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The Value of Adding a Verbal Report to Written Handoffs on Early Readmission Following Prolonged Respiratory Failure

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Patients who survive the acute phase of respiratory failure often are transferred to units with specialized expertise. These patients have a high risk of being readmitted to the acute care hospital. We conducted this study to determine whether supplementing a written report with a verbal telephone report reduces readmission rates within the first 72 h after discharge and decreases hospital costs. The study design was observational with a historical control group that included patients admitted to our respiratory acute care unit between November 2003 and October 2005. In November 2005, we implemented a strategy in which a written report at discharge was supplemented with a telephone report by the physician or nurse practitioner, nurse, and respiratory therapist. The intervention group began in November 2005 and continued through October 2007. The primary end point was readmission to Massachusetts General Hospital within 72 h of discharge. We also determined the cost related to readmission. The study included 362 patients. The OR for readmission if the handoff included a verbal report was 0.42 (95% CI, 0.17-1.04). The total hospital cost was significantly lower in the group where verbal report was used ($111,723 vs $148,574; $ = .002). Supplementing a written report with a verbal telephone report was associated with a significant reduction in cost and an average savings of ~$184,000 for every 100 patients discharged, representing added value in delivered care.

Materials and Methods

The study was performed in the respiratory acute care unit of the Massachusetts General Hospital (Boston, Massachusetts). This 10-bed unit provides care for patients on mechanical ventilation who are otherwise stable. The focus of the unit is to liberate the unit's resources while maintaining high standards of care. The study was conducted at Massachusetts General Hospital using departmental funding. The study included 362 patients. The OR for readmission if the handoff included a verbal report was 0.42 (95% CI, 0.17-1.04). The total hospital cost was significantly lower in the group where verbal report was used ($111,723 vs $148,574; P = .002). Supplementing a written report with a verbal telephone report was associated with a significant reduction in cost and an average savings of ~$184,000 for every 100 patients discharged, representing added value in delivered care.

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patients from mechanical ventilation.\textsuperscript{56} Between November 1, 2003, and October 31, 2005, a written report by the physician or nurse practitioner, nurse, and respiratory therapist was used to facilitate transfer of care between the unit and rehabilitation facilities. Written discharge summaries were prepared by the physician or nurse practitioner, nurse, and respiratory therapist, although no methods existed to ensure receipt or offer direct clarification of information.

Anecdotally, it was believed that there was a high early readmission rate (within 72 h). A unit-based task force was created to address this issue. Guidelines were developed by consensus, with input from involved personnel that included unit staff, medical consultants, and members of rehabilitation facilities. The new guidelines became effective November 1, 2005. In addition to the written report, a telephone discipline-to-discipline (ie, physician [or nurse practitioner]-to-physician, nurse-to-nurse, and therapist-to-therapist) report was instituted by physicians or nurse practitioners, nurses, and respiratory therapists in the unit. Each emphasized discipline-specific aspects of patient care that could alter outcome, that is, physicians discussed medical treatment; nurses concentrated on the nursing care plan; and therapists focused on mechanical ventilation, inhaled medications, and airway clearance. During these reports, questions by the receiving clinicians were encouraged. The physicians or nurse practitioners, nurses, and respiratory therapists provided verbal report in the same way that they do for transfer from one hospital unit to another.

\textbf{Study Design}

The study was approved by the Institutional Review Board of the Massachusetts General Hospital. We included only the first admissions of patients to the respiratory acute care unit of the hospital between November 1, 2003, and October 31, 2007. During the study period, there were no changes in policies related to discharge or readmission. There was no change in faculty or midlevel providers. Nursing and respiratory therapy staff also was stable during this time.

\textbf{Demographic Factors}

Age, sex, number of hospital days, number of days in the respiratory unit, and admission service (medicine, surgery, and neurology/neurosurgery) were recorded. Comorbidities were identified from the medical record (eg, coronary artery disease, congestive heart failure, neurologic disease, renal insufficiency, chronic obstructive lung disease, asthma) and characterized as pulmonary, cardiac, neurologic, and renal disease.

\textbf{Study End Points}

The primary end point of the study was readmission to Massachusetts General Hospital within 72 h of discharge. The secondary end point was total cost, including readmission cost, if applicable. Cost was determined using Transition Systems Inc methodology (Eclipsys Corporation; Atlanta, GA).\textsuperscript{7} The cost measure—actual total cost—includes overhead costs. The actual total cost of each aspect of care is summed to determine total hospital cost for each patient. This cost estimates the true resource use involved and is superior to using charge or reimbursement data. Costs were adjusted to 2007 dollars using the medical care category of the Consumer Price Index.

\textbf{Statistical Analysis}

We determined that a sample size of 200 patients per group was required to detect a significant reduction in readmission rate at \( \alpha = 0.05 \) and \( \beta = 0.2 \) and a decrease in readmission rate from 12\% to 5\% with one-tailed significance. A priori, we used one-tailed significance because our hypothesis stated that we expected a reduction in readmission rate. Median, interquartile range, and proportions were calculated as appropriate. For univariate analysis, \( x^2 \) and Mann-Whitney test were used as appropriate. A \( P \leq .05 \) was considered significant. Multivariate analysis was performed using logistic regression analysis. All analyses were performed with SPSS, version 16, statistical software (SPSS Inc; Chicago, IL).

\textbf{Results}

The study included 362 patients (Table 1). There were no differences in readmission rates by demographic variables, admission service, or comorbidity (Table 2). The results of the logistic regression analysis are shown in Table 3. The OR for readmission if the handoff included a verbal report was 0.42 (95\% CI, 0.17-1.04; \( P = .06 \)). The median total cost of care was significantly less if the handoff included verbal report ($111,723 vs $148,574; \( P = .002 \)) (Fig 1).

\begin{table}[h]
\centering
\begin{tabular}{llll}
\hline
Demographic Variable & No Verbal Report (n = 151) & Verbal Report (n = 211) & \( P \) Value \\
\hline
Number of readmissions & 14 (9.3) & 10 (4.7) & .13 \\
Discharge status & & & \\
Invasive ventilation & 39 (25.8) & 47 (22.3) & .45 \\
Noninvasive ventilation & 3 (2.0) & 6 (2.8) & .74 \\
Tracheostomy; no ventilator & 92 (60.9) & 99 (46.9) & .01 \\
Oxygen therapy & 17 (11.3) & 59 (28.0) & <.001 \\
Age, y & 65 (49.5-77) & 67 (52-76) & .97 \\
Hospital days & 33 (20-50) & 27 (17-39) & .001 \\
Respiratory unit days & 15 (10-22.5) & 11 (6-18) & <.001 \\
Male sex & 96 (63.6) & 133 (63) & >.99 \\
Comorbidity & & & \\
Pulmonary & 70 (46.4) & 103 (48.8) & .67 \\
Cardiac & 69 (45.7) & 101 (47.9) & .75 \\
Renal & 16 (10.6) & 36 (17.1) & .10 \\
Neurologic & 67 (44.4) & 124 (58.8) & .008 \\
Admission service & & & \\
Medical & 66 (43.7) & 102 (48.3) & .40 \\
Surgical & 63 (41.7) & 60 (28.4) & .01 \\
Neurologic & 22 (14.6) & 49 (23.2) & .05 \\
\hline
\end{tabular}
\caption{Demographic Data for the Patients Included in the Study With and Without Verbal Report}
\end{table}

\textbf{Discussion}

By supplementing a written report with a verbal telephone report when patients are discharged from our respiratory acute care unit, we found that the cost per patient was reduced by almost $37,000. With a reduction in readmission rate from 10\% to 5\%, this results in cost savings, on average, of about $184,000.
when patients are transferred to another facility. Similarly, Daly et al\(^9\) reported the 17% of these patients had multiple admissions to the respiratory acute care unit. Similarly, Daly et al\(^9\) reported the 19% readmission rate within 48 h and an almost 40% readmission rate within 2 months for 342 patients who underwent at least 72 h of mechanical ventilation. In our study of a similar patient population, we observed a baseline early readmission rate of almost 10%, which decreased to 5% with the intervention of verbal telephone report.

Patients who are readmitted to the hospital undergo multiple transitions of care, which increases the potential for miscommunication, resulting in medical errors.\(^11,12\) Sign-out-related problems among house staff have been reported at 7.5 events per 100 patient-days and have contributed to adverse events.\(^13\) It is conceivable that these problems might increase when a multidisciplinary handoff is conducted for transfer of care to another facility. Our study did not focus on the handoff process itself but rather on the impact of adding verbal report to the existing handoff procedure.

A randomized controlled trial in patients with critical illness showed that the addition of an acute practice nurse who coordinated discharge and home care did not decrease the rate of hospital readmission but did reduce the duration of readmissions.\(^10\) A discharge program that added nurse discharge advocates and a clinical pharmacist decreased the ED readmission rate within 6 months of discharge from an acute hospital.\(^14\) Although these programs require extensive additional resources and are expensive, our program did not require any additional resources. The hand-off procedure, including the verbal telephone report, was performed by the health-care providers responsible for bedside care during the patient’s stay in the unit and was incorporated into existing practice; therefore, there were no additional costs associated with this practice that might offset the potential savings from reduced hospital readmissions.

| Table 2—Demographic Data for Patients Readmitted and Not Readmitted |
|-----------------------------|-----------------------------|-----------------------------|
| Demographic Variable        | Readmitted (n = 24)          | Not Readmitted (n = 338)     | P Value |
| Discharge status            |                             |                             |         |
| Invasive ventilation        | 3 (12.5)                    | 83 (24.3)                   | .22     |
| Noninvasive ventilation     | 1 (4.2)                     | 8 (2.4)                     | .47     |
| Tracheostomy; no ventilator | 15 (62.5)                   | 176 (52.8)                  | .40     |
| Oxygen therapy              | 5 (20.8)                    | 71 (21)                     | >.99    |
| Age, y                      | 70.5 (56-79.5)              | 65 (50-77)                  | .19     |
| Hospital days               | 29 (19-36.5)                | 29 (19-45)                  | .79     |
| Respiratory unit days       | 12 (7-18.5)                 | 13 (7-20)                   | .52     |
| Male sex                    | 13 (54.2)                   | 216 (63.9%)                 | .38     |
| Comorbidity                 |                             |                             |         |
| Pulmonary                   | 15 (62.5)                   | 158 (46.7)                  | .15     |
| Cardiac                     | 14 (58.3)                   | 156 (46.2)                  | .29     |
| Renal                       | 2 (8.3)                     | 50 (14.)                    | .55     |
| Neurologic                  | 10 (41.7)                   | 181 (53.6)                  | .29     |
| Admission service           |                             |                             |         |
| Medical                     | 10 (41.7)                   | 158 (46.7)                  | .68     |
| Surgical                    | 9 (37.5)                    | 114 (33.7)                  | .82     |
| Neurologic                  | 5 (20.8)                    | 63 (19.5)                   | .80     |

Data are presented as No. (%) or median (interquartile range).

<table>
<thead>
<tr>
<th>Table 3—Results of Logistic Regression Analysis</th>
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<tbody>
<tr>
<td>Variable</td>
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<tr>
<td>Handoff with call</td>
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<tr>
<td>Respiratory unit days</td>
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<td>Hospital days</td>
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<td>Age</td>
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<td>Medical admission</td>
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<td>Surgical admission</td>
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<td>Pulmonary comorbidity</td>
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<td>Cardiac comorbidity</td>
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<td>Neurologic comorbidity</td>
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<tr>
<td>Renal comorbidity</td>
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<tr>
<td>Discharged on ventilator</td>
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<tr>
<td>Discharged with tracheostomy</td>
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<tr>
<td>Discharged on noninvasive ventilation</td>
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</tbody>
</table>

Variables not in the equation are discharged on oxygen and neurologic admission.
As stated by Cortese\textsuperscript{15} and discussed in a prior “Transparency in Health Care” commentary,\textsuperscript{16} real value in health care requires consistency over time. Consistency over the continuum of care delivery demands accurate and complete handoffs. Value traditionally has been defined as the ratio of outcome to cost. Our program of verbal report at handoff increases value because it improves outcome (lower hospital readmission rate) and reduces cost. Cortese\textsuperscript{15} suggested that safety and service be added to outcome in the numerator of the value equation. By reducing readmission rate, our program of verbal report also contributes to patient safety and improves service for both patients and the referring institution.

Limitations

Our statistical analysis did not reach a significance of $P = .05$. Nonetheless, at $P = .06$, we believe that our results represent a real change, although our study was underpowered. We have considered extending our study, but the staffing and patient mix in our respiratory unit that was very stable over the time period of this study has become less so over a longer time period. Because the study design was observational and not a randomized intervention, the two patient populations were not entirely identical. For example, there were significant differences in discharge status (tracheostomy, oxygen) between the historical controls and the intervention group, but these were not significant on multiple regression analysis, and we doubt that this imbalance affected the results of our study.

Our analysis was restricted to patients readmitted only to the Massachusetts General Hospital. Although patients discharged from our respiratory unit typically are readmitted to our hospital if necessary, it is possible that some were readmitted to different acute care facilities, resulting in underreporting of readmissions. This loss to follow-up was minimized with the shorter readmission interval. Because this study was of a single academic tertiary-care center, the ability to generalize our findings to different settings is unclear. For example, it is unknown whether our findings would apply to patients who are chronically ill with respiratory failure when discharged from units other than a specialized respiratory unit such as ours. We focused on early readmission rates because an improved handoff most likely influences the immediate period posttransfer, whereas readmissions after longer periods might be due to the multiple comorbidities of these patients who are chronically critically ill. We did not evaluate referring physician or patient satisfaction with the use of verbal report.

Conclusions

Supplementing a written report with a verbal telephone report was associated with a significant reduction in cost and an average savings of \$184,000 for every 100 patients discharged from our respiratory acute care unit. This savings represents a significant improvement in value-based care delivery for this population, which may have broad implications for other transition points of health-care delivery.

Acknowledgments

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References


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