

**Measurement-Based Care: Barriers and Facilitators to Increasing Adoption to Improve Patient
Outcomes**

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DNP Quality Improvement Project

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Abstract

BACKGROUND & LOCAL PROBLEM: Research shows that measurement-based care (MBC) in psychiatry improves accuracy in diagnosis and patient outcomes; however, implementation and adoption in practice has been slow. This project aimed to identify barriers to clinician adoption of MBC at a large urban adult outpatient psychiatry clinic, and to subsequently use that knowledge to design and implement an intervention to address the identified barriers with the goal of increasing MBC adoption.

METHODS & INTERVENTION: Using concepts from The Consolidated Framework for Implementation Research, Expert Recommendations for Implementing Change, literature review and stakeholder knowledge, a survey was developed to identify clinician barriers to MBC adoption. Data from the survey and literature were utilized to propose and implement an intervention using the Plan-Do-Study-Act cycle.

RESULTS: 57% of invited clinicians participated in the survey. The two main barriers to MBC adoption identified through the survey and stakeholder interviews included low rates of patient enrollment by staff into the MBC platform and lack of deeper integration of the MBC platform within Epic. Clinicians reported that these barriers increased their time burden in caring for patients. Over four months, the implemented intervention led to an increase from 0% to 28% of patients being enrolled in the clinic's MBC platform.

CONCLUSIONS: Systematic re-examination of the implementation of MBC at this clinic led to the identification of previously undetected barriers, which facilitated the development of an intervention to increase patient enrollment in MBC. Additional work is needed to continue to increase patient enrollment and to address patient measure completion rates.

Measurement-Based Care: Barriers and Facilitators to Increasing Adoption to Improve Patient Outcomes

Research spanning the past three decades demonstrates that measurement-based care (MBC) has significant potential to improve behavioral health outcomes; however, the rate of implementation and adoption in clinical practice has been slow (Crismon et al., 1999; Guo et al., 2015; Ricken et al., 2011). Fortney et al. (2017) define MBC as “the systematic administration of symptom rating scales and the use of results to drive clinical decision making at the level of the individual patient” (p.179). Proponents are careful to point out that MBC has the potential to augment, not replace, clinical decision making – improving both diagnostic accuracy and outcomes (Aboraya et al., 2018). In addition to these benefits, patient-entered data from rating scales may be aggregated to guide professional development, to support quality improvement efforts, and to demonstrate the effectiveness of mental health services to payers (Fortney et al., 2017). This evidence has resulted in a considerable push to enhance uptake of MBC into clinical practice in recent years.

The American Psychiatric Association (2018) and the Substance Abuse and Mental Health Services Administration support MBC as an evidence-based practice. In 2018, The Joint Commission (TJC) strengthened its MBC standard (TJC, 2020). Despite these efforts, MBC continues to be underutilized in psychiatry. Research shows that in the United States only 17.9% of psychiatrists routinely administer symptom rating scales to their patients, and even in practices where MBC has been adopted, 61.5% of clinicians don't use rating scales consistently indicating that MBC implementation is not sufficient to drive adoption (Jensen-Doss et al., 2018; Zimmerman & McGlinchey, 2008). Digital technologies called measurement feedback systems (MFS) streamline the use of MBC through the automation of the MBC process, while also generating feedback for clinicians and organizations. However, even in organizations where MFS-facilitated MBC has been implemented, the rate of adoption

may be low (Black et al., 2018). For this QI project, the term MBC will always refer to technology facilitated MBC.

In the Pacific Northwest, multiple local hospital systems and medical teaching institutions have implemented MBC in their psychiatry departments. One of these large public academic health centers, provides psychiatric services through multiple outpatient clinics including an adult outpatient clinic (OPC). Although this clinic has systematically implemented MBC into practice in recent years, its adoption by clinicians remains relatively low. Initial anecdotal evidence from OPC stakeholders suggests that barriers to adoption include lack of education on MBC as an evidence-based practice, challenges with using the technology and lack of technology support, increased time burden, and lack of staff enrollment of patients in MBC. Although the evidence is clear that MBC leads to improvements in patient outcomes, this clinic, its patients, and the local psychiatry system will not realize these benefits unless the barriers to full adoption are understood and addressed.

Available Knowledge

Barriers to MBC exist at all levels—societal, organizational, clinician/provider, staff, and patient (Black et al., 2018; Lewis et al., 2018). Understanding the context specific barriers and facilitators to MBC adoption in the OPC clinic was an essential first step towards increasing the rate of adoption. Black et al. (2020) modeled the successful use of a questionnaire to identify clinic-specific barriers and facilitators and to guide MBC implementation and uptake. A recent narrative review presents the current literature on the barriers and facilitators to MBC in routine psychiatric care (Lewis et al., 2018). Organizational barriers include limited resources for training, high turnover among staff, and often lack of leadership support and funding, while MFS barriers can include failure to provide technology support and lack of user-friendly technology (Lewis et al., 2018). In the literature, described clinician and staff barriers include lack of knowledge and clarity on the clinical utility of MBC and concerns related to increased time, effort, and cost (Black et al., 2018; Fortney et al., 2017; Lewis et al., 2018). Additional

staff barriers can include lack of MBC buy-in, lack of training in MFS use, feeling burdened by additional responsibilities and overlooked as stakeholders, lack of incentives, and lack of clear mandate for use from leadership (Black et al., 2018).

Rationale

Implementation Science frameworks are important tools for evaluating implementation work in healthcare and for improving the success of QI efforts. The Consolidated Framework for Implementation Research (CFIR) provides a framework for evaluating implementation within five domains (intervention characteristics, outer setting, inner setting, individual characteristics, and implementation process; CFIR, 2021). Essential to the goals of this project, the CFIR is said to “provide a practical guide for systematically addressing potential barriers and facilitators” (CFIR, 2021). As an established implementation science method, CFIR is a helpful construct for evaluating the adoption of MBC in a clinical setting through the collection of data on barriers and facilitators. Complementing CFIR, the Expert Recommendations for Implementing Change (ERIC) provides expert consensus implementation terminology and serves as a source for intervention strategies to overcome identified barriers (Powell et al., 2015). The data collected using the CFIR method, in combination with the ERIC implementation intervention strategies, provided the necessary framework for gathering knowledge to assess the current state of MBC adoption in the OPC and identifying targeted interventions to address barriers. The Model for Improvement developed by the Institute for Healthcare Improvement (IHI) is an improvement process designed to match the scientific method, enabling continual learning by implementing a series of short tests called Plan-Do-Study-Act cycles (Moen, 2009). This model is widely used in healthcare and informed the intervention process (Nicolay et al., 2012).

Specific Aims

By January 15th 2022, clinician barriers to MBC adoption were explored via a voluntary survey and a first PDSA cycle, based on the survey findings and literature review, was implemented to address these barriers with the goal of achieving 50% of patients being enrolled in MBC prior to intake.

Methods

Context

The Adult Psychiatry OPC is located within a large urban teaching hospital in the Pacific Northwest. The clinic sees over 700 patients monthly, with around 60 new patients entering services each month. Patients have a wide variety of mental health conditions including depression, anxiety, OCD, PTSD, ADHD, and Bipolar Disorder among others. Clinical providers include 13 Psychiatrists, 3 Psychiatric Mental Health Nurse Practitioners (PMHNPs), and 4 Clinical Psychologists. The OPC also has two front desk staff who can enroll patients in MBC post appointment in addition to a managed care coordinator and intake coordinator, both of whom can enroll new patients in MBC. The hospital's Psychiatry Department has a new but well-established QI team comprised of the Psychiatry Quality Medical Director, the Psychiatry Department Chair, a Head Administrator, Epic team members, a Physician Informaticist, Quality Specialists, and clinicians from the various psychiatry clinics. The team has had some success in the past in generating support from stakeholders at the clinic; however, there is some resistance to change and variable motivation to engage in QI projects.

Intervention

A survey was used to determine clinician perceptions and barriers to MBC adoption. This survey was developed using evidence from the literature, the experience of QI team members and OPC stakeholders, ERIC terminology, and the CFIR implementation domains. The CFIR framework guided examination of the current state and a cause-and-effect diagram (see Appendix A). In line with the focus on clinician adoption of MBC, the questions asked in the survey were drawn from the CFIR domains of "individuals involved," "inner setting," and "characteristics of the intervention." Stakeholder knowledge

was gathered through discussion in monthly QI meetings, weekly staff meetings, and individual stakeholder interviews. Additionally, several clinic champions reviewed the survey before release for relevance and completeness. The full survey (see Appendix C) was available to all clinicians for three weeks via an anonymous online survey platform, Qualtrics. Clinicians were familiar with the platform and reminders to complete the survey were sent weekly. In addition, the project and survey were discussed at monthly Departmental QI meetings and in OPC clinic meetings with support from the QI Medical Director.

Survey data in combination with a review of the literature, ERIC implementation strategies, and stakeholder information was used to develop an intervention to target identified barriers. The intervention was tailored to address the identified clinic-specific barriers utilizing the PDSA cycle format with support and guidance from the departmental Quality Medical Director. The ongoing results of the intervention were presented at monthly staff meetings and the final results were shared with the departmental quality committee.

Study of the Intervention

After completion of the clinician survey and presentation of the results from the first PDSA cycles, a second survey was administered to all OPC clinicians to gather their perspectives regarding the impact of the survey, the intervention, and other possible perceived impacts. This survey examined clinician perspectives on the survey design, their comfort with completing the survey, and whether the intervention addressed relevant barriers to MBC adoption in their practice. A field notebook was maintained which contained notes from informant interviews and daily observations made throughout the project, including moments of insight, problems that arose and how they were dealt with, and the reactions of staff, other stakeholders, and the system along the way. This provided insight into patterns and changes to the inner and outer setting, which may have influenced the impact of the intervention or the outcome, such as changes in mandates for use, culture change or reimbursement.

Measures & Analysis

The primary outcome measure was the survey rate of completion by OPC staff. Data collection from the initial survey was automatically compiled by Qualtrics for evaluation. A second qualitative outcome measure was identification of the site-specific barriers. This was determined through survey results, and a review of the field notebook, including notes from QI meeting discussions and informant interviews, using a simplified grounded theory approach to identify emerging patterns. Post-intervention survey results, specifically rating of the survey design and its ability to capture barriers to adoption, were also analyzed in Qualtrics. Similarly, results from the post-intervention survey and the field notebook were analyzed to understand any unexpected results of the intervention. For the implemented intervention, the primary outcome measure was overall growth in patient enrollment in MBC compared to baseline. The MFS partner, the Owl, continuously collects and stores clinic MBC data and provided objective data on patient enrollment.

Ethical Considerations

This project proposal was submitted to the institution's review board for determination and was deemed to not be human research. The project did not involve access to patient charts or engagement with clinical decision-making. Staff anonymity and confidentiality in the initial data collection process and post-intervention survey was ensured to protect against financial or professional retribution. The survey design and data analysis method were reviewed and approved by the institution's Psychiatry QI group before dissemination. The results of the survey analysis were also reviewed with all stakeholders at a departmental quality committee meeting. There were no conflicts of interest.

Results

In early stakeholder meetings, the low rate of patient enrollment in the MFS by front desk staff before intake surfaced as a critical barrier to clinician adoption. Due to strong interest of the departmental quality committee, the project shifted to simultaneously focus on developing an

intervention to address this barrier while conducting the survey of perceived clinician barriers. For a full description of the intervention timeline, see Appendix B.

The clinician survey was completed by 21 (13 faculty and 8 residents) out of 37 clinicians who were invited to take part in the survey with an overall completion rate of 57%. Clinician survey results showed that 74% of clinicians agreed to strongly agreed that it was worth their time to integrate MBC into their standard of practice, 84% agreed to strongly agreed that MBC enhances treatment as usual, and 84% agreed to strongly agreed that they were well educated in MBC. Results from the survey (Appendix G) and from review of the field notebook identified two consistent barriers to adoption. These included 1) a low rate of patient enrollment in the MFS by staff, leading to increased time burden for clinicians to educate patients on MBC and to enroll patients themselves, and 2) lack of deeper MFS-Epic integration creating further burden to review results. While 61% percent of clinicians indicated that they were not routinely using the MFS, 83% reported they would be more likely to use it if patients were enrolled prior to appointments. There was also some endorsement of the following as barriers to adoption: lack of availability of preferred measures, lack of mandate from leadership, and lack of supportive clinic culture.

PDSA Cycle Results

In one-on-one stakeholder meetings, staff-identified barriers to patient enrollment included issues with using the MFS such as remembering log in information and getting locked out, the overall time burden of introducing patients to MBC, managing patient frustrations with technology, and an unclear workflow for enrolling patients. Strategies implemented to address these barriers and increase enrollment focused on 1) meeting with staff to mandate change through reinforcing departmental and leadership commitment to MBC adoption, 2) purposefully reexamining and streamlining the workflow for enrolling patients in the MFS during stakeholder meetings with staff, 3) providing opportunities for open discussion and network weaving with OPC staff and a local champion from another clinic in

monthly staff meetings and 4) providing opportunities for staff engagement and accountability by presenting monthly data on staff enrollment of patients in the MFS. Specific efforts to streamline the workflow included reviewing and reinforcing proper patient education on MBC in addition to simplifying the process to enroll all new patients, intakes and consults in the MFS.

During the four-month intervention period from September to December 2021, monthly data including the number of invitations sent by staff to patients to initiate MFS enrollment, the total number of MFS patient accounts created, and the number and percent of patients who had their account created before the initial visits was tracked. Over this period, the clinic saw an increase from 0% of patients being enrolled in the MFS pre-intervention to 28% of patients being enrolled 4 months later, full results for each month are presented in Appendix E.

Post-Intervention Survey

The post-intervention survey was completed by five faculty. These survey results demonstrated that 80% of clinicians agreed to strongly agreed that the intervention addressed relevant barriers to MBC adoption; this finding was supported in the field notebook as well. Additionally, 60% percent of clinicians reported noticing that more patients were enrolled in the MFS before their first appointment. 75% of clinicians agreed to strongly agreed that they felt comfortable completing the survey and 100% agreed to strongly agreed that it allowed them to share their barriers to adoption. No unexpected results of the intervention were identified.

Discussion

Summary

This project identified two major clinician barriers to MBC adoption including lack of staff enrollment of patients in the MFS and lack of integration of the MFS within Epic. Addressing deeper integration of the MFS within Epic was outside the scope of this project. Several staff barriers to enrolling patients in MBC surfaced including perceived lack of leadership commitment, insufficient

mandate for use, and lack of clarity on the site-specific workflow and the staff perception of their role in MBC adoption. These barriers are consistent with reports in the literature. The developed interventions including reinforced leadership mandate for MBC adoption, purposeful re-examination of the implementation, simplification of the clinic workflow for enrollment, and promotion of staff engagement and accountability through regular presentation of enrollment data, led to increased staff enrollment of patients in the MFS from 0% pre-intervention to 28% post-intervention. This QI project demonstrates the successful application of the CFIR framework and ERIC intervention strategies to overcome real world clinical challenges – ultimately enhancing the uptake of evidence-based practice in this clinical site. In addition, this project highlights the need for ongoing evaluation of implementation efforts in service of achieving the full potential of augmenting treatment with MBC in psychiatry.

Interpretation

The survey completion rate was only 57%; however, the results from the survey identified clear clinician support for MBC in addition to highlighting consistent barriers to adoption. These results were well supported in the field notebook, providing further substantiating evidence. In line with the CFIR domains and other literature, clinic-specific barriers were highly related to perceived increased time burden of using MBC (Black et al., 2018; Fortney et al., 2017; Lewis et al., 2018). Despite clinician agreement that MBC adoption was worth their time, there was significant push back by clinicians to a proposed intervention that was perceived to increase time burden despite its successful implementation in another clinic within the department. This highlights a discrepancy between reported commitment to MBC adoption and fears related to increased demand for time in the context of a busy clinical environment. We suspect that low participation in the post-intervention survey may have been due to perceived time burden and its delayed release, 3 months after the initial survey. Another contextual element which could have impacted adoption at this clinic, is lack of engagement in MBC by the Medical Director who voiced support for MBC but who openly did not engage in the intervention.

The intervention demonstrated that ERIC implementation strategies were successful tools for increasing patient enrollment and MBC adoption. This project's focus on addressing clinic workflows to promote adoption is well supported by the most recent research in the field (MacLean et al., 2021). The goal rate of patient enrollment of 50% was not achieved which may have been due, in part, to a staff member taking an unexpected leave and to increased time demands during the busy holiday season for staff and patients. The impact of these circumstances on enrollment was supported by the fact that in October, before the holidays and the staff member's leave, enrollment was at 48%.

This project increased the salience of MBC adoption in the clinic. The field notebook demonstrated buy-in and commitment from staff to increase adoption. Further, the Quality Medical Director noted increased clinician engagement, demonstrated through requests for one-on-one meetings to discuss MBC and support for renewal of the contract with the MFS.

Limitations

This project is limited in generalizability due to the nature of it being a single-site study and its focus on MFS facilitated MBC adoption. Due to concerns for increased complexity in the study design and approval, patients were not included in this study which limited our ability to understand and address patient barriers to enrolling and completing measures in the MFS. Other limitations, and areas of future study, include that the intervention focused on patient enrollment and not on whether patient enrollment led to increased completion of measures. In fact, initial data suggests that there was no impact on patient completion of measures. Clinician and staff support for the study and intervention indicated an ongoing commitment to this work; however, concerns related to perceived time burden will need to be re-assessed in the future in order to ensure its sustainability.

Conclusions

This project highlights that initial MBC implementation is not sufficient for full adoption of this evidence-based practice. Our structured re-examination of this clinic's current state MBC

implementation facilitated the identification of both clinician and staff barriers to adoption, and the resultant intervention yielded a significant increase in patient enrollment in the MFS. Next steps to further increase patient enrollment could include the use of multiple platforms to remind patients to enroll such as MyChart messages and phone-call reminders (MacLean et al., 2021). We hope this project provides an organized framework and model for other clinics to better assess and intervene on current state barriers to MBC adoption. While this work is challenging, it is fundamental to fully realizing the documented benefits of MBC on improving patient outcomes in psychiatry.

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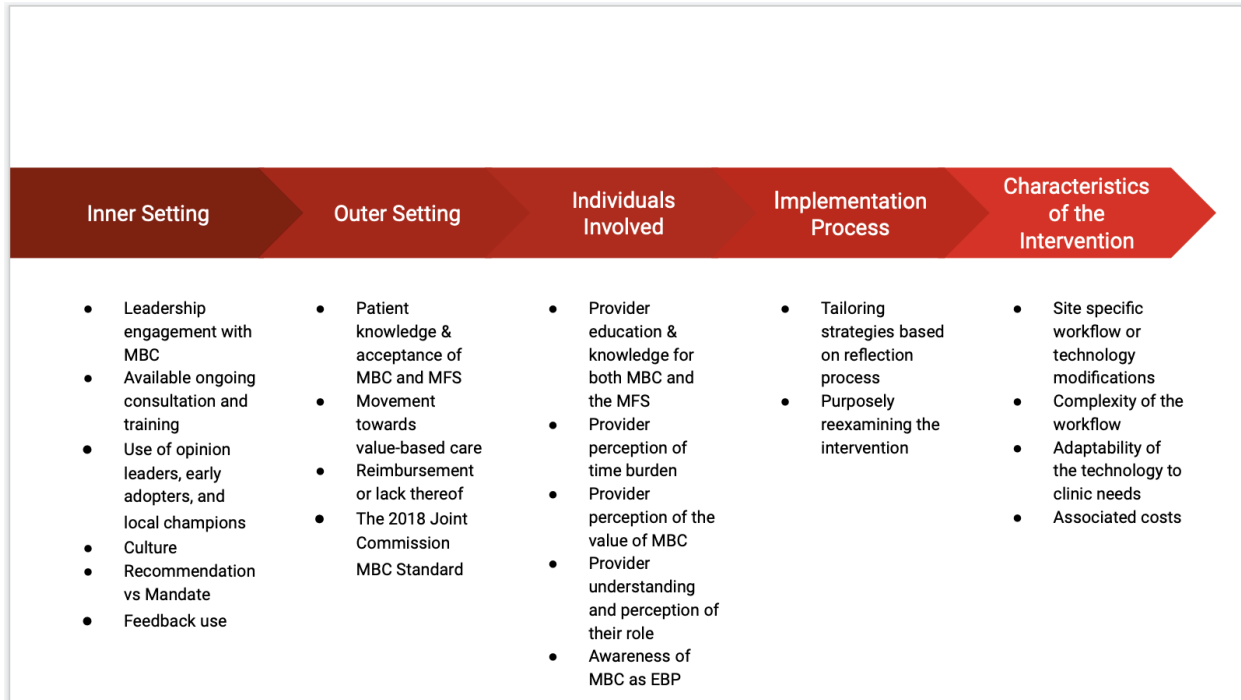
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Appendix A

Cause & Effects

Categories



Effect: Low Clinician Utilization of MBC

Appendix B

Project timeline

June 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022
<p>Attended QI meeting to gather stakeholder input</p> <p>Held meeting with QI Medical Director to discuss clinic goals</p>	<p>Introduced project at OPC Department meeting</p> <p>Held 1:1 Stakeholder meetings with OPC staff</p> <p>Began inviting consults and intakes to enroll in MFS</p> <p>Developed Survey</p>	<p>Survey released and collected</p> <p>Presented baseline and Sept data, and preliminary survey results at morning staff huddle; facilitated input from local champions</p>	<p>Presented Aug through October data at staff huddle, and presented an adapted workflow proposal based on local knowledge</p>	<p>Presented August through November data at staff huddle</p>	<p>Presented August through December data at staff huddle</p> <p>Survey and intervention results presented at QI meeting</p> <p>Post-intervention survey</p>

Appendix C


MBC Survey

Q1

Please indicate below if you are a faculty member or resident.

Faculty

Resident

Q2 


I believe measurement-based care enhances treatment-as-usual.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3 


I'm well educated in MBC.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4 


I feel that MBC is well suited to my clinical practice style.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5 


It is worth my time to integrate MBC into my standard of practice.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6 

The Owl is a helpful tool in utilizing MBC in practice.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7 


I understand how data obtained via MBC/Owl can help us triage patients and improve timely access to care

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 


It is worth my time to use the Owl in the care of my patients.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9 

I use the Owl routinely for MBC.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


Q10 

I would use the Owl if it were less of a time burden.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


Q11 

If you answered agree or strongly agree, please elaborate.

Q12 


I would be more likely to use the Owl if patients were enrolled before their initial appointment.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13 


I've been trained to use Owl, but I haven't been using it.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14 


I don't use the Owl; I have not been trained.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 


I would use the Owl if I had more training on the software.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16 


I would use the Owl if the measures I prefer were available.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17 


I'm aware of Owl technical support for clinicians and for patients.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q18 


Owl technical support is able to address my questions and concerns.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


Q19 

My use of the Owl has declined due to COVID related changes.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


Q20 

Elaborate if you answered agree or strongly agree to question 16.

Q21 

I would use the Owl if there was a clear mandate from leadership.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


Q22 

I would be more likely to use the Owl if the OPC culture encouraged use of the Owl.


	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23 


How can leadership support clinician uptake of MBC?

Q24 

If the Department continues to use the Owl, how can leadership support clinician use of the Owl?

Q25 

What new or additional features would facilitate your use of the Owl or similar technology for MBC?

Q26 

Do you have novel ideas for using MBC and/or the Owl to improve patient triage, access, and flow through our clinic?

Appendix D

Post-intervention Survey

Q2

Please indicate below if you are a faculty member or resident.

- Faculty
- Resident

Q3

Did you complete the initial survey *Exploring Barriers to Technology Facilitated Measurement Based Care* in October of 2021?

- Yes
- No

Q4



I felt that the initial survey allowed me to share my barriers to using MBC.

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5




I felt comfortable completing the survey and providing honest feedback

	Strongly agree	Agree	Neither comfortable nor uncomfortable	Disagree	Extremely comfortable
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6


I'm aware of the intervention that's currently taking place in the OPC to increase patient enrollment in the Owl prior to new and/or consult appointments.

- Yes
- No


Q7 

I feel that the intervention to increase patient enrollment in the Owl by PAS prior to new and/or consult appointments addresses relevant barriers to my use of MBC.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9 

If you answered no to the previous question, please elaborate below.

Q10 

I check to see whether or not new patients are enrolled in the Owl before their first appointment or at some point before or after the first visit.


	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Scale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11

I've noticed that more of my new patients are enrolled in the Owl before their first appointment.

Yes

No

Q12 

Please elaborate on the previous question, if desired.

Q13

I've noticed that more patients are completing measures in the Owl before their first appointment.

- Yes
- No

Q14



If you answered no to the previous question, do you have a sense for why patients are not completing measures?



Q15

I've noticed that more patients are bringing up the Owl during their first appointment and/or seem more familiar with the Owl?

- Yes
- No

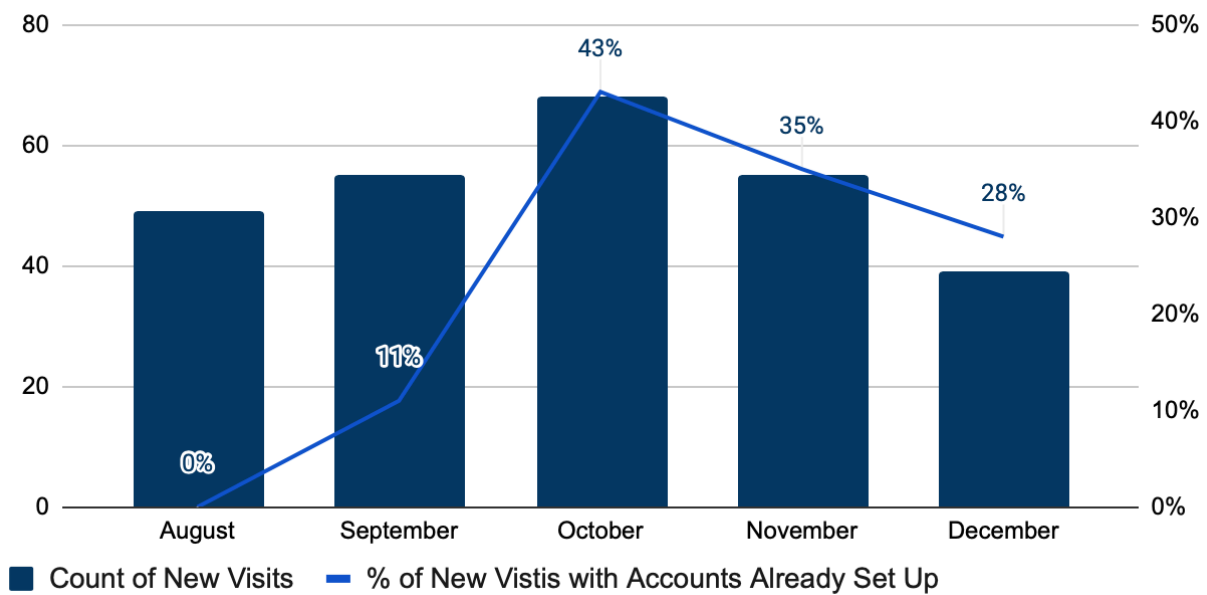
Appendix E

Intervention Data

Table 1: New Visits by Account and Invite Status (Aug - Dec 2021)

	Count of New Visits	New Visits with Owl Account Set Up Before Visit		Count of Owl Invites Sent by PAS	Count of Owl Accounts Set up (Initiated by PAS)
		#	% of All New Visits		
August	49	0	0%	1	0
September	55	6	11%	74	29
October	68	29	43%	51	43
November	55	19	35%	53	29
December	39	11	28%	44	24

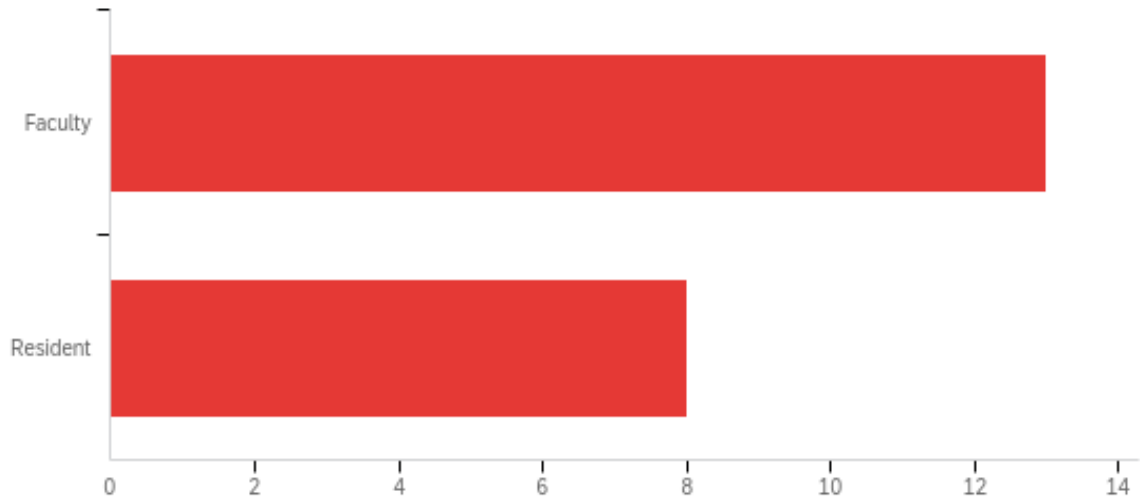
Exhibit 1: Count of New Visits and % with Accounts Already Set Up, Aug – Dec 2021



Appendix G

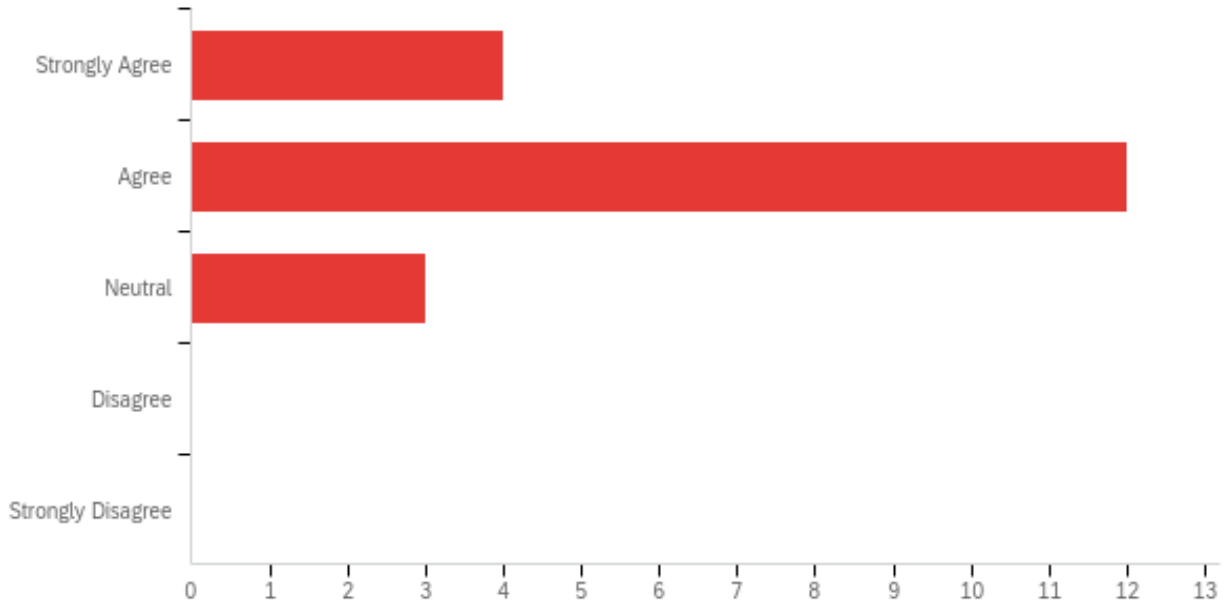
MBC Survey Results

Q1 - Please indicate below if you are a faculty member or resident.

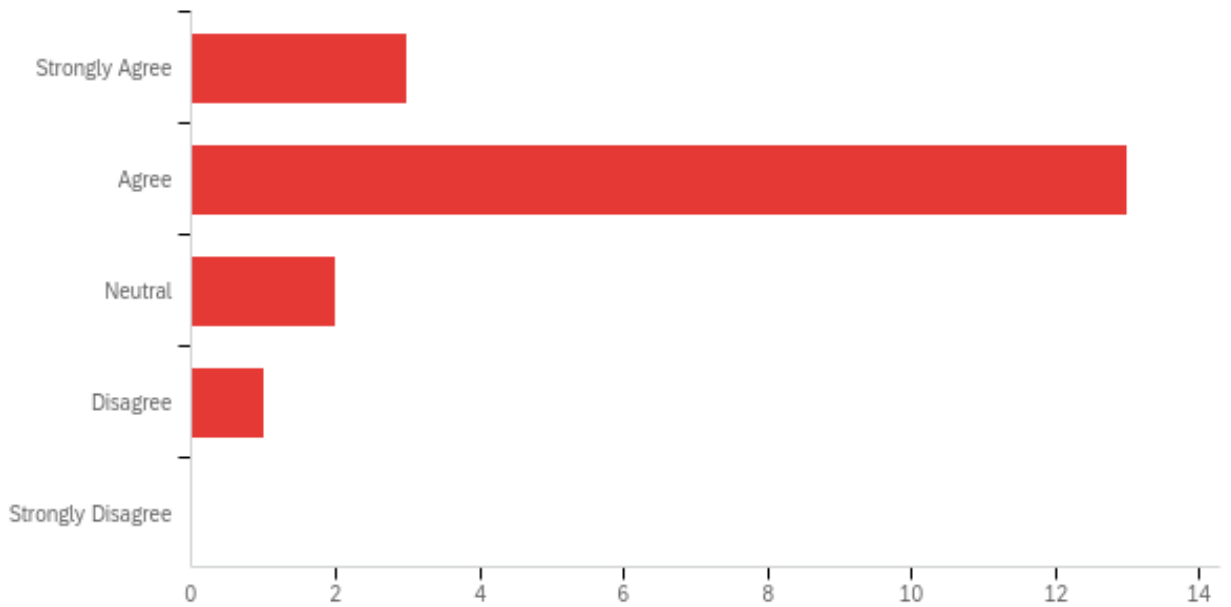


#	Answer	%	Count
2	Resident	38.10%	8
1	Faculty	61.90%	13
	Total	100%	21

Q2 - I believe measurement-based care enhances treatment-as-usual.



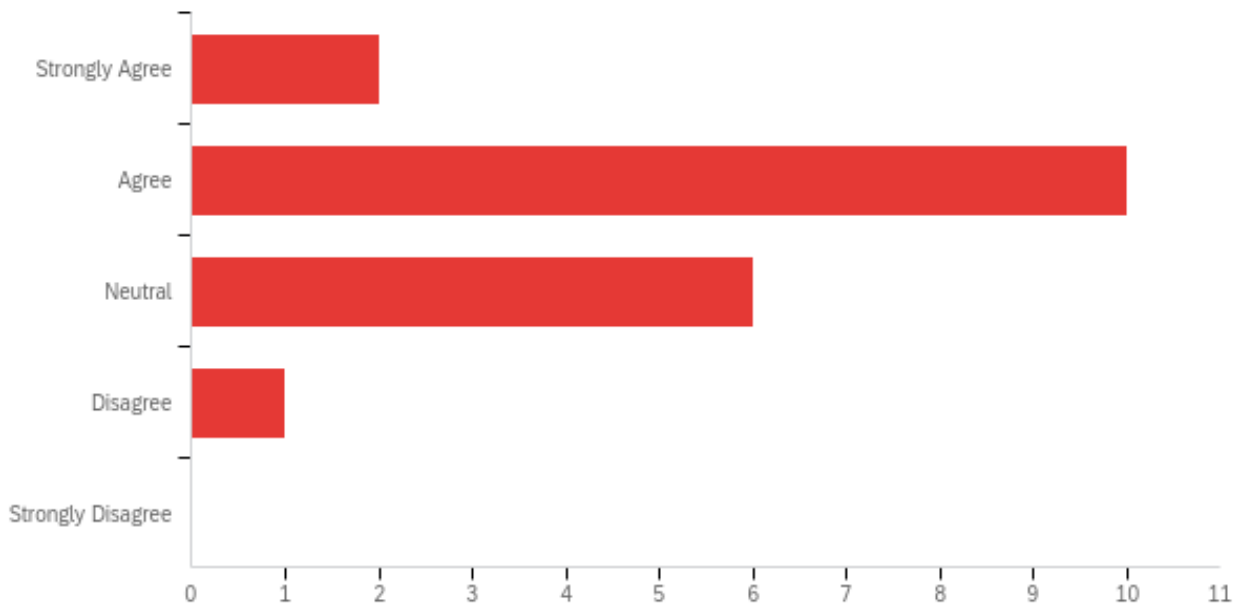
Q3 - I'm well educated in MBC.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	4.00	2.05	0.69	0.47	19

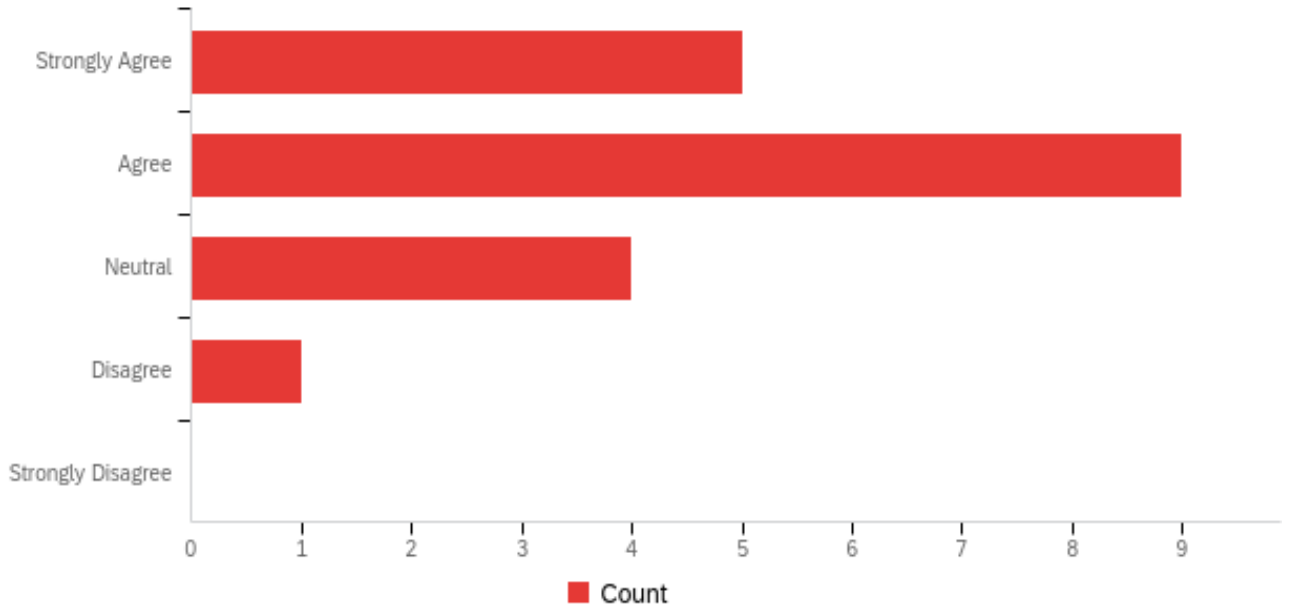
#	Answer	%	Count
1	Strongly Agree	15.79%	3
2	Agree	68.42%	13
3	Neutral	10.53%	2
4	Disagree	5.26%	1
5	Strongly Disagree	0.00%	0
	Total	100%	19

Q4 - I feel that MBC is well suited to my clinical practice style.



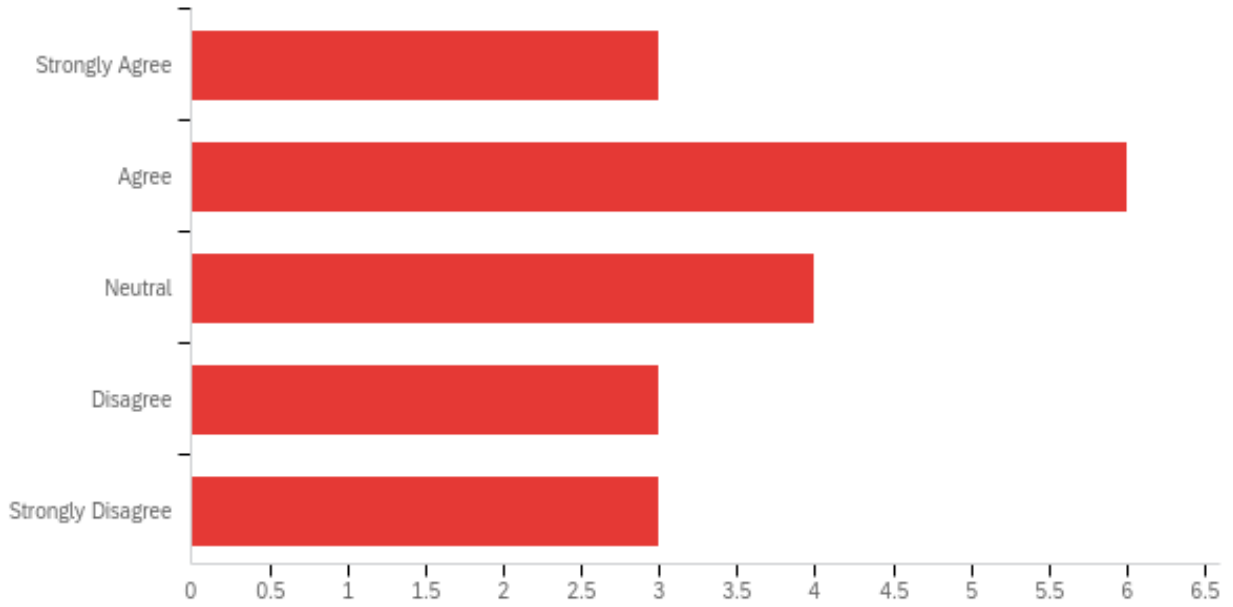
#	Answer	%	Count
1	Strongly Agree	10.53%	2
2	Agree	52.63%	10
3	Neutral	31.58%	6
4	Disagree	5.26%	1
5	Strongly Disagree	0.00%	0
	Total	100%	19

Q5 - It is worth my time to integrate MBC into my standard of practice.



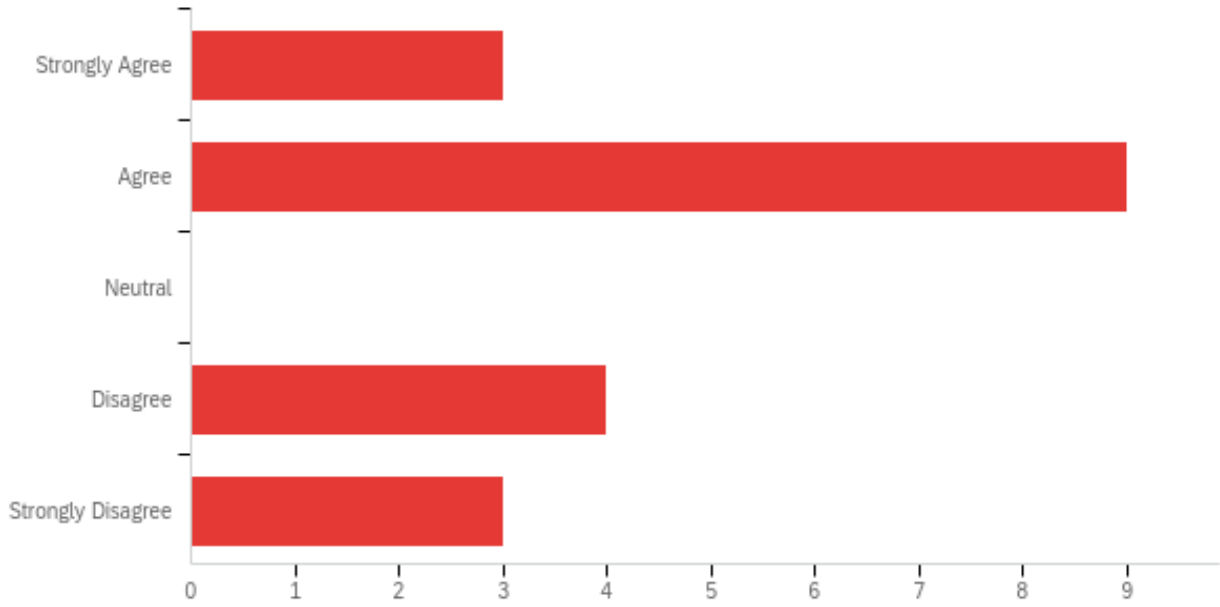
#	Answer	%	Count
5	Strongly Disagree	0.00%	0
1	Strongly Agree	26.32%	5
3	Neutral	21.05%	4
4	Disagree	5.26%	1
2	Agree	47.37%	9
	Total	100%	19

Q6 - The Owl is a helpful tool in utilizing MBC in practice.



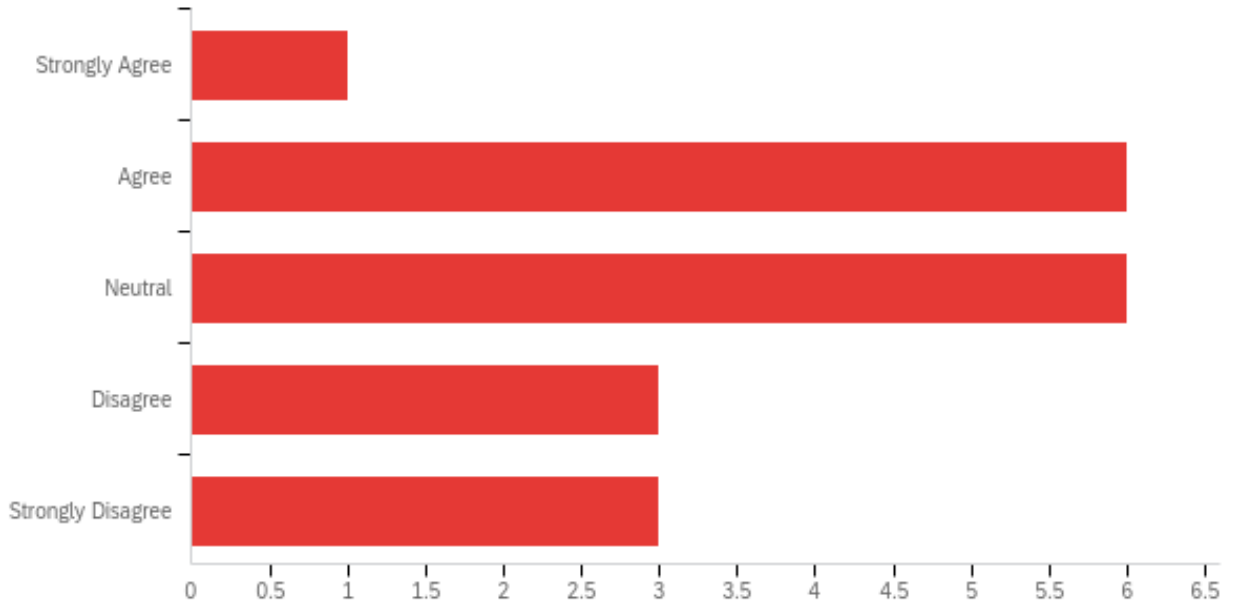
#	Answer	%	Count
1	Strongly Agree	15.79%	3
2	Agree	31.58%	6
3	Neutral	21.05%	4
4	Disagree	15.79%	3
5	Strongly Disagree	15.79%	3
	Total	100%	19

Q7 - I understand how data obtained via MBC/Owl can help us triage patients and improve timely access to care



#	Answer	%	Count
1	Strongly Agree	15.79%	3
2	Agree	47.37%	9
3	Neutral	0.00%	0
4	Disagree	21.05%	4
5	Strongly Disagree	15.79%	3
	Total	100%	19

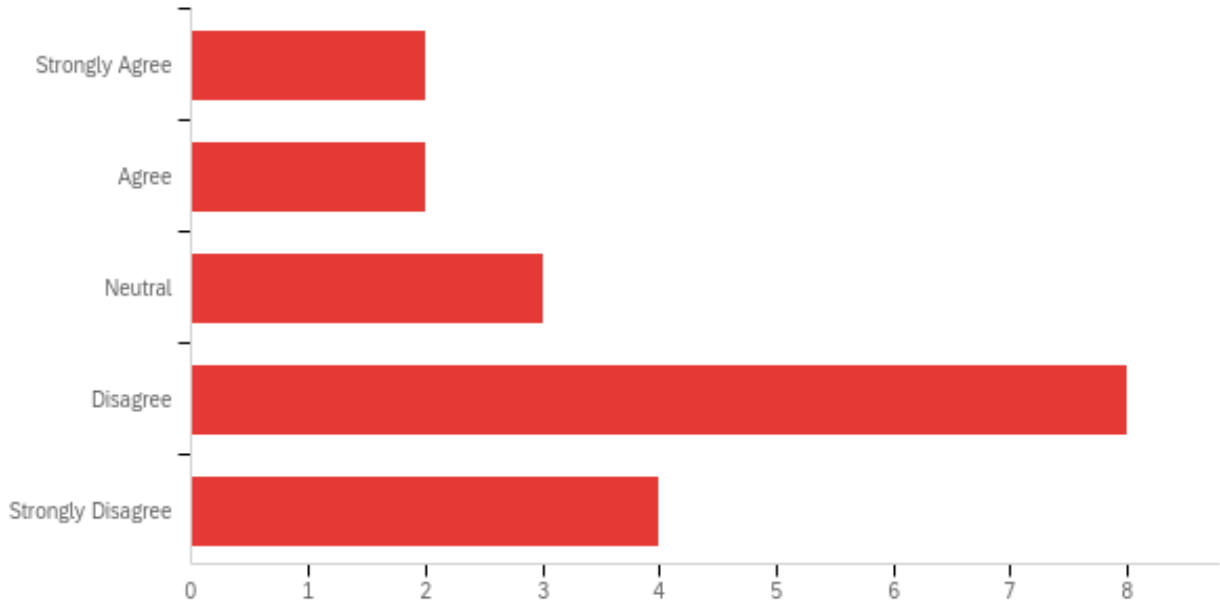
Q8 - It is worth my time to use the Owl in the care of my patients.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	3.05	1.15	1.31	19

#	Answer	%	Count
1	Strongly Agree	5.26%	1
2	Agree	31.58%	6
3	Neutral	31.58%	6
4	Disagree	15.79%	3
5	Strongly Disagree	15.79%	3
	Total	100%	19

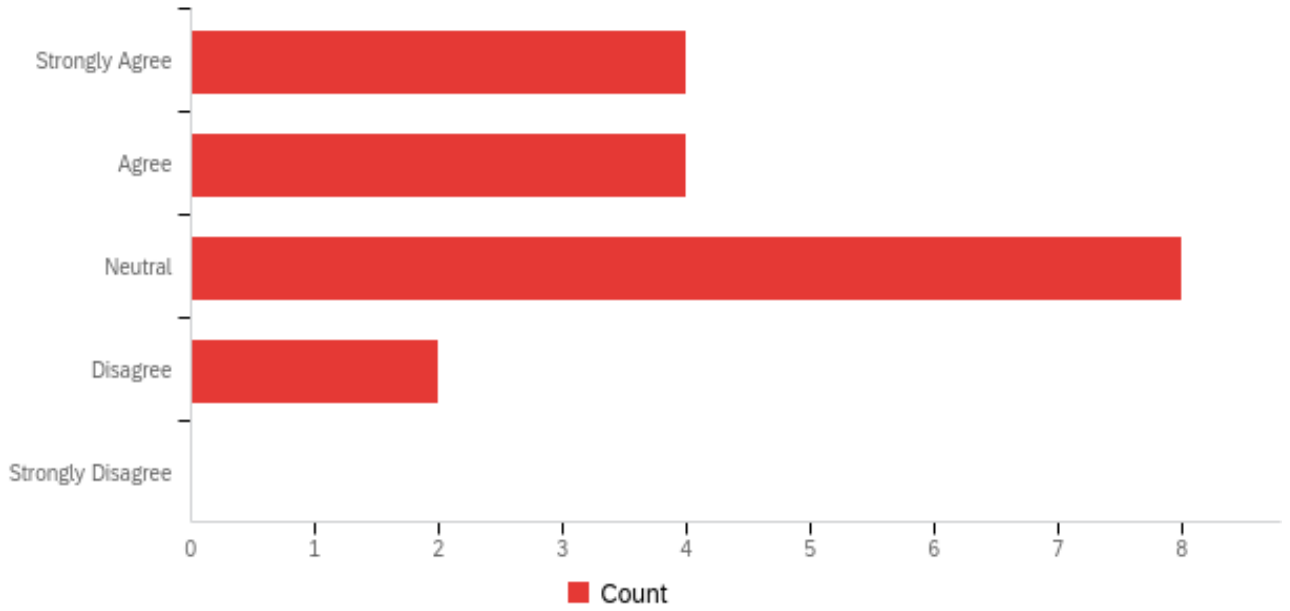
Q9 - I use the Owl routinely for MBC.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	3.53	1.23	1.51	19

#	Answer	%	Count
1	Strongly Agree	10.53%	2
2	Agree	10.53%	2
3	Neutral	15.79%	3
4	Disagree	42.11%	8
5	Strongly Disagree	21.05%	4
	Total	100%	19

Q10 - I would use the Owl if it were less of a time burden.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	4.00	2.44	0.96	0.91	18

#	Answer	%	Count
1	Strongly Agree	22.22%	4
2	Agree	22.22%	4
3	Neutral	44.44%	8
4	Disagree	11.11%	2
5	Strongly Disagree	0.00%	0
	Total	100%	18

Q11 - If you answered agree or strongly agree, please elaborate.

If you answered agree or strongly agree, please elaborate.

It would be ideal if OWL was integrated into EPIC similar to the PDMP interface. An extra click does make me prone to ignoring Owl.

The main burden is poor patient adherence and the time it takes to bring this up repeatedly

If Owl were linked in Epic, this would be very helpful.

It would be easier to use Owl if there were deeper integration with Epic flowsheets and notes. Perhaps even ability to view Owl in Epic.

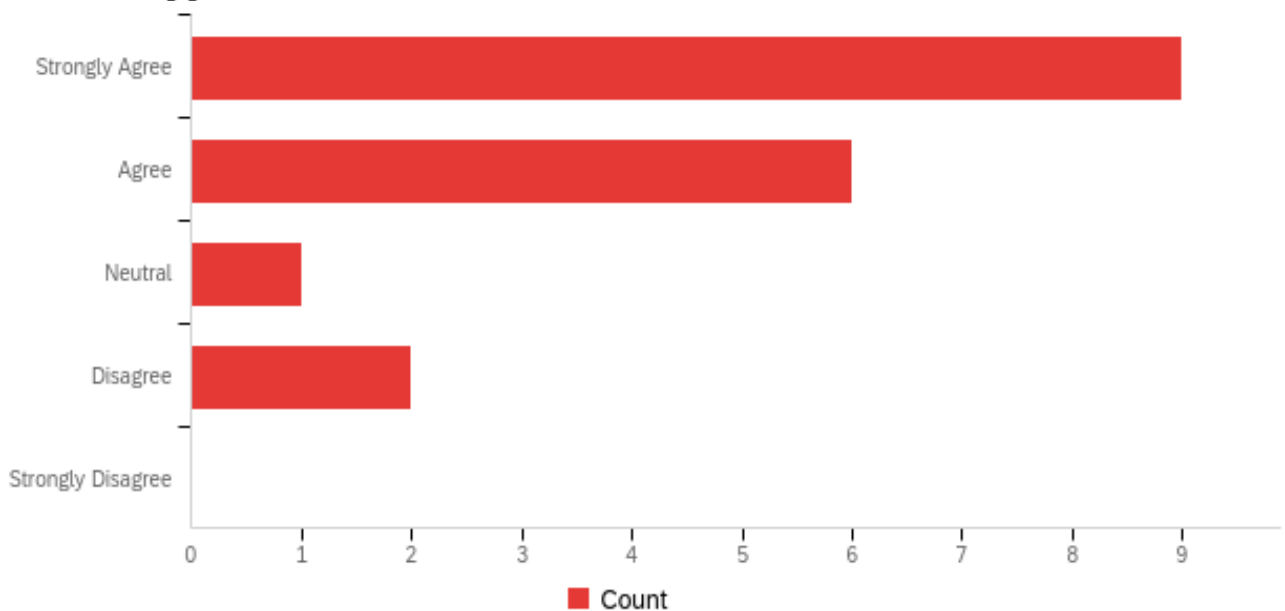
Takes time to get patients signed up for Owl.

Enrollment isn't happening. It doesn't feel like there's any support for Owl actually being utilized unless providers do 100% of it themselves.

It's lack of integration with Epic makes it cumbersome to use and to integrate in to my practice. Additionally it is time consuming for patients to have ano additional system they need to navigate within.

I have repeatedly come back to trying to utilize OWL but the barrier remains with difficulties getting patients signed up and, honestly (this sounds so silly) not having the right ID and password automatically saved in my browser. On the fly, I have had difficulties logging in and then the OWL will get lost in my to-do list.

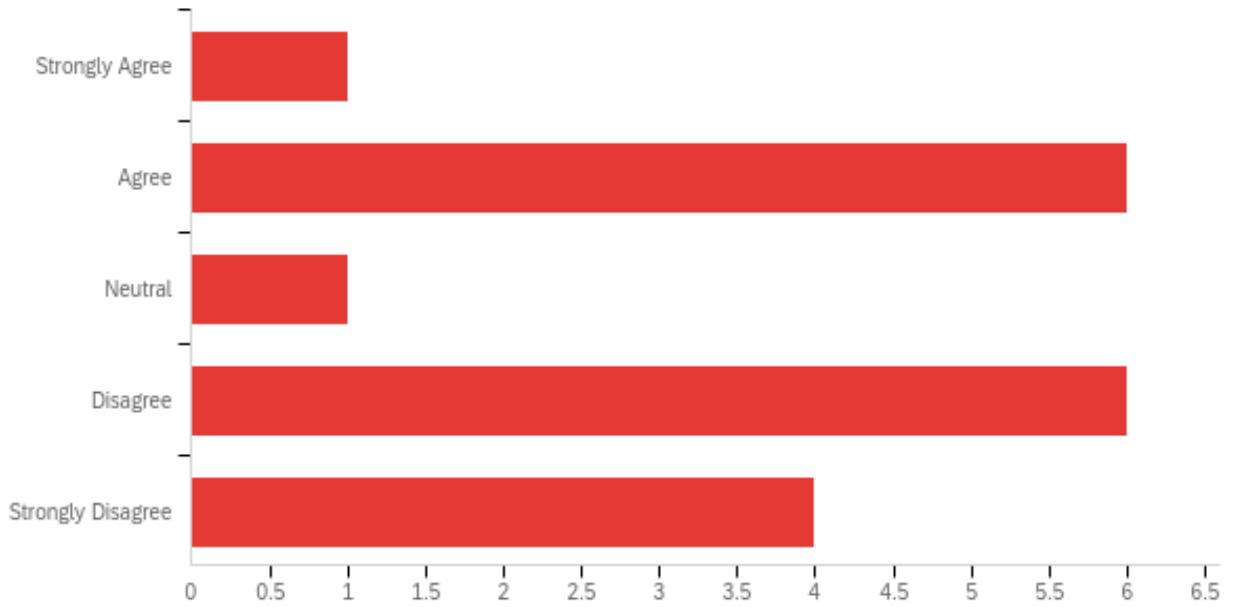
Q12 - I would be more likely to use the Owl if patients were enrolled before their initial appointment.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	4.00	1.78	0.97	0.95	18

#	Answer	%	Count
1	Strongly Agree	50.00%	9
2	Agree	33.33%	6
3	Neutral	5.56%	1
4	Disagree	11.11%	2
5	Strongly Disagree	0.00%	0
	Total	100%	18

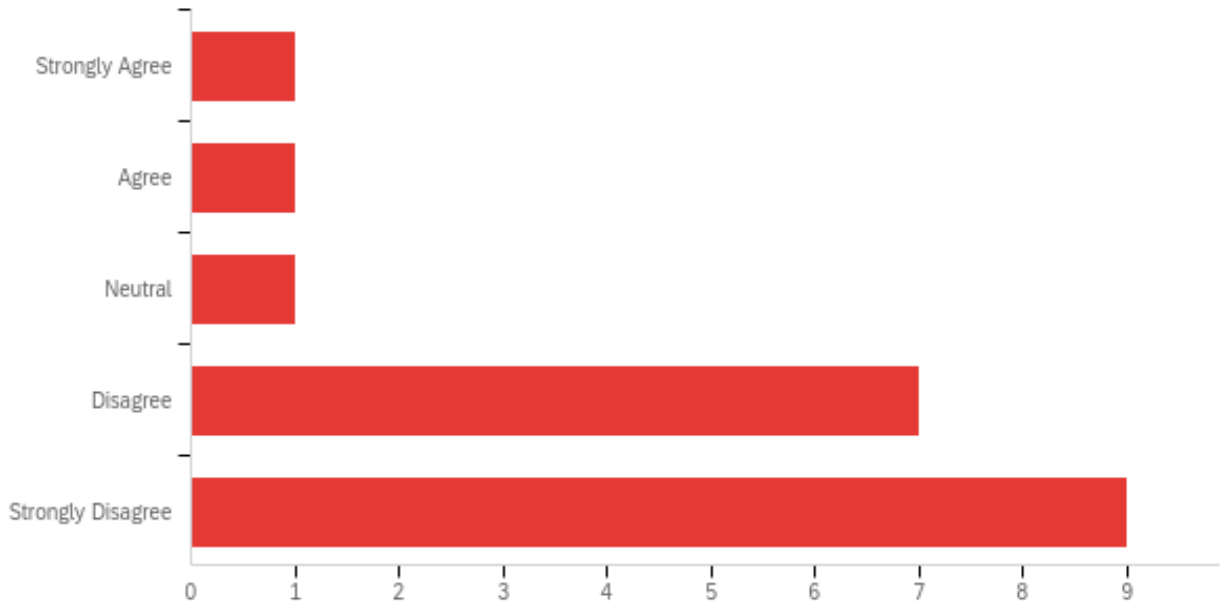
Q13 - I've been trained to use Owl, but I haven't been using it.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	3.33	1.29	1.67	18

#	Answer	%	Count
1	Strongly Agree	5.56%	1
2	Agree	33.33%	6
3	Neutral	5.56%	1
4	Disagree	33.33%	6
5	Strongly Disagree	22.22%	4
	Total	100%	18

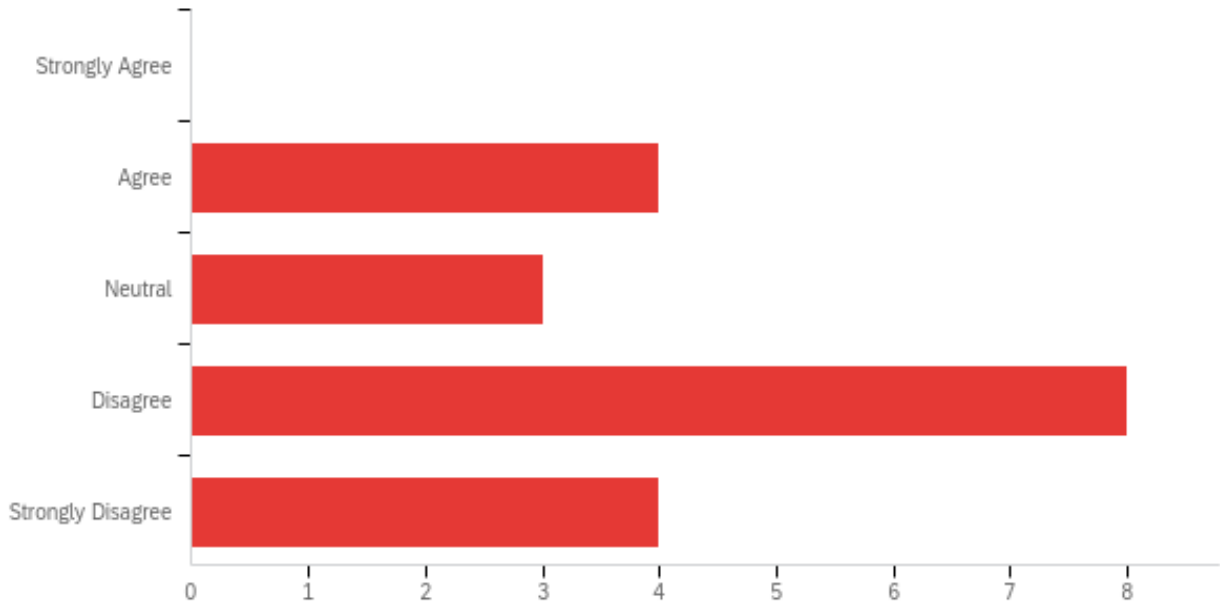
Q14 - I don't use the Owl; I have not been trained.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	4.16	1.09	1.19	19

#	Answer	%	Count
1	Strongly Agree	5.26%	1
2	Agree	5.26%	1
3	Neutral	5.26%	1
4	Disagree	36.84%	7
5	Strongly Disagree	47.37%	9
	Total	100%	19

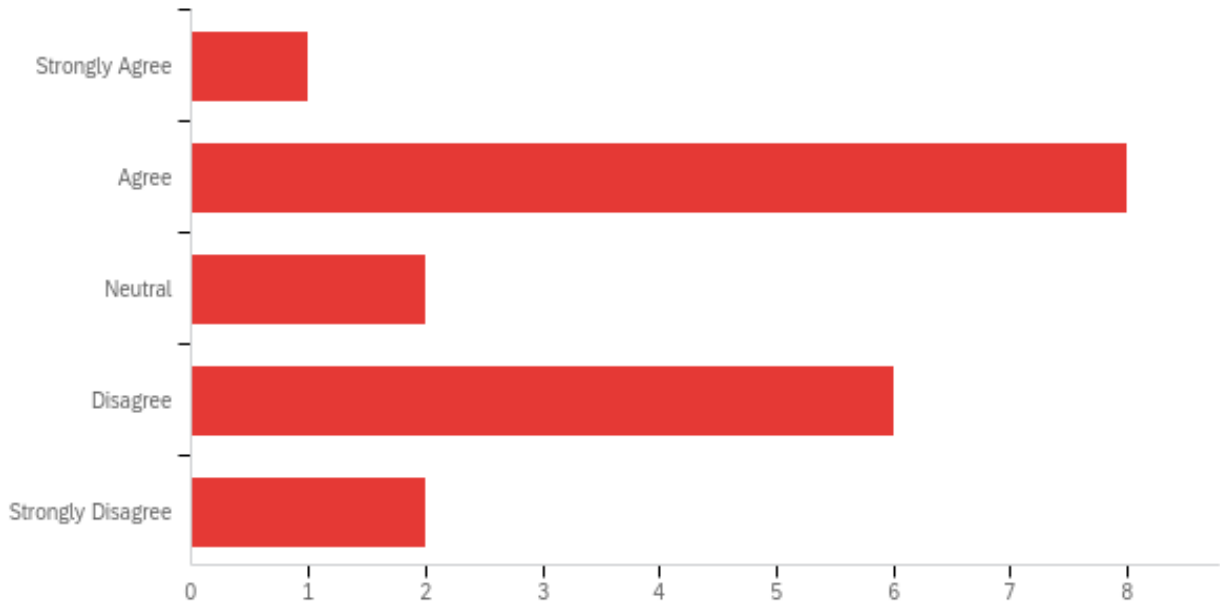
Q15 - I would use the Owl if I had more training on the software.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	2.00	5.00	3.63	1.04	1.07	19

#	Answer	%	Count
1	Strongly Agree	0.00%	0
2	Agree	21.05%	4
3	Neutral	15.79%	3
4	Disagree	42.11%	8
5	Strongly Disagree	21.05%	4
	Total	100%	19

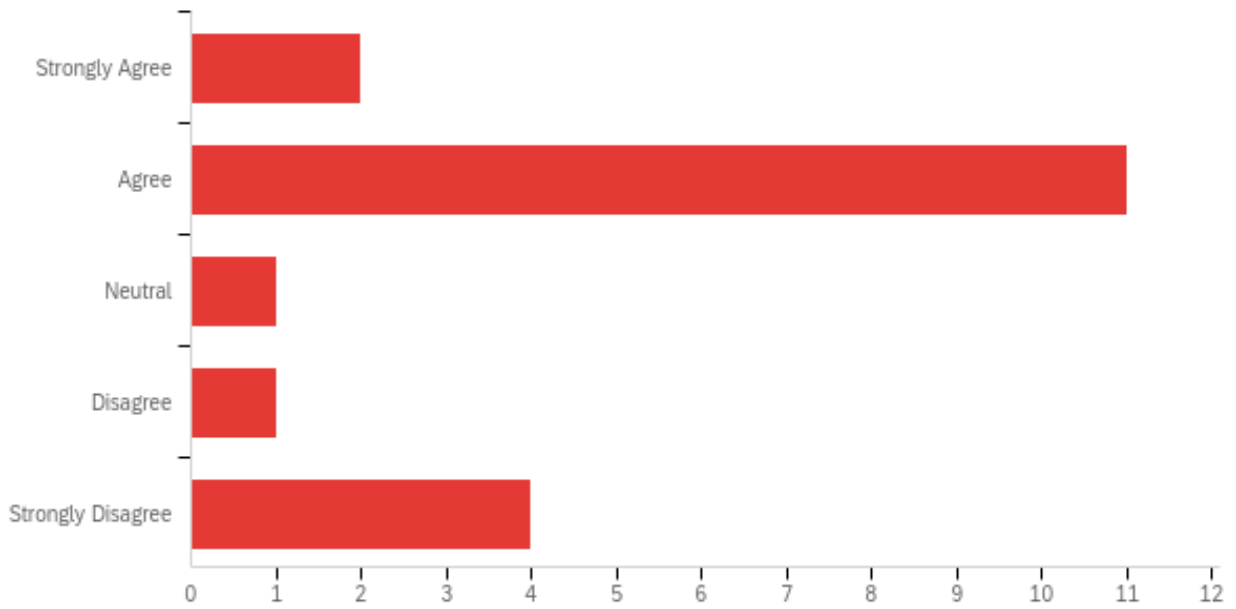
Q16 - I would use the Owl if the measures I prefer were available.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	3.00	1.17	1.37	19

#	Answer	%	Count
1	Strongly Agree	5.26%	1
2	Agree	42.11%	8
3	Neutral	10.53%	2
4	Disagree	31.58%	6
5	Strongly Disagree	10.53%	2
	Total	100%	19

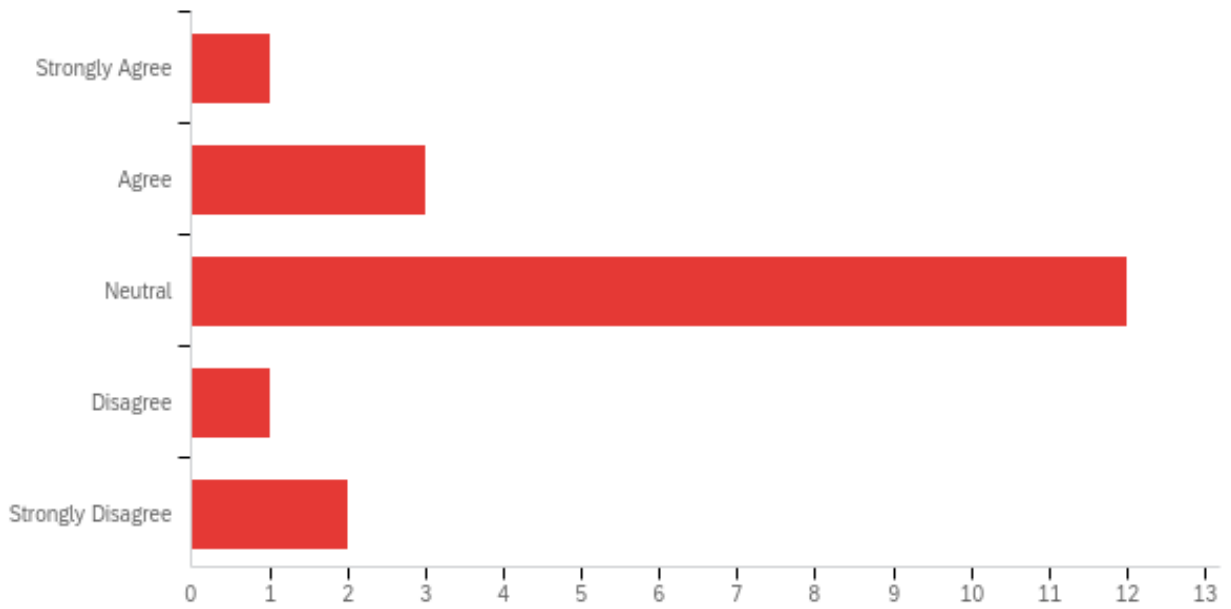
Q17 - I'm aware of Owl technical support for clinicians and for patients.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	2.68	1.34	1.80	19

#	Answer	%	Count
1	Strongly Agree	10.53%	2
2	Agree	57.89%	11
3	Neutral	5.26%	1
4	Disagree	5.26%	1
5	Strongly Disagree	21.05%	4
	Total	100%	19

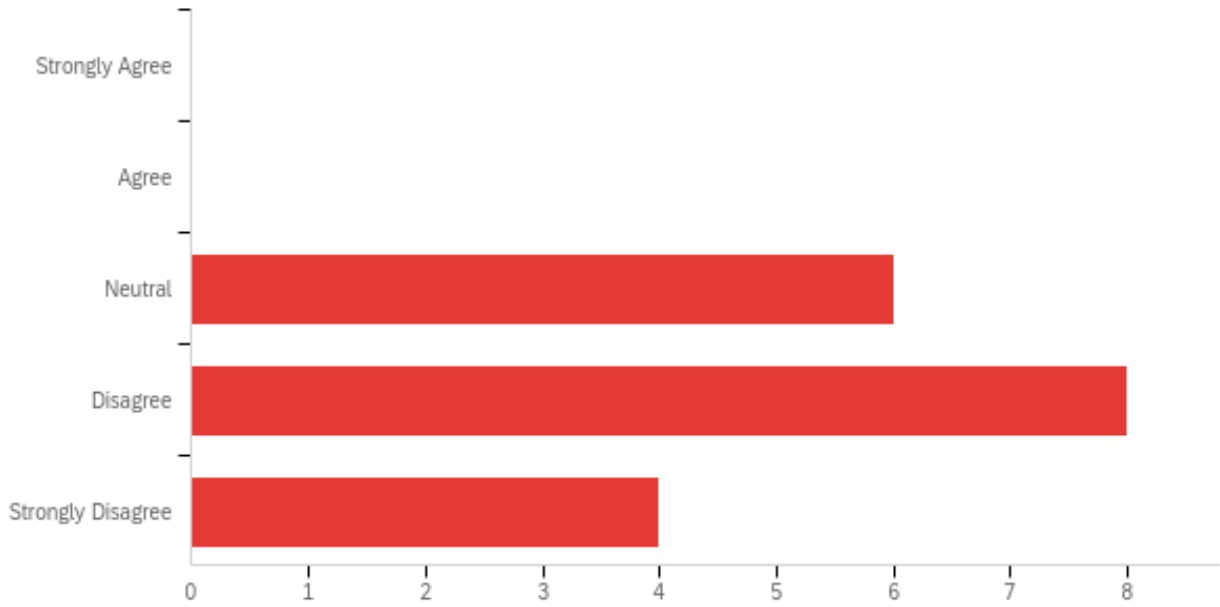
Q18 - Owl technical support is able to address my questions and concerns.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	3.00	0.92	0.84	19

#	Answer	%	Count
1	Strongly Agree	5.26%	1
2	Agree	15.79%	3
3	Neutral	63.16%	12
4	Disagree	5.26%	1
5	Strongly Disagree	10.53%	2
	Total	100%	19

Q19 - My use of the Owl has declined due to COVID related changes.

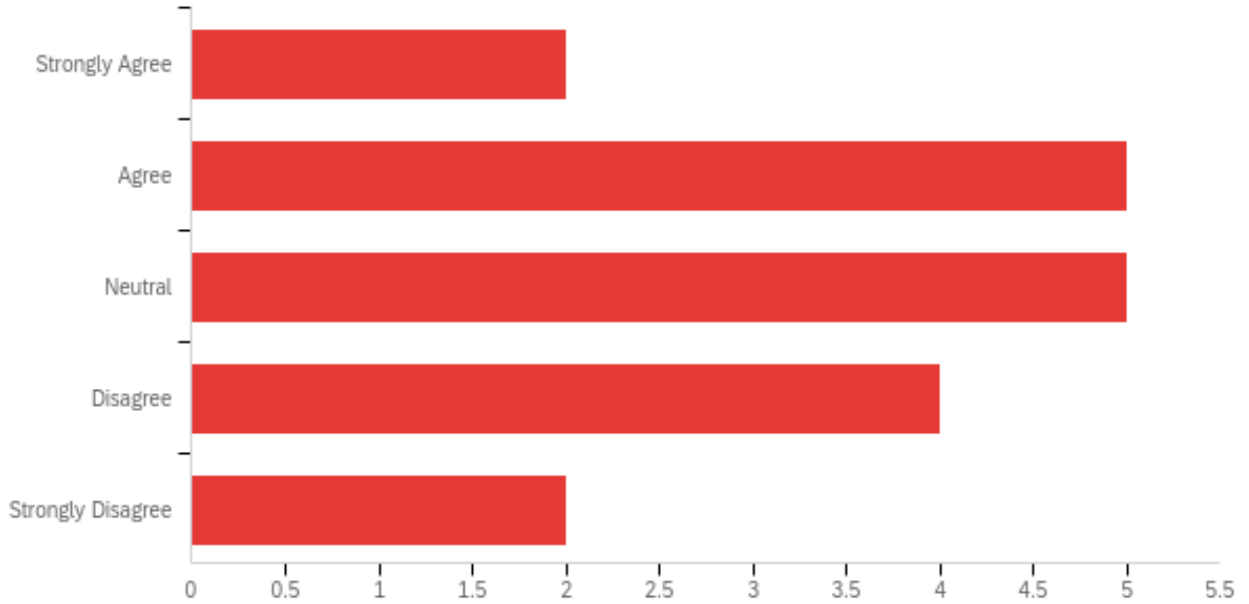


#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	3.00	5.00	3.89	0.74	0.54	18

#	Answer	%	Count
1	Strongly Agree	0.00%	0
2	Agree	0.00%	0
3	Neutral	33.33%	6
4	Disagree	44.44%	8
5	Strongly Disagree	22.22%	4
	Total	100%	18

Q20 - Elaborate if you answered agree or strongly agree to question 16.
 Elaborate if you answered agree or strongly agree to question 16.

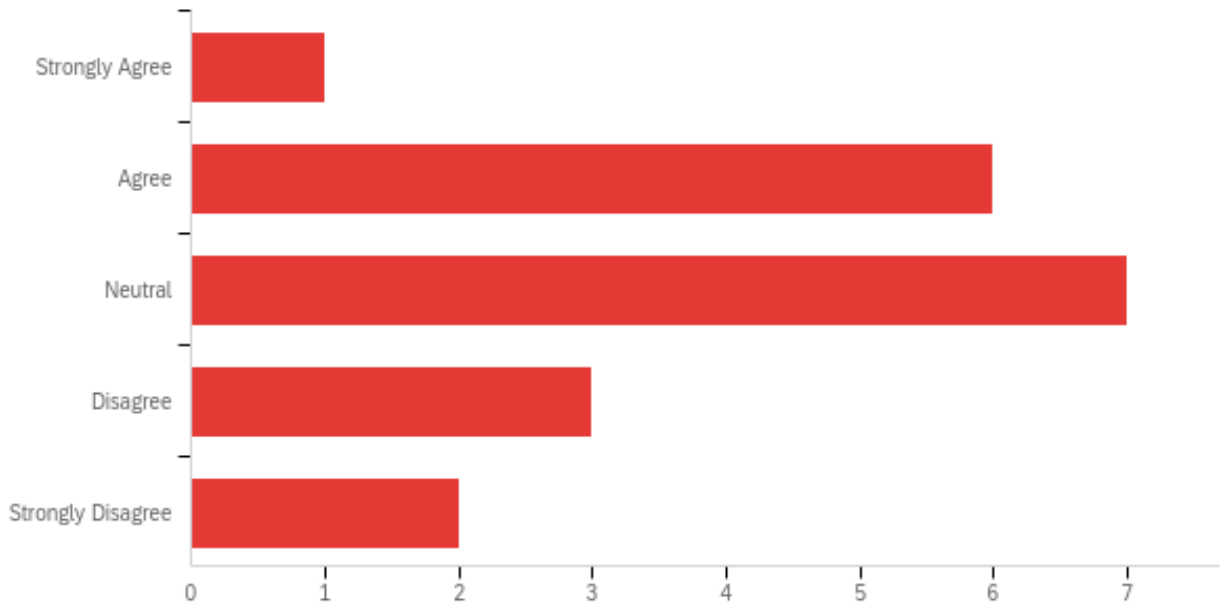
Q21 - I would use the Owl if there was a clear mandate from leadership.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	2.94	1.18	1.39	18

#	Answer	%	Count
1	Strongly Agree	11.11%	2
2	Agree	27.78%	5
3	Neutral	27.78%	5
4	Disagree	22.22%	4
5	Strongly Disagree	11.11%	2
	Total	100%	18

Q22 - I would be more likely to use the Owl if the OPC culture encouraged use of the Owl.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	5.00	2.95	1.05	1.10	19

#	Answer	%	Count
1	Strongly Agree	5.26%	1
2	Agree	31.58%	6
3	Neutral	36.84%	7
4	Disagree	15.79%	3
5	Strongly Disagree	10.53%	2
	Total	100%	19

Q23 - How can leadership support clinician uptake of MBC?

How can leadership support clinician uptake of MBC?

have patients complete MBC as part of their check-in process, PRIOR to initial appointment.

Integration into Epic.

Provider staffing and resources for panel management, asynchronous care and triage.

Getting registered so clinicians don't have the burden of it. Also, it would be helpful if they could complete it during the visit which was an option pre-remote working with the iPad.

Develop and support consistent workflow for patients to be enrolled in Owl as part of clinic enrollment

Unknown

Use a system that is integrated within Epic and mychart so that patients can access measures within Epic (they are already asked to do questionnaires at check in). This will make it easier to integrate measures and results in to the flow of a clinic visit. We shouldn't have to purchase software as a department when it can be integrated in to the EMR that we already have. It is particularly troubling that department leadership who have been pushing for OWL useage are paid by and have investment in this company. It is a conflict of interest.

More administrative support in getting patients registered. Perhaps dedicated time by support staff to provide more 1:1 support to particular providers as well as data to providers re: OWL usage. If we are able to see some data and results, we will be more likely to use it.

Integrate into Epic in a more intuitive manner.

Q24 - If the Department continues to use the Owl, how can leadership support clinician use of the Owl?

If the Department continues to use the Owl, how can leadership support clinician use of the Owl?

n/a

Training on use of Owl and ways to integrate it into workflow.

Same as last response. University leadership support and Epic integration

Noted previously

Talk about Owl - if it is part of our culture it should be a consistent part of discussion, and encouraged to be taken up by all the clinic team members including providers

Mandate its use.

I don't see my self using OWL.

Perhaps consideration of blocking time (perhaps monthly) to review OWL caselogs and reach out to patients who have dropped the OWL. This could further enhanced with staff support (assisting providers in reaching out to patients who need assistance registering). Additionally, having more materials sent to patients upfront (via new patient intructions, dotphrases for after visit summaries and mycharts explaining the OWL, etc).

Q25 - What new or additional features would facilitate your use of the Owl or similar technology for MBC?

What new or additional features would facilitate your use of the Owl or similar technology for MBC?

Needs access to proprietary measures as well. No Beck, Hamilton, etc.

having MBC be integrated with EPIC and reviewable from within EPIC so that other care providers can review results as well

Integration with Epic

View of Owl data in Epic, Owl data into Epic flow sheet, could use Owl responses to populate notes and reduce user burden; how to get more patients enrolled and using

Patients be able to complete it during visit, add more relevant measures (sleep)

Higher level integration with Epic, ability to review scales directly in Epic

If it were built into Epic. As it is, it is simply one more place you have to go check after checking MyChart, voicemail, e-mail

Integration with Epic and mychart

It would certainly be nice to have single sign on via EPIC. Having valuable measures would also be beneficial though I am sure there are restrictions with some.

Incorporate graphs within Epic.

Q26 - Do you have novel ideas for using MBC and/or the Owl to improve patient triage, access, and flow through our clinic?

Do you have novel ideas for using MBC and/or the Owl to improve patient triage, access, and flow through our clinic?

Yes. If we had a triage specialist, we could have patients complete a referral/screening form via Owl, triage/BHCM could screen and triage patients, and so forth.

Noted previously

Yes, many.

No

Integration within Epic and mychart (beyond single login, don't want to be taken to a system outside of epic)

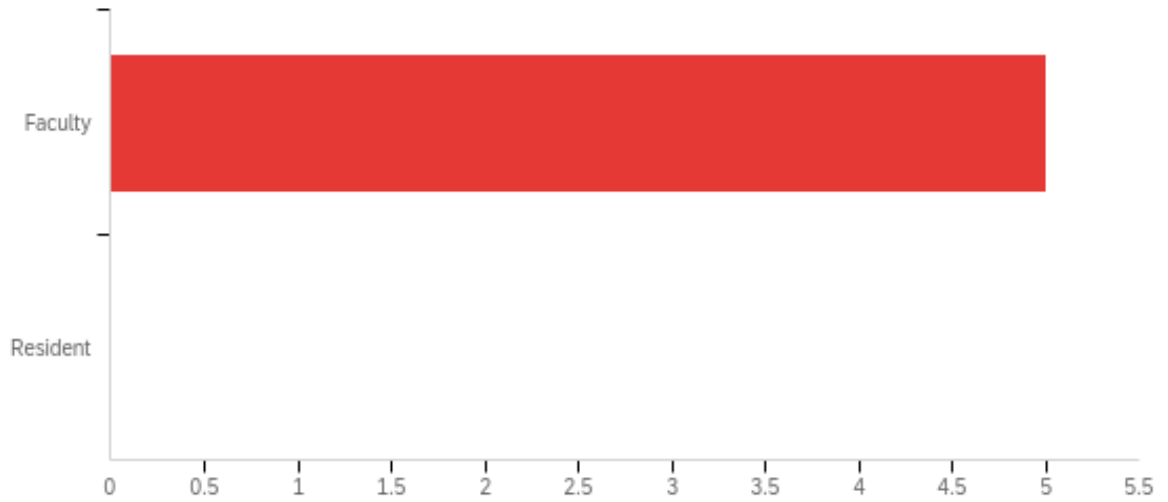
If we were to somehow include a quality of life scale around the time of intake and then annually, along with feedback for providers - that would likely incentivize providers utilizing OWL to track meaningful progress. Perhaps positive screens could direct patients to specific providers who specialize or have interest in managing certain diagnoses.

Having an initial PHQ-9 and/or GAD-7 score can help characterize patient severity prior to starting treatment.

Appendix H

Post-Intervention Survey Results

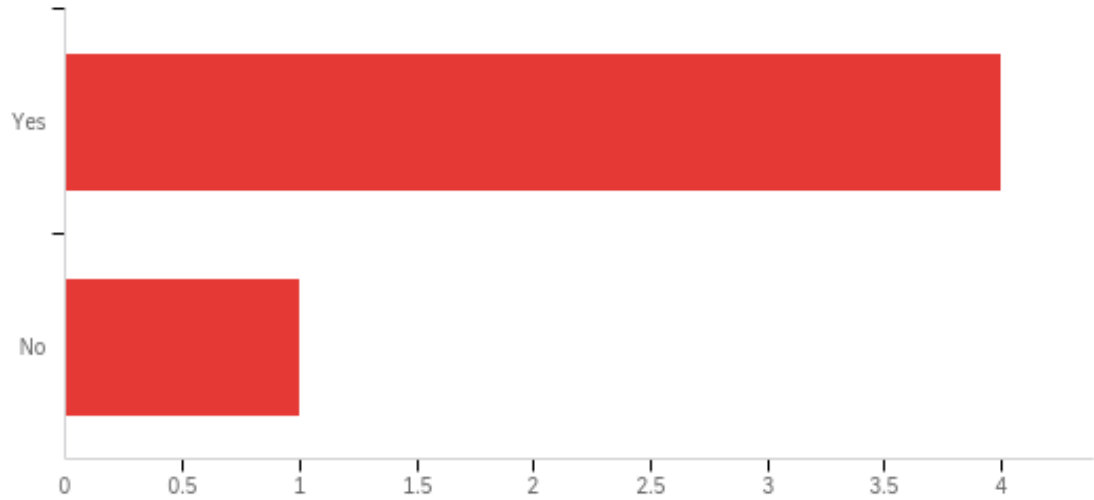
Q2 - Please indicate below if you are a faculty member or resident.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please indicate below if you are a faculty member or resident.	1.00	1.00	1.00	0.00	0.00	5

#	Answer	%	Count
1	Faculty	100.00%	5
2	Resident	0.00%	0
	Total	100%	5

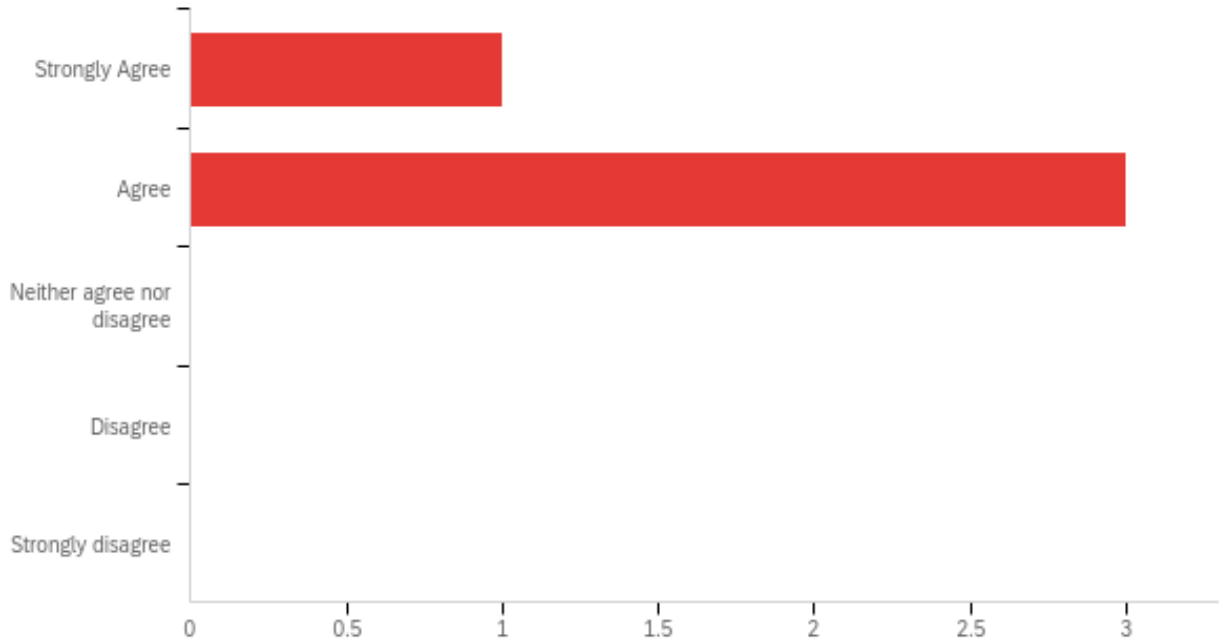
Q3 - Did you complete the initial survey Exploring Barriers to Technology Facilitated Measurement Based Care in October of 2021?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Did you complete the initial survey Exploring Barriers to Technology Facilitated Measurement Based Care in October of 2021?	1.00	2.00	1.20	0.40	0.16	5

#	Answer	%	Count
1	Yes	80.00%	4
2	No	20.00%	1
	Total	100%	5

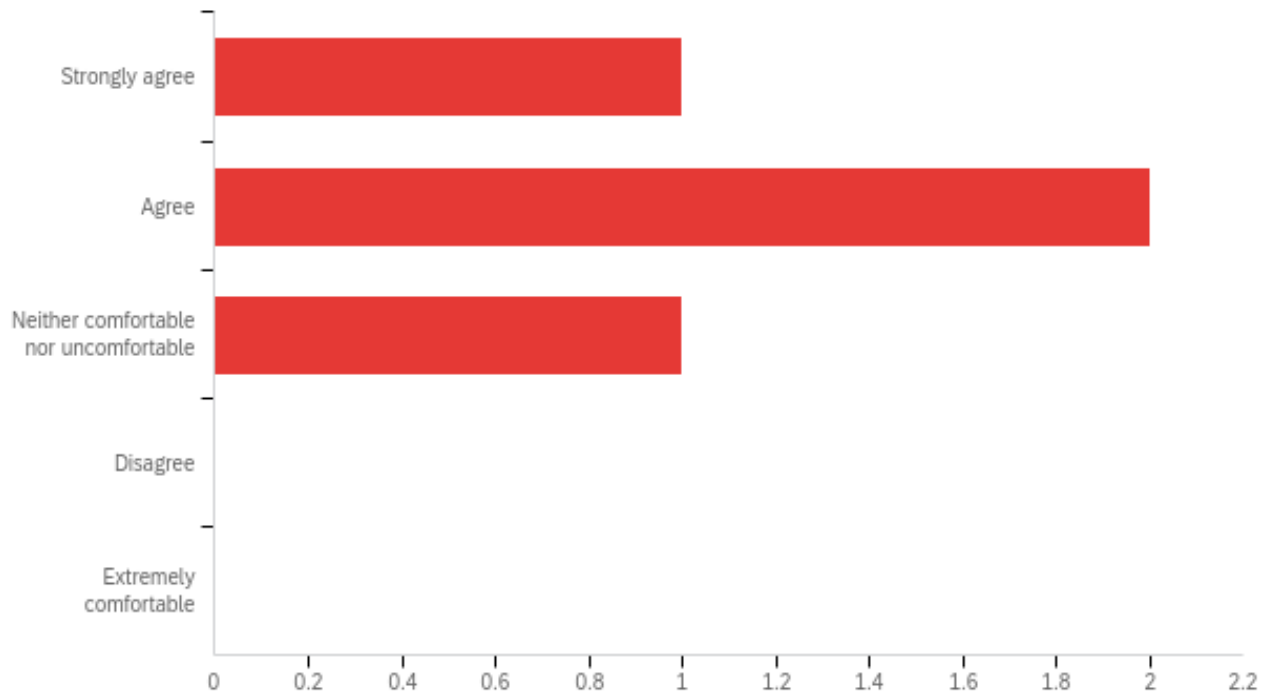
Q4 - I felt that the initial survey allowed me to share my barriers to using MBC.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	2.00	1.75	0.43	0.19	4

#	Answer	%	Count
1	Strongly Agree	25.00%	1
2	Agree	75.00%	3
3	Neither agree nor disagree	0.00%	0
4	Disagree	0.00%	0
5	Strongly disagree	0.00%	0
	Total	100%	4

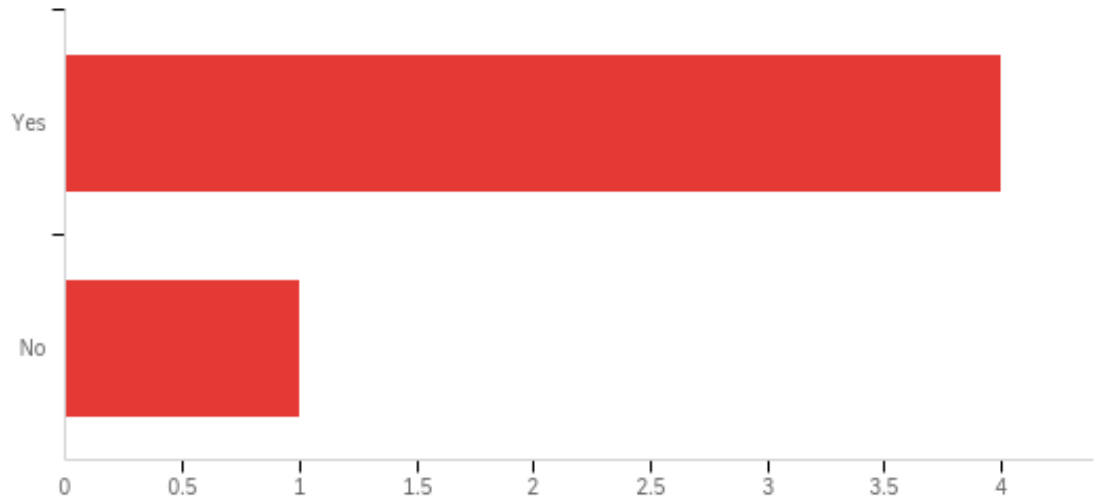
Q5 - I felt comfortable completing the survey and providing honest feedback



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	3.00	2.00	0.71	0.50	4

#	Answer	%	Count
1	Strongly agree	25.00%	1
2	Agree	50.00%	2
3	Neither comfortable nor uncomfortable	25.00%	1
4	Disagree	0.00%	0
5	Extremely comfortable	0.00%	0
	Total	100%	4

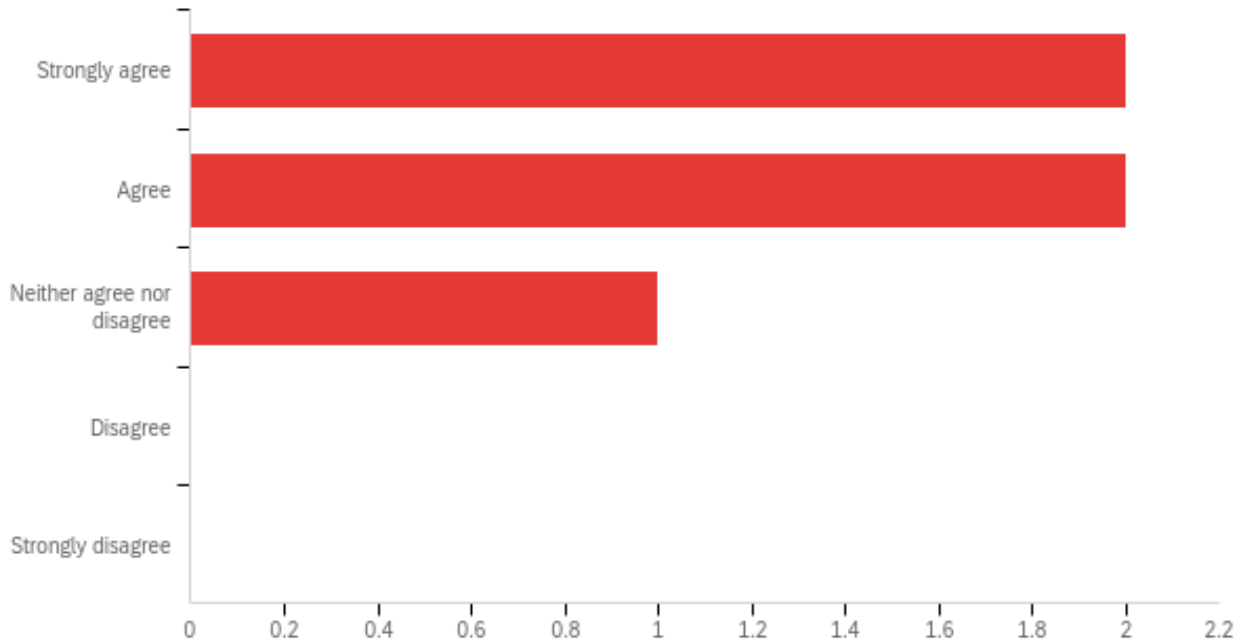
Q6 - I'm aware of the intervention that's currently taking place in the OPC to increase patient enrollment in the Owl prior to new and/or consult appointments.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I'm aware of the intervention that's currently taking place in the OPC to increase patient enrollment in the Owl prior to new and/or consult appointments.	1.00	2.00	1.20	0.40	0.16	5

#	Answer	%	Count
1	Yes	80.00%	4
2	No	20.00%	1
	Total	100%	5

Q7 - I feel that the intervention to increase patient enrollment in the Owl by PAS prior to new and/or consult appointments addresses relevant barriers to my use of MBC.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	3.00	1.80	0.75	0.56	5

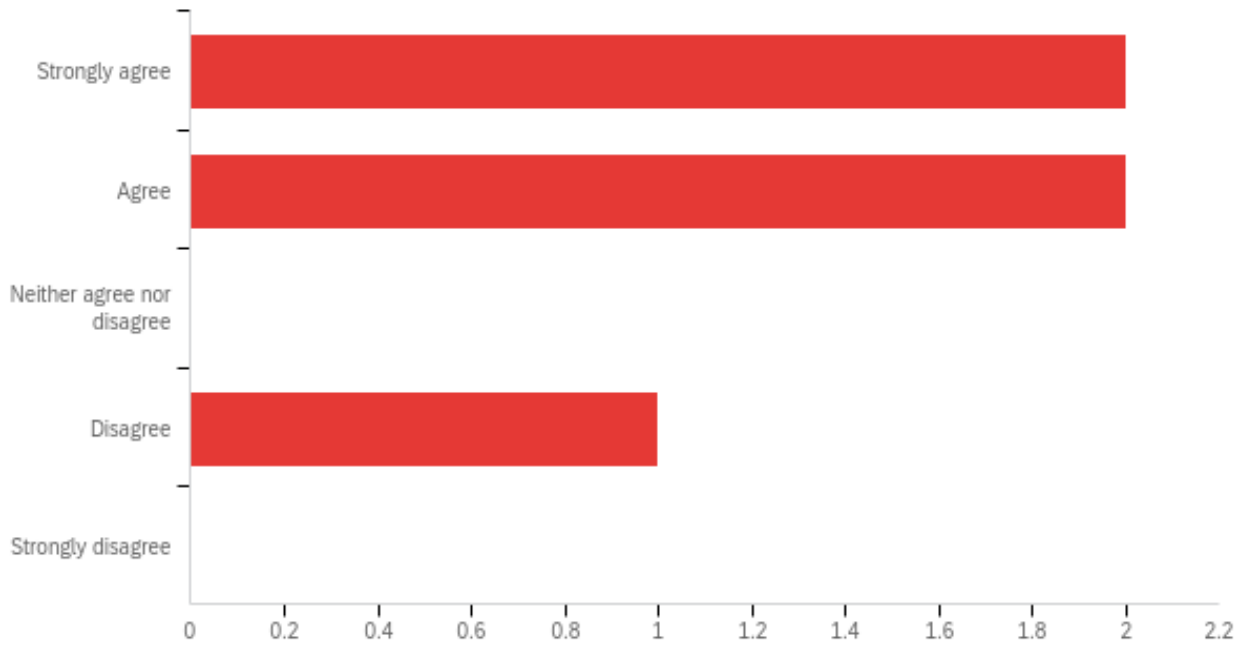
#	Answer	%	Count
1	Strongly agree	40.00%	2
2	Agree	40.00%	2
3	Neither agree nor disagree	20.00%	1
4	Disagree	0.00%	0
5	Strongly disagree	0.00%	0
	Total	100%	5

Q9 - If you answered no to the previous question, please elaborate below.

If you answered no to the previous question, please elaborate below .

Sorry, I'm not really familiar with the intervention. I also don't remember if I completed the survey in Oct.

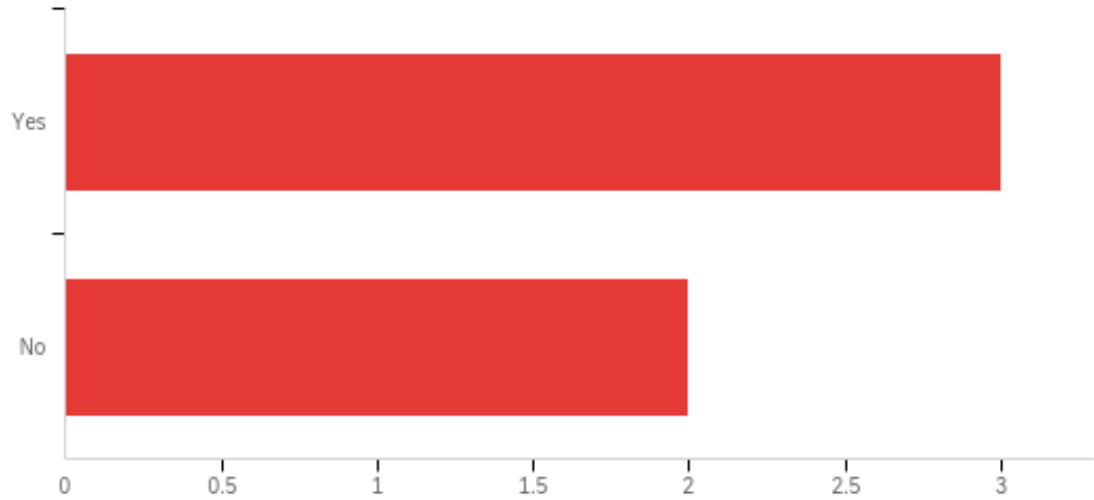
Q10 - I check to see whether or not new patients are enrolled in the Owl before their first appointment or at some point before or after the first visit.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Scale	1.00	4.00	2.00	1.10	1.20	5

#	Answer	%	Count
1	Strongly agree	40.00%	2
2	Agree	40.00%	2
3	Neither agree nor disagree	0.00%	0
4	Disagree	20.00%	1
5	Strongly disagree	0.00%	0
	Total	100%	5

Q11 - I've noticed that more of my new patients are enrolled in the Owl before their first appointment.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I've noticed that more of my new patients are enrolled in the Owl before their first appointment.	1.00	2.00	1.40	0.49	0.24	5

#	Answer	%	Count
1	Yes	60.00%	3
2	No	40.00%	2
	Total	100%	5

Q12 - Please elaborate on the previous question, if desired.

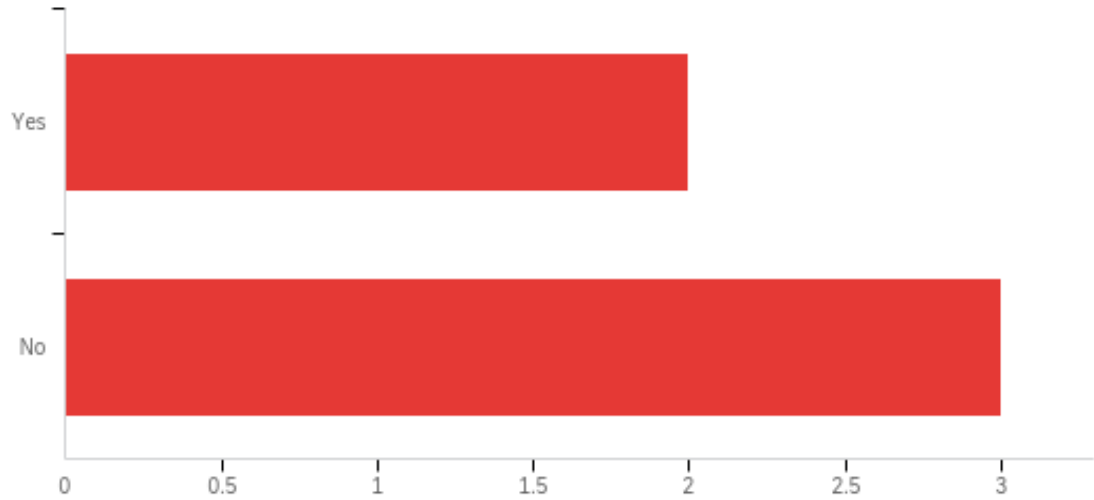
Please elaborate on the previous question, if desired.

I recently had an intake/consult - no OWL. However, it was a last minute schedule so I can see why the OWL may have been bypassed.

They seem to be enrolled but have not increased their frequency of completed initial bundle or other measures.

I have not had many new intakes recently.

Q13 - I've noticed that more patients are completing measures in the Owl before their first appointment.



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I've noticed that more patients are completing measures in the Owl before their first appointment.	1.00	2.00	1.60	0.49	0.24	5

#	Answer	%	Count
1	Yes	40.00%	2
2	No	60.00%	3
	Total	100%	5

Q14 - If you answered no to the previous question, do you have a sense for why patients are not completing measures?

If you answered no to the previous question, do you have a sense for why patients are not completing measures?

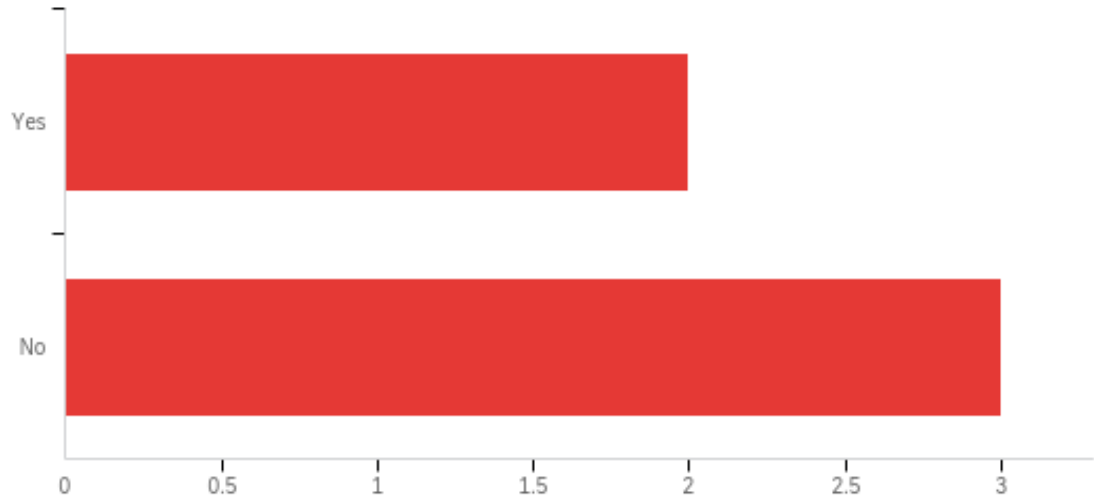
I think the email reminders often get lost in the long list of spam and emails. Were measures to be administered by phone or were there an OWL APP with it's own notifications, I believe completion rates would be higher. Obviously, I need to work to rejuvenate my use of OWL. I had once been very on top of using it but it became burdensome. I have been making an effort to incorporate it back into visits.

I don't think they know how.

about the same

they often forget to fill it out or the email goes to a spam inbox. I often have to remind my patients.

Q15 - I've noticed that more patients are bringing up the Owl during their first appointment and/or seem more familiar with the Owl?



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I've noticed that more patients are bringing up the Owl during their first appointment and/or seem more familiar with the Owl?	1.00	2.00	1.60	0.49	0.24	5

#	Answer	%	Count
1	Yes	40.00%	2
2	No	60.00%	3
	Total	100%	5