opportunity Afforded by the Computer
First Patient
First Study
Shared Record
Comparison Between Physicians and Computer when Interviewing Patients About Problems with Allergies

<table>
<thead>
<tr>
<th>Problems</th>
<th>Problems Detected by Both Physician &amp; Computer</th>
<th>Problems Detected by Physician Only</th>
<th>Problems Detected by Computer Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urticaria</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Asthma</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Drug allergy</td>
<td>7</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Slack, W.V. et al., New England Journal of Medicine, 1966
Early results led to further study and efforts to enhance rapport and yield further control.
Yielding Control
Yielding Control

- requesting permission to proceed
Yielding Control

- requesting permission to proceed
- providing sufficient information
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
- offering alternatives
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
- offering alternatives
- respecting the right to decide
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
- offering alternatives
- respecting the right to decide
- respecting the right not to decide
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
- offering alternatives
- respecting the right to decide
- respecting the right not to decide
- helping with uncertainty
Yielding Control

- requesting permission to proceed
- providing sufficient information
- respecting priorities
- offering alternatives
- respecting the right to decide
- respecting the right not to decide
- helping with uncertainty
- respecting reluctance to respond
Patient-Computer Dialogue

A Computer-Based Health Care Interview for Hospital Personnel
The Seven Health-Related Sections of the Interview

- General medical history
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
- Exercise patterns
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
- Exercise patterns
- Habits
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
- Exercise patterns
- Habits
- Safety
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
- Exercise patterns
- Habits
- Safety
- Environment
The Seven Health-Related Sections of the Interview

- General medical history
- Nutrition history
- Exercise patterns
- Habits
- Safety
- Environment
- Stress
Stress

In the PAST MONTH have you felt sad, discouraged or hopeless?

1. Yes
2. No
3. Maybe
4. Don’t understand
5. Skip it

Answer: 1
Stress

In the PAST MONTH has life sometimes seemed as if it’s not worth living?

1. Yes
2. No
3. Maybe
4. Don’t understand
5. Skip it

Answer: 1
Stress

When life seems like it’s not worth living, it’s often helpful to speak to someone about these feelings.
 Stress

There are several places where you could call at any time to speak in confidence about these feelings.
Stress

Help is available any time day or night through the:
Employee Assistance Program - (617) 123-1234

Samaritans - (617) 222-3131

Or you can always contact the Emergency Room (Ext. 3337)

Please be assured that whatever you say will be kept confidential
Stress

Would you like to discuss this when you visit with your employee nurse?

1. Yes
2. No
3. Maybe
4. Don’t understand
5. Skip it

Answer: 1
Stress

You will be receiving a printed summary of this interview at that visit.

Would it be ok to indicate on your summary that you would like to discuss this issue?

1. Yes
2. No

Answer: 2
Stress

That’s fine, but please feel free to talk about it at your visit.

<ENTER>
Sex Distribution

Males  530
Females  1407
Total  1937
In the past month have you felt sad, discouraged, or hopeless?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>811</td>
<td>(42%)</td>
</tr>
<tr>
<td>No</td>
<td>890</td>
<td>(46%)</td>
</tr>
<tr>
<td>Maybe</td>
<td>190</td>
<td>(10%)</td>
</tr>
<tr>
<td>Don’t understand</td>
<td>12</td>
<td>(1%)</td>
</tr>
<tr>
<td>Skip it</td>
<td>34</td>
<td>(2%)</td>
</tr>
</tbody>
</table>
In the past month has life sometimes seemed like it’s not worth living?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>106</td>
<td>(6%)</td>
</tr>
<tr>
<td>No</td>
<td>812</td>
<td>(42%)</td>
</tr>
<tr>
<td>Maybe</td>
<td>57</td>
<td>(3%)</td>
</tr>
<tr>
<td>Don’t understand</td>
<td>3</td>
<td>(0%)</td>
</tr>
<tr>
<td>Skip it</td>
<td>33</td>
<td>(2%)</td>
</tr>
<tr>
<td>Health-Related Program Requests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness Center</td>
<td>1385</td>
<td></td>
</tr>
<tr>
<td>Stress Reduction</td>
<td>724</td>
<td></td>
</tr>
<tr>
<td>Time Management</td>
<td>457</td>
<td></td>
</tr>
<tr>
<td>Low-Back Protection</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Smoking Cessation</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2952</strong></td>
<td></td>
</tr>
</tbody>
</table>
Concerns about the computer as a negative, depersonalizing influence would prove unfounded.
Preference
Computer vs. Doctor or Nurse

- Doctor or nurse: 39%
- Computer: 46%
- No preference: 3%
- Skip it: 12%
Did the computer sometimes ask more than you wanted to tell?

- Yes: 16%
- No: 78%
- Uncertain: 6%

Did you sometimes want to tell the computer more than it asked?

- Yes: 50%
- No: 42%
- Uncertain: 8%
Revelation in the Absence of a Face-to-Face Encounter
**Improved Alcohol Screening**

*Interview self-reported vs. clinician-documentated alcohol use were compared for 100 initial visits*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer interview, but not doctor’s note</td>
<td>14</td>
</tr>
<tr>
<td>Doctor’s note, but not computer interview</td>
<td>0</td>
</tr>
<tr>
<td>Computer interview and doctor’s note</td>
<td>80</td>
</tr>
<tr>
<td>Computer interview, but ? doctor’s note</td>
<td>6</td>
</tr>
</tbody>
</table>
Discrepant Case #1

- **MD’s note**
  - “uses alcohol socially”

- **Computer’s note**
  - “frequency 2-3/week, 3-4/day, 6+ drinks monthly, blackouts monthly”
Discrepant Case #2

- **MD’s note**
  - “occasional ETOH”

- **Computer’s note**
  - “had drinking problem in the past, abstinent now”
Revelation in the Absence of a Face-to-Face Encounter

Computer-based interview of potential blood donors elicited more HIV-related factors in the health histories than the standard questionnaire and interpersonal interviewing methods currently in use at the Red Cross.
Computer-Based Screening for HIV Risk

Locke SE, et al. JAMA, 1992
Cybermedicine for the Patient

Printed summaries developed with the patient as well as the doctor in mind.
Cybermedicine for the Patient

Dialogue between patient and doctor
the mainstay of clinical medicine,
but with problems

Patient-computer dialogue one
possible solution
Cybermedicine for the Patient

The Internet as a mediator of patient-computer dialogue
Cybermedicine for the Patient

The *patient* as a health-care resource
Patient-Computer Dialogue

The Computer as a Patient’s Assistant
Patient-Computer Dialogue

- Urinary Tract Infection
Patient-Computer Dialogue

- Teaching program for use of the computer
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
- Urine culture
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
- Urine culture
- Discussion of therapy
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
- Urine culture
- Discussion of therapy
- Patient’s Choice about treatment
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
- Urine culture
- Discussion of therapy
- Patient’s Choice about treatment
- Therapy
Patient-Computer Dialogue

- Teaching program for use of the computer
- General medical history, conditions for referral, and referral if indicated
- History referable to urinary tract infection
- Urine culture
- Discussion of therapy
- Patient’s Choice about treatment
- Therapy
- Return Visit
Patient-Computer Dialogue

After mastery of the keyboard, the program offers a bit of reinforcement, e.g. “You have a nice touch with the keys.”
If it is OK with you, we would now like to ask a few questions about urinary symptoms...
Patient-Computer Dialogue

Are you bothered by pain or burning when you urinate?

1. Yes
2. No
3. Maybe (don’t know)
4. Don’t understand
5. Skip it
Patient-Computer Dialogue

Of these: 1. How well does the medicine work?
2. How much does it cost?
3. How safe is it?
4. How often must it be taken?
5. Is it a pill or an injection?
6. Can I get well without it?

Which is most important to you: 1
Patient-Computer Dialogue

Of these: 1. How well does the medicine work?
2. How much does it cost?
3. How safe is it?
4. How often must it be taken?
5. Is it a pill or an injection?
6. Can I get well without it?

Which is most important to you: 1
and which is least important: 5
Patient-Computer Dialogue

You indicated that knowing how well sulfa works is perhaps most important to you...

Let’s consider this first.
Before deciding about sulfa, would you like to go over anything again?

1. Yes
2. No
3. Maybe (don’t know)
4. Don’t understand
5. Skip it
Very well then... would you like to

1. Take sulfa
2. Take nothing
3. Consider another medicine
4. Uncertain (can’t decide)
It seems that you took some extra time with your answer. Does this mean that you’ve been:

1. Thinking it over and feel you’ve made the right choice?

2. Trying to get things clear but aren’t sure about your choice?
Patient-Computer Dialogue

We hope it’s OK then, to ask again what is your decision?

1. Uncertain (can’t decide)
2. Consider another medicine
3. Take nothing
4. Take sulfa
Results (46 Patients)

10 referred by the program for further evaluation

35 decided to take sulfisoxazole

1 decided to wait for culture, which was negative
Patients’ Reaction to the Computer

How has it been to decide for yourself about taking sulfa?

A good thing 30
Better left up to someone else 1
No preference either way 3
Not sure 2
Patients’ Reaction to the Computer

Was the computer considerate?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>34</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Maybe</td>
<td>0</td>
</tr>
<tr>
<td>Don’t understand</td>
<td>0</td>
</tr>
<tr>
<td>Skip it</td>
<td>2</td>
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</tbody>
</table>
Cybermedicine for the Patient

More research is needed.
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Cartoon about computers replacing psychotherapists.
Patient-Computer Dialogue

Patient Site (a secure Web Site)
Patient-Computer Dialogue

Patient Site (a secure Web Site)

view results of diagnostic studies
Patient-Computer Dialogue

Patient Site (a secure Web Site)

- view results of diagnostic studies
- view medications
Patient-Computer Dialogue

Patient Site (a secure Web Site)

- view results of diagnostic studies
- view medications
- request prescriptions
Patient-Computer Dialogue

Patient Site (a secure Web Site)

- view results of diagnostic studies
- view medications
- request prescriptions
- request appointments and referrals
Patient Site (a secure Web Site)

- view results of diagnostic studies
- view medications
- request prescriptions
- request appointments and referrals
- communicate with doctors & staff
Cybermedicine for both Patient and Clinician

The ClinHaven, and a hope for the future
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Cartoon about stereotypically illegible doctor handwriting.