

INTRODUCTION

The purpose of the M-ITT (Multnomah Intensive Transition Team) is to help Multnomah Medicaid members successfully transition from acute psychiatric care to community-based mental health treatment settings - particularly those not previously affiliated with any such services. In CY 2017 and 2018, there were nearly 2,000 adult inpatient psychiatric hospitalization discharges; M-ITT met nearly half of all unaffiliated and other-affiliated (those affiliated with services other than mental health outpatient treatment). This project evaluates how well M-ITT met the objective of connecting these clients to services in its first two years of operation, and also explores what subsequent impacts on hospitalizations and healthcare expenditures may exist.

Because this report contains several large sequential analyses conducted over several months, the report has been divided into three chapters, with individual methods and results sections for each. The first chapter discusses two outcome metrics. The first measured was post-discharge treatment connections; after the state-incentivized HEDIS metric of meeting an individual after discharge, this is the most basic measure of program success. Did this connection lead to enrollment in community-based services, as was the intent? Building upon that, the second outcome measured was hospital readmissions - did this process have a significant impact on clients' likelihood in returning to the hospital? The second chapter details an analysis comparing M-ITT clients to themselves over time - a pre-/post-analysis of how their interaction with M-ITT may have impacted their number of acute care events over time. Does interaction with M-ITT reduce psychiatric hospitalizations, or any other types of acute care? Finally, the third chapter adopts the same pre-/post- approach with the same cohort, but examines healthcare expenditures instead. Does interaction with M-ITT decrease healthcare expenditures? If so, are any such reductions contained to the behavioral health side, or is the effect also seen in physical health expenditures?

CHAPTER 1: POST-DISCHARGE TREATMENT CONNECTIONS & IMPACT OF TREATMENT CONNECTION ON READMISSION RISK

METHODS

The first analysis is twofold: the impact of M-ITT on connections to treatment, and the impact of treatment connection on rehospitalization. As mentioned in the introduction, M-ITT met nearly half of all unaffiliated and other-affiliated clients who discharged from psychiatric care in 2017 and 2018, as well as a handful of mental health outpatient-affiliated clients.¹ We defined mental health outpatient (MHOP) affiliation as having an open authorization in Levels A-D mental health outpatient, DBT, ABA, ACT/FACT, EASA, or any authorization with the terms "general OP" or "general outpatient," excluding intensive outpatient and any SUD services. "Other affiliation" means any non-acute, non-crisis, non-care coordination only service that doesn't fall into the MHOP category. For example, this would include all SUD outpatient and residential services, IOP, day treatment, and so forth. If a client was deemed to be affiliated with services, the relevant authorization had to be in effect 7 or more days before the hospitalization occurred, and still be effective at least 7 days past discharge.

Logistic regression analysis was used to assess the impact of M-ITT on connection to lower levels of care, as well as the influence of other potentially relevant factors. M-ITT encounters were measured from 7 days prior to hospital dis-

1. It is important to note that numbers reported here differ from those in the 7-day follow-up metric for a variety of reasons: only approved claims for psychiatric hospitalizations under the behavioral health plans were counted; hospitalizations with readmissions within 30 days were included (however, if a readmission/transfer happened within 48 hours, the events were counted as one); all behavioral health diagnoses were included.



charge (in recognition that M-ITT can visit clients while still preparing to discharge) through 7 days post-discharge. (If a hospitalization was less than 7 days long, we counted from day 2 of hospitalization through 7 days post-discharge.) Encounters in lower levels of care were measured from date of hospital discharge up to 30 days post-discharge. If the client had their first M-ITT encounter after discharge, we looked between that date and 30 days post-discharge for said encounters.

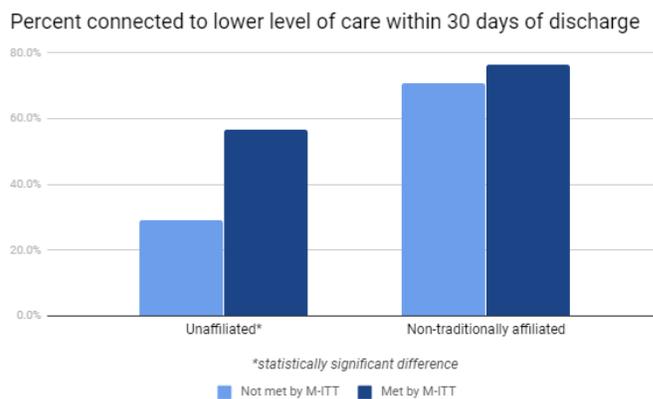
The population measured in this model was all unaffiliated and other-affiliated clients (1,045 total). Discharging hospital, length of stay, primary diagnosis, history of housing instability, disability, race, primary language, age, sex, substance use history, and SPMI history were all included as control variables. Robust standard errors, clustered by client, were employed to account for individual clients having multiple hospitalizations. The post-model LROC was 0.7647, indicating strong predictive power.

The second model, measuring the impact of said treatment connections upon rehospitalization, used many of the same data rules as the first model in terms of defining the population and variables. Readmission could be to any hospital, not just the original discharging. Multi-failure Cox survival analysis was used, in addition to the first model's control variables, prior acute care events (besides psychiatric hospitalizations, already included in the model structure) were also added. This was measured by a binary variable indicating whether a client had 3 or more acute care events - PES, emergency room, other hospitalizations - in the 90 days prior to their psychiatric hospitalization(s).

RESULTS: POST-DISCHARGE TREATMENT CONNECTIONS

As described earlier, M-ITT met nearly half of all unaffiliated and other-affiliated clients. How many of these clients subsequently connected to care? Among the completely unaffiliated, 56.8% of those met by M-ITT connected to a lower level of care within 30 days of discharge, compared to only 29.2% of those who were not met by M-ITT. Among the other-affiliated, 76.6% of those met by M-ITT made that connection, whereas 70.6% of those not met did.

While this in and of itself indicates a positive trend, there are many different factors that may influence the outcome beyond a single intervention; therefore, we also analyzed the relative impact of M-ITT while controlling for other variables, such as demographics and diagnosis (as detailed in the methods section). M-ITT still significantly increased the likelihood of connecting to a lower level of care post-discharge. The impact was greatest among completely unaffiliated clients, with a likelihood of connection 154% higher than those not met by M-ITT; however, it was also observed, to a small but significant degree, among the other-affiliated, with a 12% higher likelihood of connection.



We also took note of other significant variables in this analysis. Clients coming out of Legacy hospitals were more likely than the average to connect to a lower level of care; clients discharging from hospitals outside the region were

Unaffiliated clients were over 2.5 times as likely to connect to lower levels of care after discharge if met by M-ITT.

far less likely to connect. Those hospitalized for bipolar disorder or depression were most likely to connect to treatment; those with schizophrenia or with delusions/paranoias were least likely. Adding a known history of SPMI increased the odds of connection by 2.6 times, suggesting that, despite the diagnosis gap, we still may be appropriately targeting and prioritizing cases with the highest level of need. Other results draw attention to possible disparities in our system and warrant further review. Those with a history of homelessness or housing instability were over 60% less likely to connect; those with disabilities were over 30% less likely to connect; Asian clients² were over 75% less likely to connect.

2. Many analyses, inadvertently or otherwise, detail disparities as if one's race (or any other demographic trait) "causes" differences. We want to be clear that what

No significant impact was detected for most age categories, sex, or primary language. A few variables did not pass the threshold to statistical significance, but came close enough to be worth mentioning for further monitoring. Being an older adult (age 60+) likely reduced the odds of treatment connection. Given the obstacles described by the older adult behavioral health investment team with navigating systems of care, different benefits, and so forth, this is unsurprising, and can also serve as a reminder of the specific needs of older adults with acute mental illness. Substance use also likely reduced the likelihood of treatment connection, which may indicate greater need for dual diagnosis-specific outreach and system navigation.



It is also important to note that, just because something is statistically insignificant in this population at this time, does not mean there is no effect. A larger sample size, in time periods with less systemwide change (especially those affecting available client medical history, care coordination and utilization review caseloads, and other relevant areas - such as the Family Care transition) may increase the power of some previously insignificant effects or illuminate new connections. This analysis should thus also be considered in the context of past similar analyses.³

RESULTS: IMPACT OF TREATMENT CONNECTION ON READMISSION RISK

M-ITT appears to substantially increase the likelihood of clients connecting to community-based services. Next we ask: what is the impact of that connection on hospitalizations? We examined the likelihood of 30-day readmissions to the hospital among all psychiatric hospital discharges, measuring the impact of service connection while controlling for similar factors as earlier. Accessing any lower level of care service (any service, mental health or SUD, that isn't acute care, crisis services, or care coordination only), regardless of past history of services or current service affiliations, reduced the risk of readmission by over 40%.

Clients with a history of SPMI were nearly 10 times as likely to return to the hospital, even when taking service connection and other factors into account; additionally, those with three-plus acute care events in recent history were over 55% more likely to readmit. Those with a history of substance use also had substantially increased risk of readmission - over 65% higher. Young adults (18-29) were significantly more likely to readmit than the average, while older adults (60+) were less likely. Clients discharging from Providence were significantly more likely to readmit, while those from hospitals outside the region were less likely to do so. Finally, each additional day spent in the hospital decreased the risk of readmission by 1.4% (a minimal effect, particularly when compared to other variables).

Accessing any lower level of care (mental health or substance use) after discharge reduced the risk of readmission by over 40%.

Clients with delusions/paranoias or schizoaffective disorder were significantly more likely to readmit; those with depression, even when controlling for its greater rate of post-hospitalization service connection, were significantly less likely to readmit, as were those with anxiety and those whose diagnosis was in the "other" category.

we describe are disparate impacts felt by individuals in one population over others, not causal chains casting identities or individuals themselves as risk factors. The multilayered impact of systemic and interpersonal racism - e.g., from poor experiences in healthcare to gentrification impeding access to physical service locations - are more often what is being measured. Unmet cultural needs may also be a factor; for example, if available services are not culturally responsive or resonant (once again, a deficit in the system which also ties back to systemic racism) or if heightened mental health stigma exists in specific communities, clients may not feel understood or welcome, and this may lead to differences in many of the things we frequently measure as outcomes - e.g., access or retention.

3. Past local work on disparities has shown that racial minorities have experienced significant barriers in treatment access after leaving controlled facilities. For example, a 2018 report examining PES discharges showed that African-Americans were significantly less likely to connect to treatment within 30 days of leaving; a 2019 report on substance use and the criminal justice system also showed that African-Americans were significantly less likely to connect to SUD treatment after release from Multnomah County jails. It should also be noted that confounding factors may be present that can mask the situation. For example, in the case of the jail analysis, adding in whether the arrestee was an opioid user made the racial disparity disappear; opioid users were far more likely to be able to access treatment, and African-Americans were less likely to use opioids relative to other substances. However, our treatment of the opioid epidemic, compared to how other substances have been treated, has many racial connotations. To bring this back to the current analysis: if African-Americans (or any other race) are more likely to possess one of these other risk factors, we still have a racial disparity, but one data may mask. The use of control variables is meant to help illuminate such issues, but is not completely effective - a consideration when interpreting results.

CHAPTER 2: CHANGES IN OVERALL RATES OF HOSPITALIZATION

METHODS

The prior approach was a two-step method analyzing the impact of M-ITT on hospitalizations: examine M-ITT's efficacy in making treatment connections, and subsequently examining the impact of said treatment connections on hospitalizations. We next wanted to examine impact on overall hospitalizations over time.

Selection bias is an issue where the factors that predispose a person to be in a specific treatment group are also the factors that are likely to influence their outcomes. While there are many different ways to approach this, one simpler way to address it is to compare M-ITT clients to themselves over time; comparing specific measurements from pre-intervention to post-intervention for the same individuals. We decided to use this approach to analyze overall impact on acute care utilization for this cohort. We selected clients from the prior analysis that had Health Share eligibility for at least 6 months before and 6 months after their hospitalization and M-ITT follow-up to ensure complete data; this created a sample of 154 clients. If there were multiple consecutive M-ITT authorizations, they were combined into one; the first date the client as seen by M-ITT, during or after their psychiatric hospitalization, was the defining point between the pre- and post- period, which ran from 180 days prior to that date through 180 days after that date. (If the first date was during a hospitalization, that hospitalization is in the "before" category.)

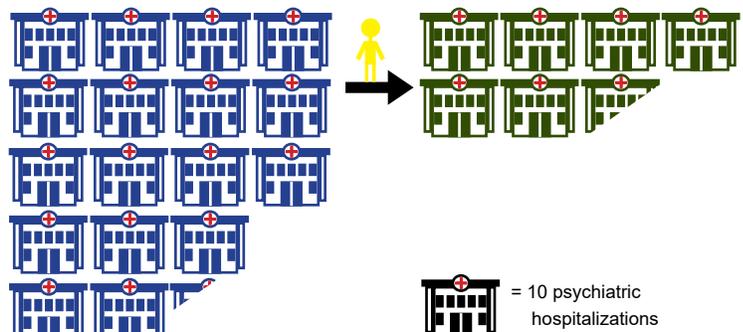
Inpatient psychiatric hospitalizations were defined by the same criteria as the first two models in this report. We also added PES visits and, recognizing the far-reaching impact of mental health, emergency room visits and all other hospitalizations. Where the outcome is labeled "All behavioral health-related acute care," that includes all inpatient psychiatric, all PES, and any emergency room visit and hospitalization that had a behavioral health diagnosis as a top three contributing cause. "All acute care" includes all inpatient psychiatric, all PES, and *all* emergency room visits and hospitalizations, regardless of cause. If acute care events happened on the same or consecutive days, they were combined into single events - for example, an emergency room visit on January 1 and a hospitalization from January 2 to 3 would be counted as one event from January 1 to 3, to help adequately account for emergency services leading to inpatient services and transfers between facilities.



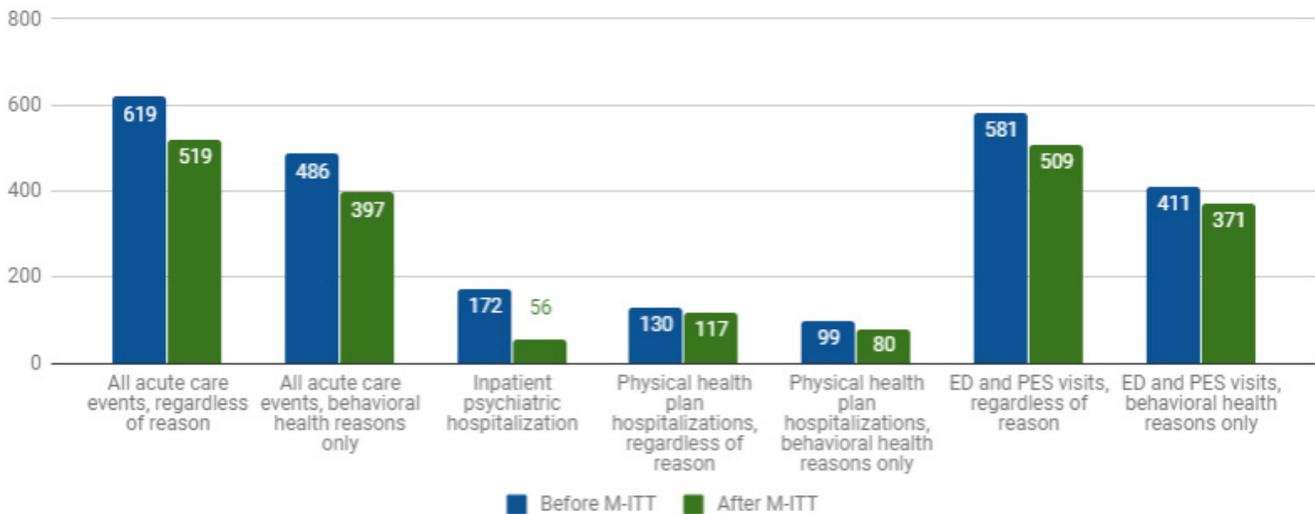
Poisson panel data analysis was used to examine the impact of M-ITT on acute care, relative to clients' prior levels of acute care. Control variables included treatment connection, history of SPMI, history of substance use, race, age, primary language, sex, housing instability, and disability.

RESULTS

A substantial difference in pre- and post-hospitalizations for M-ITT clients was observed, across multiple methods of measurement. To consider this first in "real" (unadjusted for other variables) numbers: total inpatient psychiatric hospitalizations dropped from a collective 172 in the 6 months prior to intervention to 56 in the 6 months following - a nearly 68% decrease. Similar, although not as dramatic, reductions were also seen in all other forms of acute care. In total, regardless of type or cause, acute care events were reduced by over 16%.



Pre- and post-reductions in acute care



A statistical analysis with multiple control variables was also applied to assess how much of this change may be due to other factors or chance. Even considering these possibilities, the predicted incidence rate of psychiatric hospitalizations attributed to working with M-ITT still significantly decreased. This effect was even stronger when combined with clients successfully transitioning to services in the community - a 62.8% decrease predicted for engaging with M-ITT without subsequent treatment connection, an 84% decrease predicted for those who connected to treatment within 7 days of encountering M-ITT.

This analysis also echoed the other raw number decreases observed in acute care - that, while the impact was strongest for psychiatric hospitalization, association with MITT was significantly associated with acute care reductions across the board, even while controlling for other factors and chance. Overall, these results indicate that M-ITT's interventions are likely to significantly benefit both clients, via improved health and decreased need for acute care, and the behavioral health *and* the physical health plans, by substantially reducing the number of costly acute care events across the board.

The combination of working with M-ITT and connection to treatment within 7 days reduced the predicted rate of psychiatric hospitalizations by 84%.

CHAPTER 3: CHANGES IN TOTAL HEALTHCARE EXPENDITURES

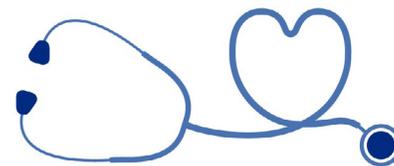
METHODS

For the final analysis, we examined healthcare costs pre- and post-intervention to estimate the potential fiscal impact of the outcomes seen previously, using the same sample of 154 clients as the last analysis. Costs were gathered from approved physical and behavioral health claims, and clustered per the following:

- *Physical health acute care*: all claims paid by the physical healthcare plans related to inpatient hospitalization, emergency department care, or psychiatric emergency services (PES).
- *Behavioral health acute care*: all claims paid by Multnomah County related to psychiatric inpatient hospitalization and subacute care.
- *Other physical healthcare*: anything not included in the physical acute category (primary care, specialist visits, diagnostics, etc., outside of acute care visits).
- *Behavioral health crisis services*: M-ITT, walk-in clinic, and so forth; short-term crisis services.
- *Behavioral health treatment and other services*: any non-acute and non-crisis service; both substance use and

mental health treatment, case management, peer support, wraparound, etc.

- *Pharmacy* was excluded, due to data limitations.



Costs were divided into the pre- and post- periods in two separate ways. For physical health and behavioral health acute care, pre-costs were all those that were incurred from 5 months before the first date M-ITT saw them until 1 month after, and post-costs were from 1 month after to 7 months after. This was to account for M-ITT meeting people who were still in an acute setting, for individuals who transferred through different acute care settings before final discharge, and other such scenarios - essentially, ensuring that the episode that triggered M-ITT engagement was fairly counted as a prior cost and not an after cost. For behavioral health crisis services, behavioral health treatment, and non-acute physical healthcare costs, pre-costs were those that were incurred from six months before the first date M-ITT saw them until that first date, and post-costs were from 1 month after to 7 months after. Costs incurred during that first 30 days from first date seen were designated as a third category outside of pre-/post-, “intervention costs” - the early costs of M-ITT, primary care engagement, behavioral health treatment engagement, and so forth. While intervention theoretically extends well beyond this early period, it accounts for the most immediate, and potentially most intense, efforts by M-ITT and any other providers, post-hospital.

Ordinary least squares regression was used, with the two primary variables of interest being M-ITT intervention and service connection within 7 days. The model also controlled for age, sex, race, primary language spoken, history of housing instability, disability, history of substance use, and history of SPMI. Five different chronic and acute physical health conditions with traditionally high healthcare costs were also considered, but due to the low prevalence of three of them in this small sample, they were omitted from the final analysis. History of diabetes and history of heart disease were retained as control variables.

RESULTS

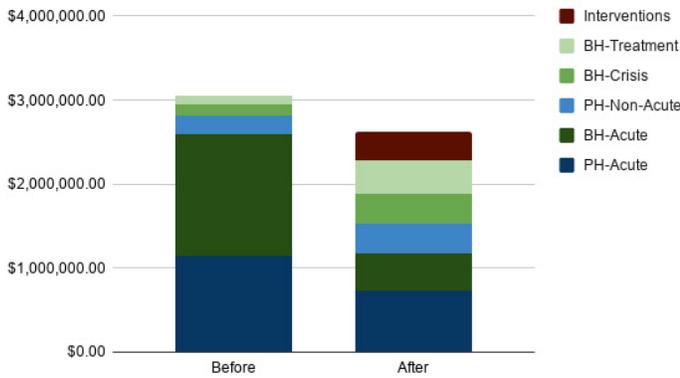
M-ITT connection was predicted to reduce all health care costs - behavioral health treatment, primary care, acute care, and so forth - by an average of over \$4,900 per client. Clients who also accessed any lower level of care treatment or supportive services (any mental health or substance use service that was not acute care or crisis response) within 7 days of the first M-ITT encounter were predicted to reduce total costs by nearly \$7,300 per client (versus \$4,300 for clients who did not make that connection within 7 days).

The bulk of these savings was primarily accrued in acute care. M-ITT connection predicted reductions in acute care costs of over \$7,700 per client on average - by \$11,800 for clients who had also accessed any lower level of care treatment or supportive services within 7 days of the first M-ITT encounter (versus just over \$6,600 for clients who did not make that connection within 7 days).

The combination of M-ITT and treatment connection was predicted to reduce acute care healthcare expenditures by \$11,800 per client over the following 6 months - \$7,300 per client across all healthcare expenditures; still a net gain even after including increases in treatment costs, primary care, and so forth.

The above estimated cost reductions were the result of the previously described statistical analysis that sought to account for key demographics, the social determinants of health, and substantial cost-driving comorbidities in order to isolate the relative impact of the interventions specifically. But it can also be helpful to have a sense of the “real” dollars. In the six months prior to M-ITT’s first client encounters for these 154 episodes of care, there was a combined total of \$3,045,685 in healthcare expenditures. In the six months after, there was a combined total of \$2,285,579, as well as \$345,434 in short-term intervention costs (the costs of M-ITT, non-acute physical healthcare, and non-acute behavioral healthcare in the first 30 days after initial intervention) Even taking into account the short- and long-term cost of intervention (e.g., long-term behavioral health treatment), total healthcare expenditures were reduced by

Health costs before and after M-ITT intervention



After working with M-ITT, total healthcare expenditures across all types of care decreased by 15% - over \$400,000.

over \$400,000 - nearly 15%. The savings at the acute care levels were far more substantial - from \$1,453,693 to \$448,151 in behavioral health acute costs (a 69% reduction), and from \$1,138,004 to \$728,795 in physical health acute costs (a 36% reduction).

Behavioral health crisis intervention, behavioral health treatment, and non-acute physical healthcare (e.g., primary or specialist care, outside of inpatient/emergency room services) all increased. Considering that M-ITT's goal is to connect high utilizers with healthcare options expected to replace acute care, this is not particularly surprising - one would reasonably expect such a tradeoff. However, true to the theory behind the model, the cost of these longer-term services appears to be substantially outweighed by reduced costs at higher levels of care.

We do need to remember that this is a sample of 154 cases, selected by having adequate Medicaid coverage to gather sufficient data. M-ITT served over three times as many in these two years. A more robust cost-benefit analysis should consider this, as well as fiscal outcomes in arenas outside healthcare - e.g., criminal justice or employment. However, these results show that there is likely a substantial financial benefit to this program, for both the physical and behavioral health plans.

CONCLUSION

Reducing acute care utilization, as an indicator of improved client health and a cost-savings measure, is a key outcome of interest for our care coordination programs. It can be difficult to specifically quantify reduced hospitalizations and expenses systemwide, given the massive changes our region has experienced over the years. The initial Medicaid expansion, the opening of Unity, the absorption of Family Care - large changes like these can all impact the wider trends in different ways. However, given the evidence presented above, it seems reasonable to suggest that M-ITT's efforts are indeed paying off. There is compelling evidence that greater treatment access, reduced hospitalizations, and reduced healthcare costs, whether via the connections they make for their clients to community-based treatment options or via their own interactions with those clients, can likely be attributed to this program. This has positive implications for our clients and for the behavioral and physical healthcare plans - replacing hospitalizations and emergency services with community-based care is better care, substantially less expensive, and more sustainable.



**Analysis and report by
Shannon M. Campbell, MPP**

Senior research & evaluation analyst,
Behavioral Health Division,
Multnomah County Health Department

*Questions can be directed to
shannon.campbell@multco.us*