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# Economic Impact of Integrated Medical-Behavioral Healthcare

## Implications for Psychiatry

Prepared for:  
**American Psychiatric Association**

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## EXECUTIVE SUMMARY

Continually escalating healthcare costs have prompted payers to seek ways to improve member health while reducing the growth of healthcare claims expenditures. One such initiative is the integration of medical and behavioral healthcare (IMBH). Some of the advances in IMBH have been driven by primary care providers, while others have been driven by behavioral healthcare practitioners. The field of psychiatry is poised to become a major participant as IMBH evolves. Psychiatry has a direct role in the value proposition of integrated/collaborative care and stands to benefit from the savings generated by effective integration programs.

The analysis provided in this report is intended to be used to help educate psychiatrists about the elevated levels of healthcare costs related to beneficiaries who have chronic medical and behavioral comorbidities. Based on the experience of recent successful IMBH programs, this report also estimates the portion of the elevated healthcare costs that can be controlled through such programs. We also discuss the possibility of shared savings that can bring some of those savings back to behavioral health and psychiatry.

Medical costs for treating those patients with chronic medical and comorbid mental health/substance use disorder (MH/SUD) conditions can be 2-3 times as high as those beneficiaries who don't have the comorbid MH/SUD conditions. The additional healthcare costs incurred by people with behavioral comorbidities are estimated to be \$293 billion in 2012 across commercially-insured, Medicaid, and Medicare beneficiaries in the United States. Most of the increased cost for those with comorbid MH/SUD conditions is attributed to medical services (more than behavioral), creating a large opportunity for savings on the medical side through integration of behavioral and medical services. Based on our literature review on the results of effective IMBH programs, we calculate that 9-16% of this total additional spending may be saved through effective integration of care, although additional work and direct experience will be needed in this area. Figure 1 shows the resulting projected potential cost savings achieved by integration for each of the three large insurance markets. This is the value proposition for IMBH.

| <b>Figure 1: Projected Healthcare Cost Savings Through Effective Integration (National, 2012)</b> |  |
|---|--|
| <b>Payer Type</b>   | <b>Annual Cost Impact of Integration</b> |
| Commercial  | \$15.8-\$31.6 billion                    |
| Medicare  | \$3.3-\$6.7 billion                      |
| Medicaid  | \$7.1-\$9.9 billion                      |
| <b>Total</b>  | <b>\$26.3-\$48.3 billion</b>             |

As shown above, an estimated \$26 - \$48 billion can potentially be saved annually through effective integration of medical and behavioral services. To put these nationally projected savings in context, the total national expenditures for mental health and substance abuse services provided by all physicians, including psychiatrists and non-psychiatric physicians, is projected to be about \$35 billion by 2014.<sup>1</sup> This estimate is before recent changes resulting from the Mental Health Parity and Addiction Equity Act (MHPAEA) and the Patient Protection and Affordable Care Act (PPACA), which will likely increase this spending estimate.

<sup>1</sup> Levit, K. R., et. al. Projections of national expenditures for mental health services and substance abuse treatment 2004 –2014. website: <http://www.samhsa.gov/Financing/file.axd?file=2009%2F6%2FProjections+of+National+Expenditures+for+Mental+Health+Services+and+Substance+Abuse+Treatment%2C+2004-2014.pdf>

## LIMITATIONS

People with chronic medical conditions may certainly be more expensive to treat, and also may more often be subject to social isolation, economic worries, and a variety of other problems that could lead to depression, anxiety, substance abuse and other behavioral disorders. It can be difficult to determine the direction from which the causality arises — does the MH/SUD disorder cause a more severe medical condition, or does the more severe medical condition cause the MH/SUD disorder? Whatever the link, there are clearly elevated healthcare costs observed in claim data that result in an opportunity for improved clinical-care programs and potential for healthcare cost savings. Our analysis does not include a detailed risk assessment of each insured member. Those with comorbid medical and behavioral disorders may have more severe cases of their chronic medical conditions than those without the behavioral comorbidity.

Unfortunately, many individuals with chronic medical conditions and co-occurring MH/SUD disorders are never diagnosed and treated for their behavioral conditions. Since this study used administrative claim data to identify illnesses and costs, these patients were not identified as suffering from these conditions. However, the establishment of evidence-based collaborative care models would likely identify many individuals with behavioral disorders that have been previously undiagnosed. This would result from the proactive use of screening tools and better awareness of behavioral disorders among the professionals working together in the collaborative care teams. This factor suggests that our savings projections could be understated.

The studies in the literature that we used to help guide our healthcare cost savings assumptions for effective integrated medical-behavioral healthcare do not cover the full gamut of chronic medical and behavioral conditions used in our analysis. The studies tend to cover a specific set of comorbid conditions, such as diabetes with depression. To the extent that the results from these studies cannot be achieved across all of the medical-behavioral comorbidities included in our analysis, the savings projections would be overstated.

These same studies tend to reflect a care management approach using a team of professionals for the healthcare being provided to their target population cohort, not just MDs. To achieve the potential savings we project in our analysis, it is very likely that a team based approach of psychiatrists, psychologists and other healthcare providers and managers would be needed.

We relied on data obtained through published literature and through proprietary and purchased data sources as the basis for our analysis and did not independently audit or verify the source of the information. If this information is incomplete or inaccurate, our observations and comments may not be appropriate. We performed general reasonable tests on the underlying data. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work.

Our national projections extrapolate the results from our database analyses (see Appendix E) to national population estimates for the Commercial, Medicare and Medicaid population cohorts. To the extent that the national population healthcare costs and risk levels for any of these cohorts differs from that represented in the databases that we used, our national estimates may need adjustment. The databases we used represent the best available sources for our analysis.

The information in this study is designed to describe the prevalence and healthcare costs of insured members with certain chronic medical conditions, behavioral conditions, or both. It may not be appropriate, and should not be used, for other purposes.

## QUALIFICATIONS

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. The authors of this report, Stephen P. Melek, Douglas T. Norris and Jordan Paulus are members of the American Academy of Actuaries, and meet the qualification standards for performing the analysis in this report.

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## RESULTS – HEALTHCARE COSTS OF BENEFICIARIES WITH AND WITHOUT BEHAVIORAL DISORDERS

We first studied the healthcare costs of individuals enrolled in commercial insurance, Medicare, and Medicaid in 2010, and trended these costs to 2012. This was intended to show the distribution of healthcare spending between medical and behavioral costs by population cohort. We stratified our commercial and Medicare populations into four groups, and the Medicaid members into two groups, based on the type of behavioral illnesses present. These groupings were developed based on the available data for each population group. The criteria used for identification of behavioral conditions are described in Appendix C.

The four groups used for Medicare and commercial insurance were:

- Those with no mental health / substance use disorder diagnoses (No MH/SUD)
- Those with mental health diagnoses, but no serious and persistent mental illness (Non-SPMI MH)
- Those with serious and persistent mental illness (SPMI)
- Those with substance use disorder diagnoses (SUD)

Members with both mental illness and substance abuse diagnoses would appear in both the mental health (either SPMI or non-SPMI) and the substance abuse groups.

We stratified Medicaid members into two groups:

- Those with no mental health / substance use disorder diagnoses (No MH/SUD)
- Those with mental health / substance use disorder diagnoses (MH/SUD)

Figure 2 shows a high-level cost comparison for people with a behavioral condition (Non-SPMI MH, SPMI, and SUD) compared to those without a behavioral condition (No MH/SUD). The Total rows include all covered beneficiaries within a population segment. The costs presented are average per member per month (PMPM) costs. The costs are displayed separately for the three population segments (commercial, Medicare, and Medicaid). The costs are also split out by broad service categories: Medical, Behavioral, Medical Rx and Behavioral Rx (as described in Appendix D). The 'Medical' column shows the facility and professional charges for non-behavioral services and the 'Medical Rx' column shows the pharmacy charges for drugs used to treat medical conditions (non-behavioral conditions). Similarly, the 'Behavioral' column shows the facility and professional charges for treating behavioral conditions and the 'Behavioral Rx' column shows the charges for prescription drugs used to treat behavioral conditions. Pharmacy data was not available for the Medicare population.

**Figure 2: Per Member Per Month (PMPM) Healthcare Costs by Population and Presence of Behavioral Conditions – 2012 Costs**

| Population        | Behavioral Health Diagnosis | Member Months | Medical | Behavioral | Medical Rx  | Behavioral Rx | Total   |
|-------------------|-----------------------------|---------------|---------|------------|-------------|---------------|---------|
| <b>Commercial</b> | <i>No MH/SUD</i>            | 2,048,000,000 | \$280   | \$3        | \$53        | \$4           | \$340   |
|                   | <i>Non-SPMI MH</i>          | 278,000,000   | \$661   | \$23       | \$145       | \$74          | \$903   |
|                   | <i>SPMI</i>                 | 47,000,000    | \$759   | \$128      | \$135       | \$175         | \$1,197 |
|                   | <i>SUD</i>                  | 22,000,000    | \$830   | \$73       | \$102       | \$67          | \$1,072 |
|                   | <i>Total</i>                | 2,386,000,000 | \$335   | \$8        | \$66        | \$16          | \$425   |
| <b>Medicare</b>   | <i>No MH/SUD</i>            | 508,000,000   | \$579   | \$3        | <i>N/A*</i> | <i>N/A*</i>   | \$582   |
|                   | <i>Non-SPMI MH</i>          | 23,000,000    | \$1,369 | \$40       | <i>N/A*</i> | <i>N/A*</i>   | \$1,409 |
|                   | <i>SPMI</i>                 | 21,000,000    | \$1,222 | \$215      | <i>N/A*</i> | <i>N/A*</i>   | \$1,437 |
|                   | <i>SUD</i>                  | 6,000,000     | \$1,291 | \$213      | <i>N/A*</i> | <i>N/A*</i>   | \$1,504 |
|                   | <i>Total</i>                | 556,000,000   | \$640   | \$13       | <i>N/A*</i> | <i>N/A*</i>   | \$653   |
| <b>Medicaid</b>   | <i>No MH/SUD</i>            | 437,000,000   | \$309   | \$4        | \$63        | \$5           | \$381   |
|                   | <i>MH/SUD</i>               | 109,000,000   | \$757   | \$286      | \$172       | \$86          | \$1,301 |
|                   | <i>Total</i>                | 546,000,000   | \$398   | \$61       | \$85        | \$21          | \$565   |
| <b>Total</b>      | <i>No MH/SUD</i>            | 2,993,000,000 | \$335   | \$3        | \$55        | \$4           | \$397   |
|                   | <i>MH/SUD</i>               | 494,000,000   | \$751   | \$100      | \$148       | \$86          | \$1,085 |
|                   | <i>Total</i>                | 3,487,000,000 | \$394   | \$17       | \$69        | \$17          | \$497   |

*\* Pharmacy data not available for the Medicare population and the totals for Medicare do not reflect pharmacy costs*

Figure 2 shows that individuals with a treated behavioral condition typically cost 2-3 times as much on average as those without a behavioral condition in all market segments. Additionally, the increased medical (non-behavioral) costs for those with MH/SUD conditions suggest significant potential for savings in medical costs through integration programs. Please note that the member months for 'No MH/SUD', 'Non-SPMI MH', 'SPMI', and 'SUD' do not sum to the total because members frequently have both a mental health disorder and a substance-abuse disorder and are included under both cohorts. The 'Total' rows represent the total non-duplicated member months. Member months represent the total number of insured months of coverage in each cohort, which is a good indication of the distribution of the population in each cohort.

Figure 3 displays the total medical, behavioral, and pharmacy spending for each category of MH/SUD diagnoses. This is the same information displayed in Figure 2, but is shown in terms of total spending (as opposed to average costs).

**Figure 3: Total Healthcare Spending by Population and Presence of Behavioral Conditions – 2012 Costs (millions)**

| Population        | Behavioral Health Diagnosis | Medical     | Behavioral | Medical Rx   | Behavioral Rx | Total       |
|-------------------|-----------------------------|-------------|------------|--------------|---------------|-------------|
| <b>Commercial</b> | <i>No MH/SUD</i>            | \$573,171   | \$5,628    | \$109,464    | \$8,833       | \$697,096   |
|                   | <i>Non-SPMI MH</i>          | \$184,147   | \$6,502    | \$40,361     | \$20,507      | \$251,517   |
|                   | <i>SPMI</i>                 | \$35,408    | \$5,954    | \$6,312      | \$8,167       | \$55,841    |
|                   | <i>SUD</i>                  | \$18,227    | \$1,596    | \$2,236      | \$1,473       | \$23,532    |
|                   | <i>Total</i>                | \$800,317   | \$18,336   | \$157,038    | \$37,695      | \$1,013,386 |
| <b>Medicare</b>   | <i>No MH/SUD</i>            | \$294,241   | \$1,619    | <i>N/A *</i> | <i>N/A *</i>  | \$295,860   |
|                   | <i>Non-SPMI MH</i>          | \$31,167    | \$914      | <i>N/A *</i> | <i>N/A *</i>  | \$32,081    |
|                   | <i>SPMI</i>                 | \$26,142    | \$4,596    | <i>N/A *</i> | <i>N/A *</i>  | \$30,738    |
|                   | <i>SUD</i>                  | \$8,346     | \$1,379    | <i>N/A *</i> | <i>N/A *</i>  | \$9,725     |
|                   | <i>Total</i>                | \$355,559   | \$7,234    | <i>N/A *</i> | <i>N/A *</i>  | \$362,793   |
| <b>Medicaid</b>   | <i>No MH/SUD</i>            | \$134,920   | \$1,963    | \$27,710     | \$2,176       | \$166,769   |
|                   | <i>MH/SUD</i>               | \$82,655    | \$31,264   | \$18,759     | \$9,389       | \$142,067   |
|                   | <i>Total</i>                | \$217,575   | \$33,227   | \$46,468     | \$11,566      | \$308,836   |
| <b>Total</b>      | <i>No MH/SUD</i>            | \$1,002,332 | \$9,210    | \$137,173    | \$11,009      | \$1,159,724 |
|                   | <i>MH/SUD</i>               | \$371,119   | \$49,587   | \$66,333     | \$38,252      | \$525,291   |
|                   | <i>Total</i>                | \$1,373,451 | \$58,797   | \$203,507    | \$49,261      | \$1,685,016 |

*\* Pharmacy data not available for the Medicare population and the totals for Medicare do not reflect pharmacy costs*

The total spending in the US across all service categories and the three populations for those with MH/SUD disorders is estimated to be \$525 billion annually, compared to \$1.7 trillion for all service categories and all cohorts combined. In other words, even though members with treated MH/SUD constitute only 14% of the total insured members across the three markets, they account for over 30% of total healthcare spending. Please note that the healthcare spending for ‘No MH/SUD’, ‘Non-SPMI MH’, ‘SPMI’, and ‘SUD’ do not sum to the total because members frequently have both a mental health disorder and a substance-abuse disorder and are included under both cohorts.

Figures 3a through 3c present the results by major service category as a percentage of total costs by presence of behavioral conditions for the Commercial, Medicare and Medicaid populations.



**Analysis of healthcare spending by service category**

Medical and behavioral healthcare non-drug spending was further analyzed by major service category to identify the sources of the healthcare spending associated with behavioral conditions. Above, we established that members with behavioral disorders use more medical services, and not just more behavioral services. This section helps to identify whether these additional medical services are high-cost facility-based services (such as inpatient hospital admissions or outpatient facility services that include ER) or lower-cost professional services.

Spending was classified as either inpatient (IP) facility, outpatient (OP) facility, or professional (PROF) services (as described in Appendix D). Figure 4a below shows 2012 spending levels by service category and MH/SUD cohort for the commercial population. The Total row combines all of the behavioral condition row results. Please note that the healthcare costs for ‘No MH/SUD’, ‘Non-SPMI MH’, ‘SPMI’, and ‘SUD’ do not sum to the total because members frequently have both a mental health disorder and a substance-abuse disorder and are included under both cohorts.

**Figure 4a: Total Healthcare Costs by Service Category and Presence of Behavioral Conditions - 2012 Costs, Commercially-Insured US Population (millions)**

| Behavioral Condition | Medical Costs   |                  |                  |                    | Behavioral Costs |                |                 |                    |
|----------------------|-----------------|------------------|------------------|--------------------|------------------|----------------|-----------------|--------------------|
|                      | IP Facility     | OP Facility      | PROF             | Total Non-Pharmacy | IP Facility      | OP Facility    | PROF            | Total Non-Pharmacy |
| <b>No MH/SUD</b>     | \$67,516        | \$238,249        | \$267,406        | \$573,171          | \$1,203          | \$735          | \$3,690         | \$5,628            |
| <b>Non-SPMI MH</b>   | \$22,792        | \$80,086         | \$81,270         | \$184,147          | \$1,242          | \$738          | \$4,522         | \$6,502            |
| <b>SPMI</b>          | \$5,379         | \$14,903         | \$15,126         | \$35,408           | \$1,714          | \$783          | \$3,457         | \$5,954            |
| <b>SUD</b>           | \$3,111         | \$8,527          | \$6,590          | \$18,227           | \$696            | \$438          | \$462           | \$1,596            |
| <b>Total</b>         | <b>\$96,851</b> | <b>\$336,940</b> | <b>\$366,526</b> | <b>\$800,317</b>   | <b>\$4,256</b>   | <b>\$2,343</b> | <b>\$11,738</b> | <b>\$18,337</b>    |

The medical spending distribution is different for the cohort without MH/SUD conditions as compared with the three cohorts with MH/SUD conditions. The groups with behavioral conditions have a higher proportion of their total non-pharmacy medical dollars being spent on facility-based services than professional services. For example, inpatient and outpatient medical services constitute about 53% of the total medical spending for the group without MH/SUD (\$67.5 billion + \$238.2 billion out of \$573.2 billion). The groups with mental health disorders see a higher proportion of dollars spent on facility-based services than the group without MH/SUD. The Non-SPMI MH cohort spends 56%, and the SPMI group spends 57%, on facility-based services. The SUD group spends 64% of total healthcare dollars on facility-based services, a percentage significantly higher than the group without MH/SUD.

Behavioral service costs are split in a similar fashion, with more facility-based spending for those with behavioral conditions compared to those without. The group without MH/SUD sees about 34% of their total behavioral non-pharmacy dollars spent on facility-based care, compared with 42% for the SPMI group and 71% for SUD group. Interestingly, the Non-SPMI MH group spent only 30% of their behavioral care dollars on facility-based services.

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Figure 4b below shows similar data for the Medicare population.

**Figure 4b: Total Healthcare Costs by Service Category and Presence of Behavioral Conditions – 2012 Costs, Medicare (millions)**

| Behavioral Condition | Medical Costs    |                  |                  |                    | Behavioral Costs |              |                |                    |
|----------------------|------------------|------------------|------------------|--------------------|------------------|--------------|----------------|--------------------|
|                      | IP Facility      | OP Facility      | PROF             | Total Non-Pharmacy | IP Facility      | OP Facility  | PROF           | Total Non-Pharmacy |
| <b>No MH/SUD</b>     | \$99,031         | \$93,124         | \$102,086        | \$294,241          | \$1,153          | \$118        | \$348          | \$1,619            |
| <b>Non-SPMI MH</b>   | \$9,329          | \$13,314         | \$8,523          | \$31,167           | \$474            | \$73         | \$367          | \$914              |
| <b>SPMI</b>          | \$8,363          | \$9,662          | \$8,117          | \$26,142           | \$2,918          | \$712        | \$967          | \$4,596            |
| <b>SUD</b>           | \$3,291          | \$2,425          | \$2,630          | \$8,346            | \$1,049          | \$188        | \$142          | \$1,379            |
| <b>Total</b>         | <b>\$118,379</b> | <b>\$117,244</b> | <b>\$119,935</b> | <b>\$355,559</b>   | <b>\$4,626</b>   | <b>\$914</b> | <b>\$1,693</b> | <b>\$7,234</b>     |

As with the commercial population, we see that facility-based medical and behavioral services constitute a greater proportion of care delivery for those with MH/SUD conditions than for those without.

Figure 4c below shows totals for the Medicaid population.

**Figure 4c: Total Healthcare Costs by Service Category and Presence of Behavioral Conditions – 2012 Costs, Medicaid (millions)**

| Behavioral Condition | Inpatient       | Behavioral Carve-Out | ER              | LTC             | Other            | Total Non-Pharmacy |
|----------------------|-----------------|----------------------|-----------------|-----------------|------------------|--------------------|
| <b>No MH/SUD</b>     | \$28,734        | \$1,963              | \$6,797         | \$10,602        | \$88,787         | \$136,883          |
| <b>MH/SUD</b>        | \$21,651        | \$31,264             | \$5,976         | \$6,805         | \$48,223         | \$113,919          |
| <b>Total</b>         | <b>\$50,385</b> | <b>\$33,227</b>      | <b>\$12,774</b> | <b>\$17,407</b> | <b>\$137,010</b> | <b>\$250,801</b>   |

In the Medicaid population, inpatient spending for the No MH/SUD group constitutes about 21% of the total non-pharmacy medical spending (IP, ER, LTC, and Other). For the MH/SUD group, this proportion is higher at 26%. Another important observation to note here is that even though the MH/SUD group constitutes just 20% of the total Medicaid membership, the total healthcare expenditures on this group accounts for 46% of the total Medicaid spending on healthcare services. Similarly, 20% of the total Medicaid members are incurring about half of the total Medicaid spending on ER visits.

## IMPACT OF BEHAVIORAL COMORBIDITIES ON OVERALL HEALTHCARE COSTS OF MEMBERS WITH CHRONIC MEDICAL CONDITIONS

### Comorbid Costs Per Patient by Medical and Behavioral Condition

We identified several chronic medical conditions in the sample populations for further analysis of cost and value opportunity through medical/behavioral integration. These conditions were selected based on relatively high prevalence rates and ease of identification in claim data. The identification criteria that we used for these chronic medical conditions (diagnosis codes and prescriptions filled) are listed in Appendix B.

The various figures presented in this section compare the total healthcare costs associated for members with chronic medical conditions and a comorbid behavioral condition, compared with those with the chronic medical condition but no behavioral comorbidity. We refer to the difference in these members' costs as the 'value opportunity' representing the potential for savings if we could manage all of a patient's comorbid conditions more effectively. Obviously, this total savings potential is unlikely to be achievable. However, a significant percentage of this differential may demonstrably be saved, and is estimated in the next section of this report.

Figure 5a shows the per member per month costs by medical condition and MH/SUD comorbidity for the Commercial populations. This sort of comparison is useful for gauging the relative potential for savings for each medical condition if only the members with the given condition were targeted for integration programs.

**Figure 5a - Impact of Behavioral Comorbidities, Commercial Population – 2012 Total PMPM Costs**

| Medical Condition                            | No MH/SUD | SPMI    | Non-SPMI MH | SUD     |
|--|-----------|---------|-------------|---------|
| Arthritis                                    | \$814     | \$2,065 | \$1,586     | \$1,827 |
| Asthma                                       | \$569     | \$1,851 | \$1,389     | \$1,774 |
| Cancer                                       | \$1,360   | \$2,525 | \$2,338     | \$2,668 |
| Chronic Kidney Disease                       | \$4,650   | \$5,664 | \$6,232     | \$6,901 |
| Congestive Heart Failure                     | \$1,274   | \$2,649 | \$1,955     | \$2,827 |
| Chronic Obstructive Pulmonary Disease        | \$992     | \$2,719 | \$2,088     | \$2,028 |
| Chronic Pain                                 | \$1,259   | \$2,355 | \$1,780     | \$2,387 |
| Back Pain                                    | \$1,624   | \$3,109 | \$2,395     | \$2,705 |
| Headache                                     | \$1,659   | \$3,311 | \$2,221     | \$3,354 |
| Diabetes (with complications)                | \$1,821   | \$3,366 | \$2,681     | \$3,678 |
| Diabetes (without complications)             | \$811     | \$1,775 | \$1,353     | \$1,848 |
| Hypercholesterolemia (with complications)    | \$1,369   | \$2,769 | \$2,061     | \$2,349 |
| Hypercholesterolemia (without complications) | \$649     | \$1,498 | \$1,065     | \$1,411 |
| Hypertension (with complications)            | \$1,447   | \$3,056 | \$2,220     | \$2,621 |
| Hypertension (without complications)         | \$688     | \$1,641 | \$1,157     | \$1,494 |
| Ischemic Heart Disease                       | \$1,443   | \$3,006 | \$2,319     | \$2,335 |
| Osteoporosis                                 | \$874     | \$2,312 | \$1,592     | \$1,720 |
| Stroke                                       | \$1,673   | \$3,556 | \$2,590     | \$2,554 |
| No Medical Condition                         | \$221     | \$762   | \$528       | \$615   |
| Any Medical Condition                        | \$695     | \$1,690 | \$1,271     | \$1,577 |
| Total  | \$340     | \$1,197 | \$903       | \$1,071 |

Chronic kidney disease shows the greatest value opportunity per patient with \$2,251 PMPM (\$6,901 - \$4,650) additional healthcare spending for those treated for substance abuse and \$1,582 PMPM (\$6,232 - \$4,650) additional costs for those treated for Non-SPMI conditions. This finding is corroborated by those of other researchers who note that patients with kidney disease and comorbid depression are twice as likely to be hospitalized or worse, die<sup>2</sup>. Other conditions with significant potential include cancer, COPD, and diabetes with complications. Generally speaking, patients with a SPMI condition comorbid alongside a chronic medical condition show the greatest value opportunity through integration with an average additional spending of \$995 (\$1,690 - \$695) PMPM followed by patients with a chronic medical condition and a comorbid substance abuse disorders with an average additional spending of \$882 PMPM (\$1,577 - \$695). All of these costs can be compared to the “Total” row costs which represents the average costs across all commercial beneficiaries for the behavioral condition cohort columns.

Figure 5b shows an example of these PMPM costs by major service category to show where the extra spending occurs. It shows costs for Arthritis with the various comorbid behavioral disorders. The majority of the higher healthcare costs when comorbid behavioral conditions are present are in medical spending as opposed to behavioral spending, with significant increases in facility-based costs.

**Figure 5b - Healthcare Costs PMPM by Service Category and Presence of Behavioral Conditions - 2012 Costs - Commercial, Arthritis Only**

| Behavioral Diagnosis | Per Member Per Month Spending |              |              |               |                          |             |            |                  | Medical Rx   | Behavioral Rx |
|----------------------|-------------------------------|--------------|--------------|---------------|--------------------------|-------------|------------|------------------|--------------|---------------|
|                      | Medical Costs, non-Rx         |              |              |               | Behavioral Costs, non-Rx |             |            |                  |              |               |
|                      | IP Facility                   | OP Facility  | Prof         | Total Medical | IP Facility              | OP Facility | Prof       | Total Behavioral |              |               |
| No MH/SUD            | \$81                          | \$288        | \$303        | \$672         | \$1                      | \$0         | \$3        | \$4              | \$128        | \$10          |
| Non-SPMI MH          | \$164                         | \$534        | \$522        | \$1,221       | \$4                      | \$2         | \$15       | \$22             | \$239        | \$105         |
| SPMI                 | \$227                         | \$632        | \$599        | \$1,458       | \$36                     | \$17        | \$82       | \$135            | \$234        | \$238         |
| SUD                  | \$251                         | \$693        | \$521        | \$1,466       | \$35                     | \$17        | \$23       | \$76             | \$161        | \$124         |
| <b>Total</b>         | <b>\$108</b>                  | <b>\$362</b> | <b>\$368</b> | <b>\$837</b>  | <b>\$3</b>               | <b>\$2</b>  | <b>\$9</b> | <b>\$14</b>      | <b>\$158</b> | <b>\$43</b>   |

Figure 5c below shows comparable results for the Medicare population. As pharmacy claims were primarily used to identify those patients with chronic pain, back pain, and headache, and pharmacy data was not available for the Medicare population, those conditions were removed from our analysis here.

<sup>2</sup> Medical News Today, The National Kidney Foundation, Inc. (2009, September 3). Kidney Disease Linked to Depression, Even in Early Stages. Retrieved from <http://www.medicalnewstoday.com/releases/162766.php>

**Figure 5c - Impact of Behavioral Comorbidities, Medicare Population – 2012 Total PMPM Costs**

| Medical Condition                            | No MH/SUD | SPMI    | Non-SPMI | SUD     |
|--|-----------|---------|----------|---------|
| Arthritis                                    | \$1,237   | \$2,109 | \$1,852  | \$2,010 |
| Asthma                                       | \$1,381   | \$2,227 | \$2,051  | \$2,325 |
| Cancer                                       | \$1,230   | \$2,117 | \$1,826  | \$2,083 |
| Chronic Kidney Disease                       | \$2,677   | \$3,986 | \$3,772  | \$4,581 |
| Congestive Heart Failure                     | \$2,230   | \$3,478 | \$2,882  | \$3,713 |
| Chronic Obstructive Pulmonary Disease        | \$1,598   | \$2,546 | \$2,335  | \$2,171 |
| Diabetes (with complications)                | \$1,740   | \$2,964 | \$2,755  | \$3,085 |
| Diabetes (without complications)             | \$811     | \$1,486 | \$1,379  | \$1,719 |
| Hypercholesterolemia (with complications)    | \$1,292   | \$2,465 | \$2,119  | \$2,302 |
| Hypercholesterolemia (without complications) | \$676     | \$1,186 | \$1,043  | \$1,267 |
| Hypertension (with complications)            | \$1,608   | \$2,917 | \$2,438  | \$2,936 |
| Hypertension (without complications)         | \$822     | \$1,528 | \$1,326  | \$1,642 |
| Ischemic Heart Disease                       | \$1,392   | \$2,659 | \$2,261  | \$2,634 |
| Osteoporosis                                 | \$1,052   | \$1,882 | \$1,627  | \$1,988 |
| Stroke                                       | \$1,567   | \$2,809 | \$2,400  | \$2,409 |
| None   | \$185     | \$665   | \$673    | \$821   |
| Any Condition                                | \$971     | \$1,701 | \$1,561  | \$1,744 |
| Total  | \$582     | \$1,436 | \$1,410  | \$1,504 |

Chronic kidney disease patients again show the greatest potential value on a per member basis. Other conditions with high value opportunities through integration include congestive heart failure and diabetes with complications comorbid with substance abuse.

Figure 5d below shows similar results for the Medicaid population, comparing costs of patients both with and without a comorbid behavioral condition. Due to the level of data available, we were not able to segregate results by SPMI, non-SPMI mental health, and substance use disorder subcategories. Additionally, the list of medical conditions available in the Medicaid data are different than the ones studied for the commercial and Medicare populations. They are more reflective of body system than medical condition.

**Figure 5d - Impact of Behavioral Comorbidities, Medicaid Population – 2012 Total PMPM Costs**

| <b>Body System (Condition)</b>                                | <b>No MH/SUD</b> | <b>MH/SUD</b>  |
|---|------------------|----------------|
| Benign/In Situ/Uncertain Neoplasm                             | \$686            | \$1,580        |
| Cardio-Respiratory Arrest                                     | \$4,798          | \$5,134        |
| Cerebro-Vascular  | \$2,052          | \$3,299        |
| Cognitive Disorders   | \$2,319          | \$3,552        |
| Diabetes  | \$1,066          | \$2,368        |
| Ears, Nose, and Throat  | \$488            | \$1,455        |
| Eyes  | \$587            | \$1,625        |
| Gastrointestinal  | \$843            | \$1,932        |
| Genital System  | \$662            | \$1,538        |
| Heart   | \$1,023          | \$2,134        |
| Hematological   | \$1,419          | \$3,003        |
| Liver   | \$1,328          | \$2,564        |
| Lung  | \$737            | \$1,912        |
| Malignant Neoplasm  | \$1,913          | \$3,185        |
| Musculoskeletal and Connective Tissue                         | \$693            | \$1,624        |
| Neurological  | \$1,476          | \$2,365        |
| Nutritional and Metabolic                                     | \$815            | \$1,923        |
| Pregnancy-Related   | \$1,147          | \$1,669        |
| Skin and Subcutaneous   | \$598            | \$1,771        |
| Urinary System  | \$1,079          | \$2,395        |
| Vascular  | \$1,808          | \$3,375        |
| <b>Total (including those without any medical conditions)</b> | <b>\$382</b>     | <b>\$1,301</b> |

Blood-related conditions have the highest value opportunity per member in the Medicaid market, with additional costs of \$1,584 PMPM for those with hematological conditions, and \$1,567 for those with vascular conditions. Most other conditions have similar value opportunities, with savings potential ranging from \$336 to \$1,584 PMPM.

Note that the “Total” row above illustrates the total PMPM costs for the entire Medicaid population, including those with no medical conditions as well as those with medical conditions other than the ones listed above (the “Total” row is not the total of the conditions listed in the rows above it).

**TOTAL VALUE OPPORTUNITY THROUGH INTEGRATION OF COMORBID MEDICAL AND BEHAVIORAL CONDITIONS**

Some of the conditions described above may provide significant potential for value through integration at an individual patient level, but are low incidence medical conditions, and so focusing efforts on those conditions may not provide the best total dollar savings opportunity overall. On the other hand, some chronic medical conditions are highly prevalent, but per member savings opportunities are lower, resulting in similar total overall savings but much larger disease management program costs. We studied the total additional healthcare cost dollars associated with a behavioral comorbidity for each medical condition.

Figures 6a through 6c display the total value opportunity through integration by medical condition for commercial, Medicare, and Medicaid populations. Value opportunities were calculated as the difference in per member per month costs between those treated for MH/SUD conditions and those not treated for MH/SUD conditions, multiplied by the

enrolled member months for those members who would be targets for intervention (the members with a behavioral comorbidity). Note that the value opportunities from each condition are not additive, because individuals can have multiple medical conditions (and in fact, many do), and these individuals would be included separately under each of their conditions. In calculating the total value opportunity, we have removed this extra counting, and hence, the sum of each row does not equal the "Total" row. Medical conditions are listed from highest value opportunity to lowest.

**Figure 6a - Annual Value Opportunity - Commercial Population – Total 2012 Dollars (millions)**

| Medical Condition                            | SPMI            | Non-SPMI MH      | SUD             | Total            |
|--|-----------------|------------------|-----------------|------------------|
| Arthritis                                    | \$7,931         | \$26,567         | \$3,013         | \$36,372         |
| Asthma                                       | \$6,298         | \$22,770         | \$2,633         | \$30,801         |
| Hypertension (without complications)         | \$5,645         | \$20,161         | \$2,505         | \$27,241         |
| Hypercholesterolemia (without complications) | \$5,151         | \$17,842         | \$1,596         | \$24,000         |
| Cancer                                       | \$2,236         | \$13,100         | \$1,149         | \$16,201         |
| Congestive Heart Failure                     | \$2,981         | \$10,166         | \$1,308         | \$13,953         |
| Diabetes (without complications)             | \$2,850         | \$9,982          | \$798           | \$13,334         |
| Chronic Obstructive Pulmonary Disease        | \$2,369         | \$7,829          | \$1,590         | \$11,428         |
| Hypertension (with complications)            | \$2,399         | \$7,905          | \$1,090         | \$11,031         |
| Diabetes (with complications)                | \$1,745         | \$6,246          | \$586           | \$8,381          |
| Hypercholesterolemia (with complications)    | \$1,707         | \$6,106          | \$720           | \$8,285          |
| Ischemic Heart Disease                       | \$1,380         | \$5,321          | \$732           | \$7,208          |
| Back Pain                                    | \$1,688         | \$4,598          | \$841           | \$6,894          |
| Chronic Pain                                 | \$1,007         | \$3,686          | \$455           | \$5,002          |
| Chronic Kidney Disease                       | \$267           | \$2,082          | \$192           | \$2,485          |
| Stroke                                       | \$632           | \$1,689          | \$262           | \$2,465          |
| Osteoporosis                                 | \$518           | \$1,602          | \$90            | \$2,209          |
| Headache                                     | \$231           | \$398            | \$119           | \$683            |
| None   | <b>\$13,373</b> | <b>\$42,270</b>  | <b>\$4,547</b>  | <b>\$56,991</b>  |
| Any Condition                                | <b>\$21,781</b> | <b>\$81,029</b>  | <b>\$9,188</b>  | <b>\$105,376</b> |
| Total  | <b>\$35,154</b> | <b>\$123,299</b> | <b>\$13,735</b> | <b>\$162,366</b> |

We estimate a total annual value opportunity of \$162 billion in the commercial market through integration (and a portion of this potential can actually be realized as discussed in the next section). A majority of the savings potential in the commercial market comes through effective integration of Non-SPMI mental conditions. Arthritis (\$36 billion), asthma (\$31 billion), hypertension with complications (\$27 billion) and hypercholesterolemia without complications (\$24 billion) provide the highest value opportunities in the commercial market. Comorbid Non-SPMI conditions make up the highest portion of total value opportunity.

Table 6b below shows similar results for the entire Medicare population.



**Figure 6b - Annual Value Opportunity - Medicare Population - Total 2012 Dollars (millions)**

| Medical Condition                            | SPMI            | Non-SPMI<br>MH  | SUD            | Total           |
|--|-----------------|-----------------|----------------|-----------------|
| Arthritis                                    | \$5,791         | \$5,042         | \$1,522        | \$11,929        |
| Hypertension (without complications)         | \$4,641         | \$3,987         | \$1,477        | \$9,620         |
| Hypertension (with complications)            | \$3,804         | \$3,616         | \$1,012        | \$8,114         |
| Ischemic Heart Disease                       | \$3,322         | \$3,269         | \$993          | \$7,278         |
| Chronic Obstructive Pulmonary Disease        | \$3,157         | \$2,498         | \$945          | \$6,408         |
| Diabetes (with complications)                | \$2,733         | \$2,555         | \$594          | \$5,727         |
| Hypercholesterolemia (without complications) | \$2,158         | \$1,495         | \$551          | \$4,034         |
| Diabetes (without complications)             | \$2,060         | \$1,405         | \$563          | \$3,842         |
| Congestive Heart Failure                     | \$1,866         | \$1,538         | \$494          | \$3,740         |
| Hypercholesterolemia (with complications)    | \$1,725         | \$1,676         | \$392          | \$3,676         |
| Cancer                                       | \$1,614         | \$1,582         | \$453          | \$3,535         |
| Asthma                                       | \$1,320         | \$809           | \$584          | \$2,570         |
| Chronic Kidney Disease                       | \$1,107         | \$1,159         | \$327          | \$2,522         |
| Stroke                                       | \$1,047         | \$1,224         | \$214          | \$2,453         |
| Osteoporosis                                 | \$570           | \$700           | \$125          | \$1,348         |
| None   | <b>\$2,626</b>  | <b>\$1,889</b>  | <b>\$1,072</b> | <b>\$5,318</b>  |
| Any Condition                                | <b>\$11,635</b> | <b>\$11,141</b> | <b>\$3,699</b> | <b>\$25,485</b> |
| Total  | <b>\$14,260</b> | <b>\$13,030</b> | <b>\$4,771</b> | <b>\$30,803</b> |

We estimate a total annual value opportunity of \$31 billion in the Medicare market through integration of MH/SUD and medical treatments. Arthritis (\$12 billion) and hypertension without complications (\$10 billion) provide the most value potential amongst Medicare patients. Comorbid SPMI conditions make up a higher portion of total value potential here as compared to the commercial market.

Table 6c below shows similar results for the entire Medicaid population – the total annual value opportunity for Medicaid beneficiaries with comorbid medical conditions and MH/SUD conditions.

**Figure 6c - Annual Value Opportunity - Medicaid Population – Total 2012 Dollars (millions)**

| <b>Medical Condition</b>                                      | <b>Total</b>     |
|---|------------------|
| Musculoskeletal and Connective Tissue                         | \$50,340         |
| Nutritional and Metabolic                                     | \$43,519         |
| Ears, Nose, and Throat  | \$42,018         |
| Gastrointestinal  | \$40,341         |
| Lung  | \$37,261         |
| Skin and Subcutaneous   | \$34,738         |
| Heart   | \$34,227         |
| Eyes  | \$29,592         |
| Urinary System  | \$21,800         |
| Genital System  | \$19,410         |
| Hematological   | \$18,072         |
| Neurological  | \$16,792         |
| Diabetes  | \$14,748         |
| Liver   | \$14,511         |
| Vascular  | \$10,619         |
| Benign/In Situ/Uncertain Neoplasm                             | \$9,201          |
| Cognitive Disorders   | \$5,934          |
| Malignant Neoplasm  | \$4,103          |
| Cerebro-Vascular  | \$3,568          |
| Pregnancy-Related   | \$2,390          |
| Cardio-Respiratory Arrest                                     | \$866            |
| <b>Total (including those without any medical conditions)</b> | <b>\$100,374</b> |

We estimate a total annual value opportunity of \$100 billion in the Medicaid market through integration of MH/SUD and medical treatments. The value opportunity was similar for most conditions on a per-patient basis. Consequently, conditions with higher incidence exhibit a greater total value potential. Musculoskeletal and connective tissue, nutritional and metabolic, ear/nose/throat and gastrointestinal conditions have the highest value potential. Although they were the most valuable on a per-patient basis, low-incidence vascular and hematological conditions are lower in terms of total value opportunity through integration in the Medicaid population.

Note that the total row is the total for the entire Medicaid population, and not just the sum of the condition-specific rows above it. The total row also counts the savings from people who have multiple conditions only once.

Across all populations (commercial plus Medicare plus Medicaid), we estimate a total annual value opportunity of \$293 billion through integration of behavioral and medical services in the U.S. Arthritis is one of the most cost savings opportunistic conditions in both the commercial and Medicare markets. When combining those with and without complications, hypertension has the greatest value opportunity in both the commercial (\$38 billion) and Medicare (\$18 billion) markets.

While high-cost conditions such as chronic kidney disease provide the most potential value on a per-patient basis, higher-prevalence conditions such as hypertension and arthritis provide the most value potential for the entire population.

Note that we are not suggesting that the members with these highlighted medical conditions are necessarily the best targets for integration. The decision to optimally focus limited resources on integration to fewer medical conditions

should be based on the costs of integration specific to those conditions, and the likelihood of being able to improve both clinical and financial outcomes for the patient cohorts. This question falls outside the scope of this report, and is a good subject for further analysis. There also may be other unmeasured or unknown medical or epidemiologic factors which make the actual value proposition different than noted here.

Next, we look at the potential financial impact of reducing total healthcare costs for those with co-morbid conditions through effective integration of medical and behavioral services.

### FINANCIAL IMPACT OF EFFECTIVE IMBH PROGRAMS

A variety of approaches to integrated medical-behavioral healthcare have been the focus of cost-effectiveness research over the past three decades, with most studies finding that integrated care can lead to reductions in total healthcare costs. Typical cost savings estimates range from 5% to 10% of total healthcare costs over a two to four year period for patients receiving collaborative care, although the most robust evidence is in the care of depression in older adults.

One study focused on a collaborative depression care management program directed toward low-income, predominantly Hispanic diabetics. The program, called the Multifaceted Diabetes and Depression Program (MDDP), was administered through a randomized clinical trial, and was compared with enhanced usual care (EUC). Although not statistically significant, medical cost savings of approximately \$39 per member per month (PMPM) were observed during the eighteen months following the implementation of the MDDP program. The study identified the 95% confidence interval for the savings of the program as savings of \$110 PMPM at the upper limit to an additional cost (or negative savings) of \$32 PMPM at the lower limit.

The Pathways study focused on the outcomes of a program utilizing specialized nurses to deliver a twelve-month depression treatment program for patients with diabetes. This program was administered through a randomized controlled trial that compared the systematic depression treatment program with care as usual. Total outpatient costs were approximately equal during the 12-month intervention period for both the intervention group and the usual care group, but during the 12-month period following the intervention, median outpatient costs for the intervention group were \$50 PMPM lower than costs for the usual care group. Over the entire two year period, including the intervention period, total healthcare costs (including inpatient and outpatient health services) were \$46 PMPM lower for the intervention group than for the usual care group. This represents savings of about 5% of total healthcare costs for the intervention group over a 2 year period.

The IMPACT study focused on a twelve-month collaborative care management program for elderly patients with depression. The program was administered through a randomized clinical trial that compared a collaborative care intervention using teams of depression care managers, primary care doctors and psychiatrists to the usual care for depression. Total healthcare costs were tracked for a 4-year period following the intervention, and costs for the intervention group were an average of \$70 PMPM lower than costs for those receiving usual care. This represents savings of about 10% of total healthcare costs for the intervention group over a 4 year period. Patients in the collaborative care management program had lower costs in every category that was observed, and the results of a bootstrap analysis indicated that patients in the collaborative care program were 87% more likely to have lower total healthcare costs than those receiving usual care.

Missouri established Community Mental Health Center healthcare homes in 2012 for Medicaid eligible persons with serious and persistent mental illnesses, comorbid mental health and substance use disorders, and certain chronic medical conditions comorbid with a mental health or substance use disorder. Their early results showed that independent living increased by 33%, vocational activity increased by 44%, legal involvement decreased by 68%, psychiatric hospitalization decreased by 52%, and overall healthcare costs decreased by 8.1%.

A meta-analysis of cost-effectiveness research studies identified 23 studies addressing the economics of collaborative care over the past three decades. In nearly all of these studies, collaborative care programs were found to be at least cost neutral, with most studies indicating actual savings. One study compared the financial outcomes of clinics newly

practicing collaborative care to demographically similar clinics practicing usual care. Healthcare costs increased for both groups of clinics following the introduction of collaborative care, but clinics practicing collaborative care saw only 73% of the increase that clinics practicing usual care experienced, and their patients were 54% less likely to use the emergency department, and 49% less likely to use inpatient psychiatric care. Additional studies and innovation projects will be needed to confirm these findings in other populations and non-research settings.

## PUTTING THINGS IN PERSPECTIVE

Patients with behavioral health conditions cost an estimated \$525 billion in health care expenditures annually. Literature suggests that an estimated 5-10% of these total healthcare expenditures for those with behavioral conditions may be eliminated through effective integration of behavioral healthcare with medical care, particularly in older patients with depression. Total cost savings were estimated by applying 5-10% expected savings to the total costs for MH/SUD patients in the commercial and Medicare markets and 5-7% in the Medicaid market to introduce conservatism into the Medicaid estimate. The Medicaid population tends to have unstable enrollment periods and is more difficult to manage than the commercially insured or Medicare populations. These calculations result in projected annual savings of \$26-48 billion through IMBH efforts, or 9-16% of the total value opportunity of \$293 billion in the commercial, Medicare, and Medicaid markets as shown in Figures 6a-6c.

The American Medical Association estimates that there are 41,784 psychiatrists practicing patient care as of 2012<sup>3</sup>. The Bureau of Labor Statistics estimates average annual earnings of \$174,170 per practicing psychiatrist as of May 2011.<sup>4</sup> This translates to \$7.3 billion in psychiatrist wages annually. Comparing this estimate to the projected savings estimate of \$26-48 billion means that the potential financial impact of IMBH programs can be up to 3.5 to 6.6 times annual psychiatrist earnings. Stated another way, a 10% gain sharing arrangement for psychiatrists (where they are credited with a certain percentage of actual achieved healthcare cost savings through a contractual arrangement) of savings from integration has the potential to increase annual earnings estimates for psychiatry overall by about 50%. In this example, that leaves the other 90% of savings through collaborative care to be shared with others in the collaborative care teams, to be used to lower healthcare premiums, and to be reinvested in community based care.

A 2003 study from the Substance Abuse and Mental Health Services Administration (SAMHSA) reports that the total national expenditures for mental health and substance abuse services provided by all physicians, including psychiatrists and non-psychiatric physicians, is projected to be about \$35 billion by 2014.<sup>5</sup> This estimate is before recent changes resulting from MHPAEA and PPACA and includes all payers - private and public; federal, state and local. Our estimates of savings from effective IMBH programs approach 75-140% of this total.

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<sup>3</sup> American Medical Association: Physician Characteristics and Distribution in the U.S. Chicago: AMA, 2012

<sup>4</sup> Occupational Employment and Wages, May 2011, 29-1066 Psychiatrists (March 27, 2012).. In Bureau of Labor Statistics. Retrieved January 10, 2013, from <http://www.bls.gov/oes/current/oes291066.htm#ind>.

<sup>5</sup> Levit, K. R., et. al. Projections of national expenditures for mental health services and substance abuse treatment 2004 –2014. website: <http://www.samhsa.gov/Financing/file.axd?file=2009%2F6%2FProjections+of+National+Expenditures+for+Mental+Health+Services+and+Substance+Abuse+Treatment%2C+2004-2014.pdf>

## CONCLUSIONS – WHERE DO WE GO FROM HERE?

There is clear potential for healthcare expenditure savings through effective integration of behavioral healthcare with medical services. Figure 7 summarizes membership, claims, and cost impact potential through integration.

**Figure 7: Average Annual Cost Savings and Impact Through Effective Integration – 2012 Totals**

(All Costs in Millions)

| Payer Type        | Member Months        | Total Claims       | Value Opportunity | Cost Impact of Integration |
|-------------------|----------------------|--------------------|-------------------|----------------------------|
| <b>Commercial</b> | 2,386,000,000        | \$1,013,386        | \$162,366         | \$15,815-\$31,629          |
| <b>Medicare</b>   | 556,000,000          | \$362,793          | \$30,803          | \$3,347-\$6,693            |
| <b>Medicaid</b>   | 546,000,000          | \$308,836          | \$100,374         | \$7,103-\$9,945            |
| <b>Total</b>      | <b>3,487,000,000</b> | <b>\$1,685,016</b> | <b>\$293,543</b>  | <b>\$26,265-\$48,267</b>   |

The potential cost impact of \$26-48 billion is several times that of expected psychiatric salaries and approaches the level of total national expenditures on psychiatric services provided by physicians (including non psychiatric physicians), estimated to reach about \$35 billion in 2014.

To realize this savings, it may be best to implement integration among conditions that show the highest potential for savings either per person or through the entire population. Figures 5a - 5c showed that high-severity conditions such as chronic kidney disease, COPD, hypertension, and circulatory conditions have the greatest potential for savings on a per patient basis, while high-incidence illnesses such as arthritis and asthma have the greatest potential for savings through the entire population. Regarding comorbid behavioral conditions, those with more severe SPMI conditions have the greatest potential for savings on a per patient basis. Non-SPMI conditions are more prevalent and therefore represent a higher portion of the savings for all patients combined.

Potential healthcare savings should not be the only factor used in determining which conditions to concentrate integration efforts. Additional consideration should be given to which comorbid conditions and patients that physicians, practitioners and care management teams believe can most optimally improve clinical and financial outcomes, thus reducing healthcare expenditures through their integration implementation efforts.

## APPENDIX A: STUDY DESIGN AND METHODOLOGY

### Sample Selection

People eligible for inclusion in the study for the commercial and Medicare populations must meet the following criteria:

1. Must have at least 3 months of enrollment in 2009 to ensure that minimum credible claim data to identify chronic conditions was present.
2. Must have 12 months of continuous enrollment in 2010
3. Must be eligible for pharmacy benefits in both 2009 and 2010 during the entire period of enrollment

Patients with chosen conditions in 2009 were identified and the patients' healthcare utilization and costs were followed through 2010. People with chronic medical conditions without any comorbid behavioral conditions were compared against those with both a chronic medical condition and at least one comorbid behavioral condition

The Medicaid population was based on 2010 MassHealth Medicaid data (see Appendix E below for more details) and adjusted to represent a national population.

### Condition Selection

Eighteen chronic medical conditions were chosen for analysis for the Commercial and Medicare populations:

- Arthritis
- Asthma
- Cancer (Malignant)
- Chronic Kidney Disease (CKD)
- Congestive Heart Failure (CHF)
- Chronic Obstructive Pulmonary Disease (COPD)
- Chronic Pain (excluding back pain and headache)
- Back Pain
- Headache
- Diabetes
  - with complications (IHD, CHF, Stroke, Chronic Kidney Disease, Retinopathy, Neuropathy)
  - without complications
- Hypercholesterolemia
  - with IHD, CHF, or Stroke

- without IHD, CHF, or Stroke
- Hypertension
  - with IHD, CHF, or Stroke
  - without IHD, CHF, or Stroke
- Ischemic Heart Disease (IHD)
- Osteoporosis
- Stroke

Twenty-one condition categories were chosen for analysis for the Medicaid population:

- Musculoskeletal and Connective Tissue
- Nutritional and Metabolic
- Gastrointestinal
- Ears, Nose, and Throat
- Heart
- Lung
- Skin and Subcutaneous
- Eyes
- Neurological
- Urinary System
- Genital System
- Hematological
- Diabetes
- Liver
- Vascular
- Benign/In Situ/Uncertain Neoplasm
- Cognitive Disorders
- Cardio-Respiratory Arrest
- Malignant Neoplasm
- Cerebro-Vascular

- Pregnancy-Related

Eleven MH/SUD disorders were selected for this study based on ease of identification in claims data:

- Adjustment reaction
- Alcoholism
- Anorexia / Bulimia
- Anxiety
- Depression
- Drug Abuse
- Neurotic Disorder
- Dementia
- Mental Retardation
- Somatoform Disorders
- Psychosis

Criteria for identification of chronic medical conditions and comorbid behavior conditions are provided on Appendix B.



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## APPENDIX B: IDENTIFICATION OF MEDICAL AND BEHAVIORAL CONDITIONS (COMMERCIAL AND MEDICARE)

Certain conditions were identified using just the primary and secondary ICD-9 diagnosis codes for claims for inpatient (IP), emergency (ER), and outpatient (OP) healthcare services. For other conditions, pharmacy-based criteria were used as well. A patient can have multiple chronic medical conditions; these patients were analyzed once for each condition. The diagnosis code(s) and pharmacy criteria for identifying each of the conditions are described below. Note that the pharmacy based criteria was used for commercial population only and not for Medicare population due to the lack of pharmacy data for the Medicaid population.

For prescription-based criteria, when drugs were used to treat up to 4 conditions, we required presence of a diagnosis code within 30 days prior to the prescription to identify the condition. If a drug is used to treat a single condition, then we did not require the 'diagnosis within 30 day' criteria. Certain conditions are treated with prescription medications that are also used for more than 4 other conditions. Since these drugs do not help us uniquely identify the patient's condition, we have not included such drugs in the condition identification criteria below.

For certain chronic conditions (arthritis and osteoporosis) that are managed using drugs, we may see only prescription claims and no diagnosis of the condition. In such cases, we applied age-and-gender-based criteria to reduce the false positives. For example, for Osteoporosis, if only prescriptions for the condition but no diagnosis codes are available, then we required that the member also be a female over the age of 50 to be assessed as having Osteoporosis.

Certain prescription-based criteria use therapeutic classes.

Other prescription-based condition-identification criteria were obtained from Milliman Underwriting Guidelines. The guidelines include non-FDA approved uses for some of the drugs. If a drug has 3 or more FDA approved uses, then they would not list the non-FDA approved conditions for that drug. If the drug has fewer than 3 FDA-approved uses, then they would list up to 3 'generally-accepted' uses. If no such uses exist, then they list up to 3 'limited evidence uses'.

### Chronic Medical Conditions

#### ARTHRITIS

Any claim with a diagnosis code in the 710.0 - 719.99 range

#### ASTHMA

Any claim with a diagnosis code in the 493.0 - 493.99 range, or a prescription drug claim with an NDC number identified as an asthma medication according to NCQA.

#### CANCER (MALIGNANT)

Any claim with a diagnosis code in the 140.0-208.99 or 230.0-239.99 ranges

#### CHRONIC KIDNEY DISEASE

Any claim with a diagnosis code in the 585.00-585.99 range

#### CONGESTIVE HEART FAILURE (CHF)

Any claim with a diagnosis code of 402.01, 402.11, 402.91, 404.01, or 404.11, or 428.XX. Several drug classes are used to treat CHF. However, the only therapeutic classes that appear to uniquely identify CHF are "Cardiac, Cardiac

Glycosides”, “Diuretics, Misc.”, “Diuretics, Loop Diuretics”, “Diuretics, Osmotic”, “Diuretics, Potassium-Sparing”, and “Diuretics, Carb Anhydrase Inhib”. Other therapeutic classes such as “Cardiac, ACE Inhibitors” and “Diuretics, Thiazides & related” are also used to treat other conditions and, therefore, excluded from this criteria.

**CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)**

Any claim with a diagnosis code in one of the following ranges: 490.0-492.99, 494.0-496.99, or 500.0-508.99.

Or, any member over the age of 50 and having at least 2 prescription drug claims for any of the following drugs:

**Table B1**

|         |             |                  |           |          |
|---------|-------------|------------------|-----------|----------|
| Airet   | Aralast     | Arcapta Neohaler | Combivent | Daliresp |
| Glassia | Perforomist | Prolastin        | Spiriva   | Volmax   |
| Zemaira |             |                  |           |          |

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs:

**Table B2**

|                   |              |                |                |              |
|-------------------|--------------|----------------|----------------|--------------|
| Accuneb           | Duoneb       | Proventil      | Acetylcysteine | Dyflex-G     |
| Quibron-T         | Advair       | Dy-G           | Qvar           | Aerobid      |
| Dylix             | Symbicort    | Aerolate       | Dyphylline-GG  | Theo-24      |
| Albuterol         | Elixophyllin | Theocap        | Aminophylline  | Factive      |
| Theochron         | Brondil      | Flovent Diskus | Theolair       | Brovana      |
| Foradil Aerolizer | Theophylline | Cedax          | Jay-Phyl       | Uniphyl      |
| Copd              | Ketek        | Ventolin HFA   | Dg 200         | Levalbuterol |
| Vospire ER        | Difil-G      | Lufyllin       | Xopenex        | Dillex-G     |
| Mucomyst          | Dilor        | Proair         |                |              |

**CHRONIC PAIN**

Any patient who had a medication possession ratio (MPR) for 75% of his/her enrolled period. Any patient with chronic back pain and chronic headaches will not be counted under this condition; they are carved out into separate conditions as described below.

**BACK PAIN**

Any claim with a diagnosis code of 724.XX and an MPR of 75% (as described in Chronic Pain)

**HEADACHE**

Any claim with a diagnosis code of 784.0X and an MPR of 75% (as described in Chronic Pain)

**DIABETES MELLITUS**

Diabetes identification: Any claim with a diagnosis code starting with 250 or a pharmacy drug claim with a therapeutic class of "Diabetes Mell/Diab Supply NEC", "Antidiabetic Ag, Sulfonylureas", "Antidiabetic Agents, Insulins", or "Antidiabetic Agents, Misc" resulted in the assignment of this condition.

Complications: member must also have had IHD, CHF, stroke, kidney disease, retinopathy, or neuropathy. Retinopathy was identified as claims with an ICD-9 code starting with 362.0x or 362.2x. Neuropathy was identified as claims with ICD-9 code starting with 365.0x or 356.8x. All other conditions were identified as mentioned elsewhere in this section.

**HYPERCHOLESTEROLEMIA**

Any claim with a diagnosis code of 272.0, 272.1, 272.2, 272.3, 272.4, or 272.9.

Or, at least 2 prescription drug claims for any of the following drugs:

| Table B3 |         |             |                 |           |
|----------|---------|-------------|-----------------|-----------|
| Advicor  | Antara  | Fenofibrate | Fenofibric Acid | Fenoglide |
| Fibricor | Lipofen | Livalo      | Lofibra         | Lovaza    |
| Niaspan  | Simcor  | Tricor      | Triglide        | Trilipix  |
| Vytorin  | Zetia   |             |                 |           |

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs:

| Table B4                  |                   |  |              |                      |
|---------------------------|-------------------|--|--------------|----------------------|
| Altoprev                  | Lovastatin        | Amlodipine Besylate / Atorvastatin Calcium | Mevacor      | Atorvastatin Calcium |
| Micronized Colestipol Hcl | Caduet            | Neo-Fradin                                 | Cardiosterol | Niacin               |
| Cholestyramine            | Pantothenic Acid  | Colestid                                   | Policosanol  | Colestipol           |
| Prevalite                 | Crestor           | Questran                                   | Gemfibrozil  | Simvastatin          |
| Juvisync                  | Vanadium          | Lescol                                     | Welchol      | Lipitor (Brand)      |
| Zocor                     | Lipitor (Generic) | Zyncol                                     | Lopid        |                      |

**HYPERTENSION**

Any claim with a diagnosis code in the 401.0-405.99 range except for those in the range for congestive heart failure above.

Or, at least 2 prescription drug claims for any of the following drugs:

| Table B5  |          |         |   |          |
|-----------|----------|---------|---|----------|
| Accuretic | Aldoclor | Aldoril | Amlodipine Besylate / Benaxepiril Hydrochloride | Amturide |

**Table B5**

|                     |   |   |                  |                                  |
|---------------------|---|---|------------------|----------------------------------|
| Avalide             | Azor                                    | Bisoprolol Fumarate / Hydrochlorothiazide | Bystolic         | Cartrol                          |
| Cleviprex           | Clorpres                                | Corlopam                                  | Corzide          | Edarbi                           |
| Enalaprilat         | Enduronyl                               | Eprosartan Mesylate                       | Exforge          | Exforge Hct                      |
| Fenoldopam Mesylate | Fosinopril Sodium / Hydrochlorothiazide | Guanabenz Acetate                         | Inderide         | Innopran XI                      |
| Kerlone             | Levatol                                 | Lotrel                                    | Methyclothiazide | Methyldopa / Hydrochlorothiazide |
| Methyldopate Hcl    | Minizide                                | Moexipril                                 | Naturetin        | Olmesartan Medoxomil             |
| Quinaretic          | Rauwolfia / Bendroflumethiazide         | Tarka                                     | Tekamlo          | Tekturna                         |
| Tekturna Hct        | Tenoretic                               | Teveten                                   | Timolide         | Trandolapril / Verapamil Hcl     |
| Tribenzor           | Twynsta                                 | Uniretic                                  | Univasc          | Valturna                         |
| Ziac                |   |   |                  |                                  |

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs:

**Table B6**

|                |                       |  |  |                     |
|----------------|-----------------------|--|--|---------------------|
| Accupril       | Aceon                 | Adalat                                     | Afeditab                                 | Aldactazide         |
| Altace         | Amlodipine Besylate   | Amlodipine Besylate / Atorvastatin Calcium | Atacand                                  | Atenolol            |
| Avapro         | Benazepril Hcl        | Benicar                                    | Betaxolol Hcl                            | Bisoprolol Fumarate |
| Blocadren      | Brevibloc             | Bumetanide                                 | Caduet                                   | Calan               |
| Capoten        | Capozide              | Captopril                                  | Captopril / Hydrochlorothiazide          | Cardene             |
| Cardizem       | Cardura               | Cartia Xt                                  | Carvedilol                               | Catapres            |
| Chlorothiazide | Chlorothiazide Sodium | Chlorthalidone                             | Clonidine Hcl                            | Coreg               |
| Corgard        | Covera-Hs             | Cozaar                                     | Demadex                                  | Demser              |
| Dibenzyline    | Dilacor               | Diltia Xt                                  | Diltiazem                                | Dilt-Xr             |
| Diltzac        | Diovan                | Diuril                                     | Doxazosin Mesylate                       | Dyazide             |
| Dynacirc       | Dyrenium              | Enalapril Maleate                          | Enalapril Maleate / Hydrochlorothiazide  | Eplerenone          |
| Esmolol Hcl    | Felodipine            | Fosinopril Sodium                          | Furosemide                               | Guanfacine Hcl      |
| Hydralazine    | Hydrochlorothiazide   | Hytrin                                     | Hyzaar                                   | Indapamide          |
| Inspra         | Isoptin               | Isradipine                                 | Labetalol Hcl                            | Lasix               |
| Linseed Oil    | Lisinopril            | Losartan Potassium                         | Losartan Potassium / Hydrochlorothiazide | Lotensin            |
| Lozol          | Lytensopril           | Magnesium Sulfate                          | Matzim La                                | Mavik               |

**Table B6**

|                      |                |                 |                                   |              |
|----------------------|----------------|-----------------|-----------------------------------|--------------|
| Maxzide              | Methyldopa     | Metolazone      | Metoprolol                        | Micardis     |
| Microzide            | Midamor        | Minipress       | Minoxidil                         | Monopril     |
| Nadolol              | Nexiclon Xr    | Nicardipine Hcl | Nifediac Cc                       | Nifedical XI |
| Nifedipine           | Nisoldipine    | Nitroglycerin   | Nitropress                        | Norvasc      |
| Perindopril Erbumine | Pindolol       | Plendil         | Prazosin Hcl                      | Prinivil     |
| Prinzide             | Procardia      | Quinapril       | Ramipril                          | Renese       |
| Reserpine            | Sodium Edecrin | Sular           | Taztia Xt                         | Tenex        |
| Tenormin             | Terazosin Hcl  | Thalitone       | Tiazac                            | Toprol XI    |
| Torsemide            | Trandate       | Trandolapril    | Triamterene / Hydrochlorothiazide | Vaseretic    |
| Vasotec              | Verapamil Hcl  | Verelan         | Zaroxolyn                         | Zebeta       |
| Zestoretic           | Zestril        |                 |                                   |              |

**ISCHEMIC HEART DISEASE**

Any claim with a diagnosis code starting with any number between 410.XX – 414.XX (including 410, 414).

**OSTEOPOROSIS**

Claim lines were identified as pertaining to osteoporosis if either of the ICD-9 diagnosis codes was in the range 733.00-733.09 inclusive.

Or, any female over the age of 50 and having at least 2 prescription drug claims for any of the following drugs:

**Table B7**

|           |         |                   |        |          |
|-----------|---------|-------------------|--------|----------|
| Actimmune | Atelvia | Calcitonin-Salmon | Forteo | Fortical |
| Fosteum   |         |                   |        |          |

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs:

**Table B8**

|                    |                    |                         |                 |                         |
|--------------------|--------------------|-------------------------|-----------------|-------------------------|
| Activella          | Actonel            | Alendronate Sodium      | Alora           | Boniva                  |
| Calafol            | Calcium Acetate    | Calcium*                | Cavarest        | Cavirinse               |
| Citrus Calcium + D | Clinpro            | Controlrx               | Denta 5000 Plus | Dentagel                |
| Dentall 1100 Plus  | Estraderm          | Estropipate             | Evista          | Femhrt                  |
| Florical           | Fluoride Mouthwash | Fluoridex Daily Defense | Fluorigard      | Fosamax                 |
| Gynodiol           | Jevantique         | Jinteli                 | Karigel         | Listerine Tooth Defense |
| Listermint         | Menostar           | Miacalcin               | Mimvey          | Nafrinse                |

**Table B8**

|                       |                         |          |           |                 |
|-----------------------|-------------------------|----------|-----------|-----------------|
| Neutragard Advanced   | Neutral Sodium Fluoride | Nitrobid | Ogen      | Ortho-Est       |
| Phos-Flur             | Phos-Flur Otc           | Prefest  | Premphase | Prempro         |
| Prevident             | Prolia                  | Reclast  | Rembrandt | Sodium Fluoride |
| Sodium Fluoride Plain | Thera-Flur-N            | Vivelle  |           |                 |

**STROKE (ISCHEMIC)**

Any claim with a diagnosis code in the 430.0 - 434.9 range.

Or, any member over the age of 50 and having at least 2 prescription drug claims for Aggrenox.

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs:

**Table B9**

|  |          |                      |                   |                    |
|--|----------|----------------------|-------------------|--------------------|
| Activase                                 | Altace   | Atorvastatin calcium | Clopidogrel       | Cozaar             |
| Hyzaar                                   | Juvisync | Lipitor (brand)      | Lipitor (generic) | Losartan potassium |
| Losartan potassium / hydrochlorothiazide | Micardis | Nimodipine           | Nimotop           | Plavix             |
| Pradaxa                                  | Ramipril | Reopro               | Simvastatin       | Ticlid             |
| Ticlopidine HCL                          | Xarelto  | Zocor                |                   |                    |

**Behavioral Conditions**

**ADJUSTMENT REACTION**

Any claim with a diagnosis code in the range 309.0 - 309.99 excluding those in the range for anxiety below.

**ALCOHOLISM**

Any claim with a diagnosis code in the ranges 303.0-303.99 or 305.00-305.09

**ANOREXIA/BULIMIA**

Any claim with a diagnosis code of 307.1, 307.50, 307.51, 307.52, 307.53, 307.54, or 307.59

**ANXIETY DISORDER**

Any claim with a diagnosis code of 293.84, 300.00, 300.01, 300.02, 300.09, 300.20-300.29, 300.3, 308.3, or 309.81, or a pharmacy drug with a generic name of "Clonazepam", "Buspirone Hydrochloride", or "ASH, Benzodiazepines".

**DEPRESSION**

Any claim with a diagnosis code in the 296.0-296.99 range or the 311.0-311.99 range, a diagnosis code of 300.4, or a pharmacy drug claim with a therapeutic class of "Psychother, Antidepressants"

**DRUG ABUSE**

Any claim with a diagnosis code in the ranges 304.0-304.99 or 305.1-305.99

**NEUROTIC DISORDER**

Any claim with a diagnosis code in the range 300.0-300.99 excluding those in the range for anxiety above

**DEMENTIA**

Any claim with a diagnosis code starting with 290 or 294.1X.

Or, any member over the age of 65 and having at least 2 prescription drug claims for Reminyl or Ergoloid Mesylates.

Or, at least 1 prescription drug claim within 30 days of diagnosis for any of the following drugs

**TABLE B10**

|              |          |             |                |                      |
|--------------|----------|-------------|----------------|----------------------|
| Cardiosterol | CLA      | DHEA        | Eldepryl       | Emulsified Omega-3   |
| EPA          | Fish Oil | Galantamine | Ginkgo Biloba  | Namenda              |
| Nicotine     | Omega-3  | Razadyne    | Selegiline HCL | Triple Omega Complex |

Namenda

**MENTAL RETARDATION**

Any claim with a diagnosis code in the range 317-319

**SOMATOFORM DISORDERS**

Any claim with a diagnosis code in the range 300.81-300.82

**PSYCHOSIS**

Any claim with a diagnosis code in the range 293.XX-302.XX or 306.XX-314.XX excluding those in the ranges listed above

**Additional Criteria for Determination of Medical and Behavioral Conditions**

To ensure that we believe credible evidence exists of chronic medical and comorbid behavioral conditions, we applied the following additional criteria to determine presence of a condition:

- For all conditions where drug-based identification criteria were not used, members had to meet any one of the following criteria: member must have 1 IP admission, 1 ER visit, or 2 OP visits with a diagnosis code identified above.
- For all other conditions except chronic pain, the member had to meet any one of the following criteria: 1 IP admission, 1 ER visit, 1 OP visit and 1 Rx script (when the Rx is used to treat only condition), 1 OP visit and 1 Rx within 30 days of OP visit (when Rx is used to treat more than 1 condition), 2 OP visits, or 2 Rx scripts related to

the condition (that is, diagnosis code for the condition was present on the visit or the script met the therapeutic class / generic name criteria described above).

- The chronic pain identification criteria are described above.



## APPENDIX C: IDENTIFICATION OF MENTAL HEALTH/SUBSTANCE USE DISORDER CATEGORIES

For those included in the study based on the criteria presented in Appendix B and identified as having comorbid behavioral conditions as defined in Appendix B, patients were identified as having serious and persistent mental illness (SPMI) diagnoses, mental health diagnoses but no serious and persistent mental illness (Non-SPMI MH) diagnoses, and substance use disorder (SUD) diagnoses based on the criteria below.

### Serious and Persistent Mental Illness (SPMI)

Patients meeting the criteria for inclusion in the study and diagnosed with at least one comorbid behavioral condition as defined in Appendix B were identified as having SPMI diagnoses if at least one ICD-9 code in the following ranges was present:

**Table C1: ICD-9 Codes Used to Identify Those with Serious and Persistent Mental Illness (SPMI) Diagnoses**

| Condition                              | ICD-9 Range(s)               |
|--|------------------------------|
| Paranoid and Other Psychotic Disorders | 293.81-293.82, 298.9, 301.0  |
| Schizophrenia                          | 295.00-295.99                |
| Bipolar Disorder                       | 296.00-296.19, 296.40-296.89 |
| Major Depressive                       | 296.20-296.39                |

### Mental Health Diagnoses but No Serious and Persistent Mental Illness (non-SPMI MH)

Patients meeting the criteria for inclusion in the study and diagnosed with at least one comorbid behavioral condition as defined in Appendix B were identified as having Non-SPMI MH diagnoses if no ICD-9 Codes fell within the ranges to be considered for inclusion with SPMI diagnoses.

### Substance Use Disorders (SUD)

Patients meeting the criteria for inclusion in the study and diagnosed with at least one comorbid behavioral condition as defined in Appendix B were identified as having substance use disorder diagnoses if the patient was identified as treated for drug abuse (ICD-9 Codes within the ranges 304.0-304.99 or 305.1-305.99) or alcoholism (ICD-9 Codes within the ranges 303.0-303.99 or 305.00-305.09) as described in Appendix B. Individuals identified with substance abuse could also be identified as having SPMI or Non-SPMI MH conditions if they also met the criteria described above.

## APPENDIX D: CLAIM CATEGORIES

We previously conducted our analysis grouping claims by using the healthcare service categories listed below. This allowed us to identify where the elevated costs existed and where the greatest potential for savings exists. The details on how these service categories were identified are described below.

- Inpatient Facility (Behavioral)
- Inpatient Facility (Medical)
- OP Facility (Behavioral)
- OP Facility (Medical)
- Professional (Behavioral)
- Professional (Medical)
- Prescription Drugs (Behavioral)
- Prescription Drugs (Medical)

These categories were summarized into the following categories for Figures 2-3.

- Medical: Inpatient Facility (Medical), OP Facility (Medical), Professional (Medical)
- Behavioral: Inpatient Facility (Behavioral), OP Facility (Behavioral), Professional (Behavioral)
- Medical Rx: Prescription Drugs (Medical)
- Behavioral Rx: Prescription Drugs (Behavioral)

### Inpatient facility – behavioral

These claims were identified using revenue codes of 114, 116, 124, 126, 134, 136, 144, 146, 154, 156, 204, 1000, 1001, 1002, 1003, 1004, 1005

### Inpatient facility – medical

If the revenue code falls between 100 and 249 or between 720 and 729, then the claim is tagged as inpatient facility – medical

### Outpatient facility - behavioral

Partial Hospitalization and Intensive Outpatient claims are identified by revenue codes of 944, 945, or between 900 and 919

### Outpatient facility - medical

Any claim with a revenue code populated but was not mapped into Inpatient Facility – Medical, Inpatient Facility – Behavioral, or Outpatient Facility - Behavioral, is assigned to this category.

### Outpatient professional – behavioral

If the claim is not Inpatient Facility – Medical, Inpatient Facility – Behavioral, PHP/IOP, or Hospital ER/Lab/Rad/Oth, then HCPCs procedure codes of G0176, G0177, M0064, S9475, S9480, S9481, S9482, S9483, S9484, S9485, or codes between 90801 and 90911 are used to map claims into OP Professional – Behavioral.

### Outpatient professional - medical

Any claim not mapped into one of the categories above is tagged under this category.

### Prescription drugs - behavioral

Any claims identified by the following criteria were allocated to these categories.

- Anti-anxiety drugs: Therapeutic classes of "ASH, Benzodiazepines", "Anticonvulsant, Benzodiazepine", and "Anxiolytic/Sedative/Hypnot NEC"
- Central Nervous System (CNS) agents: Therapeutic classes of "Analg/Antipyr, Opiate Agonists", "Anticonvulsants, Misc", and "CNS Agents, Misc."
- Anti-psychotics: Therapeutic classes of "Antimanic Agents, NEC" and "Psychother, Tranq/Antipsychotic"
- Anti-depressants: Therapeutic class of "Psychother, Antidepressants"
- Anorexiant: Therapeutic class of "Stimulant, Amphetamine Type"
- Memory enhancers: the dementia medication described under the section for identifying Dementia above.

### Prescription drugs – medical

Any prescription drug claim not categorized as a behavioral drug above is tagged under this category.

## APPENDIX E: CLAIMS DATABASES USED IN ANALYSIS

### Medstat MarketScan Database

For purposes of the commercial analyses, the Medstat MarketScan claims database was used. The MarketScan database represents the inpatient and outpatient healthcare service use of individuals in the United States who are covered by the benefit plans of large employers, health plans, and government and public organizations.

The MarketScan database links paid claims and encounter data to detailed patient information across sites and types of providers, and over time. The annual medical database includes private-sector health data from approximately 100 payers. Historically, more than 500 million claim records are available in the MarketScan database.

These data represent the medical experience of insured employees and their dependents (for active employees), early retirees, COBRA continues, and Medicare eligible retirees with employer provided Medicare supplemental plans. No Medicaid or Workers' Compensation data are included.

Medstat data for 2009 and 2010 were used in these analyses, covering a total of more than 200 million member-months. When restricting our study to members who were eligible in both 2009 and 2010, with full 2010 prescription history, we are left with approximately 17.4 million individuals for study.

### Medicare 5% Sample

For purposes of the Medicare analyses, the Medicare 5% Sample claims database was used. This data contains claims and enrollment for a randomly selected, de-identified 5% of the Medicare population. Claims of all categories are included, including inpatient, outpatient hospital, SNF, home health, hospice, physician and supplier, and DME. This data set includes approximately 2.4 million unique lives.

No commercial, Medicaid or Workers' Compensation data are included. Pharmacy data is not included.

Sample data for 2009 and 2010 were used in these analyses.

### Medicaid

We used 2010 MassHealth Medicaid data as our starting point to inform the PMPM spending levels for people with various medical conditions with and without behavioral comorbidities. Since this data does not reflect the national estimates of average costs or prevalence rates, we made a variety of adjustments to arrive at our national estimates.

We trued up the average costs in the MassHealth data to nationwide averages from Kaiser State Health Facts data to reflect nationwide area factor, enrollment mix, a/s distribution, and utilization patterns.

We used census estimates of Medicaid enrollment and applied that to the average costs to get total spending.

We also adjusted the prevalence rates of various medical and behavioral conditions in the MassHealth population to reflect a more national estimate of prevalence rates using literature review and actuarial judgment.

We compared our estimates of spending by various categories and conditions to national healthcare estimates (NHE) data from the Centers for Medicare and Medicaid Services website as well as to the conclusions from various other researchers.

## APPENDIX F: DEMOGRAPHIC COMPARISONS USED IN EXTRAPOLATION

Population differences were considered and reviewed when extrapolating the sample population to reflect the full populations for each payer type. Population distribution by gender and age characteristics for the commercial and Medicare are provided in Figures F1 (Commercial) and F2 (Medicare). In both instances, population differences were considered minimal and no cost adjustments were made.

**Figure F1: Demographic Distribution, Commercial Sample**

| Gender        | Age Band | % of Database Total |                         |
|---------------|----------|---------------------|-------------------------|
|               |          | MarketScan Sample   | Commercial Census, 2010 |
| <b>Female</b> | 00 to 24 | 16.5%               | 17.5%                   |
|               | 25 to 29 | 3.0%                | 3.7%                    |
|               | 30 to 34 | 3.7%                | 3.7%                    |
|               | 35 to 39 | 4.3%                | 4.0%                    |
|               | 40 to 44 | 4.6%                | 4.3%                    |
|               | 45 to 49 | 5.4%                | 4.8%                    |
|               | 50 to 54 | 5.6%                | 4.8%                    |
|               | 55 to 59 | 5.2%                | 4.2%                    |
|               | 60 to 64 | 3.7%                | 3.6%                    |
| <b>Male</b>   | 00 to 24 | 16.9%               | 18.3%                   |
|               | 25 to 29 | 2.5%                | 3.6%                    |
|               | 30 to 34 | 3.2%                | 3.5%                    |
|               | 35 to 39 | 3.8%                | 3.9%                    |
|               | 40 to 44 | 4.1%                | 4.1%                    |
|               | 45 to 49 | 4.7%                | 4.6%                    |
|               | 50 to 54 | 4.9%                | 4.5%                    |
|               | 55 to 59 | 4.5%                | 3.9%                    |
|               | 60 to 64 | 3.4%                | 3.2%                    |

**Figure F2: Demographic Distribution, Medicare Sample**

| Gender        | Age Band | % of Database Total |                       |
|---------------|----------|---------------------|-----------------------|
|               |          | Medicare 5% Sample  | Medicare Census, 2010 |
| <b>Female</b> | 00 to 24 | 0.1%                | 0.9%                  |
|               | 25 to 29 | 0.2%                | 0.3%                  |
|               | 30 to 34 | 0.3%                | 0.4%                  |
|               | 35 to 39 | 0.5%                | 0.5%                  |
|               | 40 to 44 | 0.7%                | 0.7%                  |
|               | 45 to 49 | 1.1%                | 0.9%                  |
|               | 50 to 54 | 1.4%                | 1.3%                  |
|               | 55 to 59 | 1.7%                | 1.7%                  |
|               | 60 to 64 | 1.8%                | 2.6%                  |
|               | 65 to 69 | 13.4%               | 9.3%                  |
|               | 70 to 74 | 10.7%               | 11.2%                 |
|               | 75 to 79 | 8.8%                | 9.7%                  |
|               | 80+      | 14.5%               | 14.9%                 |
| <b>Male</b>   | 00 to 24 | 0.1%                | 0.9%                  |
|               | 25 to 29 | 0.3%                | 0.4%                  |
|               | 30 to 34 | 0.4%                | 0.2%                  |
|               | 35 to 39 | 0.5%                | 0.4%                  |
|               | 40 to 44 | 0.8%                | 0.6%                  |
|               | 45 to 49 | 1.2%                | 0.9%                  |
|               | 50 to 54 | 1.5%                | 1.2%                  |
|               | 55 to 59 | 1.8%                | 1.6%                  |
|               | 60 to 64 | 1.9%                | 2.1%                  |
|               | 65 to 69 | 12.2%               | 12.0%                 |
|               | 70 to 74 | 9.1%                | 9.1%                  |
|               | 75 to 79 | 6.7%                | 7.2%                  |
|               | 80+      | 8.1%                | 9.0%                  |

**APPENDIX G: ASSUMPTIONS**

| <b>Figure G1: Trend Assumptions</b> |                   |                 |                 |
|-------------------------------------|-------------------|-----------------|-----------------|
| <b>Service Type</b>                 | <b>Commercial</b> | <b>Medicare</b> | <b>Medicaid</b> |
| <b>Medical</b>                      | 7%                | 1.90%           | 4%              |
| <b>Behavioral</b>                   | 10%               | 1.60%           | 2%              |
| <b>Med Rx</b>                       | 6%                | <i>N/A</i> *    | 6%              |
| <b>Behavioral Rx</b>                | 7%                | <i>N/A</i> *    | 4%              |
| Population Trend, 2011 to 2012      |                   | 0.75%           |                 |

\* Pharmacy data not available for Medicare population