4. PATIENT COMPLIANCE WITH HEALTH BUDDY™ SURVEYS

As used in this section, compliance measures the fraction of days that patients respond to Health Buddy™ surveys. We are interested in compliance for two reasons. First, low compliance may compromise outcomes. If a patient fails to respond to the surveys, his or her condition may deteriorate unbeknownst to the case manager. The patient may need hospitalization, which might have been avoided had the case manager had timely information. Second, low compliance may increase case management costs. When the patient fails to respond to a Health Buddy™ survey, the case manager may telephone the patient to obtain the information. Of course, there is a tradeoff between these two factors. If the case manager obtains the information via telephone, the patient will avoid worse outcomes.

In many—perhaps most—case management programs, the case manager calls the patient, so this form of compliance is not an issue. But one study we found [2] required the patient to dial a toll-free number and report data to a computerized voice answering system. This study reported a compliance rate of over 80 percent for daily data entry, for a group of 68 patients followed for 7.4 months on average, though the compliance rate was not precisely defined. This 80 percent figure may serve as a standard of comparison for Health Buddy™.

This section examines only compliance with the task of responding to Health Buddy™ surveys. In the next section we present some limited data on patient reports of other forms of compliance, namely compliance with medication and diet.

Alternative Compliance Measures

We define several measures of compliance with Health Buddy™ surveys. They are all ratios of the number of days a patient or group of patients has provided adequately timely information by answering a
Health Buddy™ survey, to the number of days which ought to be covered by such information.³

We define the denominator of this ratio (i.e., the days that ought to be covered) as the number of patient-days that the patients have Health Buddies™ and are not hospitalized.

While the Health Buddy™ is designed for daily contact with patients, from a case management perspective, a patient who occasionally fails to respond may still be considered compliant. We therefore consider seven different definitions for the numerator of the ratio (i.e., the days covered by a patient response). According to these definitions, a day is covered if the most recent patient response occurred today (definition 1), yesterday (definition 2), on up to six days ago (definition 7). Because the nurse case manager receives a patient’s response the day after he or she makes it, under definition ‘n’ the case manager will have information that is no more than ‘n’ days old. Clearly, the longer it has been since the patient has responded, the more time there has been for his condition to deteriorate, and the greater the risk of compromised outcomes.

Patients Who Dropped Out Early

As mentioned earlier, 12 of 52 patients from site A and 11 of 98 from site B stopped responding to Health Buddy™ surveys before the end of the study periods. In addition, three patients from site A and 14 from site B received Health Buddies™ but never responded; these patients are not included in the calculation of compliance rates.

Some patients did not complete the study for reasons that have nothing to do with compliance. Case manager notes from site A give reasons why five of the 12 patients did not complete the study, including switching physicians (1 patient), switching plans (2 patients), moving to another city (1 patient), and physician not signing patient up (1 patient). We can speculate that some patients dropped out because they were sent to skilled nursing facilities (SNF) or died. On

³ Patients did not have the option of skipping some of the questions on a Health Buddy™ survey. Unless a patient answered all the questions, nothing would be uploaded to the Health Hero database for that day.
the other hand, some patients who dropped out early or never responded should be considered non-compliant. They may have decided that they “can’t be bothered to fiddle with electronic gimcrackery,” or they may have been intimidated by the task of installing the Health Buddy™ (though as described earlier, most patients seemed to find it easy).

Data on Days to Cover

For each patient we include in our compliance rate computation (40 patients from site A, 87 from site B), we take the first day to cover as the first day on which the patient responded to a Health Buddy™ survey. Patients could have received their Health Buddies™ earlier, however, as we have no independent data showing when the box was received.

We take the last day to cover to be the end of the study period (August 30, 1999 for site A, and September 15, 1999 for site B).

We assumed that Health Buddy™ information did not need to cover any day that a patient spent in a hospital or SNF, since for that day the patient would be monitored by nurses at the facility. From both sites we obtained data on all stays in hospital and SNF for which one of the admitting diagnoses was CHF (ICD9 code=428.x). It is possible that patients were hospitalized for other reasons during the study period—indeed, case manager notes from site A suggest that this happened on a couple of occasions. Since a patient won’t respond to Health Buddy™ surveys while in hospital for any reason, omitting non-CHF hospitalizations should lead to an underestimate of compliance.

Data on Days Covered

Health Hero provided data on responses to Health Buddy™ surveys from all patients. Each response is stamped with the date and time at which the patient completed the survey. We assigned the vast majority of responses to the date with which they were stamped. Sometimes, however, two responses were stamped with the same date, one at an early morning hour (e.g., 3:00 AM) and one at a more conventional hour (e.g., 10:00 AM or 1:00 PM). In such a case we assigned the 3:00 AM response to the previous day, assuming the patient had had a late night.
Compliance Results

Figure 4.1 shows the percent of patient-days covered at the two sites as a function of how old the latest response can be and still cover a day. A patient-day needs to be covered if the patient has a Health Buddy™ and is not in a hospital or SNF. Patients miss about one day in eight or ten on the average, though they rarely miss more than two or three days in a row.

The data for Figure 4.1 appear in Table 4.1.

Table 4.1:
Percent of Total Patient Days at Site A Covered by Health Buddy™ Responses

<table>
<thead>
<tr>
<th>Days Grace from Last Response</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site A</td>
<td>87.1</td>
<td>92.4</td>
<td>94.4</td>
<td>95.4</td>
<td>96.1</td>
<td>96.7</td>
<td>97.2</td>
</tr>
<tr>
<td>Site B</td>
<td>90.5</td>
<td>94.2</td>
<td>95.8</td>
<td>96.7</td>
<td>97.2</td>
<td>97.7</td>
<td>98.1</td>
</tr>
</tbody>
</table>

Rates of compliance with long-term regimens tend to be lower than with short-term regimens [15]. As Table 4.2 shows, the compliance rate at site A (the site with the longer study period) looks very flat over time, with just a bit of random looking variation from month to month.
However, “long-term” generally means a year or more, and the study period at site A covers less than six months. Thus the results in Table 4.2, while promising, are not definitive.

**Table 4.2:**

Percent of Total Patient Days at Site A Covered by Health Buddy™ Responses, By Month

<table>
<thead>
<tr>
<th>Period</th>
<th>Days Grace from Last Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3/15 – 4/30</td>
<td>91.0</td>
</tr>
<tr>
<td>5/1 – 5/31</td>
<td>86.6</td>
</tr>
<tr>
<td>6/1 – 6/30</td>
<td>88.2</td>
</tr>
<tr>
<td>7/1 – 7/31</td>
<td>82.5</td>
</tr>
<tr>
<td>8/1 – 8/30</td>
<td>87.4</td>
</tr>
</tbody>
</table>

**Summary of beta site compliance**

Overall, the analysis of the data from both sites points to a high level of patient acceptance and use of the Health Buddy™ device, provided the patient is able to connect the device and use it at least once. The compliance rate compares favorably to the 80 percent figure reported by Heidenreich et al [2]. Patients who stay with the program tend to be quite consistent in their use of the device. Further analysis on who drops out and why could be helpful.