The Case for Medicare Investment in DME – 2014 Update

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The original study of Medicare payments for DME in 2011 showed that paying for DME for beneficiaries saves Medicare orders of magnitude more than the actual payments it makes for the equipment. That study has now been updated to reflect the dynamic and turbulent three years that have followed. We have seen the launch and then expansion of the competitive bidding program and continued attacks by CMS on payments for power chairs, oxygen therapy and most recently CPAP therapy. While all of these efforts have not yet fully impacted beneficiaries and reliable current data continues to lag the market by significant periods of time, one thing has become clear -- CMS has failed to recognize the leverage of its spending potential. Instead, it is chasing pennies and simultaneously throwing away dollars in Part A payments that could be eliminated by wisely investing in DME. Ironically, as CMS arbitrarily reduces payments for DME, the value of the potential DME investment savings rises. It is time for CMS to change direction and invest in DME and drive Part A payments down dramatically.

Background. Over the past twenty-plus years, The Centers for Medicare & Medicaid Services (CMS) of the U.S. Department of Health & Human Services (HHS) have treated payments for durable medical equipment as a cost burden to be watched over and continually reduced or eliminated. These payments, which comprise 1.5% of overall Medicare spending[1], have been periodically driven downward. CMS has implemented a "competitive bidding" program for DMEPOS (Durable Medical Equipment; Prosthetics; Orthotics; and Supplies) and is now expanding that program across the country. During the 1st round, three things happened: the number of beneficiaries receiving DME dropped; the number of available suppliers was slashed; and CMS claims savings of over 40% in DME payments.[2]

Rather than simply assume that Medicare spending on DME is a cost burden, this study considers both costs of and benefits (i.e., cost avoidance) derived from providing DME to Medicare beneficiaries. Looking at three major categories of DME [mobility equipment, oxygen [O_2] and continuous positive airway pressure [CPAP], the study identifies cost avoidance that results from providing equipment and compares that savings to the direct cost of providing the equipment. While focusing on costs borne directly by Medicare, the study also considers spending by Medicare beneficiaries and their private insurers, which when combined with Medicare spending constitutes the direct expense or cost savings to the overall U.S. healthcare system.

The original study showed that DME dramatically reduces the impact of injuries and other serious medical conditions that would result if the DME was not provided. This reduces the amount Medicare

would otherwise have to pay to treat those conditions in amounts that are orders of magnitude larger than the cost savings that CMS is chasing. The updated study reveals that the gap is growing.

Falls are now the leading cause of unintentional injury and death in the United States among adults aged 65 years and over.[3] When Medicare pays for the mobility DME to Medicare beneficiaries, falls are reduced and significant net spending savings are realized. *Fall avoidance* leads directly to cost *avoidance*. When a fall is avoided, direct Medicare spending for doctor visits, emergency room visits, hospital stays, ambulance transport, rehabilitation and long term care is avoided. The updated study shows that:

- **For every dollar that Medicare currently spends providing mobility DME, Medicare actually avoids spending an additional $16.78 (i.e., a 1678% rate of return) over a five-year equipment life period for fall-related emergency room visits, hospital stays, ambulance transport, rehabilitation and long term care that would result without that equipment**. This number is up dramatically from three years ago, when it was $10.73, and has been driven by significant reductions in Medicare spending for power chairs.

- **The breakeven period based on the first year's return alone is 3.4 months, which suggests that Medicare can self-fund the cost of additional investments in mobility DME during year one of any program out of the direct cost savings from providing the equipment.**

- **Every dollar that Medicare now spends providing mobility DME results in an additional minimum cost savings to Medicare beneficiaries and their private insurers over five years of $2.40, for a total five-year cost avoidance savings of $19.18.**

- **Beyond these direct costs, studies have shown that additional indirect or economic costs (the value of lost wages and labor productivity) for the 65 and older category add another 20% to the total cost of falls.**

COPD is the 2nd leading cause of disability and the 3rd leading cause of death in the United States.[4] Supplemental oxygen therapy is used to treat individuals who have difficulty breathing as a result of COPD. When Medicare pays for supplemental oxygen therapy, the cost of treating medical complications created by COPD drops dramatically and significant net spending savings are realized. The study shows that:

- **For every dollar that Medicare pays to provide supplemental oxygen therapy, Medicare avoids spending $9.62 (i.e., a rate of return of 962%) for treatment of COPD-caused medical complications in that year that would result if the oxygen therapy was not provided**.[5]

- **The breakeven period for this return, since all of return is realized in the first year, is 1.2 months, which suggests that Medicare can self-fund the cost of additional payments for supplemental oxygen therapy during year one of any program out of the direct cost savings from providing oxygen therapy to those who medically qualify.**

- **Every dollar that Medicare now pays to provide supplemental oxygen therapy results in an additional minimum cost savings to Medicare beneficiaries and their private insurers in the first year of $5.25, for a total cost one-year avoidance savings of between $14.87.**

- **Data that was not available at the time of the original study shows that the government had previously dramatically understated its spending on COPD treatment as a generation of smokers reached Medicare age and brought with them the medical costs of years of smoking. Data released since the original study shows that the potential cost saving estimated in that report was understated.**

Obstructive Sleep Apnea (OSA) occurs in 70% of men over 65 and 56% of women over 65.[6] OSA is also a contributing factor in coronary artery disease, congestive heart failure, atrial fibrillation, stroke and other serious medical conditions. Continuous positive airway pressure (CPAP) therapy is used to treat individuals who have breathing interruptions and sleep disruptions as a result of OSA. CPAP therapy has been shown to significantly decrease the medical costs related to treatment of coronary artery disease, congestive heart failure, atrial fibrillation and stroke. When Medicare pays for CPAP therapy, the cost of treating a myriad of medical complications created by OSA drops dramatically and significant net spending savings are realized. The study shows that:

- **For every dollar that Medicare pays to provide CPAP therapy, Medicare avoids spending a minimum of $6.73 (i.e., a rate of return of 673%) for treatment of OSA-caused medical complications in that year that would result if the CPAP therapy was not provided**.

- **The breakeven period for this return is 1.8 months, which suggests that Medicare can self-fund the cost of additional payments for CPAP therapy during year one of any program out of the direct cost savings from providing CPAP therapy to those who medically qualify.**

- **Every dollar that Medicare now pays to provide CPAP therapy results in an additional minimum cost savings to Medicare beneficiaries and their private insurers in the first year of $1.35, for a total annual cost avoidance savings of $8.07.**

- **In the past three years, the saving potential for CPAP has risen slightly as the number of beneficiaries receiving treatment has risen while Part A expenses for some of the OSA complications have dropped, reflecting the nationwide efforts to recognize and treat heart-related problems earlier and more often.**

Introduction. The CMS have historically been pressured to cut the cost of providing durable medical equipment (DME) to Medicare beneficiaries. The Government Accountability Office (GAO) and HHS's Office of Inspector General (OIG) have regularly applied pressure on CMS for decades to manage reimbursements and lower overall costs. When HHS and GAO recommend a cost reduction initiative or a new cost savings program, they typically promote the cost savings that will be realized by Medicare beneficiaries, rationalizing that their 20% co-pays will be reduced as part of the initiative.[7] With the continual focus on the **cost** of providing essential DME to those in need and at risk in the Medicare population, the value of providing DME and the cost **benefit** that results is typically overlooked, ignored or not adequately considered.

This study analyzed three areas of DME that constitute a significant portion of Medicare spending in this overall category – mobility equipment (e.g., wheelchairs, walkers and power chairs); oxygen [O_2] therapy; and continuous positive airway pressure [CPAP] therapy. For each area, a model was developed to analyze annual Medicare spending and to project the annual spending savings benefit that results from providing equipment and supplies.[8] This savings also applies to any future investments to provide more DME equipment to those Medicare beneficiaries at risk in the analyzed areas.

Mobility Equipment

Overview. When a Medicare beneficiary falls, a resulting chain of events is triggered. This chain can include numerous links which are both (a) medical treatment events and (b) Medicare spending events. Approximately one-third of all Medicare beneficiaries fall at least once each year, and at least 25% of those falls result in serious injuries requiring treatment by a doctor, clinic or emergency room [ER]. ER visits for falls in 2012 numbered 8,974,752, of which 2,422,463 were Medicare beneficiaries.[9] Medicare pays for these treatments.

Over 25% of those who visit the ER for a fall are admitted for a hospital stay. After a set deductible, Medicare pays for these stays. A significant portion of those patients are transported to the ER/hospital by a Medicare-funded ambulance. Medicare pays the bulk of this cost. Almost half (45.5%) of these fall patients also see a doctor or visit a clinic before going to the ER, see their personal doctor while in the ER or once admitted, or see a doctor or go to a clinic to address their fall injuries in lieu of an ER visit. Medicare pays for these visits.

Over half (55.6%) of those admitted to a hospital are discharged to a rehabilitation facility or skilled nursing facility for recovery and transported there by Medicare-funded ambulance. Medicare pays for twenty days of rehab. Approximately one in five Medicare beneficiaries hospitalized for a fall requires a longer stay in a nursing home/skilled nursing facility to recover from the fall injuries and be able to return home. Medicare pays for the first 20 days of the stay. After the first twenty days, Medicare pays a substantial portion of the next 80 days' stay. Every step along the path to recovery, Medicare pays, through Parts A and B, but mostly through Part A.

Discussion. Numerous studies have been conducted over the years attempting to assess elements of the cost matrix of falls and to analyze attempts to reduce falls. To date, there is no single source document that comprehensively lays out the cost analysis of Medicare falls and the impact of DME on fall costs. To accomplish this, one must construct a model that incorporates information from a large number of disparate data points, studies, surveys and research that span over two decades.

All portions of the study incorporate data from a wide variety of sources. Our research focused on identifying the most reliable data available. In many cases, the most relevant data was not the most current. Commonly available Consumer Price Index [CPI] data (published by the Federal Reserve Bank of Minneapolis)[10] and Census Bureau population data and projections were employed to adjust data to a common year for analysis. When multiple data sources were available, the author used all available information and best analytical judgment to select the data source to be used. In a few instances, no identifiable data was uncovered. In these instances, the author has used his best judgment to select estimates expected to conservatively understate outcomes. This approach is purposeful and is intended to obtain overall results that are supportable and conservative in nature and not skewed toward any particular conclusion.

The model described here does not attempt to incorporate every cost associated with Medicare beneficiary falls. Such a model would be an interesting exercise in frustration designed to quantify cost numbers to extreme levels not particularly useful in addressing the important issues – **do Medicare's payments for mobility DME make sense financially and what is the order of magnitude of any overall cost savings that results?**

The model includes key direct cost estimates for the major Medicare cost elements of the fall-triggered chain of events: emergency room visits; hospital admissions; ambulance service; doctor and clinic visits; rehabilitation following hospital discharge; and stays in long-term nursing facilities required to reacquire mobility and be able to go back home. For each element, it calculates the estimated annual Medicare payments based on available data on number of falls and the resulting use of facilities. After calculating the Medicare payments, the model also considers fall-related costs that will need to be paid for by co-pays, deductibles and non-covered expenses. These costs are typically borne directly by Medicare beneficiaries or by a secondary insurer. They are none the less real costs that add to the burden on the U.S. healthcare system and are costs that would be avoided simultaneously with any Medicare payment savings achieved.

The model, which is explained and described in greater detail in the *Mobility Equipment Model* section, calculates an annual Total Medicare Payments for Falls, which comprises the payments for ER visits and the cascading care spending that result, including Medicare spending on hospital admissions, doctor/clinic visits, ambulance trips, rehabilitation facility admissions and long term skilled nursing facility stays.

Dividing the Total Medicare Payments for Falls by the number of falls yields an average overall payment by Medicare for each Medicare patient fall. Based on available data estimating the number of falls avoided by providing DME mobility equipment and on a projected average useful life for the DME provided, the model calculates the value of Medicare Falls Payments Avoided over the equipment life.

Comparing this number to the total cost of the equipment provided, a ratio of Medicare Payment Savings per dollar invested in medical mobility equipment is derived.

Simply stated, this ratio shows the number of dollars saved by Medicare each time it invests $1 on providing mobility DME to Medicare beneficiaries.

Finally, a second ratio is calculated to project to the overall Healthcare System Payment Savings saved by every Medicare dollar invested in medical mobility equipment.

This ratio adds back the co-pays, deductibles and the long term cost for recovery in skilled nursing facilities that is not paid for by Medicare (i.e., the cost of stays past day 100 for those Medicare patients who require an extended stay in a skilled nursing facility to recover from the fall injuries and be able to return home). These are all real, direct costs paid by Medicare beneficiaries and their insurers.

Mobility Equipment Model. The model to calculate the Total Medicare Falls Payments (MP_{Falls}) for mobility equipment consists of six elements, identified in the model equation:

$$MP_{Falls} = \Sigma \left(\underset{①}{MP_{Falls\text{-}ER}} + \underset{②}{MP_{Falls\text{-}Hosp}} + \underset{③}{MP_{Falls\text{-}Doctor}} + \underset{④}{MP_{Falls\text{-}Amb}} + \underset{⑤}{MP_{Falls\text{-}Rehab}} + \underset{⑥}{MP_{Falls\text{-}LTC}}\right)$$

① This element calculates Medicare-funded emergency room payments as a percentage of overall Medicare payments for falls in 2014 dollars.[11]

② This element calculates Medicare payments for hospital stays as a percentage of overall Medicare payments for falls in 2014 dollars.[12]

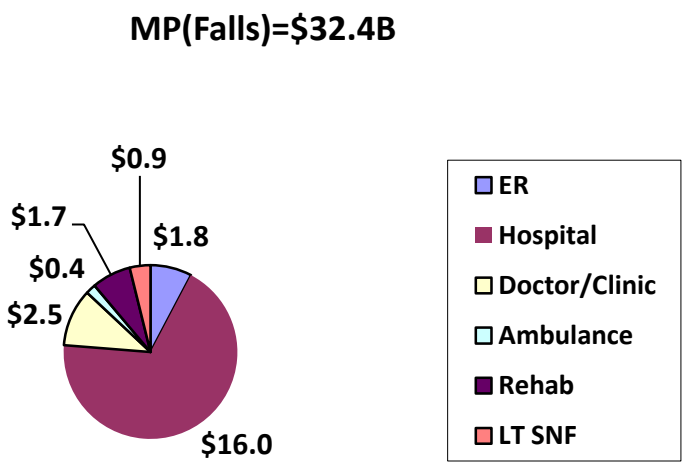
③ This element calculates Medicare payments for doctor/clinic fall-caused visits as a percentage of overall Medicare payments for falls in 2014 dollars.[13]

④ This element calculates Medicare payments for ambulance services as a percentage of overall Medicare payments for falls in 2014 dollars**.**[14]

⑤ This element calculates Medicare payments for patients discharged to rehabilitation centers after hospitalization. This element is calculated by multiplying the number of Medicare fall patients discharged to rehab facilities[15] times the average Medicare payment per day[16] for a rehab stay times the expected length of stay in the facility, which is assumed to be the 20-day limit imposed by Medicare.

⑥ This element calculates Medicare payments for stays in long-term care facilities to complete recovery. For a portion of patients who complete initial rehab, additional long-term treatment in a skilled nursing facility is mandated. This element is calculated by multiplying the number of Medicare fall patients who are sent to long-term care for additional therapy and recovery[17] times the average daily Medicare payment for care[18] times the expected length of stay in the facility, which is assumed to be the 80-day limit imposed by Medicare.

For 2014, the Total Medicare Payments for Falls are projected to be $32.4 Billion.[19] This total comprises $1.8B in ER visit payments; $16.4B in Hospital payments; $2.5B in Doctor/clinic payments; $443M in Ambulance payments; $1.7B in Rehab payments; and $0.9B in Long-Term Skilled Nursing Facility payments.



Having calculated Total Medicare Payments for Falls, the model now determines the Medicare Falls Payments Avoided ($MPAvoided_{Falls}$) comprising two elements:

$$MPAvoided_{Falls} = \sum_{n=1}^{n} (MP_{Falls}/F)^{①} * ((DME*FPY*\%FR)^{②} * (1-FRF)^{n-1})$$

① The Total Medicare Falls Payments per fall.

② The number of falls avoided by providing medical mobility equipment, calculated by multiplying the total number of wheelchairs, power chairs and walkers provided by Medicare (*DME*)[20] times the average number of falls per year (*FPY*)[21] times the percentage of fall reduction (*%FR*)[22] times a fall reduction factor (*1-FRF*)[23] that accounts for decreased utilization of equipment in years 2-n.

For 2014, it is projected that the medical mobility equipment (wheelchairs; power chairs and walkers) paid for by Medicare will result in Medicare Falls Payments Avoided of $10.9 Billion during the five year useful life of the equipment, from 2014-2018. The yearly savings is projected as:

2014	$2.27 Billion
2015	$2.23 Billion
2016	$2.19 Billion
2017	$2.14 Billion
2018	$2.10 Billion
2014-18	$10.93 Billion

2014 savings alone translate to a 3.4 month payback period on the investment in medical mobility equipment, indicating that Medicare spending on medical mobility equipment can essentially be self-funded in Year 1. The breakeven period is calculated by dividing the first year's savings by the amount Medicare pays for the equipment (=3.50) and then dividing that number into 12 (months in a year).

The ratio of Medicare Payment Savings (MPS_{Falls}) per dollar invested in medical mobility equipment is then calculated by dividing the value of Medicare Falls Payments Avoided ($MPAvoided_{Falls}$) over the five-year life of the equipment by the total Medicare cost of the equipment provided.

①

$$MPS_{Falls}\ Ratio = MPAvoided_{Falls} / (DME * P_{DME})$$

① That cost is calculated by multiplying the total number of pieces of medical mobility equipment provided by Medicare (*DME*) by the Medicare payments for that equipment P_{DME}.

For 2014, the projected *Medicare Payment Savings Ratio for Falls* is 16.78. **This represents a direct spending savings to Medicare over five years of $16.78 for every dollar that Medicare spends for medical mobility equipment.**

Finally, the ratio of overall Healthcare System Payment Savings ($HSPS_{Falls}$) per Medicare dollar paid for medical mobility equipment is calculated by dividing the value of Medicare Falls Payments Avoided ($MPAvoided_{Falls}$) plus Addbacks by the total Medicare cost of the equipment provided.

①

$$HSPS_{Falls}\ Ratio = (MPAvoided_{Falls} + Addbacks)/(DME * P_{DME})$$

① The value of Medicare Falls Spending Avoided ($MPAvoided_{Falls}$) plus Addbacks representing co-pays, deductibles and long-term care costs not covered by Medicare that are paid by Medicare beneficiaries and private insurers are all divided by the total Medicare cost of the equipment provided.

For 2014, the projected overall Healthcare System Payment Savings per Medicare dollar paid for medical mobility equipment is over the five-year equipment life is 19.18, an incremental 2.40 from the MPS_{Falls}. **This represents a direct cost savings to the overall U.S. healthcare system over five years of an additional $2.40, for a total five-year savings of $19.18 for every dollar that Medicare spends on medical mobility equipment.**

While this report focuses on direct spending to identify the potential cost avoidance for Medicare and the overall U.S. healthcare system, it is worth noting that analysts concerned with spending and cost savings will also look at indirect or economic costs (the value of disability, dependence on others, lost time from work and household duties, labor productivity and reduced quality of life) when attempting to assess the total costs of falls. The report most referenced in the literature on economic costs for falls suggests that economic costs add another 20% to the total cost of falls for the 65 and older age group.[24]

Finally, it should be noted that Medicare's efforts to reduce spending on DME through competitive bidding and other efforts focused on particular items of DME (e.g., power chairs) will reduce the denominator in the savings ratios above and result in even more leverage for responsible spending on DME.

Oxygen Therapy

Overview. Chronic Obstructive Pulmonary Disease (COPD) is 2nd leading cause of disability and the 3rd leading cause of death in the United States.[25] COPD refers to two chronic lung diseases, chronic bronchitis and emphysema. Only heart disease and cancer take more lives each year. The overall cost of treating medical complications caused by COPD in the U.S. is estimated at over $68 Billion, with a direct cost of over $53 Billion.[26] Direct costs include costs for emergency room and hospital treatments, prescription drugs, doctor and clinic visits, and home health and nursing home care. Medicare payments comprise approximately 65% of this total, approximately $38 Billion.[27]

Supplemental oxygen therapy helps individuals who have difficulty breathing as a result of COPD. Often quoted research estimates that providing supplemental oxygen therapy to COPD patients with chronic hypoxemia (low blood oxygen) reduces hospital stays by 43.5%.[28] Based on the best available data, which is admittedly quite dated, the author concludes that Medicare pays for supplemental oxygen therapy for over one million beneficiaries annually who suffer from COPD with chronic hypoxemia.[29] Remarkably, up-to-date data from reliable government sources on the number of Medicare

beneficiaries receiving supplemental oxygen therapy is simply not available. Taking into account the percentage of Medicare beneficiaries who receive both stationary and portable equipment to deliver oxygen therapy and the percentage who receive oxygen therapy beyond the initial 36-month payment period, annually Medicare pays approximately $2.15 Billion for supplemental oxygen therapy.[30] The DMEPOS competitive bidding program is projected to reduce Medicare payments for oxygen therapy by 41% as it is rolled out in Round 2 over the coming years.[31] That would reduce the Medicare annual payment from $2.15 Billion to $1.27 Billion.

Discussion. The model described here does not attempt to incorporate every cost associated with treating Medicare beneficiaries for COPD. It does address the important issues – **do Medicare's payments for supplemental oxygen therapy make sense financially and what is the order of magnitude of any overall cost savings that results?**

The model, which is explained and described in greater detail in the *Supplemental Oxygen Therapy Model* section, calculates annual Total Medicare Payments for COPD Treatment, which comprises the payments for ER visits, hospital admissions, doctor/clinic visits, prescription medications and homecare The model calculates the overall estimated payments by Medicare for treatment of COPD exacerbations. The model then calculates the cost impact of providing supplemental oxygen therapy.

The model also considers supplemental oxygen therapy costs that will need to be paid for by co-pays, deductibles and non-covered expenses. These costs are typically borne by directly by Medicare beneficiaries or by a secondary insurer. They are none the less real costs that add to the burden on the U.S. healthcare system and are costs that would be avoided simultaneously with any Medicare cost savings achieved.

The model looks at the number of Medicare beneficiaries who are annually admitted to a hospital for COPD exacerbations, i.e., the Medicare population that generates the bulk of annual Medicare expenditures.

Comparing this number to the total cost of the equipment provided, a ratio of Medicare Payment Savings per dollar invested in oxygen therapy is derived.

Simply stated, these ratios show the number of dollars saved by Medicare each time it pays $1 to provide supplemental oxygen therapy to Medicare recipients.

Finally, a second ratio is calculated to project to the overall Healthcare System Payment Savings saved by every Medicare dollar paid to provide supplemental oxygen therapy.

This ratio adds back the co-pays and deductibles that are direct costs paid by Medicare beneficiaries and their insurers.

Supplemental Oxygen Therapy Model. The model to calculate the Total Medicare Payments for COPD Treatment (MP_{COPD}) consists of six elements, identified in the model equation:

$$MP_{COPD} = \Sigma\ (\underset{①}{MP_{COPD\text{-}ER}} + \underset{②}{MP_{COPD\text{-}Hosp}} + \underset{③}{MP_{COPD\text{-}Doctor}} + \underset{④}{MP_{PrescriptionMeds}} + \underset{⑤}{MP_{COPD\text{-}HomeHealth}})$$

① This element calculates COPD-related Medicare-funded emergency room payments as a percentage of overall Medicare payments in 2014 dollars.[32]

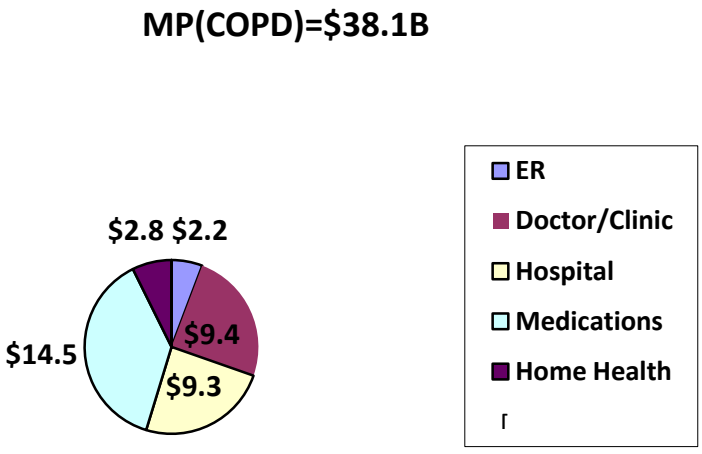
② This element calculates COPD-related Medicare payments for hospital stays as a percentage of overall Medicare payments in 2014 dollars.[33]

③ This element calculates COPD-related Medicare payments for doctor/clinic visits as a percentage of overall Medicare payments in 2014 dollars.[34]

④ This element calculates COPD-related Medicare payments for prescription medicines as a percentage of overall Medicare payments in 2014 dollars.[35]

⑤ This element calculates COPD-related Medicare payments for patients discharged provided with home healthcare services after hospitalization in 2014 dollars.[36]

Total Medicare Payments for COPD are projected to be $38.1 Billion. This total comprises $9.3B in Hospital payments; $2.2B in ER payments; $9.4B in Doctor/clinic payments; $14.5B in prescription medicine payments; and $2.8B in Home Health Care payments.



Having calculated Total Medicare Payments for COPD, the model now determines a range of 'Savings to Medicare Payments' ratios. The model compares cost saving from reductions in hospital, ER, doctor, medicine and home healthcare costs that would be realized from providing supplemental oxygen therapy to all Medicare beneficiaries treated for COPD-related problems to the incremental cost of providing supplemental oxygen therapy for those beneficiaries.

To consider the most conservative view of future costs, one should take into account the projected reductions in spending that Medicare claims will be realized by the DMEPOS competitive bidding program. Because Medicare is spending less under this assumption, the ratio of cost saving to cost actually goes up. Rather than continue to attempt to squeeze pennies out of DME spending, Medicare should be focused on saving dollars by proper spending to provide supplemental oxygen therapy to more beneficiaries with COPD-related diseases.

MPS_{COPD} *Ratio* = $MPIncremental_{COPD}/MPIncremental_{O2} = 9.62$

Simply stated, these ratios show the number of dollars saved by Medicare annually each time it pays $1 to provide supplemental oxygen therapy to Medicare beneficiaries. **This represents an annual direct spending savings to Medicare of $9.62 for every dollar that Medicare pays for supplemental oxygen therapy.**

Finally, a second ratio is calculated to project to the overall Healthcare System Payment Savings ($HSPS_{COPD}$) saved by every Medicare dollar paid for supplemental oxygen therapy:

$HSPS_{COPD}$ *Ratio* = MPS_{COPD} *Ratio + Addbacks Ratio = 14.87*

This ratio adds back the co-pays and deductibles that are direct costs paid by Medicare beneficiaries and their insurers. **This represents an annual direct cost savings to the overall U.S. healthcare system of an additional $5.25, for a total savings of $14.87 for every dollar that Medicare pays for supplemental oxygen therapy.**

These savings translate to a 1.2 month payback period on the payments for supplemental oxygen therapy, indicating that Medicare spending on oxygen therapy can essentially be self-funded in Year 1. The breakeven period is calculated by dividing the annual savings by the amount Medicare pays for the equipment (9.62) and then dividing that number into 12 (months in a year).

While this report focuses on direct spending to identify the potential cost avoidance for Medicare and the overall U.S. healthcare system, it is worth noting that analysts concerned with spending and cost savings will also look at indirect or economic costs (the value of lost wages and labor productivity) when attempting to assess the total costs of COPD. The economic costs of COPD-related treatment for the entire U.S. population add another 27% to the total cost of COPD.[37]

CPAP Therapy

Overview. Since Obstructive Sleep Apnea (OSA) was first defined just over forty years ago, there has been a substantial increase in the healthcare costs related to diagnosis and treatment of breathing disorders during sleep. Unlike many other conditions, emergency room visits, hospital admissions and other significant medical cost events are typically not attributed directly to OSA. In fact, over 85% of patients with clinically significant and treatable OSA may not yet have been diagnosed. The referral populations of OSA patients may represent the 'tip of the iceberg' of OSA prevalence and the understanding of the true cost of OSA.[38]

OSA is, however, a contributing factor to major, serious medical conditions including coronary artery disease, congestive heart failure, atrial fibrillation and stroke.[39] Coronary artery disease, congestive heart failure, atrial fibrillation and stroke patients who also have OSA incur dramatically higher medical costs, including costs for emergency room and hospital treatments, doctor and clinic visits, prescription drugs and home health and nursing home care.[40] Medicare pays an estimated $61 Billion annually to treat these medical conditions alone.[41] Medicare payments due to medical complications of OSA for these conditions are estimated to be $13.7 Billion.[42]

Medicare pays for CPAP therapy for some 684,000 beneficiaries annually who suffer from OSA.[43] Total Medicare annual payment for CPAP therapy is estimated to be $745 Million.[44]

Discussion. The model described here does not attempt to incorporate every cost associated with treating Medicare beneficiaries for OSA. It does address the important issues – **do Medicare's payments for supplemental CPAP therapy make sense financially and what is the order of magnitude of any overall cost savings that results?**

The model includes key direct Medicare payment estimates of treating conditions that involve OSA as a contributing factor: emergency room visits; hospital admissions; ambulance service; doctor and clinic visits; prescription medicines; home care; and rehabilitation following hospital discharge. The model calculates the overall estimated payments by Medicare for treatment of OSA exacerbations of these conditions. While OSA certainly contributes to other significant medical conditions including hypertension, obesity and Type 2 Diabetes[45], this report focuses on the four conditions referenced above, where data sources for spending and payments are reasonably available.

The model then calculates the cost impact of providing CPAP therapy. Since the literature strongly suggests that there are an extremely high percentage of individuals in the United States with undiagnosed OSA[46], the model assumes for the purposes of calculating cost savings and payback periods that those being treated for the four medical conditions to which OSA is a significant contributor are not

already on CPAP therapy. This is a conservative assumption that results in the minimum projected savings numbers.

The model also considers CPAP therapy costs that will need to be paid for by co-pays, deductibles and non-covered expenses. These costs are typically borne by directly by Medicare beneficiaries or by a secondary insurer. They are none the less real costs that add to the burden on the U.S. healthcare system and are costs that would be avoided simultaneously with any Medicare cost savings achieved.

CPAP Therapy Model. The model calculates annual the Total Medicare Payments for OSA related Treatment (MP_{OSA}). MP_{OSA} comprises the payments for hospital admissions, ER visits, doctor/clinic visits, ambulance trips, prescription medications, rehabilitation facility admissions and homecare, adjusted by a comorbidity factor for OSA for each condition, a cost savings factor and a CPAP compliance factor:

Total Medicare Payments for OSA related Treatment (MP_{OSA}*) = Σ (Medicare Payments for each of the measured conditions * Comorbidity Factor * Cost Savings Factor * CPAP Compliance Factor); or*

MP_{OSA} *= Σ (Medicare Direct Cost*$_{\text{OSA related conditions}}$ ** Comorbidity Factor*$_{OSA}$ ** Cost Savings Factor*$_{OSA}$ ** CPAP Compliance Factor)*

The model looks at the number of Medicare beneficiaries who are annually admitted to a hospital for the four conditions, i.e., the Medicare population that generates the bulk of annual Medicare expenditures where OSA is a significant contributing factor. To determine Medicare payments for this population, the model adjusts hospital billings to Medicare by a Medicare payments factor[47]. To create a minimum savings estimate to Medicare payments ratio, the model assumes that all hospital admissions are beneficiaries who are not receiving CPAP therapy at the time of admission. While this is certainly not the case, it is a reasonable approximation that yields a low-end, conservative result.

The incremental cost of treating the OSA-related exacerbations for beneficiaries not already receiving therapy is calculated and compared to the cost of providing those beneficiaries with CPAP therapy, creating a Medicare Payment Savings ratio (MPS_{OSA}):

MPS_{OSA} *Ratio =* $MP_{OSA}/MPIncremental_{CPAP}$, where $MPIncremental_{CPAP}$ is calculated by applying the current Medicare average annual payment to provide CPAP equipment to the population hospitalized for the four conditions.

Simply stated, this ratio shows the number of dollars saved by Medicare each time it pays $1 to provide CPAP therapy to Medicare recipients.

Finally, a second ratio is calculated to project to the overall Healthcare System Payment Savings ($HSPS_{OSA}$) saved by every Medicare dollar paid to provide CPAP therapy:

$HSPS_{OSA}$ *Ratio =* MPS_{OSA} *Ratio + Addbacks Ratio*

This ratio adds back the co-pays and deductibles that are direct costs paid by Medicare beneficiaries and their insurers. It also includes a small, direct cost for automobile accidents attributable to OSA.

The model is designed to calculate the Total Medicare Payments for OSA related Treatment (MP_{OSA}) based on available data is identified in the model equation:

$MP_{OSA} = \Sigma$ (*Medicare Direct Cost*$_{\text{OSA related conditions}}$ * *Comorbidity Factor*$_{OSA}$ * *Cost Savings Factor*$_{OSA}$ * *CPAP Compliance Factor)*

For the four major medical conditions evaluated in this analysis, the payments and multiplying factors are:

	Medicare Payments	Comorbidity	Cost Saving Factor	CPAP Compliance	Projected Medicare Pmts. Savings
CAD	$24,128,000,000	0.6	0.6	0.7	$6,080,256,000
CHF	$8,762,000,000	0. 5	0.6	0.7	$1,840,020,000
Stroke	$11,934,000,000	0.6	0.5	0.7	$2,506,140,000
A Fib	$15,700,000,000	0.49	0.6	0.7	$3,231,060,000

For 2012, the Total Medicare Payments for OSA related direct costs were $60.5 Billion and Projected Medicare Payment Savings from expanding CPAP use are $13.7 Billion.

Having calculated Total Medicare Payments for OSA related costs, the model now determines the minimum projected 'Savings to Medicare payments' ratio. The model assumes that all hospital admissions are beneficiaries who are not receiving CPAP therapy at the time of admission, as discussed above.

$MPIncremental_{CPAP} = MP_{CPAP}/M\ Recipients_{CPAP} * Population\ Treated\ for\ Conditions$[48]

$MPS_{OSA}\ Ratio = MPIncremental_{OSA}/MPIncremental_{CPAP} = 6.73$

Simply stated, this ratio shows the number of dollars saved by Medicare annually each time it pays $1 to provide CPAP therapy to Medicare beneficiaries. **This represents an annual direct spending savings to Medicare of $6.73 for every dollar that Medicare pays for CPAP therapy.**

Finally, a second ratio is calculated to project to the overall Healthcare System Payment Savings ($HSPS_{OSA}$) saved by every Medicare dollar paid for CPAP therapy:

$HSPS_{OSA}$ Ratio = MPS_{OSA} Ratio + Addbacks Ratio = 8.07

This ratio adds back the co-pays and deductibles that are direct costs paid by Medicare beneficiaries. The original study included a small incremental cost attributable to a calculated cost savings for vehicular accidents that that are OSA caused. This number was very small and the data to support its calculation is no longer available in the current literature, so it was not included in this update. **This represents an annual direct cost savings to the overall U.S. healthcare system of an additional $1.34, for a total savings of $8.07 for every dollar that Medicare pays for CPAP therapy.**

These savings translate to a 1.8 month payback period on the payments for CPAP therapy, indicating that Medicare spending on CPAP therapy can essentially be self-funded in Year 1. The breakeven period is calculated by dividing the annual savings by the amount Medicare pays for the equipment (6.73) and then dividing that number into 12 (months in a year).

While this report focuses on direct spending to identify the potential cost avoidance for Medicare and the overall U.S. healthcare system, it is worth noting that analysts concerned with spending and cost savings will also look at indirect or economic costs (the value of lost wages and labor productivity) when attempting to assess the total OSA related costs. The literature on economic costs for OSA suggests that economic costs for the entire U.S. population add another 65-100% to the total cost of OSA.[49]

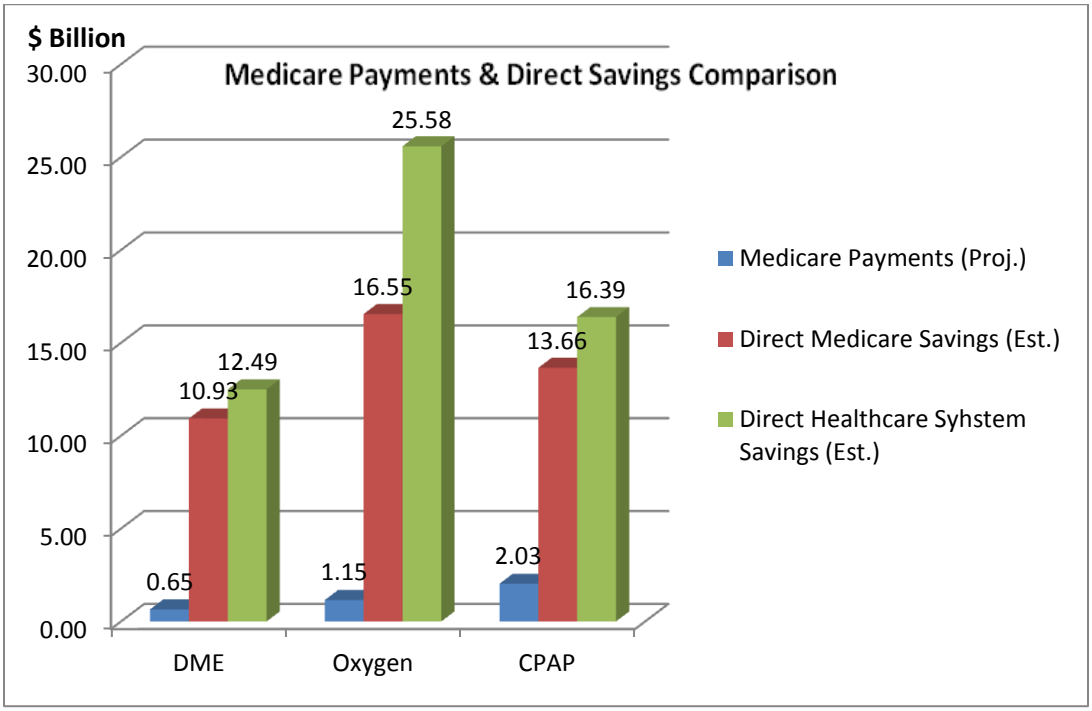
Finally, CMS has indicated their intent to lower CPAP therapy payments by 47%. Again, the outcome will be a reduction in the denominator in the savings ratios above and result in even more leverage for responsible spending on CPAP therapy.

Conclusion

It is time for CMS to change direction and invest in DME and drive Medicare Part A payments down dramatically. Medicare can achieve significant direct cost savings by providing Mobility Equipment, Supplemental Oxygen Therapy and CPAP Therapy to Medicare beneficiaries. The Part A cost of treating COPD, OSA complications related to the major medical conditions and the injuries resulting from falls is orders of magnitude greater than the payments made by Medicare to provide that equipment and therapy.

For every dollar Medicare pays for:	**It avoids paying:**
Mobility Equipment	**$16.78 for treating falls that would result**
Supplemental Oxygen Therapy	**$9.62 for treatment of COPD-caused medical complications**
CPAP Therapy	**$6.73 in treatment of OSA related complications**

In addition, Medicare directly saves its beneficiaries and their secondary insurers additional dollars that would otherwise have to be spent on these treatments and indirectly saves significant amounts in economic costs that would otherwise be incurred. Direct savings estimates are shown in the following graph for each of the three categories considered in this analysis:



[1]2012 CMS National Health Expenditures Tables, Table 2. http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/downloads/tables.pdf

[2] CMS, *Competitive Bidding Update—One Year Implementation Update*, 2012. http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/DMEPOSCompetitiveBid/Downloads/Competitive-Bidding-Update-One-Year-Implementation.pdf
GAO, *MEDICARE:Second Year Update for CMS's Durable Medical Equipment Competitive Bidding Program Round 1 Rebid,* 2014. http://www.gao.gov/products/GAO-14-156

[3] *CDC Advance Data from Vital and Health Statistics*, Number 392, September 21, 2007. http://www.cdc.gov/nchs/data/ad/ad392.pdf; *Injuries From Falls Fact Sheet*, National Business Group on Health, May 2011. http://www.businessgrouphealth.org/pub/f3115fe4-2354-d714-5195-544ca84d399c

[4] *Respiratory Care Meets Star Trek*, NHOPA News, National Home Oxygen Patients Association, Volume 15, Number 2, February/March 2012. http://www.homeoxygen.org/assets/docs/Feb-Mar12Newsletter.pdf

[5] The original study and this update did not examine the appropriateness of home oxygen therapy for the Medicare beneficiaries who received it. That analysis could result in identification of additional cost savings that should be addressed separately.

[6] *State of the Art, Epidemiology of Obstructive Sleep Apnea, A Population Health Perspective*, American Journal of Respiratory and Critical Care Medicine, Vol. 165, pp. 1220-1221. http://ajrccm.atsjournals.org/cgi/reprint/165/9/1217. Naresh M. Punjabi, *The Epidemiology of Adult Obstructive Sleep Apnea*, Proceedings of the American Thoracic Society, Vol. 5, No. 2 (2008), pp. 136-143. http://www.atsjournals.org/doi/full/10.1513/pats.200709155MG?prevSearch=obstructive+sleep+apnea&searchHistoryKey=#.U3V_x4FdVF0

[7] See, e.g., *ASPE Issue Brief, Medicare Beneficiary Savings and the Affordable Care Act,* U.S. Department of Health and Human Services, February 2012. http://aspe.hhs.gov/health/reports/2012/medicarebeneficiarysavings/ib.shtml. *Medicare Home Oxygen – Refining Payment Methodology Has Potential to Lower Program and Beneficiary Spending*, GAO 11-56, January 2011, second paragraph. http://www.gao.gov/new.items/d1156.pdf.

[8] The availability of new data since the publication of the original study has allowed the simplification of elements of the original model. A comparison of the formulae used in the original study and this updated version will reveal those simplifications.

[9] Medicare data calculated using CDC WISQARS data tool. http://webappa.cdc.gov/sasweb/ncipc/nfilead2001.html

[10] http://www.minneapolisfed.org/community_education/teacher/calc/hist1913.cfm.

[11] *Costs of Falls Among Older Adults,* CDC website, Home & Recreational Safety, adjusted to 2014 dollars. http://www.cdc.gov/homeandrecreationalsafety/falls/fallcost.html

[12] Id.

[13] Id.

[14] *Mandated report: Medicare payment for ambulance services*, Z. Gaumer et al. 2012. Slide 11. MedPAC. http://www.medpac.gov/transcripts/Ambulance_presentation_Sept2012.pdf

[15] 55.6% of hospitalized Medicare fall patients are discharged to rehab. *Fall-related Hospitalizations among Elderly Medicare Beneficiaries,* Presentation by William Buczko, PhD, APHA Annual Meeting, November 2007, Abstract # 160280. (http://apha.confex.com/apha/135am/techprogram/paper_160280.htm).

[16] $228.00 in 2014 dollars adjusted from 2012 report using CPI data. *Market Survey of Long-term Care Costs,* MetLife November 2012. (https://www.metlife.com/assets/cao/mmi/publications/studies/2012/studies/mmi-2012-market-survey-long-term-care-costs.pdf).

[17] 24.1%. *ARHQ Statistical Brief #80* October 2009. (http://www.hcup-us.ahrq.gov/reports/statbriefs/sb80.pdf).

[18] See note 15.

[19] See note 10.

[20] 1,306,617 units in 2012. Derived from Part B, National Summary Data File, HCPCS Codes E and K Durable Medical Equipment.

[21] Conservatively estimated at 1.1. Derived from information presented in *Preventing Falls: What Works*, Stevens and Sogolow, National Center for Injury Prevention and Control 2008 (http://www.cdc.gov/ncipc/preventingfalls/CDCCompendium_030508.pdf) and *UCLA Health Policy Research Brief, Older Californians at Risk for Avoidable Falls, May 2010.* (http://www.healthpolicy.ucla.edu/pubs/files/Avoidable_Falls_PB_0510.pdf).

[22] Estimate derived from *Age in Action*, Volume 26, Number 1, *Case Study: Impact of Providing Rehab Mobility Equipment to Those in Need*, B. Stelmack and B. Leitten 2011 (http://www.vcu.edu/vcoa/ageaction/agewinter11.pdf) and *Med J Aust.*, 6;164(9):530-2, *Preventing falls in the elderly at home: a community-based program* 1996. (http://www.ncbi.nlm.nih.gov/pubmed/8649287).

[23] Estimated by the author to decay at 5% per annum over the 5-year period of equipment use.

[24] *Economic Dimensions of Slip and Fall Injuries*, *Journal of Forensic Science* 1996, 41(5), Englander et al.

[25] National Heat Lung and Blood Institute, *Diseases and Conditions Index*, 2011. http://www.nhlbi.nih.gov/health/dci/Diseases/Copd/Copd_KeyPoints.html; *Respiratory Care Meets Star Trek*, NHOPA News, National Home Oxygen Patients Association, Volume 15, Number 2, February/March 2012. http://www.homeoxygen.org/assets/docs/Feb-Mar12Newsletter.pdf

[26] *Mortality & Morbidity: 2012 Chart Book on Cardiovascular, Lung and Blood Diseases,* National Institutes of Health 2012, pp.19-20. http://www.nhlbi.nih.gov/resources/docs/2012_ChartBook_508.pdf.

[27] Calculated based on total cost of COPD care and historical Medicare proportion of payment. Hospital cost data derived from http://www.nhlbi.nih.gov/resources/docs/2012_ChartBook_508.pdf and Medicare proportion of payment calculated from data at http://archive.ahrq.gov/news/nn/nn110105.htm.

[28] *Does long-term oxygen therapy reduce hospitalisation in hypoxaemic chronic obstructive pulmonary disease?*, European Respiratory Journal, 20: 38-42, 2002. http://erj.ersjournals.com/content/20/1/38.full.pdf+html. *Cost-Effectiveness of Homecare*, American Association of Homecare website, Key Issues, Advocacy. https://www.aahomecare.org/issues/cost-effectiveness-of-homecare

[29] *Current Issues in Home Long Term Oxygen Therapy,* Lewarski, 2007. http://www.thoracic.org/chapters/thoracic-society-chapters/ca/current-news/resources/home-longterm-oxygen.pdf

[30] *Medicare Home Oxygen – Refining Payment Methodology Has Potential to Lower Program and Beneficiary Spending*, GAO, January 2011. http://www.gao.gov/new.items/d1156.pdf.

[31] *CMS Fact Sheet - Details for: Expansion of Competitive Bidding Program will Increase Competition, Maintain Quality, and Save Medicare Billions*, January 30, 2013. http://www.cms.gov/apps/media/press/factsheet.asp?Counter=4513&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&keywordType=All&chkNewsType=6&intPage=&showAll=&pYear=&year=&desc=false&cboOrder=date

[32] *Mortality & Morbidity: 2012 Chart Book on Cardiovascular, Lung and Blood Diseases,* National Institutes of Health 2012, pp.19-20. http://www.nhlbi.nih.gov/resources/docs/2012_ChartBook_508.pdf.

[33] Id.

[34] Id.

[35] I

[36] Id.

[37] Id.

[38] *AHA/ACCF Scientific Statement, Sleep Apnea and Cardiovascular Disease*, 2008. http://circ.ahajournals.org/content/118/10/1080.full

[39] *Incidence and Prevalence of Sleep Apnea in Cardiovascular Patients***,** S. Javahari and S. Redline, 2012 http://apnea.cardiosource.org/Hot-Topics/2012/11/Incidence-and-Prevalence-of-Sleep-Apnea-in-CV-Patients.aspx *Obstructive Sleep Apnea and Cardioembolic Stroke Risk*, Mayo Clinic. http://www.mayoclinic.org/medical-professionals/clinical-updates/neurosciences/obstructive-sleep-apnea-cardioembolic-stroke-risk

[40] Based on several studies, the author estimates that 50-60% of Medicare payments to treat these conditions when OSA is involved is attributable to the complications caused by OSA. *Reduced Hospitalization with Cardiovascular and Pulmonary Disease in Obstructive Sleep Apnea Patients on Nasal CPAP Treatment,* Peker et al.*, Sleep,* 202(8):645-653 *(*http://www.mysleepquest.com/sa_papers.lasso); *Cost Justification for Diagnosis* and Treatment of Obstructive *Sleep Apnea, SLEEP,* Vol. 23, No. 8, 2000 (http://www.novasom.com/clinical_library/cost_justification.pdf*); Obstructive Sleep Apnea (OSA) in Primary Care: Evidence-based Practice*, Pagel, *The Journal of the American Board of Family Medicine* 20 (4): 392-398, 2007, (http://www.jabfm.org/cgi/content/full/20/4/392); *Determinants affecting health-care utilization in obstructive sleep apnea syndrome patients,* Tarasiuk et al.*, Chest* Sep;128(3):1310-4 2005 (http://www.ncbi.nlm.nih.gov/pubmed?term=16162723%20).

[41] Calculated by the author from data presented in *Medicare and Atrial Fibrillation/Consequences in Cost and Care*, Eisenhart et al., 2009 (http://www.afstat.com/docs/pdf/Avalere_Medicare_AFib_report.pdf) and *Short Stay Management of Acute Heart Failure*, W. F. Peacock, Editor, 2010, Chapter 2, Table 2.1.

[42] Calculated by the author. Medicare hospital payments for each of the four conditions is adjusted for comorbidity of OSA, total Medicare medical payments for treatment of the condition, CPAP compliance and a payments savings factor.

[43] Calculated by the author from the CMS Part B National Summary Data Files 2012, A and E Codes, using 5.4 approved services per beneficiary.

[44] Calculated by the author from the CMS Part B National Summary Data Files 2012, A and E Codes.

[45] ResMed *Sleep Apnea Facts and Figures* 2010. http://www.quinlansmedical.com/pdf/Sleep_Apnea_Facts_Figures.pdf

[46] *AHA/ACCF Scientific Statement, Sleep Apnea and Cardiovascular Disease*, 2008. http://circ.ahajournals.org/content/118/10/1080.full
American Sleep Apnea Association website. http://sleepapnea.org/i-am-a-health-care-professional.html

[47] Approximately 26%, calculated using the data in the references in footnote 47.

[48] 2012 Medicare CPAP payments were $745,000,000. Total number of Medicare CPAP recipients was 684,000. Total number of Medicare recipients hospitalized for the four conditions studied was 1,864,200.

[49] *& Morbidity: 2012 Chart Book on Cardiovascular, Lung and Blood Diseases,* National Institutes of Health 2012, p.19. http://www.nhlbi.nih.gov/resources/docs/2012_ChartBook_508.pdf.