COST SAVINGS THROUGH BEDSORE AVOIDANCE

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SUMMARY

Over one million persons are afflicted with bedsores in US hospitals every year. The problem is growing worse, partly because of an aging population. A radical departure from present treatment approaches is called for. It is demonstrated that the cost of bedsores in hospitals is conservatively 55 billion dollars per year. Analysis is presented concluding that a net savings of 44.5 billion dollars, along with virtual eradication of the bedsore in hospitals, would result through the widespread preemptive use of the technology generally acknowledged to be the most effective available.

INTRODUCTION

Over one million hospital patients are subjected to the affliction of bedsores every year. Many have observed that the unnecessary agony caused is so great that "Prevention, rather than treatment, appears to be essential to reducing the burden of suffering associated with pressure ulcers."[1] But the problem is not being solved. In fact, it gets worse every year. While victims can be of any age, most victims are in their seventies and eighties. Thus, an aging population exacerbates the problem.

A recent engineering text[3] observes, "Everyone agrees they are preventable, but many pressure sores still occur." Studies[2] have found that about 50% of patients with pressure ulcers are over the age of 70, and among these elderly, bedsores mean a fourfold increase in the rate of death. The mortality rate in hospitals for afflicted patients is between 23 and 37 percent. The financial toll caused by this menace is absolutely astounding – billions of dollars in healthcare expenditures that could be largely avoided through education and a proper application of resources. The scope of the problem is even much greater when bedsores in nursing homes and home care are included.

The present study investigates the feasibility of a radical departure in treatment strategy in order to overcome this bleak outlook. It is proposed that the most effective known therapy for bedsore healing, presently considered too expensive to be applied in any but the most critical cases, be used widely in a preemptive mode having the potential to eradicate the bedsore.

BEDSORE AVOIDANCE

When the patient is supported in such a manner that a pressure sufficient to obstruct blood flow in capillaries results, bedsores (pressure ulcers) occur. This condition arises at bony prominences; by far the most common location is the sacrum.[2]

A swimmer floating in water does not experience elevated pressure on his bony prominences. By Archimedes principle, pressure is uniform on all surfaces and in every direction. Engineers developed an ingenious patient support system based on this principle over 30 years ago.[5] In order to fluidize a bed of particles, air is forced upward through the bed at such a rate that the pressure drop is just sufficient to overcome gravity: The particles (ceramic spheres), restrained by a permeable sheet, act as a fluid of elevated specific gravity on top of which the patient "floats".

In study after study[6,7] this support system has been shown to be the most effective therapy available to facilitate healing of advanced bedsores. But the air-fluidized bed (AFB) is perceived to be an expensive therapy. Medicare will pay for its use in nursing homes only after a Stage 3 ulcer has developed (through fat and muscle and nearly to the bone), or when multiple Stage 2 ulcers have appeared. In hospitals, far too few administrators and/or physicians are willing to use AFB therapy because, under Medicare's Prospective Payment System (PPS), they fear that too few dollars will remain to pay their fees.

The availability of such studies showing the efficacy of AFB therapy in healing bedsores, coupled with the fact that the AFB supports the patient at below capillary pressure, leads to a reasoned judgment that use of the AFB upon hospital admission, or possibly upon note of the Stage 1 first bedsore indication, has the promise of reducing greatly the incidence of these wounds. But there is further hard evidence. Six beds of sand were used in a hospital ward in England for five years in the early 1970's.[8]

The sand surface was carefully contoured to provide recesses for bony prominences. For three of those five years, a prototype air-fluidised bed was used along with the sand beds. "This provides automatic accommodation of the sand surface to the patient's contours and obviates the necessity to make manual impressions in static sand trays..."

"During this period [5 yrs, 6 beds] no patient has developed a bed sore...despite the fact that a considered high risk of decubitus ulceration was the usual indication for the prescription of this form of patient support."

INCIDENCE OF BEDSORES

The most recent prevalence study[2] found that 10.8% (std dev 5.84) of the hospital patients at a given time are afflicted with bedsores. The range of prevalence found was 1.4% to 36.4% with a sample size of 265 hospitals. The problem is probably even worse because the worst of hospitals are unlikely to have volunteered to take part in the study.

The average length of hospital stay in the United States in a recent year was 5.4 days.[9] Allman[4] found that, when comparing patients that developed bedsores to those that did not (admitted initially for similar causes), "Average length of stay increased by a factor of five". Thus it is estimated that the average length of hospital stay for those patients afflicted with bedsores is about 27 days.

In a recent year there were 6,374 hospitals in the US with an average of 177 beds per hospital.[9] The mean occupancy rate for 1994 was 66.1%. Thus, on average, 6374 × 177 x .661 = 745,740 beds were occupied on any given day. Since prevalence equals (no. of patients with bedsores) / (total hospital population at any given time), the hospital population suffering with bedsores numbers, on any given day, about .108 times 745,740 or 80,540.

Incidence = 80,540/27 = 2982 patients/day or 1,088,778 patients developing sores/yr.

COSTS DUE TO BEDSORES

The costs associated with a day of hospitalization may be estimated using data for Medicare patients,[10] particularly considering the fact that bedsores afflict mostly the elderly. Medicare hospital admissions for 1994 were 10,399,000. Total hospital covered charges were $133, 591 million, and physician allowed charges related to hospital stays were $38,151 million. Given that the average stay for those 65 and over was 7 days, the average cost for a day of hospitalization was $2,360.

The additional cost related to the extended hospital stay of the average bedsore patient is then: (27 – 5.4) days x $2,360/day = $50,976 per bedsore patient.

Multiplying this cost per patient by the annual incidence of bedsores found above, the annual cost of the bedsore problem in the United States is estimated to be over 55 billion dollars. This is a very conservative estimate because the days of extended stay for the bedsore patient are not typical in any sense. Plastic surgery, skin grafts, horrible infections (often resistant to available antibiotics) and possible quarantine are all the lot of the patient unlucky enough to be given a bedsore. These are very, very expensive days of extended hospital stay.

AVAILABLE SAVINGS

The cost of providing AFB therapy is a small fraction of the average daily cost of hospital care. Yet the perception has always been that the cost is too high for all but the most desperate cases.

Writing in 1984, Dolezal reported "the current cost for the use of the Clinitron is high: the daily rent is $65.00, but this represents an additional cost of only 4% to 6% of the total hospital bill."

Based on today's costs, the expense of providing AFB therapy is still in the same range as a percentage of total daily hospital costs.[12] The present rental rate for the most expensive model of AFB made by one manufacturer is $155/day.

Three strategies for eradicating the scourge of the bedsore will be evaluated.
They are: 1) Provide AFB therapy to all patients upon admission. 2) Provide AFB therapy to all admitted patients judged to be at high risk for bedsores. 3) Provide AFB therapy only at the first sign of a developing bedsore, at early Stage 1.

Strategy No. 1
The number of patients admitted daily to hospitals in the US is equal to the average number of occupied beds divided by the average duration of hospital stay:

- Patients Admitted = 745,740 / 5.4 = 138,100 patients per day
- The annual cost of providing AFB therapy to all patients admitted is then: $155/day x 5.4 days/patient x 138,100 patients admitted/day x 365 days/yr. = $42 Billion/yr.

As discussed above, this strategy would result in the virtual eradication of the bedsore as a problem in hospitals. Thus the entire annual cost of the extended stay associated with bedsores, $55 Billion, would be eliminated, resulting in an annual savings of $13 Billion.

Strategy No. 2

Factors known to be associated with the risk of bedsore development include advanced age, immobility, poor nutrition and incontinence. Such risk factors have been quantified in the Norton Scale and the Braden Scale.[13] Allman[14], using related but different criteria, found that 17% (14% to 20% with 95% confidence) of hospitalized patients are at risk. Certainly all paralyzed and otherwise immobile patients are included in that group.

Providing AFB therapy to the at-risk population would cost, on average, 17% of the cost of providing the therapy to all admitted patients, or $7.2 Billion. Allman reports that in a group of 59 orthopedic patients, the Norton Scale was able to identify 12 of 13 patients who went on to develop a bedsore. Estimating conservatively that 90% of those destined to receive bedsores could be identified through risk assessment, 90% of the annual cost of bedsores in the US, or $49.5 Billion, would be saved. Thus the net savings of Strategy No. 2 is $42.3 Billion.

Strategy No. 3

The savings available from Strategy No. 2 are so great, and the potential for relieving human suffering so apparent, that it is difficult to believe that such an approach would not be implemented. Yet, it is anticipated that resistance to providing preemptive medical treatment will be substantial. Thus a third strategy, that of providing AFB therapy to patients at the first sign of a developing bedsore, was evaluated.

If it were possible to identify all developing bedsores when in Stage 1, AFB therapy would be provided to all 1,088,778 patients that develop bedsores in hospitals each year. Trials of AFB intervention at Stage 1 have not been reported in the literature. The conservative assumption is made that such intervention would reduce the length of hospital stay for the bedsore-afflicted patient on average by a factor of one-half, to 13.5 days.

The cost of providing AFB therapy to this population would be:

- $155 x 1,088,778 × 13.5 = $2.3 Billion.

Savings due to reduced hospital stay would be:

- 13.5 × 1,088,778 x $2,360 = $34.7 Billion.

Thus the net savings associated with Strategy No. 3 are $32.4 Billion.

Strategies No. 2 and No. 3

Combined Ten percent of those destined to develop bedsores would not be provided AFB therapy upon hospital admission according to the estimate discussed above under Strategy No. 2. Under the proposed combined strategy, 108,879 patients would be provided AFB therapy upon note of the first stage of bedsore development. The cost of doing so would be $0.23 Billion. The savings achieved by reducing the stay of these patients by half would be $3.47 Billion, for a net savings of $3.2 Billion. Adding this amount to the savings arrived at above for Strategy 2 provides the total savings for the combined strategy, $45.5 Billion.

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