

# The John Marshall Journal of Information Technology & Privacy Law

---

Volume 19

Issue 4 *Journal of Computer & Information Law* -  
Summer 2001

Article 4


---

Summer 2001

## Cybermedicine: How Computing Empowers Doctors and Patients for Better Health Care, 19 J. Marshall J. Computer & Info. L. 589 (2001)

William B. Powers

Follow this and additional works at: <http://repository.jmls.edu/jitpl>

 Part of the [Computer Law Commons](#), [Health Law and Policy Commons](#), [Internet Law Commons](#), [Medical Jurisprudence Commons](#), [Privacy Law Commons](#), and the [Science and Technology Law Commons](#)

---

### Recommended Citation

William B. Powers, Cybermedicine: How Computing Empowers Doctors and Patients for Better Health Care, 19 J. Marshall J. Computer & Info. L. 589 (2001)

<http://repository.jmls.edu/jitpl/vol19/iss4/4>

This Book Review is brought to you for free and open access by The John Marshall Institutional Repository. It has been accepted for inclusion in The John Marshall Journal of Information Technology & Privacy Law by an authorized administrator of The John Marshall Institutional Repository.

## BOOK REVIEW

# CYBERMEDICINE: HOW COMPUTING EMPOWERS DOCTORS AND PATIENTS FOR BETTER HEALTH CARE

WILLIAM B. POWERS†

### INTRODUCTION

In *Cybermedicine: How Computing Empowers Doctors and Patients for Better Health Care*,<sup>1</sup> Dr. Warner V. Slack, professor of medicine and psychiatry at Harvard Medical School and co-president of the Center for Clinical Computing and co-director of the Division for Clinical Computing at Beth Israel Deaconess Medical Center, takes the reader on an interesting journey from the advent of experimental computer usage in the early 1960s, to comprehensive, hospital-wide computing systems in the 1980s, and into the future. Dr. Slack, who has been involved with computers in medicine for some thirty-five years, demonstrates how the use of computers can empower both doctor and patient. Doctors can be em-

---

† Associate Dean for Admission & Student Affairs, The John Marshall Law School. Prior to joining the John Marshall administration, Dean Powers was the assistant consultant on legal education to the American Bar Association where he developed research projects, administered the student complaint process, oversaw publications of the office of the consultant, provided staff support for the council and various section committees, consulted with legal educators about accreditation matters and edited *Syllabus*. He received a B.A. degree with distinction from Purdue University and a J.D. Degree from Indiana University, where he was a member of the moot court society and served on the board of editors of *Indiana Law Review*. His publications include "Karcher v. Daggett: The Supreme Court Draws the Line on Malapportionment and Gerrymandering in Congressional Redistricting," 17 *Indiana Law Review* 651 [1984]; *A Study of Contemporary Law School Curricula* [1987]; *Promotion and Tenure Policies of ABA Approved Law Schools* [1990]; *Law School Facilities Reference Book* [1993]; *Research Institutes of ABA Approved Law Schools* [1996]; and a number of articles in *Syllabus*, the ABA Section of Legal Education and Admissions to the Bar's quarterly news publication.

1. Warner V. Slack, *Cybermedicine: How Computing Empowers Doctors and Patients for Better Health Care* (2d ed., Jossey-Bass 2001) (forward by Ralph Nader).

powered by having more efficient tools with which to practice medicine; patients can be empowered by a greater ability to make informed medical decisions. The book is divided into three sections: Cybermedicine and the Patient,<sup>2</sup> Cybermedicine and the Doctor,<sup>3</sup> and Modern Times, in which Dr. Slack looks at the future of cybermedicine.<sup>4</sup>

## CYBERMEDICINE AND THE PATIENT

### PROVIDING INFORMATION TO PATIENTS

According to Dr. Slack, the largest and most "neglected health care resource is the patient or prospective patient."<sup>5</sup> He asserts that people could manage a number of routine medical problems if they have enough information to decide when to deal with a medical problem themselves and when to turn to a physician.<sup>6</sup> Though face-to-face communication between doctor and patient has been the "mainstay" of medicine, individual attention is not always possible and can be very expensive.<sup>7</sup> Furthermore, Dr. Slack notes that doctors are under pressure from patients who want more and more individualized attention and from bureaucrats who schedule more and more patients at shorter intervals.<sup>8</sup> He identifies a great need for additional ways to supplement and enhance the doctor-patient dialogue.<sup>9</sup>

One form of communication between physician and patient, notes Dr. Slack, is the printed word.<sup>10</sup> The medical profession, however, was slow to adopt the printed word: "patients were to be kept in the dark."<sup>11</sup> Then came Dr. Spock's 1946 book on childcare.<sup>12</sup> The book was an enormous success, with sales second only to the Bible.<sup>13</sup> Now self-help publications on medical topics abound.<sup>14</sup> Dr. Slack views these publications as helpful but inadequate because the published form is "one-way communication," with little or no opportunity to for the reader/patient to interact with the author/physician.<sup>15</sup>

---

2. *Id.* at 3-83.

3. *Id.* at 87-159.

4. *Id.* at 163-206.

5. *Id.* at 3.

6. *Id.* at 4.

7. *Id.*

8. *Id.* at 4-5.

9. *Id.* at 5.

10. *Id.* at 5-7.

11. *Id.* at 6.

12. *Id.* at 7; see generally Benjamin Spock, *Dr. Spock's Baby and Child Care* (7th ed., Pocket Bks. 1998).

13. Slack, *supra* n. 1, at 7.

14. *Id.*

15. *Id.*

After the printed word, came attempts to provide medical information via the airwaves.<sup>16</sup> First there was radio and then television health programs, but these programs still had the problem of primarily one-way communication.<sup>17</sup> Dr. Slack notes that in some radio and shows, people were able to call in and ask questions,<sup>18</sup> but the shows were mainly programs of general interest that did not provide solutions to the particular needs of individual patients.<sup>19</sup> This may be an overgeneralization by Dr. Slack. A number of call-in programs have enabled people to ask very specific questions of physicians.<sup>20</sup> The inadequacies of this form of communication though were the tiny percentage of the population that could get through to a physician in this manner and the inability of the individual to follow-up with the physician in any meaningful way.<sup>21</sup>

Continuing the history of doctor/patient communication methods, Dr. Slack asserts that a great benefit of the computer is its ability to interact with the patient.<sup>22</sup> "[T]he computer can be programmed to simulate a one-on-one conversation."<sup>23</sup> Like the early resistance to the printed word, there is some resistance in the medical community to the idea of a patient talking to a computer.<sup>24</sup> Dr. Slack chastises his colleagues who are not open to new ideas of communication, stating that "[g]ood ideas are often thwarted" by those with a stake in the current order.<sup>25</sup>

#### PATIENT-COMPUTER DIALOGUE

Having asserted that the computer can benefit patients, Dr. Slack continues by describing his early efforts at connecting patients with computers.<sup>26</sup> In 1965, Dr. Slack experimented with taking patient histories by computer.<sup>27</sup> Dr. Slack states that this aspect of medical communication was selected because taking patient histories is time-consuming, sometimes results in illegible records, and presents problems when there is a shortage of physicians.<sup>28</sup>

Dr. Slack notes that "self-administered paper questionnaires" were being used with some success at the time, but they were not tailored to

---

16. *Id.* at 8-9.

17. *Id.* at 8.

18. *Id.*

19. *Id.* at 9.

20. *Id.*

21. *Id.*

22. *Id.* at 10.

23. *Id.* at 10-11.

24. *Id.* at 11.

25. *Id.*

26. *Id.* at 13-27.

27. *Id.* at 13.

28. *Id.*

the patient's particular situation.<sup>29</sup> In response, Dr. Slack wrote 450 questions about personal, family, and social history as well as a "review of systems."<sup>30</sup> Patients placed cards in trays marked "yes," "no," or "I don't know" and were given additional cards to supplement "yes" answers.<sup>31</sup> Sorted cards were fed into a computer and a patient history was printed out.<sup>32</sup> Unfortunately, the card-sorting was lengthy and tiring, so Dr. Slack thought that a better system would have a computer administering questions to a patient.<sup>33</sup>

Slack's solution was LINC, short for laboratory instrument computer, located at the University of Wisconsin hospitals.<sup>34</sup> By today's standards, LINC was slow and its memory limited,<sup>35</sup> but the idea was to the program a computer to have some of the advantages of a physician-administered interview: exploring abnormal findings and interviewing in a considerate, dignified manner.<sup>36</sup>

The first patient to try the computer-administered interview was a man recovering from a heart attack.<sup>37</sup> The patient was comfortable with the computer, answering each question appropriately, laughing at some of the questions that had been programmed to be amusing, and occasionally making comments out loud.<sup>38</sup> The patient reported liking the computer more than some of the doctors.<sup>39</sup> A summary program printed out the patient's answers, and the patient was given an opportunity to review this chart.<sup>40</sup> The patient pointed out some errors, including some items he misunderstood.<sup>41</sup> Ever since this study, Dr. Slack has emphasized the value of patients reviewing charts and helping to build the history.<sup>42</sup>

Dr. Slack went on to conduct a more formal study concerning allergy histories, using fifty participants.<sup>43</sup> He compared the computer's output with a conventional hospital chart.<sup>44</sup> The computer-administered interviews contained "no false negative findings;" that is, all allergies men-

---

29. *Id.* at 14.

30. *Id.*

31. *Id.*

32. *Id.*

33. *Id.* at 15.

34. *Id.* at 16.

35. *Id.*

36. *Id.*

37. *Id.* at 18.

38. *Id.* at 19.

39. *Id.*

40. *Id.* at 20.

41. *Id.*

42. *Id.*

43. *Id.*

44. *Id.*

tioned in the participants' charts were identified, but there were several false positive findings.<sup>45</sup> Participants were asked about the experience, and almost all found it "interesting and enjoyable."<sup>46</sup> Subsequent studies were conducted using as participants individuals with cancer and epilepsy.<sup>47</sup>

Dr. Slack noticed that some participants were more willing to answer sensitive, personal questions when posed by the computer rather than a doctor.<sup>48</sup> Dr. Slack also found that printouts for the epileptic participants contained more information about symptoms before, during, and after seizures than did hospital charts.<sup>49</sup>

Dr. Slack also conducted a study of patients with headaches.<sup>50</sup> While these studies were being conducted, Dr. Slack was also working to develop a comprehensive computer-based general medical history<sup>51</sup> and was exploring additional roles for the computer as an interview tool.<sup>52</sup>

Computer-administered interviews usually began with words of welcome from the computer, followed by instructions on how to use the keyboard.<sup>53</sup> The computer programs were designed to respect the patient-participant's priorities and the right to answer a question or not.<sup>54</sup> Thus, the program incorporated a "skip it" response.<sup>55</sup>

Dr. Slack concludes his discussion of early computer-administered interviews by stating that, in his experience as well as experience of most others, any concern about a depersonalizing influence of computers was unfounded.<sup>56</sup> Through the 1970s, the debate among doctors about whether and how to empower the patient continued, but Dr. Slack noted that all agreed that in dialogue between patient and computer, the patient should be in charge.<sup>57</sup>

#### CYBERMEDICINE AS A PHYSICIAN'S ASSISTANT

Dr. Slack stated that the first step in developing cybermedicine was to develop computer-administered interview programs that would be helpful to doctors in diagnosis and treatment.<sup>58</sup> The next step was to develop

---

45. *Id.* at 21.

46. *Id.*

47. *Id.*

48. *Id.* at 22.

49. *Id.*

50. *Id.*

51. *Id.* at 23.

52. *Id.*

53. *Id.* at 25-26.

54. *Id.* at 26.

55. *Id.*

56. *Id.* at 27.

57. *Id.*

58. *Id.* at 29.

programs helpful to the patient.<sup>59</sup> In developing such interactive programs, Dr. Slack identified nine criteria:

1. The program should be medically sound.  
...
2. The program should be easy to use.  
...
3. The program should be truly interactive.  
...
4. The program should be of immediate benefit to the user.  
...
5. The patient should be in charge.  
...
6. Confidentiality should be protected.  
...
7. The program should be readily available.  
...
8. The program should be fast and reliable.  
...
9. The program should be tested before being offered to the public.<sup>60</sup>

Building on early favorable outcomes with computer-administered medical interviews, Dr. Slack noted that in 1990 Beth Israel at Harvard replaced the paper questionnaire used in its employee Live-for-Life program with a computer-administered health-screening interview.<sup>61</sup> The program was voluntary, and was designed to promote good physical and emotional health among employees.<sup>62</sup> Within the past ten years, 3,335 employees have participated in the computer-administered interview,<sup>63</sup> which generated great interest among employees in the health programs offered by Beth Israel.<sup>64</sup> For example, thirty-two percent of the employees who took the computer-administered interview followed up with a visit to the staff nurse.<sup>65</sup> Eighty-five percent of those who took the interview said it was worthwhile.<sup>66</sup> Most indicated a preference for interacting with the computer over interacting with a doctor or nurse.<sup>67</sup> These results bolster Dr. Slack's hypothesis regarding self-care: the patient-computer dialogue could be just as effective as an office visit.<sup>68</sup>

The next step for Dr. Slack was to develop a program designed for an experimental trial in a clinical setting, though Dr. Slack noted that the

---

59. *Id.*

60. *Id.* at 29-31.

61. *Id.* at 33.

62. *Id.*

63. *Id.* at 35.

64. *Id.* at 36.

65. *Id.* at 35.

66. *Id.* at 36.

67. *Id.*

68. *Id.* at 37.

ultimate goal was to develop a program the patient could use at home.<sup>69</sup> The trial involved patients presenting with likely urinary tract infections ("UTIs").<sup>70</sup> Each participant was interviewed via computer and if the computer did not find any reason for referral to a physician, the participant was given a choice of taking sulfa, the most common medication prescribed for UTIs, taking no medication, or taking some other medication.<sup>71</sup> If the patient-participant chose one of the medication options, the computer prepared and printed a medication schedule.<sup>72</sup>

A research assistant made a follow-up telephone call to the forty-six participants in the study.<sup>73</sup> Of them, forty-two participants were asked their reaction to the computer-administered interview, and forty found the computer "considerate," thirty-eight found it "thoughtful" and "respectful," and thirty-eight said the time with the computer was "well spent."<sup>74</sup> Thirty found that it was "a good thing" when asked, "How has it been to decide for yourself about taking sulfa?"<sup>75</sup>

Dr. Slack believes strongly that patients who want to should be encouraged to make their own clinical decisions.<sup>76</sup> He believes this will result in a decrease in patient non-compliance because patients will be telling themselves what to do instead of being told what to do by a physician.<sup>77</sup>

#### CYBERMEDICINE IN PSYCHOLOGY AND PSYCHIATRY

Dr. Slack then turns from cybermedicine for the body to cybermedicine for the mind.<sup>78</sup> Here, Dr. Slack notes that the computer was first used in the early 1960s at the Mayo Clinic to administer the Minnesota Multiphasic Personality Inventory ("MMPI").<sup>79</sup> In response to the criticism that the MMPI focused too much on the negative, Dr. Slack developed the Wisconsin Uniphasic Personality Inventory ("WUPI"), which focused on the positive.<sup>80</sup> Patients reacted favorably to Dr. Slack's computer-administered psychiatric interview<sup>81</sup> and reported finding the computer more thorough than a clinician.<sup>82</sup>

---

69. *Id.* at 38.

70. *Id.*

71. *Id.* at 39.

72. *Id.*

73. *Id.* at 40.

74. *Id.* at 41.

75. *Id.*

76. *Id.* at 42.

77. *Id.*

78. *Id.* at 45.

79. *Id.*

80. *Id.*

81. *Id.* at 46.

82. *Id.*



Dr. Slack states that a number of good computer programs have been developed for use in psychotherapy.<sup>83</sup> For example, a University of Wisconsin program emulates a cognitive therapist.<sup>84</sup> Success has been reported with patients with early Alzheimer's Disease.<sup>85</sup> Dr. Slack asserts that interactive voice-response systems and the Internet show promise,<sup>86</sup> and virtual environments have been used successfully to cure certain phobias.<sup>87</sup>

Dr. Slack reasserts his earlier-stated hypothesis that patients' natural resistance to discussing emotionally laden topics is lessened with the use of the computer,<sup>88</sup> and he guides the reader through a discussion of the branch of psychiatry that pertains to soliloquy, or the benefit of the patient speaking aloud in therapy.<sup>89</sup> Dr. Slack states that there are three hypotheses regarding computer-assisted soliloquy: "the presence of the therapist is not essential in talking therapy;" "speaking out . . . is important to the effectiveness of psychotherapy;" and "the doctor-patient relationship . . . can sometimes inhibit frank disclosure."<sup>90</sup>

Dr. Slack conducted a computer-assisted soliloquy experiment using a PDP-12 computer and a microphone connected to a speaker.<sup>91</sup> One-half of the thirty-two participants interviewed with a doctor; the other half interviewed with a computer.<sup>92</sup> Reactions of the participants varied widely.<sup>93</sup> Unlike reactions of subjects in earlier experiments with the computer-administered interview, the subjects in this experiment reacted more favorably to the doctor than to the computer.<sup>94</sup>

Dr. Slack, however, does not offer a hypothesis for this result and does not report any follow-up research to help explain the reaction of these participants. Instead, he proceeds to describe a computer-administered program designed to address the symptoms of anxiety.<sup>95</sup> In this study, the participants were forty-two men between twenty and thirty years of age.<sup>96</sup> The mean heart rate and anxiety scores went down for the participants from the beginning to the end of the interview.<sup>97</sup> The

---

83. *Id.* at 47.  
 84. *Id.*  
 85. *Id.*  
 86. *Id.*  
 87. *Id.* at 48.  
 88. *Id.* at 49.  
 89. *Id.* at 49-50.  
 90. *Id.* at 51.  
 91. *Id.* at 52.  
 92. *Id.* at 53.  
 93. *Id.* at 58.  
 94. *Id.*  
 95. *Id.* at 59.  
 96. *Id.* at 60.  
 97. *Id.* at 61.

approach used was to talk first about anxiety, then about relaxation, and last about personal strategies to replace anxiety with relaxation.<sup>98</sup>

Dr. Slack concludes his discussion of experiments with computer-administered patient interviews by noting that remarks made by participants to the computer are not readily distinguishable from remarks made to persons.<sup>99</sup> Interestingly, this observation undercuts Dr. Slack's earlier assertion that people are often more frank with a computer than with a physician.<sup>100</sup>

#### THE PATIENT ONLINE

Dr. Slack turns at this point to cybermedicine and the Internet.<sup>101</sup> He presents a short history of telecommunications, noting that the Advanced Research Projects Agency Network ("ARPANET"), the precursor to the Internet, began in the late 1960s under the U.S. Department of Defense.<sup>102</sup> The original purpose of the system was to send large computer files from one place to another.<sup>103</sup> In the early 1980s, the National Science Foundation ("NSF") replaced the Department of Defense as the source of government funding.<sup>104</sup> "[T]he NSF sponsored the development of a nationwide network" that linked government computers with industrial and academic computers.<sup>105</sup> The newest method of using the Internet is the World Wide Web.<sup>106</sup>

Dr. Slack estimates that there are some 100,000 health related Web sites,<sup>107</sup> and as to these sites, he advises users to be wary of the information posted and recommends seeking a second or even a third opinion on any medical problem.<sup>108</sup> Dr. Slack identifies three reliable sources of health information on the Web: the National Library of Medicine;<sup>110</sup> the Centers for Disease Control and Prevention;<sup>109</sup> and Healthfinder<sup>110</sup> from the Department of Health and Human Services.<sup>111</sup> The Medical

---

98. *Id.*

99. *Id.* at 63.

100. *Id.* at 22.

101. *Id.* at 67.

102. *Id.* at 68-69.

103. *Id.* at 68.

104. *Id.* at 69.

105. *Id.*

106. *Id.* at 70.

107. *Id.* at 72.

108. *Id.*

109. See generally Ctr. for Disease Control & Prevention <<http://www.cdc.gov>> (last updated Apr. 3, 2002).

110. See generally Healthfinder, *Your Guide to Reliable Health Information* <<http://www.healthfinder.gov>> (accessed Mar. 30, 2002).

111. Slack, *supra* n. 1, at 73-74.

Library Association<sup>112</sup> lists several additional sites.<sup>113</sup>

Dr. Slack emphasizes that one important solution to rising health-care costs is enlightened self-care at home.<sup>114</sup> He notes that the cost of obtaining access to the Internet keeps going down, enabling a larger segment of the population to take advantage of this technology.<sup>115</sup> Unfortunately, there is still a wide technology gap in the U.S., not to mention the world. Recent statistics report that some 513 million people are online worldwide,<sup>116</sup> representing only about eight percent of the world's population of 6.2 billion.<sup>117</sup> Further, there is a mal-distribution of Internet users. Although nearly one-quarter of people in the Americas and about one-fifth of people in Europe are online, less than one percent of people in Africa are online and an even smaller percentage of people in Asia have this technology.<sup>118</sup> Thus, a key component of Dr. Slack's vision of patient self-enlightenment—access to technology—is missing in the world.

Dr. Slack also discusses other uses of the Internet that help link patient and physician, including teleconverse: the exchange of messages using the computer.<sup>119</sup> E-mail is the most prevalent form of teleconverse,<sup>120</sup> but there are others such as individual mailings and postings,<sup>121</sup> self-help mailing lists,<sup>122</sup> and self-help chat groups.<sup>123</sup> Dr. Slack contends that the burgeoning use of the Internet attests to the fact that patients like to be online.<sup>124</sup> In Part II of the book, he examines the use of technology by physicians.<sup>125</sup>

## CYBERMEDICINE AND THE CLINICIAN

### CYBERMEDICINE IN THE HOSPITAL AND CLINIC

Dr. Slack begins this section of the book by observing that some people still worry that the use of computers in medicine will alter the doctor/

112. See generally Med. Lib. Assoc., MLANet <<http://www.mlahq.org>> (last updated Apr. 2, 2002).

113. Slack, *supra* n. 1, at 75.

114. *Id.* at 76.

115. *Id.*

116. Nua.com, *How Many Online?* <[http://www.nua.ie/surveys/how\\_many\\_online](http://www.nua.ie/surveys/how_many_online)> (accessed Feb. 9, 2002).

117. U.S. Census Bureau, *Population Clocks, World Population Estimate* <<http://www.census.gov/main/www/popclock.html>> (last updated Feb. 9, 2002).

118. See generally Nua.com, *supra* n. 116.

119. Slack, *supra* n. 1, at 77.

120. *Id.*

121. *Id.* at 78.

122. *Id.* at 79.

123. *Id.* at 81.

124. *Id.* at 83.

125. *Id.* at 87-159.

patient relationship.<sup>126</sup> He asserts, however, that the problem is not that computer use in medicine is dangerous or immoral but that the computer has failed to reach full potential.<sup>127</sup>

Dr. Slack presents the reader with a history of the development of cybermedicine in two hospitals.<sup>128</sup> In the 1970s, Dr. Slack established the Division of Clinical Computing at Harvard's Beth Israel,<sup>129</sup> a hospital-wide cybermedicine program guided by the following principles:

1. Information should be captured directly at computer terminals located at the point of each medical transaction, not on pieces of paper;  
     . . .
2. Information captured at a terminal or automated device anywhere in the hospital or clinic should be available immediately, if needed, at any other terminal;  
     . . .
3. The response time of the computer should be rapid;  
     . . .
4. The computer should be reliable and accurate;  
     . . .
5. Confidentiality should be protected;  
     . . .
6. The computer programs should be friendly to the user and reinforce the user's behavior; [and]  
     . . .
7. There should be a common registry for all patients.<sup>130</sup>

In the fall of 1982, Dr. Slack designed a similar program, the Center for Clinical Computing ("CCC"), for Boston's Brigham and Women's Hospital.<sup>131</sup> CCC was implemented first in the admitting, ambulatory-care, and medical records departments,<sup>132</sup> and then extended to virtually every laboratory and clinical department.<sup>133</sup> Noting that the ultimate goal of hospital computing is to improve patient care,<sup>134</sup> Dr. Slack turns the reader's attention to how the CCC's cybermedicine system works.<sup>135</sup>

---

126. *Id.* at 88.

127. *Id.* at 89.

128. *Id.* at 95.

129. *Id.*

130. *Id.* at 96-97.

131. *Id.* at 97.

132. *Id.* at 98.

133. *Id.* at 100.

134. *Id.* at 104.

135. *Id.* at 107-19.

## CYBERMEDICINE IN THE CARE OF THE PATIENT

In his discussion of CCC's cybermedicine system, Dr. Slack notes that the most heavily used option is looking up clinical information about a patient.<sup>136</sup> Selecting this option yields a patient's demographic data, a list of consulting physicians, a list of previous admissions and diagnoses, and the results of diagnostic testing.<sup>137</sup>

CCC also helps the doctor in his everyday practice.<sup>138</sup> A doctor can call up and edit his personal patient list.<sup>139</sup> There is a personal patient look-up option that includes clinical data about the doctor's patients.<sup>140</sup> There is a "notes" option, which the doctor can use to make notes about a patient's care.<sup>141</sup> Finally, there is a "utilities" function that offers a variety of options to assist the physician.<sup>142</sup>

CCC assists the physician in decision-making as well.<sup>143</sup> There is acid-base consultation for the determination of appropriate IV fluids.<sup>144</sup> "Bugman" is the name of an interactive guide for the treatment of infectious diseases.<sup>145</sup> There is an online reference book for medications as well as "Drugman," an interactive hospital formulary.<sup>146</sup> There is a special program for patients with AIDS and guidelines for the withdrawal of therapy for patients near death.<sup>147</sup>

CCC contains additional information to assist the clinician's search of the medical literature.<sup>148</sup> It contains "PaperChase," the National Library of Medicine's database of medical references and "ClinQuery," a function that retrieves clinical information and contains a database of all patients and their medical conditions since 1984.<sup>149</sup> ClinQuery enables the clinician to compare a new patient's clinical situation to that of a patient in the database, while keeping the identity of the previous patient confidential.<sup>150</sup>

Dr. Slack emphasizes that the problem that he and others are trying to solve with computing for the clinician is the problem of communica-

---

136. *Id.* at 107.

137. *Id.* at 108-09.

138. *Id.* at 109.

139. *Id.*

140. *Id.*

141. *Id.* at 110.

142. *Id.*

143. *Id.* at 112.

144. *Id.*

145. *Id.*

146. *Id.* at 113.

147. *Id.*

148. *Id.* at 116.

149. *Id.*

150. *Id.*

tion.<sup>151</sup> He states that those working in the field of cybermedicine must not only set up computer systems, but evaluate the impact of the systems on the practice of medicine.<sup>152</sup>

#### HOW WELL DOES CCC WORK?

Here Dr. Slack assesses cybermedicine by examining the responses to six questions:

1. How often is a system used?  
...
2. What is the attitude of users toward cybermedicine?  
...
3. What is the effect of cybermedicine on the quality of medical care?  
...
4. What is the effect of cybermedicine on the education of the clinician?  
...
5. What is the effect of cybermedicine on the finances of the hospital?  
...
6. What is the cost of cybermedicine?<sup>153</sup>

Dr. Slack states that doctors, nurses, and medical students frequently and voluntarily use available computer systems.<sup>154</sup> In one week in 1984, 818 medical staff at Beth Israel accessed the system 16,768 times.<sup>155</sup> In one week in 1988, 1,737 hospital staff accessed the system 58,757 times.<sup>156</sup> In one week in 1992, 2,354 staff members accessed the system 69,784 times.<sup>157</sup> There were similar results for CCC at Brigham and Women's Hospital.<sup>158</sup> It is unclear, however, just how "voluntary" use of the systems was during these periods. What alternatives did the staff have to using the systems?

To help measure the attitude of the users toward cybermedicine, a computer-administered interview was undertaken in 1982.<sup>159</sup> As part of the log-on procedure, the interview asked users to rate the computer's helpfulness, efficiency and ease of use.<sup>160</sup> Of obligatory users of the system, seventy percent said that the computer made their work more accurate, easier, faster and more interesting.<sup>161</sup> Eighty percent of the

---

151. *Id.* at 118.

152. *Id.*

153. *Id.* at 122.

154. *Id.*

155. *Id.* at 123.

156. *Id.*

157. *Id.*

158. *Id.* at 125.

159. *Id.*

160. *Id.*

161. *Id.* at 126.

clinicians used the system to look up laboratory results and reported finding the system very helpful.<sup>162</sup>

With regard to the effect of cybermedicine on the quality of medical care, Dr. Slack states that direct evidence is hard to come by.<sup>163</sup> This is a disturbing admission given that Dr. Slack asserts that the primary purpose of cybermedicine is to enhance the "quality of medical care."<sup>164</sup> Dr. Slack claims, however, that doctors are far less likely to make errors if they use the computer system.<sup>165</sup> For example, the "alert" function of the system has reduced serious errors at Brigham and Women's Hospital by fifty-five percent.<sup>166</sup>

CCC also assists with the education of the clinician; at any time of the day or night, a doctor or a medical student can look up information.<sup>167</sup> An intern can use the system to get expert consultation on diagnoses and treatments by using PaperChase and ClinQuery.<sup>168</sup>

Turning to the cost of cybermedicine, during the development of CCC in the 1980s, one and one half percent of the operating budget of Beth Israel and two percent of the operating budget of Brigham and Women's Hospitals were devoted to computing costs.<sup>169</sup> Dr. Slack reports that these figures compare favorably with the two to six percent figure that surveys indicate hospitals spend on computing systems with less capability.<sup>170</sup> Furthermore, with regard to the effect of cybermedicine on the finances of the hospital, Dr. Slack notes that the finances of a clinical facility are better served when the financial computing is a "by-product of the clinical system."<sup>171</sup>

The work of CCC continues today.<sup>172</sup> It conducts major research projects including studies of programs using medical and psychiatric interviews, programs administering standardized psychometric instruments, and programs providing consultation to physicians.<sup>173</sup>

#### THE CLINICIAN ONLINE

More and more medical information is available to both doctors and

---

162. *Id.*

163. *Id.* at 127.

164. *Id.*

165. *Id.*

166. *Id.* at 127-28.

167. *Id.* at 130.

168. *Id.*

169. *Id.*

170. *Id.*

171. *Id.* at 131.

172. See generally Harvard Med. Sch. Dept. of Psych., *Clinical Computing in Medicine and Psychiatry*, <[www.hmcnet.harvard.edu/psych/redbook/171.htm](http://www.hmcnet.harvard.edu/psych/redbook/171.htm)> (accessed Mar. 28, 2002).

173. *Id.*

patients online.<sup>174</sup> Earlier, Dr. Slack discussed patients making use of online technology to become more informed about medicine.<sup>175</sup> Here, Dr. Slack reviews online opportunities for physicians. Among the sites discussed are the National Institute of Health site, PaperChase and MEDLINE, from the National Library of Medicine, which contains 25,000 new abstracted references each month.<sup>176</sup>

In addition to visiting Web sites, Dr. Slack states that doctors increasingly offer medical advice via e-mail,<sup>177</sup> but he adds that there are potential problems with e-mail.<sup>178</sup> It takes two to use e-mail effectively and both users must read and respond in a timely fashion.<sup>179</sup> There is junk e-mail to contend with, and there is an emotive aspect to e-mail in which people feel unrestrained, sometimes sending inappropriate messages.<sup>180</sup> E-mail is an "attractive nuisance" in that people can spend a great deal of time sorting through and sending e-mails.<sup>181</sup> Finally, e-mail may not be confidential.<sup>182</sup> Building on this theme, Dr. Slack devotes a chapter to discussing a vital aspect to the success of cybermedicine: maintaining confidentiality of medical records.<sup>183</sup>

#### CONFIDENTIALITY

Ideally, Dr. Slack says, all medical information should be confidential, known only to those with good reason to know.<sup>184</sup> But there is also a need to compromise because the easier it is to retrieve medical information, one of the benefits of cybermedicine, the less secure is the information.<sup>185</sup> Thus, a paper record might be more confidential, but it is a worse medical record because the handwriting may be illegible and the contents disorganized.<sup>186</sup>

Dr. Slack discusses a number of measures that are incorporated into CCC to help protect the confidentiality of patient records.<sup>187</sup> To help prevent access by intruders, a unique, computer-assigned password is given to staff and is changed every six months or at the request of the

---

174. Slack, *supra* n. 1, at 133.

175. See nn. 103-08, 114-19 and accompanying text.

176. *Id.* at 134.

177. *Id.* at 136.

178. *Id.* at 140-41.

179. *Id.* at 140.

180. *Id.* at 141.

181. *Id.*

182. *Id.*

183. *Id.* at 143-59.

184. *Id.* at 145.

185. *Id.*

186. *Id.* at 146.

187. *Id.* at 147.



user.<sup>188</sup> The password permits access to only those parts of the system appropriate for the user.<sup>189</sup>

Doctors may access any patient's record,<sup>190</sup> which Slack says is a sacrifice of privacy for enhanced medical care.<sup>191</sup> But doctors sign a statement promising not to look at medical information unnecessarily.<sup>192</sup> In sum, the approach to confidentiality in Slack's CCC involves the physical protection of computer terminals, the use of unique passwords, and personal accountability.<sup>193</sup>

Slack turns the discussion of confidentiality to the sharing of a patient's medical information outside the hospital.<sup>194</sup> He notes that with the advent of medical insurance, a third party, the payer, now has access to a patient's confidential medical records.<sup>195</sup> Little is known about whether or how such third parties protect confidential patient information,<sup>196</sup> and for now, the scales tip in favor of third-party payers, with confidential information sometimes passing from one third party to another.<sup>197</sup>

Dr. Slack proposes a solution: stop sending confidential information to third party payers.<sup>198</sup> He urges the development of a system that documents clinical transactions but is free of clinical content.<sup>199</sup> Such a system would contain procedures to ensure accuracy of the link between a charge and the service.<sup>200</sup>

Dr. Slack's discussion of the confidentiality of patient records also focuses on preventing access by unauthorized persons.<sup>201</sup> It is especially important for any electronic record-keeping system to employ the very latest technology to prevent persons outside a medical facility from hacking into its system. Two catastrophic consequences could emerge if mischievous outsiders gain access to a patient's records: first, the privacy of the patient would be invaded; second, a malicious hacker could change information in the patient's record, leading to misdiagnosis and

---

188. *Id.*

189. *Id.* at 148.

190. *Id.*

191. *Id.* at 149.

192. *Id.*

193. *Id.* at 150.

194. *Id.* at 152-59.

195. *Id.* at 152.

196. *Id.* at 156.

197. *Id.*

198. *Id.* at 157.

199. *Id.*

200. *Id.* at 158.

201. *Id.* at 156-57.

mistreatment.<sup>202</sup>

### MODERN TIMES

Dr. Slack spent the first part of the book discussing cybermedicine and the patient and the second part of the book discussing cybermedicine and the clinician. In the third and concluding section, Dr. Slack discusses challenges to the development of cybermedicine and the future of cybermedicine.

### BARRIERS TO CYBERMEDICINE

Slack asserts that there are some imaginary barriers to cybermedicine.<sup>203</sup> Some cite age and computer phobia as reasons why cybermedicine will not catch on, but these are not real barriers.<sup>204</sup> Computer phobia disappears rapidly when the machine is easy to use and helpful.<sup>205</sup> People also cite lack of computer literacy as a barrier, but people do not need to understand the inner workings of a computer in order to use one and find it helpful.<sup>206</sup>

Dr. Slack, however, does identify real barriers to cybermedicine.<sup>207</sup> One is the hospital administrator, of which there are two types.<sup>208</sup> One type "is both willing and able to help the clinician care for the patient and one who isn't."<sup>209</sup> The goal of the first is to promote patient care;<sup>210</sup> the goal of the second is to promote the existing administrative order.<sup>211</sup>

Another barrier for cybermedicine is the hospital committee, of which there are also two types.<sup>212</sup> One type of hospital committee has well-defined goals, a few members, and a short lifespan;<sup>213</sup> the other type has ill-defined goals, many members, an indefinite life span, and its work is judged by form and process.<sup>214</sup>

A third barrier to cybermedicine is the vendor of hospital computing

---

202. Slack does not discuss malpractice issues that may arise from cybermedicine. See Nicholas P. Terry, *Cyber-Malpractice: Legal Exposure for Cybermedicine*, 25 Am. J. of L. & Med. 327-66 (1999) (providing an examination of exposure of healthcare providers operating in cyberspace). See generally *Legal Dangers for Cybermedicine*, Revista Electronica de Derecho Informatico <[http://vlex.com/redi/No.\\_21\\_-\\_Abril\\_del\\_2000/2](http://vlex.com/redi/No._21_-_Abril_del_2000/2)> (Apr. 21, 2000).

203. Slack, *supra* n. 1, at 164.

204. *Id.* at 164-65.

205. *Id.* at 165.

206. *Id.*

207. *Id.* at 167-73.

208. *Id.* at 167-68.

209. *Id.* at 167.

210. *Id.*

211. *Id.*

212. *Id.* at 170-72.

213. *Id.*

214. *Id.*

systems.<sup>215</sup> Some vendors sell to administrators, not to clinicians caring for patients.<sup>216</sup>

Cost is another barrier to cybermedicine, but Dr. Slack is optimistic that cost will continue to come down.<sup>217</sup> He states that it is now possible to replace huge mainframe computers with networks of minicomputers if the hospital bureaucracy can be overcome.<sup>218</sup>

#### NEW HORIZONS

In the final chapter of the book, Dr. Slack discusses what clinicians can do to promote the development of cybermedicine.<sup>219</sup> Clinicians must be more assertive, convincing administrators that cybermedicine will increase efficiency and save money while improving patient care.<sup>220</sup>

Dr. Slack also encourages patients to promote the development of cybermedicine by urging doctors to have computer-ready access to the results of diagnostic tests.<sup>221</sup> He adds that patients should emphasize the need for privacy protection.<sup>222</sup>

#### A DREAM FOR THE FUTURE

Dr. Slack concludes with his vision of medical care in the future.<sup>223</sup> All medical services will move out of the hospital, which will disappear.<sup>224</sup> Clinical havens of the future will be decentralized, small, conveniently located within residential areas,<sup>225</sup> and staffed by skilled, humanistic clinicians who run the facility in consultation with a board of directors that includes patients and prospective patients.<sup>226</sup>

The clinical haven will be equipped with the latest technology, including good cybermedicine.<sup>227</sup> There will be local financing and prepaid financing for major expenses, with provisions for those who cannot pay.<sup>228</sup> Confidentiality will be protected,<sup>229</sup> and no clinical information will be released to third party payers without a patient's consent.<sup>230</sup>

---

215. *Id.* at 172-73.

216. *Id.* at 172.

217. *Id.* at 173.

218. *Id.*

219. *Id.* at 185-91.

220. *Id.* at 186.

221. *Id.* at 187.

222. *Id.*

223. *Id.* at 190-91.

224. *Id.* at 190.

225. *Id.*

226. *Id.*

227. *Id.*

228. *Id.*

229. *Id.*

230. *Id.*

Much of medical care will move back into the home.<sup>231</sup> Cost will be reduced while the quality of medical care will be high.<sup>232</sup>

Dr. Slack's vision of medical care in the future may be appealing, but his hope for the demise of the hospital leaves many unanswered questions. He wants the quality of medical care to be high and the cost low, but the economies of scale that come from a hospital making available expensive diagnostic equipment to a large sector of the population are not present in his dream. Who will fund all of this equipment for all of these small clinical havens? How will decentralizing medical treatment facilities lead to lower costs and better care?

### CONCLUSION

In his epilogue, Dr. Slack notes that some argue that technology is to blame for inflated costs, but he argues that it is the misuse and overuse of technology that is to blame.<sup>233</sup> Most good machines become better and less and less expensive over time.<sup>234</sup>

Dr. Slack has spent his life working to bring medicine and technology together, and his humanistic approach to the practice of medicine is appealing. His book makes the case that, though there are obstacles to be overcome, the medical and technological communities can work together to improve the quality of medical care and lower its cost.

---

231. *Id.* at 191.

232. *Id.*

233. *Id.* at 198.

234. *Id.*

