

The Business Case for Medical Respite Services

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EXECUTIVE SUMMARY

OVERVIEW

The objective of this study is to develop a business case for medical respite (MR). This business case examines the potential costs and financial benefits of MR care to hospitals treating patients experiencing homelessness, particularly those in Trinity Health. Although providing medical care to people experiencing homelessness is part of a hospital's social mission, individuals in this population are difficult to identify and represent a substantial financial burden to the hospitals that treat them.

Using the capture-recapture method to estimate more accurately the number of episodes of patients experiencing homelessness, the best estimate is actually 2.0 to 2.3 times the numbers that were identified. Furthermore, we found that the full cost of care for this population exceeds the reimbursement the hospital receives; thus, on average, the hospital loses money on each episode. If MR can treat patients experiencing homelessness less expensively, MR can help reduce the hospital's costs. In addition, if the hospital is part of an accountable care organization (ACO) or similar shared savings arrangement, it may gain additional revenues through shared savings.

Taking into consideration a standard MR model, we calculated that St. Francis Hospital (in a Medicaid expansion state) could afford to contribute up to \$4,635 and Holy Cross Hospital (in a non-expansion state) could contribute up to \$8,268 towards an episode of MR, and still break even. In a national study for the Centers for Medicare and Medicaid Services, an average episode of MR lasted 45 days and cost \$136 per day or \$6,120 in total.¹ Our financial analysis suggests that in a non-Medicaid expansion state, a hospital will benefit financially from MR care even if it paid the full cost of MR care. In a Medicaid expansion state if both the hospital and payers each paid 50% of the cost, both stakeholders would benefit financially from MR. Therefore, we recommend that in these states, hospitals and payers collaborate to fund MR programs, which will result in improved care for patients experiencing homelessness, and financial savings and reduced risk for both parties.

BACKGROUND

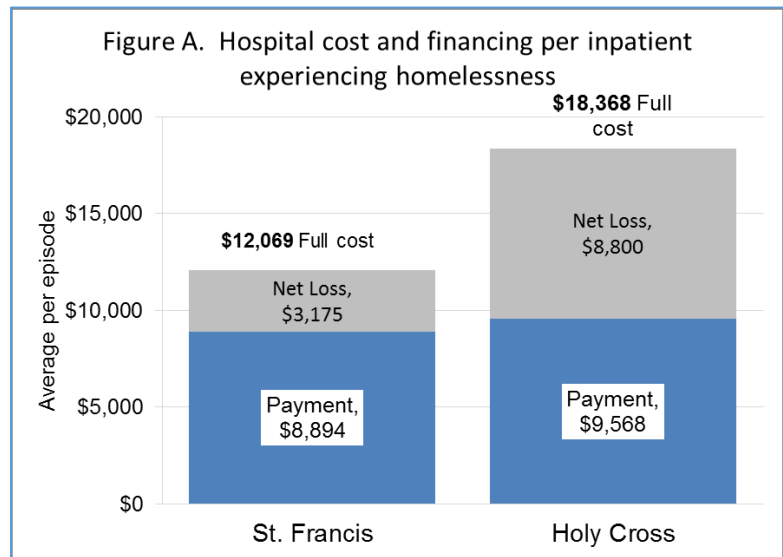
Setting

Hospitals treat persons experiencing homelessness as part of their social responsibility. The project conducted case studies in two hospitals to examine the situation in a state with Medicaid expansion, St. Francis Hospital, (Hartford, CT), and one without expansion, Holy Cross Hospital (Ft. Lauderdale, FL). MR care provides a safe place for people experiencing homelessness to continue to receive medical care after a hospital visit without the high costs associated with prolonged hospital stays. MR services are thought to not only improve health outcomes for persons experiencing homelessness, but also generate savings for acute care hospitals and/or the health care system that makes it financially viable for them. Payment models for MR are currently the subject of active discussion by hospitals, health centers, and stakeholder associations.² If a hospital belonged to a Next Generation ACO, a shared risk payment model under which healthcare providers can retain 80%-100% of generated savings, an MR program could potentially not only reduce costs but also generate revenue to hospitals.³

Approach

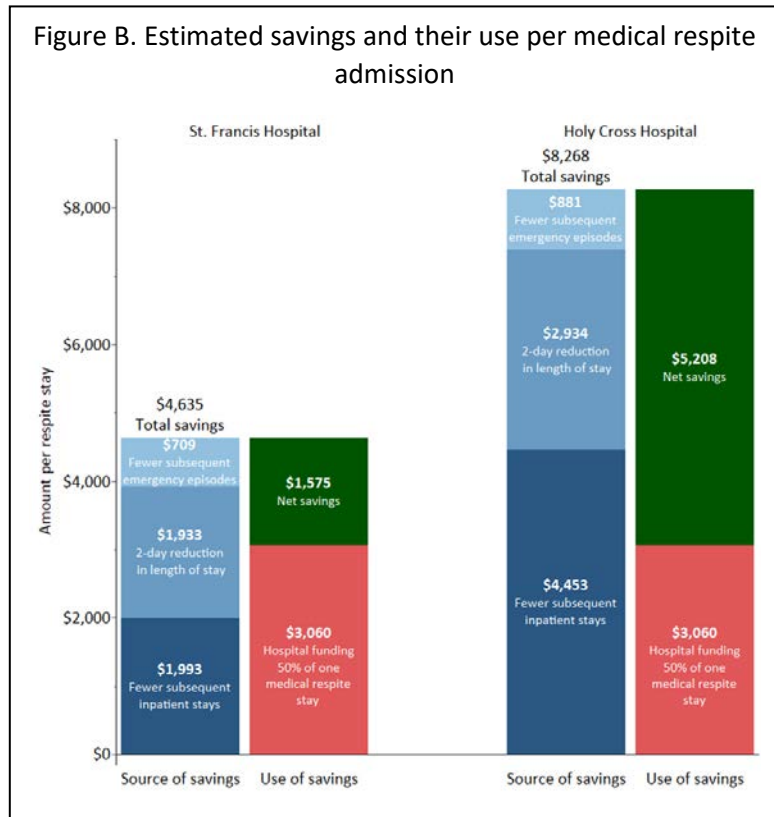
Although some people experiencing homelessness self-identify, many choose to “fly under the radar” or hospital staff may not be asking the right questions to elicit a person’s true housing status. Without knowing an accurate volume of patients who are experiencing homelessness, any financial analysis would underestimate the full cost of caring for this population. To overcome this obstacle we employed the capture-recapture methodology, which allows us to estimate the total size of a population based on the size and overlap between two independent samples.⁴

Having estimated the net losses incurred by caring for this population, we turned to estimating the potential savings that MR could represent. There are two main areas where MR can potentially generate savings. Experts on homelessness estimate that the average length of stay of patients experiencing homelessness is about two days longer than is typical for housed patients. The first area of savings rests on the estimate that, had an MR facility been available, these two extra days in the hospital could be eliminated. The other area of savings rests on interim findings from a federally funded study. It found that among MR participants experiencing homelessness, the average the rate of hospital admissions declined by 35% in the year following MR care as compared to the year before, and that average emergency room visits dropped 45% in the same time period.¹



RESULTS

Using the capture-recapture method, the projected numbers of annual homeless episodes were 3,328 and 1,927 episodes, at St Francis and Holy Cross respectively, or 2.3 and 2.0 times the identified numbers. While hospitals receive reimbursement for some of these patients experiencing homelessness, both hospitals lost money on their care, in the sense that reimbursement was less than the full cost (see Figure A). Given the average reimbursement as a percentage of complete cost, we found that St. Francis is realizing an annual net loss of \$3.3 million and Holy Cross, an annual net loss of \$2.7 million by serving this population. MR would reduce these losses, thereby saving the hospitals money.



Taking into account a standardized

MR model, Figure B shows the estimated savings and their use per MR admission. Each hospital saves money from three sources: a 2-day reduction in length of stay, fewer subsequent inpatient admissions after discharge and fewer subsequent emergency room episodes after discharge.

LIMITATIONS

Three limitations should be acknowledged. First, part of this analysis is based on the assumption that MR will eliminate two days from the average hospitalization. This can only be achieved through tight coordination of care between the hospital and MR program, and should be monitored and refined as the program is implemented. Second, this study analyzed only two hospitals in Trinity Health. Extrapolation to other hospitals should take into account the particularities of those hospitals. Third, we have projected the cost of an MR episode in an average-cost program. Costs of actual MR programs vary by a factor of two.

RECOMMENDATIONS

Medicaid expansion states

In Medicaid expansion states, where Medicaid is already reimbursing much of the cost of care for this population, both hospital and payer will realize savings if the cost of MR care is split between these two parties (or subsidized by other funders). Therefore, it is recommended that Medicaid and hospitals collaborate to fund MR programs jointly. This cooperation will financially benefit both parties.

Non-Medicaid expansion states

On the other hand, the analysis suggests that in non-Medicaid expansion states, hospitals will realize savings from funding MR programs even if the hospital were to fund the full cost of MR. This result is in part due to the high cost of charity care in non-Medicaid expansion states. Therefore it is recommended that in these states, it is in the hospital's best interest to help initiate and fund MR programs, regardless of other funding sources.

Risk-based contracts

In addition to savings realized directly by hospitals from MR, some risk-based payment models can share the payers' savings with the hospitals that help generate them. Next Generation ACOs, for example, will pay providers 80% to 100% of generated savings as additional revenue.³ Although only a small portion of people experiencing homelessness are Medicare beneficiaries, the revenue generated from a Medicare Next Generation ACO is likely relatively small. Some Medicaid contracts may have similar arrangements, thereby generating greater additional revenue.

MAIN REPORT

INTRODUCTION

Homelessness increases use of inpatient and emergency department (ED) care. People experiencing homelessness have high readmission rates: 30-day ED revisit rates are 5.7 times higher, and 30-day inpatient readmission rates are 1.9 times higher than their housed counterparts.⁵ They also stay in the hospital longer than their housed counterparts. Patients in New York City experiencing homelessness stayed 4.1 days (36%) longer and cost an average of \$4,094 more than their housed counterparts, adjusted for case mix, demographics and socio-economic characteristics.⁶ A Toronto study using administrative data found that admissions of patients experiencing homelessness on average cost \$2,559 (Canadian dollars, approximately the same in 2011 US dollars) more than their housed counterparts after adjusting for individual characteristics and resource intensity weight.⁷ Among all inpatients experiencing delay in discharge days (hospitalizations prolonged due to non-medical or external causes), homeless patients experienced 4 more delay days than their housed counterparts.⁸

Patients experiencing homelessness also tend to use the ED for regular care in lieu of primary care, contributing to both higher hospitalization costs and elevated mortality.^{9,10} A national study found patients experiencing homelessness averaged 6.0 ED visits per year compared to 1.6 visits for housed counterparts, and 24.6% encountered barriers to receiving needed medical care within the past year.¹¹

One driver of these trends is these patients' lack of access to a safe, sanitary space to convalesce and receive post-acute care.^{12,13} Medical respite (MR) programs have been developed to provide such a space. They seek to break the cycle of hospital to homelessness, ease the suffering of this vulnerable population and reduce medical system costs. In experience to date, a randomized trial in Chicago found that MR paired with permanent supportive housing reduced hospital length of stay by 2.7 days, reduced hospitalizations by 29%, and reduced emergency department visits by 24%.¹⁴ A retrospective cohort study in Boston, controlling for individual characteristics, found that MR lowered the odds of hospital readmission by roughly 50%.¹⁵ Interim findings from a national study found that MR reduced subsequent inpatient admissions by 35% and subsequent ED visits by 45%.¹ Chicago patients discharged to MR with subsequent supportive housing saved the health system \$6,307 over patients discharged to usual care.¹⁶

While these studies show the potential of MR for improving outcomes and saving costs, they have several limitations. The latest published study dates from 2012, before most provisions of The Affordable Care Act took effect, so they do not reflect the current health care environment. Also, they examine the health system as a whole. To become a sustainable service, MR would need a long-term payment model. Such models are currently the subject of active discussion by hospitals, health centers, and stakeholder associations.² Alternative payment models, particularly Next Generation Accountable Care Organizations (ACOs) and similarly designed Medicaid contracts, can provide a mechanism for hospitals to obtain additional revenue from MR. MR programs can be funded as part of the medical services delivered by a Federally Qualified Health Center, reimbursed as fee-for-service, paid on a flat rate by a managed care plan, supported by a grant, or funded by hospitals or payers (private insurers, managed care organizations and government programs).

To inform these multi-party decisions, costs and savings need to be separated by payer. To address these needs, we develop a business case for MR. We examine the potential costs and financial benefits

of MR to hospitals treating patients experiencing homelessness and the payers in their healthcare markets. Using two Trinity Health hospitals as examples, we consider states both with and without Medicaid expansion under the Affordable Care Act.

METHODS

Study hospitals

Trinity Health selected two hospitals in its network for site-level analysis: St. Francis Hospital (Hartford, CT) and Holy Cross Hospital (Ft. Lauderdale, FL). St. Francis Hospital is a 617-bed, acute care hospital; Holy Cross Hospital is a 557-bed, acute care hospital. With Connecticut being a Medicaid expansion state and Florida not, the two hospitals represent a range of contexts for this study. Staff of Yale New Haven Hospital, who have developed detailed procedures for identifying patients experiencing homelessness and examining service utilization, provided additional methodological insights.

Number of care episodes of patients experiencing homelessness

Although some people experiencing homelessness self-identify, many are not recognized. Some patients may choose to “fly under the radar” while others may not have been asked the appropriate questions to elicit their true housing status. Without knowing the complete number of care episodes to patients experiencing homelessness, any financial analysis would underestimate the full cost of caring for this population. To overcome this obstacle, we employed the capture-recapture methodology, which allows us to estimate the total size of a population based on the size and overlap between two independent samples.⁴

Both hospitals began to identify patients who were experiencing homelessness using information from their medical record system during the year ending April 30, 2016. St. Francis first searched for the word “homeless” in its Epic electronic medical record system and Holy Cross the “code 17”ⁱ in its Meditech electronic medical record system.

The second independent sample relied on identifying patients experiencing homelessness via an International Classification of Diseases (ICD) diagnosis code (V60 in ICD-9 or Z59 in ICD-10) which represents homelessness. These codes are generally completed by the responsible provider on discharge. Both St Francis and Holy Cross have been able to use this approach. Treating the two approaches as independent, we implemented the capture-recapture technique with data from each hospital by type of episode, and then summed across types of episode. This allowed us to estimate the total number of episodes of people experiencing homelessness at each hospital (including those who had not been identified as such).

Potential financial savings

To describe the current costs of treatment for patients experiencing homelessness, patients were grouped by financial category, such as Medicaid or self-pay. The hospitals reported charges and, where available, revenues and costs.

Having estimated the costs incurred by caring for this population, we turned to estimating the potential savings that MR could represent. There are two main areas where MR can potentially generate savings.

ⁱ Code 17 is used at Holy Cross Hospital to identify patients experiencing homelessness.

Based on expert opinion, consistent with data from St. Francis Hospital and Yale New Haven Hospital, we estimated that patients experiencing homelessness were hospitalized for two days longer than housed patients with comparable diagnoses (Michael Ferry and Janis Bozzo, unpublished data from Yale New Haven Hospital, Aug. 2016). This is consistent with previous studies.⁶⁻⁸

The first area of savings rests on the estimate that, had an MR facility been utilized, these two extra days in the hospital could be eliminated. The average costs from the second to last day of these episodes represent a good estimate of the daily costs associated with a patient who is ready to be discharged but is being held in the hospital because a safe discharge destination has not been arranged. Doubling these costs thus estimates the savings that would be realized by shortening an episode by two days. This approach reduced the chance of spurious findings due to a partial stay or late billings, which could have affected the actual charges and costs associated with the last two days.

The other area of savings rests on interim findings from a federally funded study from a standardized program of MR. Preliminary results across five sites found that the average length of stay was 45 days. The average rate of hospital admissions for MR participants dropped from 0.13 to 0.08 per person per month from the year before to the year after MR, a 35% decline. Similarly, the average rate of emergency room visits dropped from 0.33 to 0.18 per person per month from the year before to the year after this period, a 45% decline.¹

Finally, we conducted sensitivity analyses to reflect the possible distribution of the costs of an MR program between the hospital that typically treats patients experiencing homelessness and the funder. See Appendix 1 for more details on the methodology.

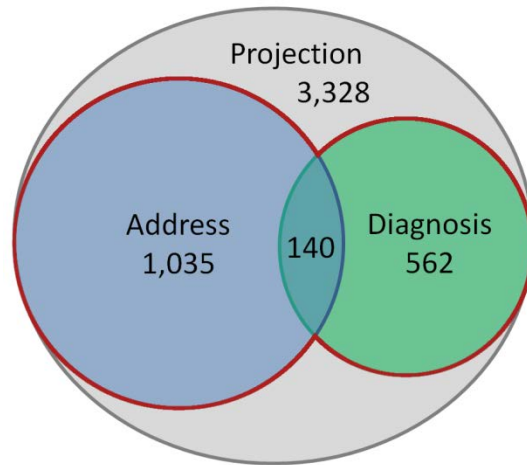
We used data from Yale New Haven Hospital which allowed us to estimate the likely use of MR. Out of 1,496 inpatient admissions of persons identified as experiencing homelessness, during 2014-15, 8.0% (204) entered MR. The remainder were not eligible (e.g., did not require daily medical care) or declined to participate (e.g., could not agree to the program's rules such as the inability to come and go from the program at will, etc.). The above study of MR found an average length of stay of 45 days. We estimated that in order to be efficient, but always have a bed available for an admission when needed, an MR program could operate at an occupancy rate of 80%.¹ This means that over the year, one MR bed allows 6.49 admissions. Based on a daily cost of \$136 per occupied bed, the annual cost of one bed would be \$39,700. If the hospital paid 50% of this cost, its annual share would be \$19,850 per respite bed.

RESULTS FOR ST. FRANCIS HOSPITAL (HARTFORD, CT)

Number of care episodes of patients experiencing homelessness

Figure 1 shows the application of the search procedures and the capture-recapture technique to St. Francis Hospital. The results indicate that only about one in three likely homeless patients is currently being identified as experiencing homelessness. These capture-recapture calculations suggest that St. Francis hospital provided 3,328 care episodes to patients experiencing homelessness (665 hospitalizations and 2,663 outpatient visits). For details see Appendix 2, Table A4.

Figure 1: Numbers of episodes at St. Francis Hospital of patients experiencing homelessness, 2015-16.



Legend: Episodes of encounters of patients experiencing homelessness were identified through addresses (n=1035), diagnoses (n=562), both sources (n=140) or either source (n=1457), and projected using the capture-recapture method (n=3,328).

Projected financial impacts of shorter hospitalization

The length of stay of patients experiencing homelessness in St. Francis Hospital of 5.75 days was about two days longer than the hospital’s typical length of stay. We estimated the savings from a two-day reduction in the inpatient hospital stay for relevant admissions. We excluded patients with a length of stay of one or two days, as a two-day reduction would have made their length of stay negative or zero. This exclusion removed 30 (3 with one day and 27 with two days) or 6.6% of the 455 identified hospitalizations of patients experiencing homelessness. Table 1 shows the results. For further details, see Appendix Table A4. The net revenue averaged \$8,894. While this revenue covered the hospital’s direct cost, it did not cover the complete cost.ⁱⁱ The last two days of care had average complete costs (including indirect costs) of \$1,933. The hospital lost \$3,175 per hospitalization of three or more days.

Table 1. Amounts per inpatient admission, St. Francis Hospital

Financial Class	Actual hospitalizations						Savings from 2-day reduction	
	Eligible inpatient stays	Avg. LOS	Net Revenue	Charges	Complete cost*	Loss on full stay	On charges	On complete cost
Medicaid	329	7.0	\$8,841	\$26,211	\$11,795	\$2,953	\$4,370	\$1,967
Medicare	77	9.3	\$9,244	\$31,421	\$14,139	\$4,896	\$3,504	\$1,577
All Payers	425	7.4	\$8,894	\$26,820	\$12,069	\$3,175	\$4,296	\$1,933

Notes: hospitalizations of fewer than 3 days were excluded. Avg. denotes average; LOS denotes length of stay.

*Complete cost (including indirect costs) was estimated from the finding that inpatient cost averaged 45.0% of inpatient charges.

Almost all inpatient care is paid based on the discharge diagnosis for the episode, so the payment would not be affected by a reduction in length of stay. If the hospital could save the costs associated with the last two days, the average loss per patient would drop to \$1,242 (i.e., \$3,175 minus \$1,933). Altogether, savings from eliminating the last two days, counting direct and indirect costs, lowers the loss per hospitalization of a patient experiencing homelessness by 61%. See Appendix 2, Table A6 for details.

ⁱⁱ Direct costs relate to services directly received by patients, such as general ward care, prescriptions and laboratory procedures. Indirect costs relate to supportive services, such as administration or insurance. Complete costs were estimated from the finding that inpatient costs average 45% of inpatient charges at St. Francis Hospital.

Potential downstream impacts on health systems’ costs

Along with the savings associated with reducing the hospital length of stay, MR programs have the potential to generate savings by reducing the number of hospitalizations in the year following an MR admission.¹⁵ Table 2 merges the savings from both the length of stay reduction and reduced subsequent hospitalizations to assess the one-year savings to the two major health system stakeholders: the hospital treating the patient and the primary payer (i.e., Medicaid) for the patient’s care. Under this projection, the hospital will experience fewer inpatient and outpatient episodes in the subsequent year. As the hospital would have incurred a loss on each of these episodes, the reduction in such episodes represents a reduction in its loss—a relative savings. The hospital also gains from a shorter hospital stay. This base case financial analysis assumes that the MR stay is funded half by the hospital and half by the payer. In the previously mentioned respite study, the median cost per day was \$136 with a wide range of \$60 to \$388.¹ Using the median value, a 45 day admission to MR would cost \$6,120 for an MR stay that is split between the hospital and the payer. In this base case, the hospital saves \$1,575 per respite episode, while the payer saves \$1,254 per respite stay. See Appendix 2, Table A7 for details.

Table 2. Projected financial impact of one medical respite (MR) episode, St. Francis Hospital

Source of impact	Annual Reduction	Loss per MR episode		Annual savings from MR episode	
		Hospital	Payer	Hospital	Payer
Fewer subsequent inpatient episodes	0.60	\$3,322	\$6,215	\$1,993	\$3,729
Fewer subsequent emergency episodes	1.80	\$394	\$325	\$709	\$585
2-day reduction in inpatient stay				\$1,933	\$0
Medical respite stay (50% each)				-\$3,060	-\$3,060
Total				\$1,575	\$1,254

If St. Francis Hospital or a partner organization wished to set up an MR program to meet the hospital’s needs, we estimate that it would have 117 MR admissions annually (1,457 identified homeless episodes x 8.0%) and need 18 MR beds (117/6.49 admissions per bed). The annual cost of this respite program to the hospital and payers would each be \$357,000 (i.e., 18x\$19,850, as noted above). After paying these contributions, however, the hospital and payers would still realize a yearly net savings of \$184,000 and \$147,000, respectively.

Sensitivity analyses

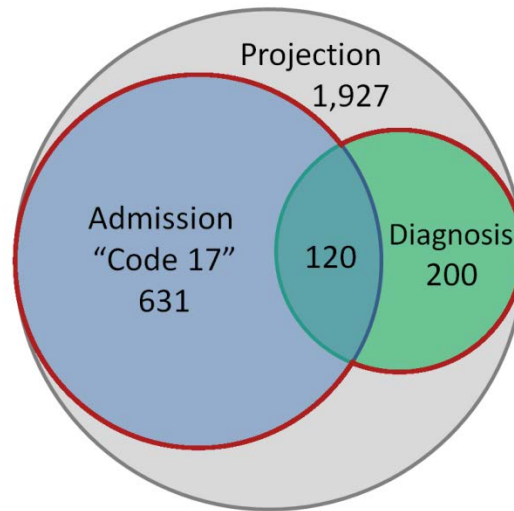
Our most likely assumption is that hospital and payer each fund 50% of the costs of MR. Then the hospital saves \$1,575 while payers gain \$1,254 per MR admission. In the examination of alternative allocation of costs of MR between the hospital and payers, we found that if the hospital’s share is between 30% to 75% of the costs (so the payer’s share is 25% to 70%), then both parties realize financial savings from MR. See Appendix 2, Figure A3 for details.

RESULTS FOR HOLY CROSS HOSPITAL (FT. LAUDERDALE, FL)

Number of care episodes of patients experiencing homelessness

Figure 2 shows the application of search procedures and the capture-recapture technique to Holy Cross Hospital. The results indicate that only about half of the episodes by likely patients experiencing homelessness are currently being identified. The capture-recapture calculations suggest that Holy Cross Hospital provided 1,927 care episodes to patients experiencing homelessness (232 inpatient, 1,381 emergency and 314 observation visits). See Appendix 3, Table A10 for details.

Figure 2: Numbers of episodes at Holy Cross Hospital of patients experiencing homelessness, 2015-16



Legend: Episodes of encounters of patients experiencing homelessness were identified through Admission "Code 17"ⁱⁱⁱ (n=631), diagnoses (n=200), both sources (n=120) or either source (n=711), and projected using the capture-recapture method (n=1,927).

Projected financial impacts of shorter hospitalization

We built on the assumption that a well-coordinated MR program would, on average, be able to eliminate two medically unnecessary days of the hospital length of stay. Beginning with inpatient episodes based on admissions criteria, we excluded 25 episodes with a length of stay of one or two days. This left 117 of the original 142 episodes.

Almost all inpatient care is paid based on the discharge diagnosis for the episode, so the payment would not be affected by a reduction in length of stay. Table 3 shows calculations of the savings associated with eliminating two medically unnecessary days. These data show that the projected savings from a two-day reduction in length of stay averaged \$2,934, slightly smaller than the corresponding amount at St Francis Hospital (\$3,175). See Appendix 3, Table A11 for details.

ⁱⁱⁱ Code 17 is used at Holy Cross Hospital to identify patients experiencing homelessness

Table 3. Projected impact of a 2-day reduction in length of stay on a hospitalization of 3 or more days, Holy Cross Hospital

Financial Class	Actual hospitalizations						Savings from 2-day reduction	
	Eligible inpatient stays	Avg. LOS	Net Revenue	Charges	Complete cost	Loss on full stay	On charges	On complete costs
Medicaid	25	11.6	\$8,452	\$87,134	\$28,014	\$19,562	\$8,951	\$3,489
Medicare	38	8.7	\$13,765	\$79,564	\$18,904	\$5,139	\$9,094	\$2,885
All Payers	117	11.9	\$9,568	\$67,849	\$18,368	\$8,800	\$8,646	\$2,934

Notes: Hospitalizations of fewer than 3 days were excluded. Avg. denotes average; LOS denotes length of stay.

Potential downstream impacts on health systems' costs

As noted earlier, potential savings may be realized through shorter hospital stays and fewer hospital encounters following an MR stay. Table 4 merges the savings realized through reducing an average of two medically unnecessary days of hospitalization with the savings from reduced inpatient and ED visits in the year after MR. This base case financial analysis assumes that the MR stay is funded half by the hospital and half by the payer. In the previously mentioned respite study, the median cost per day was \$136 with a broad range of \$60 to \$388.¹ Using the median value, an admission to MR would cost \$6,120. Thus, the cost of 45 days at \$138 per day or \$6,120 for the MR stay is split between the hospital and the payer. In this base case, the hospital saves \$5,208 per respite episode, while payers save \$1,885 per respite episode. See Appendix 3, Table A12 for details.

Table 4. Projected financial impact of one medical respite (MR) episode, Holy Cross Hospital

Source of impact	Annual Reduction	Loss per MR episode		Annual savings from MR episode	
		Hospital	Payer	Hospital	Payer
Fewer subsequent inpatient episodes	0.60	\$7,421	\$7,928	\$4,453	\$4,757
Fewer subsequent emergency episodes	1.80	\$490	\$104	\$881	\$188
2-day reduction in inpatient stay				\$2,934	\$0
Medical respite stay (50% each)				-\$3,060	-\$3,060
Total				\$5,208	\$1,885

If Holy Cross Hospital or a partner wished to set up or expand an MR program to meet the hospital's needs, we estimate that it would have 57 admissions annually (711 identified homeless episodes x 8.0%) and need 9 MR beds (57/6.49 admissions per bed). The annual cost of this respite program to the hospital and payers would each be \$179,000 (i.e., 9x\$19,850, again as noted above). After paying these contributions, however, the hospital and payers would still realize yearly net savings of \$297,000 and \$107,000, respectively.

Sensitivity analyses

Our sensitivity analysis (see Appendix 3, Figure A5 for details) shows the effect on savings for both payer and hospital as the hospital pays for a larger and larger share of the cost of MR. Ironically, as the

hospital in a non-Medicaid expansion state loses more money on each hospitalized episode of care for a person experiencing homelessness, it could afford to pay more towards an MR stay and still benefit financially. The threshold analysis shows that the payer saves, provided the hospital pays at least 19% of the cost of MR. As the hospital pays a higher share of the costs of MR, its savings fall but still remain positive (i.e., the hospital would realize savings even it paid for the full cost of the MR care episode).

RESULTS ON COMPARISON BETWEEN HOSPITALS

As a way of seeking to generalize beyond the two hospitals, we show results of the hospitals together. Figure 3 shows the full cost of an average episode of inpatient care at each of the hospitals. It shows that the episode costs more in Holy Cross Hospital. Additionally, being located in a state without Medicaid expansion, the net loss of the hospital in Florida is higher in both dollar and percentage terms than its Connecticut counterpart.

Figure 3. Hospital cost and financing per inpatient experiencing homelessness

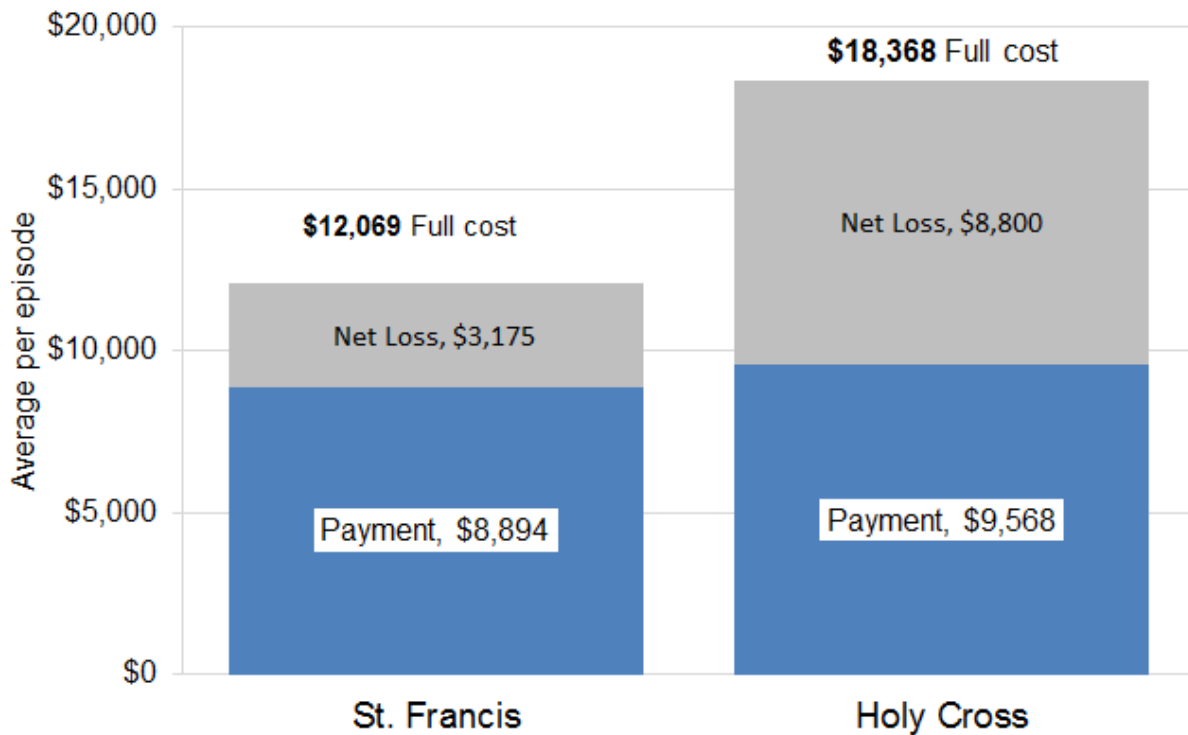
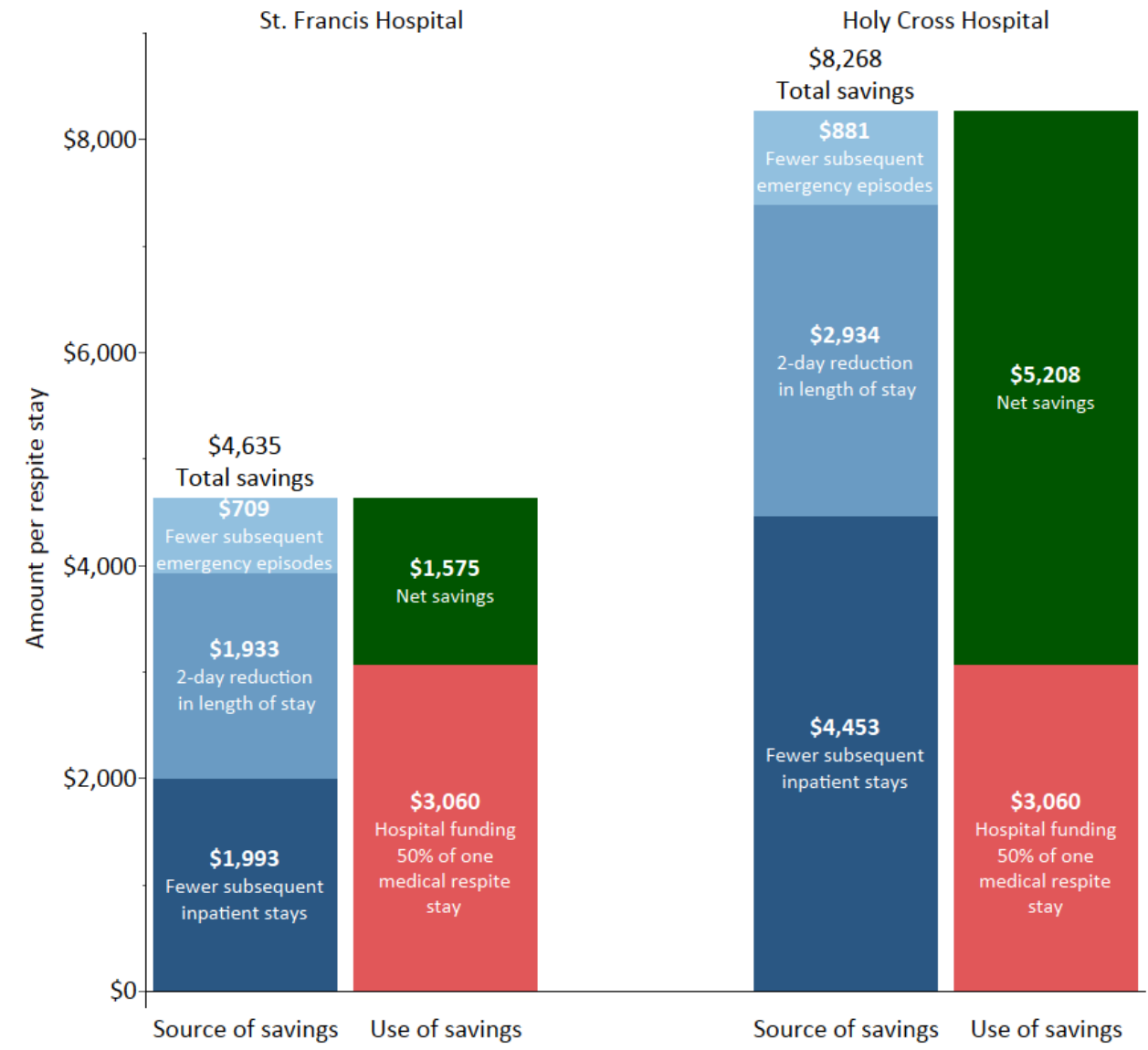


Figure 4 shows the estimated savings and their use per MR admission. Each hospital saves money from three sources: fewer subsequent emergency room episodes after discharge, a 2-day reduction in length of stay, and fewer subsequent inpatient admissions after discharge.

Figure 4. Estimated savings and their use per medical respite admission



DISCUSSION

Both of these hospitals serve their social missions by treating a substantial number of patients experiencing homelessness. The care of these patients must be subsidized from other sources. The specific number of patients experiencing homelessness served increases the more thoroughly the hospital records are searched. At St. Francis Hospital, for example, the search under the word “homeless” in the address field found 99 hospitalizations. When other relevant addresses (those of shelters and the hospital) were added, the number of homeless hospitalizations increased to 142. When homeless discharge diagnoses are added, the number rose to 455. Finally, using the capture-recapture

technique to adjust for patients experiencing homelessness who were not identified, the projected number of hospitalizations rose to 665. The technique also raised the estimated number of outpatients treated by the hospital. The projected 3,328 care episodes of patients experiencing homelessness at St. Francis represents 5 episodes for each of the hospital's 617 beds.

Even though almost all of the patients experiencing homelessness at St. Francis had an expected payment source, the hospital lost money on their care as the reimbursement was low in relation to the cost of their care. Overall, revenues average 58.3% of costs overall and 56.1% of costs for Medicaid clients. For outpatients, reimbursement is even lower, being 45.2% of costs overall and just 40.6% for Medicaid enrollees.

Results from the standardized model show several types of savings throughout the health care system. An MR program with excellent coordination between the hospital and the MR program would plausibly achieve a 2-day reduction in length of stay. Staff at Yale New Haven Hospital and its associated MR program at Columbus House have not yet seen a reduction in inpatient length of stay of patients experiencing homelessness compared to the period before the opening of MR (Ferry M, personal communication, July 5, 2016). However, Columbus House has not previously had medical personnel on its staff, but sees the potential for future reductions. On this assumption, MR could save an estimated \$1,933 on index admissions of patients experiencing homelessness at St. Francis. If the acute care hospital did not have to pay for the MR program, the savings would substantially reduce the loss that the hospital currently incurs.

Figure 4 presents the cost per case for both hospitals. The projected downstream impacts of MR on subsequent inpatient and outpatient episodes involve considerable uncertainty. Here, we have taken the direct before and after comparisons and applied them for a one-year period. Other factors could make the true value higher or lower than this estimate. The factor leading to true savings being even higher is the expectation that an MR program could have benefits longer than one year. Besides addressing the current illness, a structured MR program seeks to connect clients to a medical home for primary care (shifting long-term utilization habits from inappropriate emergency room visits to preventative primary care visits), engage clients in smoking cessation, strengthen their self-confidence and care management skills, and try to get them placed in permanent supportive housing. Successes along these dimensions would likely persist for many years. On the other hand, our before and after comparisons may be overstated due to regression to the mean, as clients generally entered MR at a point of high utilization. For the present analysis, we have assumed that these two concerns would offset one another.

This business case found that regardless of state's Medicaid expansion, both payers and hospitals would benefit financially if the costs of an MR program were shared roughly equally between these stakeholders.

In addition to savings realized directly by hospitals from MR, some risk-based payment models can share the payers' savings with the hospitals that help generate them. Next Generation ACOs, for example, will pay providers 80% to 100% of generated savings as additional revenue.³ Although only a small portion of people experiencing homelessness are Medicare beneficiaries, the revenue generated from a Medicare Next Generation ACO is likely relatively small. Some Medicaid contracts may have similar arrangements, thereby generating greater additional revenue. The savings and revenue are in addition

to the contribution of MR to the health and social wellbeing of people experiencing homelessness and the community service goals of hospitals and payers.

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APPENDIX 1: DETAILED METHODS

Study hospitals

As noted in the main text, Trinity HealthCare selected two hospitals in its network for site-level analysis: St. Francis Hospital (Hartford, CT) and Holy Cross Hospital (Ft. Lauderdale, FL). St. Francis Hospital, located at 114 Woodland St., Hartford, CT 06105, is a 617-bed acute care Catholic hospital (see Figure A1). Holy Cross Hospital, located at 4725 N. Federal Highway, Ft. Lauderdale, FL 33308, is a 557-bed acute care Catholic hospital (see Figure A2). With Connecticut being a Medicaid expansion state and Florida not, the two hospitals represent a range of contexts for this study. Staff of Yale New Haven Hospital, who have developed detailed procedures for identifying patients experiencing homelessness and examining service utilization, provided additional methodological insights.

Figure A1. St. Francis Hospital



Figure A2. Holy Cross Hospital



Number of care episodes of patients experiencing homelessness

We first estimated the number of patients experiencing homelessness treated in the latest one year period with data for both hospitals: the year ending April 30, 2016. To do this we employed the capture-recapture technique, which allows us to estimate the total size of a population based on the size and overlap between two independent samples.⁴ Both hospitals began to identify these independent samples by using information from their medical record system to identify patients experiencing homelessness. St. Francis first searched for the word “homeless” in its Epic electronic medical record system; and Holy Cross, the code 17^{iv} in its Meditech electronic medical record system. St. Francis subsequently expanded the registration search by checking for patients whose address on record

^{iv} Code 17 is used at Holy Cross Hospital to identify patients experiencing homelessness.

corresponded to the address of a homeless shelter in the greater Hartford area, or the hospital's address. Holy Cross's staff were unable to search by address.

The second apparently independent sample relied on identifying patients experiencing homelessness via the diagnosis code (V60 in ICD-9 or Z59 in ICD-10). These codes are generally completed by the responsible provider on discharge. Both St Francis and Holy Cross have been able to use this approach. Within each type of episode (inpatient and ambulatory), we considered the two approaches as independent as the information came from different medical professionals with separate interaction with the patient at different points during the episode care. Thus, we implemented the capture-recapture technique with data from each hospital by type of episode, and then summed across types of episode. This allowed us to estimate the total number of episodes of people experiencing homelessness at each hospital (including those that had not been identified as such).

Potential financial savings

To describe the current costs of treatment for patients experiencing homelessness, patients were categorized by financial category, such as Medicaid or self-pay. The hospitals reported charges and, where available, revenues and costs.

As noted in the main text, to estimate the potential savings on inpatient admissions, we calculated the resource use associated with "extra days" attributed to homelessness that might be eliminated by an MR program. Based on expert opinion, consistent with data from Yale New Haven Hospital, we estimated that patients experiencing homelessness were hospitalized for two days longer than housed patients with comparable diagnoses (Michael Ferry, Janis Bozzo, unpublished data from Yale New Haven Hospital, Aug. 2016). The associated financial implications were measured as the associated charges and direct costs (reported directly) and as estimated total costs (derived through the ratio of inpatient costs to charges). We examined overall costs and utilization with the concept of bed-day equivalents, where one hospital outpatient visit is counted as 0.32 bed-day equivalents.¹⁷

To project the financial impact of changes in utilization from MR, we estimated the average unit cost per inpatient and outpatient episode. We used data from diagnostic categories that were treated entirely in a single setting (either inpatient or outpatient), excluding categories that were managed in both settings. We merged these unit costs with utilization data to estimate the one-year projected savings in health systems' costs following an MR episode. Finally, we conducted sensitivity analyses to reflect the possible distribution of the costs of MR between the hospital that typically treats patients experiencing homelessness and the payer.

APPENDIX 2: ADDITIONAL RESULTS - ST. FRANCIS HOSPITAL

Numbers and characteristics of care episodes

Table A1 shows the breakdown of patients experiencing homelessness at St. Francis based on the initial registration information. It uses the bed-day equivalent as a unit of care combining both inpatient and outpatient services, with weights derived from a review of hospital costs.¹⁷ Almost all of the care (83.1% of the bed-day equivalents) was for Medicaid beneficiaries. Although the hospital was paid for treating Medicaid patients, Medicaid reimbursement covered only 57% of the costs. For Medicaid patients experiencing homelessness the average cost was \$1,871 per bed-day equivalent.

Table A1. Stay episodes in St Francis Care, Hartford, CT by financial group with "homeless" in address field (May 1, 2015-April 30, 2016)

Payer (Financial Class)	Private (Blue Cross, Commercial, Managed Care)	Medicaid	Medicare Managed Care	Other Welfare	Self Pay	Total
<u>Stays</u>						
Inpatient stays	3	83	11	2	0	99
Out-patient stays	4	441	38	3	15	501
Inpatient bed days	18	473	73	5	0	569
Bed-day equivs*	19.28	614.12	85.16	5.96	4.80	729.32
<u>% distribution</u>						
Inpatient stays	3.0%	83.8%	11.1%	2.0%	0.0%	100.0%
Out-patient stays	0.8%	88.0%	7.6%	0.6%	3.0%	100.0%
Inpatient bed days	3.2%	83.1%	12.8%	0.9%	0.0%	100.0%
<u>Financial aggregate amounts</u>						
Aggregate charges	\$69,384	\$3,426,849	\$365,670	\$34,602	\$72,925	\$3,969,430
Aggregate costs	\$27,478	\$1,148,977	\$147,669	\$9,979	\$10,972	\$1,345,075
Aggregate net revenue	\$30,095	\$651,590	\$97,737	\$4,854	\$333	\$784,609
Aggregate net margin	\$2,618	-\$497,387	-\$49,932	-\$5,125	-\$10,639	-\$560,465
Avg. LOS	6.00	5.70	6.64	2.50	0.00	5.75
Cost as % of charges	39.6%	33.5%	40.4%	28.8%	15.0%	33.9%
Net revenue as % of charges	43.4%	19.0%	26.7%	14.0%	0.5%	19.8%
Net revenue as % of costs	109.5%	56.7%	66.2%	48.6%	3.0%	58.3%
Average charge per day equiv	\$3,599	\$5,580	\$4,294	\$5,806	\$15,193	\$5,443
Average cost per day equiv	\$1,425	\$1,871	\$1,734	\$1,674	\$2,286	\$1,844
Average revenue per day equ	\$1,561	\$1,061	\$1,148	\$814	\$69	\$1,076
Payer % of bed-day equiv.	2.6%	84.2%	11.7%	0.8%	3.0%	100.0%
Payer % of charges	1.7%	86.3%	9.2%	0.9%	1.8%	100.0%
Payer % of costs	2.0%	85.4%	11.0%	0.7%	0.8%	100.0%
Payer % of revs	3.8%	83.0%	12.5%	0.6%	0.0%	100.0%
Payer % of net losses	-0.5%	88.7%	8.9%	0.9%	1.9%	100.0%

*Each outpatient visit weighted as 0.32 bed day equivalents, based on Shepard et al (2000), *Hospital*

Notes: Equiv and Equ denotes equivalent; Avg. denotes average; LOS denotes length of stay; revs denotes revenues.

Table A2 lists the leading diagnoses at St. Francis Hospital. The ranking is based on the number of episodes, summing inpatients and outpatients. The ranking depends in part in the way that diagnoses are grouped. Thus all of the top five categories contain the word “unspecified,” indicating the breadth of these residual categories. It is noteworthy that all of the top five categories relate to behavioral health, confirming the prominence of these conditions among patients experiencing homelessness.

Table A2. Leading diagnoses at St. Francis Hospital, ranked by number of episodes`with address as "homeless"

Rank	Diagnosis code & name	In- patients	Days	Out- patients	Epi- sodes	Charges	Total Cost	Net Revenue
1	F10.129 Alcohol abuse with intoxication,	0	0	21	21	80,255	15,368	6,558
2	F10.10 Alcohol abuse, uncomplicated	0	0	15	15	57,619	11,082	4,218
3	303.00 AC Alcohol intox- unspec	0	0	12	12	51,882	11,168	4,061
4	305.00 Alcohol abuse- unspec	0	0	12	12	53,020	11,144	4,314
5	F20.9 Schizophrenia, unspecified	2	17	10	12	83,985	35,674	19,270
	All	99	569	501	600	3,969,430	1,345,075	784,609

Notes: unspec denotes unspecified

Table A3 shows the breakdown of care by setting at St. Francis Hospital. As the table was derived from the combined breakdown by diagnosis and settings, it shows three settings: inpatient, mixed, and outpatient. Mixed diagnoses were those that applied to both inpatient and outpatient episodes of patients experiencing homelessness. This breakdown shows that costs are a higher percentage of charges for inpatient care than for outpatient care. It also shows that inpatient care is better reimbursed: revenue as a percentage of costs is higher for inpatient care compared to outpatient care. The cost per bed-day equivalent is relatively similar between outpatient and inpatient services, \$2,246 vs. \$1,742, respectively.¹⁷

Table A3. Breakdown of episodes by setting with patient's address as "homeless", St. Francis Hospital

Set- ting	In- pts	Out- Days	Out- pts	Charges	Total Cost	Net Revenue	Avg LOS	Bed- day*	Cost %	Net rev %	Rev %	Cost/ bed- day eq
<u>All financial categories</u>												
Outpt	0	0	444	\$1,623,101	\$319,171	\$144,281	0.0	142	19.7%	8.9%	45.2%	\$2,246
Mixed	40	246	57	\$1,095,843	\$463,230	\$273,628	6.2	264	42.3%	25.0%	59.1%	\$1,753
Inpt	59	323	0	\$1,250,487	\$562,674	\$366,700	5.5	323	45.0%	29.3%	65.2%	\$1,742
Total	99	569	501	\$3,969,430	\$1,345,075	\$784,609	5.7	729	33.9%	19.8%	58.3%	\$1,844
<u>Medicaid patients</u>												
Outpt	0	0	387	\$1,401,568	\$284,445	\$115,594	0.0	124	20.3%	8.2%	40.6%	\$2,297
Mixed	37	227	54	\$1,017,537	\$428,487	\$257,791	6.1	244	42.1%	25.3%	60.2%	\$1,754
Inpt	46	246	0	\$1,007,744	\$436,045	\$278,205	5.3	246	43.3%	27.6%	63.8%	\$1,773
Total	83	473	441	\$3,426,849	\$1,148,977	\$651,590	5.7	614	33.5%	19.0%	56.7%	\$1,871

*Each outpatient visit as weighted as 0.32 bed day equivalents, based on Shepard et al (2000), *Hospital Costs*.

Notes: Inpt denotes inpatient; Outpts denotes outpatients; Avg denotes average; LOS denotes length of stay; chrgs denotes charges; rev denotes revenues; eq denotes equivalent

If bed-day equivalent were a perfect measure of hospital resource use, then the cost per bed-day equivalent would be identical between inpatient and outpatient settings. The similarity in unit costs per bed-day equivalent between inpatient and outpatient settings indicates that the bed-day equivalent was a reasonably good indicator of a unit of service in this study (Table A3). Cost patterns in mixed settings were, as expected, intermediate between outpatient and inpatient settings.

Potential downstream impacts on health systems costs

Table A4 shows the capture-recapture analysis by setting.

Table A4. Application of 'capture-recapture' method to estimating number of care episodes to patients experiencing homelessness, St. Francis*

Homeless diagnosis*	<u>Address "Homeless" or Shelter</u>			<u>Application of capture-recapture</u>			
	No	Yes	Total	Number of identified encounters	Number of projected encounters	Expansion factor from identified encounters	Expansion factor from address
<u>Inpatients</u>							
No	Unknown	57	57				
Yes	313	85	398				
Total	313	142	455	455	665	1.5	4.7
<u>Outpatients</u>							
No	Unknown	838	838				
Yes	109	55	164				
Total	109	893	1002	1,002	2,663	2.7	3.0
<u>Combined</u>							
No	Unknown	895	895				
Yes	422	140	562				
Total	422	1035	1457	1,457	3,328	2.3	3.2

* Notes: ICD9-V60 or ICD10-Z59.

<u>Address sources</u>	<u>Number</u>	<u>%</u>
Word "homeless"	629	19%
Word "shelter" or a shelter address	406	12%
Subtotal: all address fields	1,035	31%
Diagnosis code, excluding previously identified	422	13%
Subtotal: all identified patients	1,457	44%
Projected total	3,328	100%

The upper panel in Table A5 shows the average cost of inpatient and outpatient episodes at St. Francis Hospital based on episodes identified by searching for “homeless” in the address field. Because the hospital’s net revenue is below its cost, the hospital incurs a loss on each episode of care provided to a person experiencing homelessness. This loss occurs even if that patient is covered by Medicaid and the hospital receives the Medicaid reimbursement. For all payers, reimbursement for an average inpatient and outpatient episode covers only 65% and 45% of the costs, respectively. For Medicaid clients, these percentages are slightly lower. The lower panel in Table A5 shows the aggregate amounts based on projected episodes. Table A6 shows the details of the impact of a 2-day reduction in length of stay and Table A7 the details of the impact of an MR episode.

Table A5. Average and aggregate amounts by type of episode, St. Francis Hospital

Financial class	Charges	Cost	Net revenue	% of cost	Savings or loss	(N)
<u>Average per inpatient admission</u>						
All	\$21,195	\$9,537	\$6,215	65%	-\$3,322	59
Medicaid	\$21,907	\$9,479	\$6,048	64%	-\$3,431	46
<u>Average per outpatient episode</u>						
All	\$3,656	\$719	\$325	45%	-\$394	444
Medicaid	\$3,622	\$735	\$299	41%	-\$436	387
<u>Aggregate amounts based on projected episodes</u>						
Inpatient	\$14,094,467	\$6,342,007	\$4,133,147	65%	-\$2,208,860	663
Outpatient	\$9,734,950	\$1,914,304	\$865,361	45%	-\$1,048,944	2,663
Total	\$23,829,417	\$8,256,311	\$4,998,508	61%	-\$3,257,803	3,328

Table A6. Projected impact of a 2-day reduction in length of stay (LOS) of eligible hospitalizations, St. Francis Hospital

Financial Class	Elig- ible inpt.	Avg. LOS	Net Reve- nue	Charges	Direct Cost	Full com- plete cost*	Last 2 days: charges	Last 2 days: direct cost	Last 2 days: complete cost	Savings (loss) complete stay	Savings in direct costs (2 last days)	Savings in complete costs (2 last days)
Medicaid												
All Medicaid	329	7.0	\$8,841	\$26,211	\$5,500	\$11,795	\$4,370	\$1,048	\$1,967	-\$2,953	-\$1,906	-\$987
Medicare												
Medicare	62	8.8	\$7,849	\$24,779	\$5,818	\$11,150	\$3,328	\$866	\$1,498	-\$3,301	-\$2,435	-\$1,803
Medicare Managed Care	15	11.1	\$15,006	\$58,876	\$12,347	\$26,494	\$4,231	\$1,095	\$1,904	-\$11,488	-\$10,393	-\$9,584
Other												
Blue Cross	1	8.0	\$6,888	\$20,635	\$5,400	\$9,286	\$2,693	\$805	\$1,212	-\$2,398	-\$1,593	-\$1,186
Managed Care	6	6.8	\$9,129	\$18,966	\$4,830	\$8,534	\$3,088	\$919	\$1,390	\$594	\$1,514	\$1,984
Other Welfare	11	7.2	\$7,955	\$17,172	\$4,144	\$7,727	\$8,410	\$2,294	\$3,785	\$228	\$2,522	\$4,012
Self Pay	1	8.0	\$0	\$30,239	\$6,269	\$13,608	\$3,441	\$649	\$1,548	-\$13,608	-\$12,959	-\$12,059
All	425	7.4	\$8,894	\$26,820	\$5,745	\$12,069	\$4,296	\$1,052	\$1,933	-\$3,175	-\$2,123	-\$1,242

*Complete cost (including indirect costs) was estimated from the finding that inpatient cost averaged 45.0% of inpatient charges.

Notes: Inpt denotes inpatient; LOS denotes length of stay.

Table A7. Financial analysis of medical respite per episode (St. Francis Hospital).

Hospital episode	Monthly utilization per medical respite recipient				Annual Reduction	Cost per episode		Annual savings to stakeholder	
	Before	After	Change	Hospital		Payer	Hospital	Payer	
Inpatient episode	0.13	0.08	-0.05	0.60	\$3,322	\$6,215	\$1,993	\$3,729	
Outpatient episode	0.33	0.18	-0.15	1.80	\$394	\$325	\$709	\$585	
Shorter hospitalization							\$1,933	\$0	
Medical respite stay (50% each)					\$3,060	\$3,060	-\$3,060	-\$3,060	
Total							\$1,575	\$1,254	

Sensitivity analyses

Figure A3 presents a sensitivity analysis exploring alternative divisions of the cost between the hospital and the payer or funder (e.g., Medicaid) for St. Francis. The left axis corresponds to the scenario where all of the cost of MR is covered by the payer or funder, and none by the hospital. As the share covered by the hospital increases, the payer's savings increase while the hospital's savings decline. When the hospital's share crosses 30%, the payer achieves positive savings. However, once the hospital's share reaches 75%, the hospital's savings drop to zero and then become negative.

Thus, if the costs of MR are divided so that the hospital's share is between 30% to 75% of the costs (so the payer's share is 25% to 70%), then both parties realize financial savings from MR. At the approximate midpoint (hospital and payer each fund 50% of the costs of MR), the hospital saves \$1,575 while the payer gains \$1,254 per MR admission.

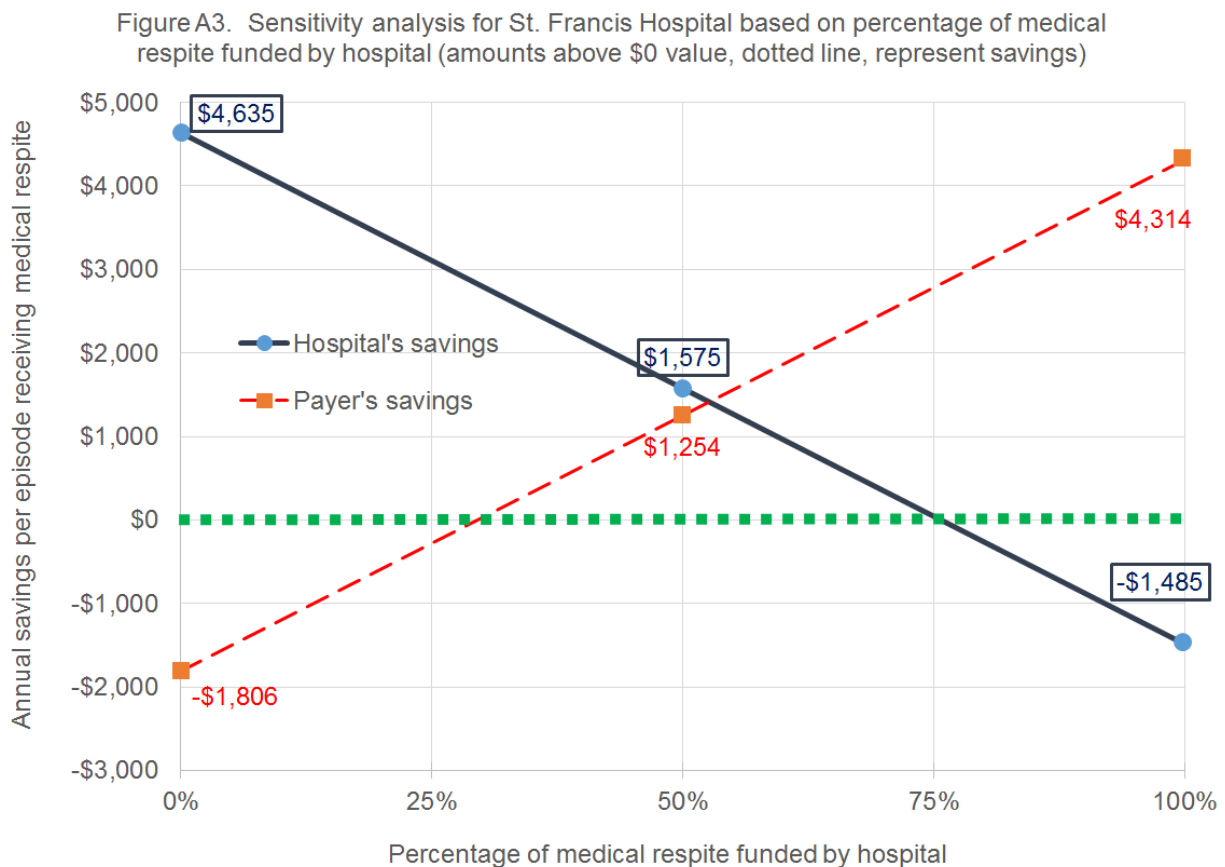
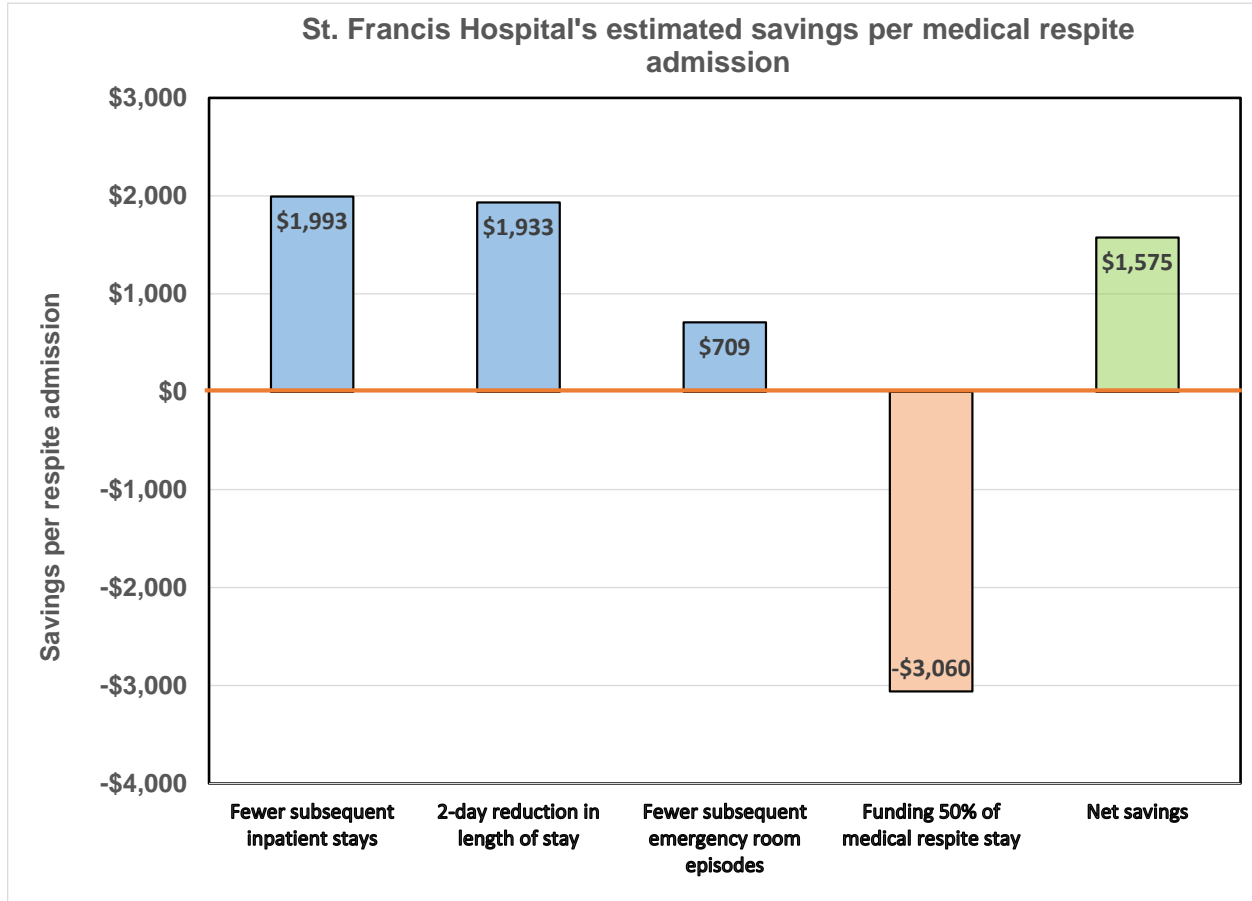


Figure A4 summarizes St. Francis Hospital's estimated savings per MR admission assuming the hospital pays 50% of the cost of an MR stay. After paying this share, the hospital saves \$1,575 per MR admission through reduced losses from fewer subsequent inpatient admissions, a shorter index stay, and fewer subsequent emergency room episodes. Assuming payers (such as Medicaid and other insurers) paid the

remaining 50% share of an MR stay, they would still save \$1,254 per MR admission through their share of savings from fewer subsequent inpatient admissions and emergency room episodes.

Figure A4



APPENDIX 3: ADDITIONAL RESULTS FROM HOLY CROSS HOSPITAL

Table A8 shows the financial data of the 951 identified episodes of patients experiencing homelessness by financial class for Holy Cross. Medicaid represents 25% of the charges. The absence of Medicaid expansion in Florida limits eligibility, so a smaller share of patients experiencing homelessness were covered by Medicaid than found in the case study in Connecticut, a Medicaid expansion state. Thus, the hospital's safety net was much larger, with charity and self-pay representing 27% and 6%, respectively, of adjusted charges.

Table A8. Payments as a percent of charges for patients experiencing homelessness at Holy Cross Hospital (n=951 episodes)

Financial class	Explanation	Payments & insurance balance	Charges	% of charges	Payments as % of charges
Charity					
CHAR	Charity	\$0	\$2,944,594	27%	0.0%
Medicaid					
MCD	Medicaid	\$153,098	\$1,550,943	14%	9.9%
MCDMNG	Medicaid managed care	\$104,929	\$1,097,591	10%	9.6%
MCDPEND	Medicaid pending	\$4,237	\$54,357	1%	7.8%
Total	Medicaid	\$262,264	\$2,702,891	25%	9.7%
Medicare					
MCR	Medicare	\$437,122	\$2,935,138	27%	14.9%
MCRMNG	Medicaid managed care	\$180,815	\$644,323	6%	28.1%
Total	Medicare	\$617,937	\$3,579,461	33%	17.3%
Self Pay					
SP	Self pay (not fixed fee)	(\$99)	\$679,344	6%	0.0%
SPFF	Self-pay fixed fee	\$5,792	\$21,293	0%	27.2%
Total	Self pay	\$5,693	\$700,637	6%	0.8%
Other					
BC	Blue Cross	\$60,694	\$150,007	1%	40.5%
CH	Champus	\$348	\$5,027	0%	6.9%
CO	Commercial	\$33,079	\$179,264	2%	18.5%
WC	Worker's compensation	\$822	\$1,435	0%	57.3%
U	Unknown	\$0	\$1	0%	0.0%
HM	Health Maintenance Org.	\$346,515	\$584,451	5%	59.3%
Total	Other	\$441,459	\$920,184	8%	48.0%
Grand total	All	\$1,327,353	\$10,847,767	100%	12.2%

Potential downstream impacts on health systems costs

Hospitals incur a loss on each episode of care provided to a person experiencing homelessness because the hospital's net revenue is below its cost for these patients. This loss occurs even if that patient is covered by Medicaid and the hospital receives the Medicaid reimbursement. Table A9 shows the data for Holy Cross Hospital by type of episode. As Florida lacks Medicaid expansion, Medicaid payments cover a smaller share of the costs at Holy Cross than at St. Francis. For inpatient episodes, expected

payments average 52% of complete costs at Holy Cross compared to 65% at St. Francis. We estimate these costs to be around \$7,421 per inpatient episode and \$490 per emergency episode. To show the scale of the burden at Holy Cross hospital we projected the cost and net loss for all episodes identified by the capture-recapture analysis. We estimate that serving people experiencing homelessness costs the hospital \$4.8 million with a net loss of \$2.7 million annually. Table A10 presents the capture-recapture calculations by setting, Table A11 shows details of the impact of a 2-day reduction of length of stay, and Table A12 the detailed financial impact of an MR stay.

Table A9. Financial data and projections at Holy Cross by type of episode

Type of episode	Charges	Complete cost	Expected payment	Exp. pmt. as % of cost	Net loss	(N)
<u>Actual amounts per episode</u>						
Inpatient	\$56,849	\$15,349	\$7,928	52%	\$7,421	150
Emergency	\$2,200	\$594	\$104	18%	\$490	623
Observator	\$5,367	\$1,449	\$413	29%	\$1,036	177
<u>Projected aggregates for all episodes from capture-recapture analysis</u>						
Inpatient	\$13,189,064	\$3,561,047	\$1,839,267	52%	\$1,721,780	232
Emergency	\$3,037,883	\$820,228	\$144,138	18%	\$676,091	1,381
Observator	\$1,685,128	\$454,985	\$129,766	29%	\$325,219	314
Total	\$17,912,075	\$4,836,260	\$2,113,171	44%	\$2,723,089	1,927

*Complete costs are estimated at 27% of charges, based on inpatient data

Notes: Exp denotes expected; pmt denotes payment

Table A10. Application of 'capture-recapture' method to estimating number of homeless patients, Holy Cross*

Homeless diagnosis *	<u>Registration (code 17)</u>			<u>Application of capture-recapture</u>			
	No	Yes	Total	Number of identified encounters	Number of projected encounters	Expansion factor from identified encounters	Expansion factor from code 17
<u>Inpatient</u>							
No	Unknown	40	40				
Yes	74	36	110				
Total	74	76	150	150	232	1.5	3.1
<u>Emergency</u>							
No	Unknown	455	455				
Yes	105	63	168				
Total	105	518	623	623	1,381	2.2	2.7
<u>Observation</u>							
No	Unknown	136	136				
Yes	21	21	42				
Total	21	157	178	178	314	1.8	2.0
<u>Total</u>							
No	Unknown	631	631				
Yes	200	120	320				
Total	200	751	951	951	1,927	2.0	2.6

* Notes: ICD9-V60 or ICD10-Z59.

<u>Address sources</u>	<u>Number</u>	<u>%</u>
Code 17	742	39%
Diagnosis code, excluding previously	209	11%
Subtotal: all identified patients	951	49%
Projected total	1,927	100%

Table A11. Projected impact of a 2-day reduction in length of stay on a hospitalization of 3 or more days, Holy Cross Hospital

Financial Class	Actual hospitalizations						Savings on 2-day reduct.		
	Eligible inpt. stays	Avg. LOS	Net Revenue	Charges	Revenue as % of charges	Complete cost	Surplus (loss) complete stay	On charges	On complete costs
<u>Aggregate amounts</u>									
Charity	32	5.8	\$0	\$1,466,628	0.0%	\$414,545	(\$414,545)	\$271,183	\$91,766
Medicaid	25	11.6	\$211,300	\$2,178,352	9.7%	\$700,362	(\$489,062)	\$223,763	\$87,213
Medicare	38	8.7	\$523,053	\$3,023,429	17.3%	\$718,341	(\$195,288)	\$345,566	\$109,640
Self Pay	14	4.9	\$3,804	\$475,462	0.8%	\$122,028	(\$118,224)	\$104,852	\$32,891
Other	8	8.3	\$381,333	\$794,444	48.0%	\$193,772	\$187,561	\$66,258	\$21,809
All	117	11.9	\$1,119,490	\$7,938,315	14.1%	\$2,149,049	(\$1,029,559)	\$1,011,621	\$343,319
<u>Average amount per inpatient episode</u>									
Charity	32	5.8	\$0	\$45,832	0.0%	\$12,955	(\$12,955)	\$8,474	\$2,868
Medicaid	25	11.6	\$8,452	\$87,134	9.7%	\$28,014	(\$19,562)	\$8,951	\$3,489
Medicare	38	8.7	\$13,765	\$79,564	17.3%	\$18,904	(\$5,139)	\$9,094	\$2,885
Self Pay	14	4.9	\$272	\$33,962	0.8%	\$8,716	(\$8,445)	\$7,489	\$2,349
Other	8	8.3	\$47,667	\$99,305	48.0%	\$24,222	\$23,445	\$8,282	\$2,726
All	117	11.9	\$9,568	\$67,849	14.1%	\$18,368	(\$8,800)	\$8,646	\$2,934

Notes: Hospitalizations of fewer than 3 days were excluded. LOS denotes length of stay.

Table A12. Projected financial impact of one medical respite episode (MR, Holy Cross)

Source of impact	Monthly utilization			Annual	Loss per MR		Annual savings	
	Before	After	Change	utilizatio n per MR	episode	Payer	Hospital	Payer
Fewer subsequent inpatient episodes	0.13	0.08	-0.05	-0.60	\$7,421	\$7,928	\$4,453	\$4,757
Fewer subsequent emergency	0.33	0.18	-0.15	-1.80	\$490	\$104	\$881	\$188
Subtotal							\$5,334	\$4,945
2-day reduction in inpatient stay							\$2,934	\$0
Subtotal savings on hospital utilization							\$8,268	\$4,945
Medical respite stay (payer funds all)								-\$6,120
Total							\$8,268	-\$1,175

Notes: MR denotes medical respite.

Sensitivity analyses

Figure A5 presents a sensitivity analysis exploring alternative divisions of the cost between the hospital and the payer or funder (e.g., Medicaid) for Holy Cross Hospital. The left axis corresponds to the scenario where all of the cost of MR is covered by the payer or funder, and none by the hospital. As the share covered by the hospital increases, the payer's savings increase while the hospital's savings decline. When the hospital's share crosses 19%, the payer achieves positive savings.

At the approximate midpoint (hospital and payer each fund 50% of the costs of MR), the hospital saves \$5,208 while the payer gains \$1,885 per MR admission.

Figure A5. Sensitivity analysis of Holy Cross Hospital based on percentage of medical respite funded by hospital (amounts above \$0 value, dotted line, represent savings)

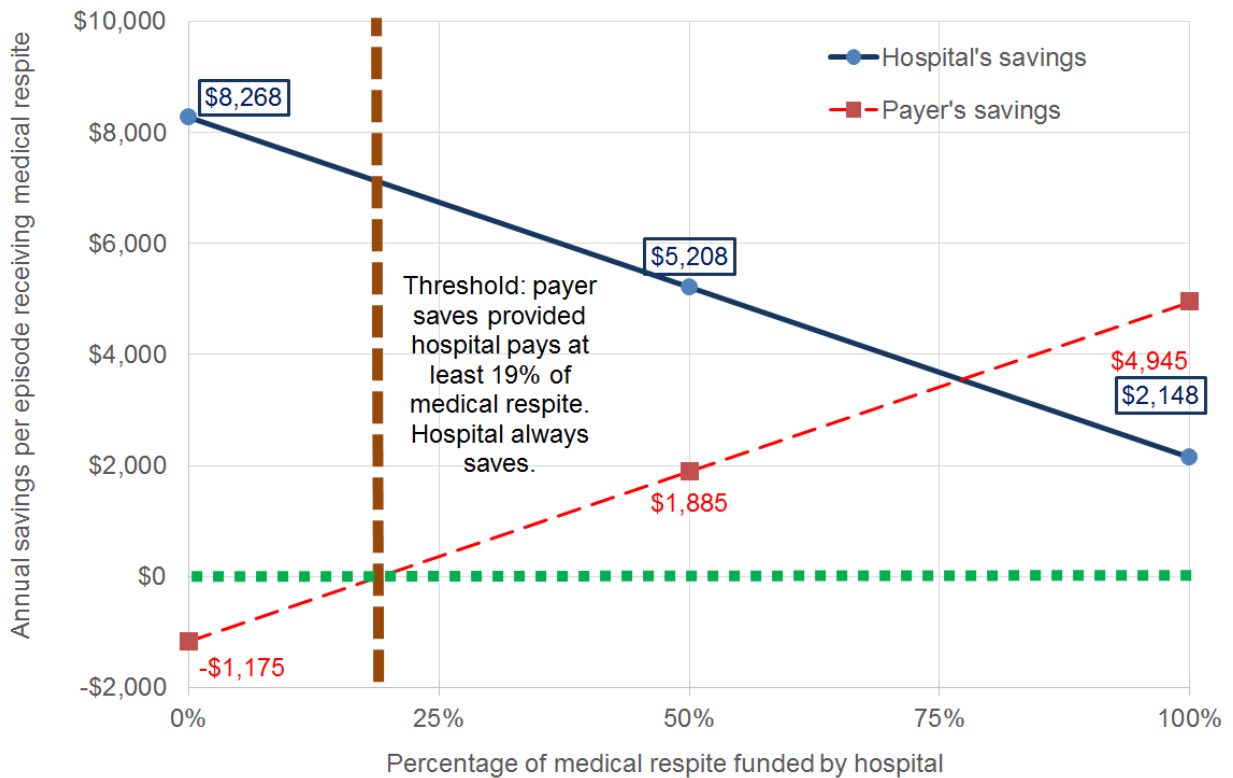
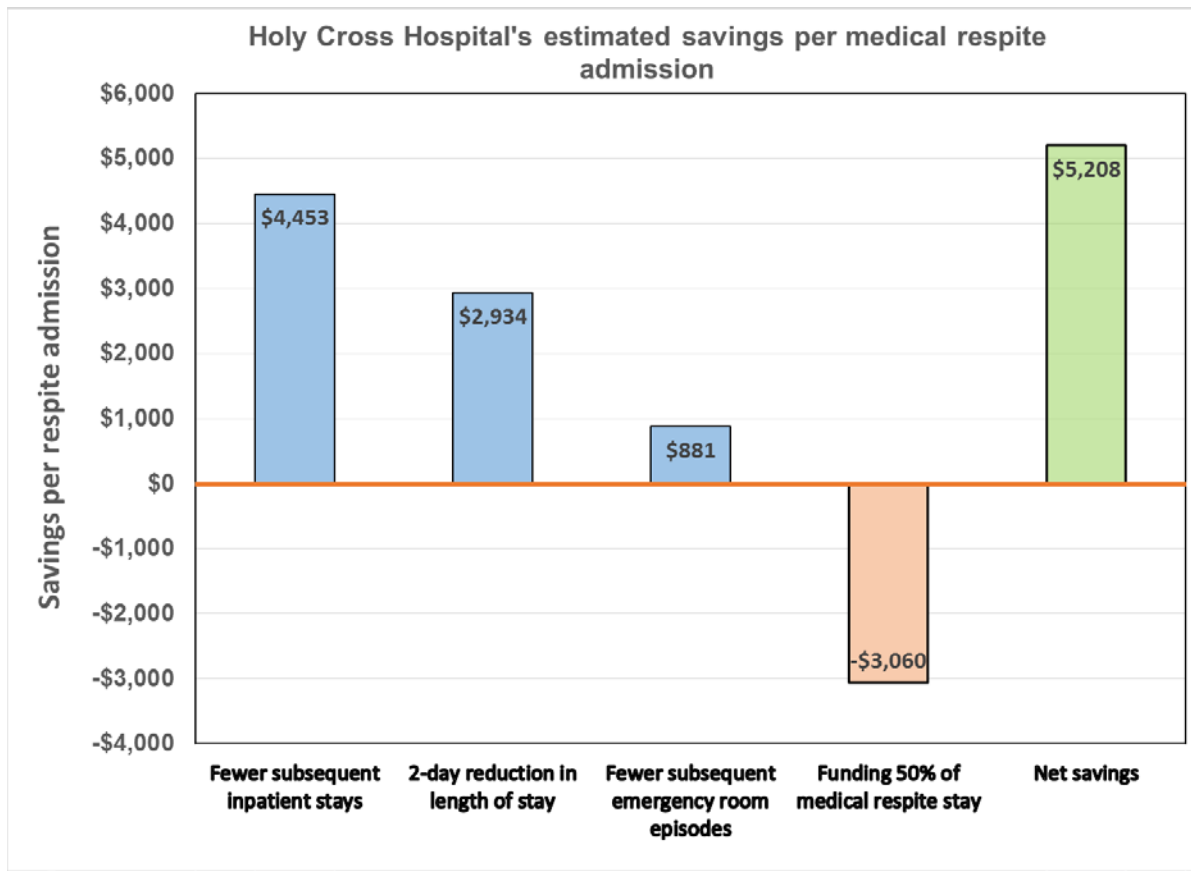


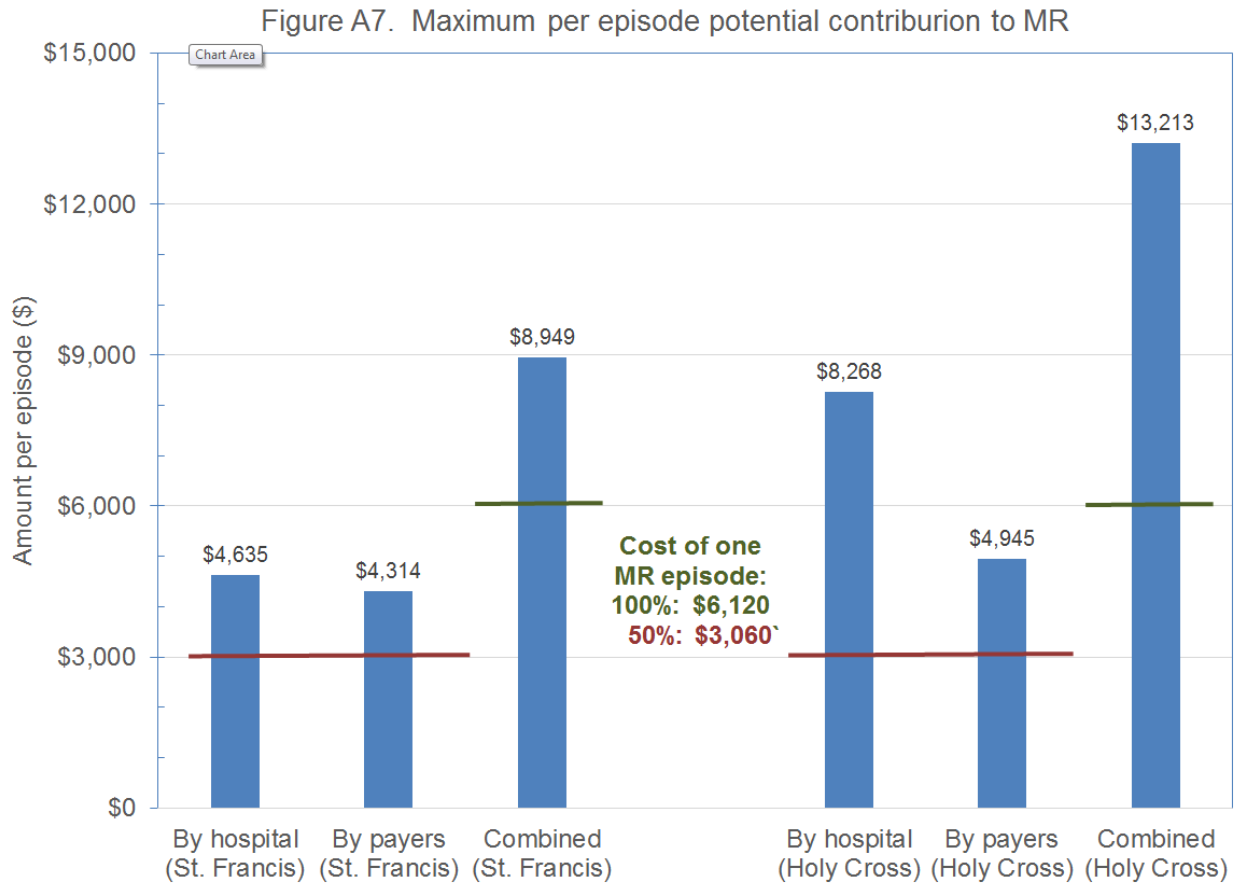
Figure A6 summarizes Holy Cross Hospital’s estimated savings per MR admission assuming the hospital pays 50% of the cost of an MR stay. After paying this share of the cost of MR, the hospital saves \$5,208 per MR admission through reduced losses from fewer subsequent inpatient admissions, a shorter index stay, and fewer subsequent emergency room episodes. Assuming payers (such as Medicaid and other insurers) paid the remaining 50% share of an MR stay, they would still save \$1,865 per MR admission through their share of savings from fewer subsequent inpatient admissions and emergency room episodes.

Figure A6



APPENDIX 4: ADDITIONAL RESULTS FROM COMPARISON

Figure A7 shows the maximum break-even contribution to MR from each stakeholder in each hospital and the combined amount. This contribution represents the amount at which the financial costs would just equal the financial benefits. The horizontal lines for the combined amounts show the full cost of MR, while the separate payers show 50% of this cost. The fact that the maximum contribution exceeds these lines shows that the two payers could afford to support an episode of MR and still gain financially. Furthermore, if the cost were allocated with 50% to each stakeholder, each would gain more than it spends.



Notes: MR denotes medical respite.

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