**Using Virtual Remote Monitoring as an Alternative**

**Observation Method for Suicidal Patients**

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**Abstract**

The overarching aim of this quality improvement project was to determine if virtual remote monitoring is an acceptable alternative to the constant observation method traditionally deployed for all hospitalized adult patients on suicide watch. An adult patient at low or medium risk for suicide residing on the general medical floor outside the inpatient psychiatric unit routinely required the assignment of an in-person sitter to provide constant observation until active suicide precautions were discontinued. This initiative was intended to assess the use of virtual remote monitoring as an alternative to the traditional method and its effects on patient health and well-being, cost, and experience of care. An analysis of the data 16 weeks post-implementation revealedno adverse events associated with virtual remote monitoring, the same results that were attained in the past with in-person sitting. A net annual cost-savings of $357,000 were realized when compared to pre-implementation costs. Though nurses preferred in-person sitting to virtual remote monitoring, the decision to use virtual remote monitoring for appropriate patients was based on inclusion and exclusion criteria and reinforced by the clinical house supervisor who served as the gatekeeper. Therefore, virtual remote monitoring was demonstrated to be an acceptably safe and cost-effective means for providing observation for adult suicidal patients. Criteria for use proved to be the driver of improvement rather than nurse preference despite the availability of more assistive personnel to manage the personal care needs of other patients on the general medical floors.

 *Keywords:* suicide, patient monitoring, safety, quality improvement

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**Problem Description**

Virtual remote monitoringis one method by which hospitalized patients in the United States are observed for safety reasons. This process requires the use of a mobile or fixed camera in the patient’s room that transmits real-time visual feedback to a remote central workstation staffed by a virtual monitoring technician. It may or may not be accompanied by intercom, duress alarm, and privacy capability. This method of patient safety surveillance has predominantly been used to observe patients at high risk for falls with the goal of keeping them safer, as evidenced by a reduction in injurious falls. Ideally, there is a pre-established communication mechanism by which the virtual monitoring technician communicates with the caregivers responsible for the patient’s direct care needs, including situations requiring rapid intervention (AvaSure, 2019).

Virtual remote monitoring is considered a cost-effective solution (Votruba, Graham, Wisinski, & Syed, 2016). With this method, one individual has the capacity to observe up to 12 patients remotely as opposed to assigning an individual sitter to each patient (S. Tobar, personal communication, July 20, 2020). The hardware, cabling, and software required to provide this support represent a modest one-time cost of up to $157,500 to accommodate up to 12 cameras (R. Jones, personal communication, August 17, 2020), as compared to the ongoing expense associated with the number of worked hours accrued by multiple sitters, each at an average of $14 per hour (D. Reed, personal communication, August 17, 2020), watching the same set of patients for a prolonged period.

Virtual remote monitoring is only beginning to gain favor among behavioral health specialists responsible for the safety and well-being of patients on suicide watch. The Joint Commission (2018) has allowed hospitals to decide on the most suitable safety surveillance method for patients at low or medium risk for suicide, but still requires the assignment of individual sitters for patients at high risk. This quality improvement initiative is intended to replicate the work conducted at Brigham and Women’s Hospital in which virtual remote monitoring was used to provide observation to hospitalized adult patients screening positive for suicide at low or medium risk and low impulsivity (Kroll et al., 2019).

**Background**

Every adult patient presenting to St. Joseph Mercy Oakland hospital with suicidal ideation or gesture is immediately assigned to an individual sitter to provide constant observation until active suicide precautions are discontinued. While the literature lacks evidence to support this practice (Kroll et al., 2019), most content experts agree that it would be negligent in depriving suicidal patients of this support (Russ, 2016). However, the need for constant observation in this patient population is sporadic and often challenging to provide just in time. Frequently, nurse assistants are used to supplement the need until other sitter resources can be identified and secured, thereby shortchanging other patients and their nurses of staffing support. In addition, sitter utilization is costly. The annual cost at St. Joseph Mercy Oakland is $2.3M and trending upward year-over-year (M. Corbat, personal communication, January 23, 2020).

Trinity Health, the parent company of St. Joseph Mercy Oakland, has recently adopted Epic as its enterprise-wide electronic health record. The Columbia-Suicide Severity Rating Scale (Appendix A), an evidence-based suicide risk assessment tool (Giddens, Sheehan, & Sheehan, 2014), is included in all Epic workflows where a suicide risk assessment is required. By completing the Columbia-Suicide Severity Rating Scale, a suicide risk-stratification score is assigned such that patients are classified as low, medium, or high risk. In the aftermath of electronic health record adoption and in conjunction with the rollout of a standard virtual remote monitoring platform, AvaSure, ministries are expected to reduce sitter utilization by 50% within one year (M. Boyd, personal communication, August 18, 2020). Nearly 100% of the sitters currently being utilized at St. Joseph Mercy Oakland are assigned to adult patients on suicide watch (M. Corbat, personal communication, July 1, 2020). However, of those adult patients on active suicide precautions, 75% are classified as low risk, 10% as medium risk, and 15% as high risk (D. Bobryk, personal communication, September 29, 2020), thereby presenting significant opportunity to utilize resources more efficiently and effectively.

Suicide risk stratification is not a concept that behavioral health specialists accept at face value. The evidence suggests that the accuracy and predictive value of risk-stratification tools are poor, therefore, unable to guide appropriate interventions (Abarca, Gheza, Coda, & Elicer, 2018). In response to this concern, the literature supports the concomitant use of an impulsivity score to gauge those screening positive for suicide ideation/gesture as more or less likely to act on this intention (Kroll et al., 2019). Several valid and reliable impulsivity measurement scales have been used for this purpose such as the Richmond Agitation-Sedation Scale (Zun & Downey, 2008) (Appendix B) and Behavioral Activity Rating Scale (Simpson, Pidgeon, & Nordstrom, 2017) (Appendix C).

**Significance of the Problem**

According to the American Foundation for Suicide Prevention (2019, November 4), suicide is the 10th leading cause of death in the United States. Males are four times more likely to kill themselves than women; and white men comprise nearly 70% of all suicides. There are 129 suicides per day and 1.4 million attempts annually. Approximately 50% of all suicide deaths are the result of firearms. The incidence of suicide in hospitals ranges from 48.5 to 64.9 annually (Williams, Schmaltz, Castro, & Baker, 2018). Though the annual number of hospital suicides is relatively low, it is classified as a “serious reportable event” or “never event” by the National Quality Forum (2011) and subjected to regulatory review by the Centers for Medicare and Medicaid Services with potentially dire consequences to accreditation, program integrity, community trust, and finances including fines.

As with any quality improvement initiative, the Quadruple Aim framework, an expansion of the Triple Aim originally introduced by Berwick, Nolan, and Whittington (2008), best describes the significance of this work to healthcare and advanced nursing practice. “Improving the experience of care” (Sikka, Morath, & Leape, 2015), the first aim is essential, especially to a patient population that already feels marginalized. Approximately 65% of the patients who present to St. Joseph Mercy Oakland with suicide ideation/gesture are underinsured, uninsured, or receiving general assistance (M. Samyn, personal communication, July 1, 2020). Access to care is challenging, to say the least, as patients wait on average from four hours to four days before a care disposition is made by Common Ground (A. McIntosh, personal communication, July 1, 2020), the managed care arm for Medicaid subscribers in Oakland County. Virtual technology facilitates rapidly securing a private care space, thereby promoting dignity and respect while awaiting disposition.

“Improving the health of populations” (Sikka, Morath, & Leape, 2015), the second aim is achieved through the application of standard evidence-based tools that promptly qualify suicidal patients for the most appropriate and safest method of observation while suicide precautions remain active. This foundation allows for the delivery of safe and reliable care.

“Reducing the per capita costs of healthcare” (Sikka, Morath, & Leape, 2015), the third aim is achieved by reducing the expense incurred by multiple sitters assigned to multiple suicidal patients to provide constant observation and, instead, using virtual remote monitoring as an alternative when pre-established criteria are met. In turn, the appropriate resources are available at the right time for the right patient.

“Improving the provider experience’ (Sikka, Morath, & Leape, 2015), the fourth aim is achieved directly by leveraging technology and, as a result, utilizing available existing human resources in a more efficient and effective manner, thereby providing greater support for the delivery of care to all patients. Consequently, nurses feel a stronger sense of accomplishment by completing the care necessitated by their patients’ condition. This ultimately reduces the burnout experienced by providers resulting from fatigue and moral distress.

**Problem Statement**

The assignment of an individual sitter to every adult patient presenting to the hospital with suicidal ideation and/or gesture is expensive and difficult at best to consistently accommodate just-in-time. The use of virtual remote monitoring as an alternative to constant observation by an individual sitter may be a suitable option for an adult patient outside of the inpatient psychiatric unit at St. Joseph Mercy Oakland who is classified as low or medium risk for suicide combined with a low impulsivity score. The potential benefits of a suicide observation protocol that includes the use of virtual remote monitoring may result in improvement in the experience of care for the patient and provider, improvement in the health and well-being of the target population, and reduction in the per capita costs of care (Kroll et al., 2019).

**Available Knowledge**

**Literature Review**

A review of the literature was performed using PubMed as the primary search engine and produced 119 articles. Key words included suicide AND ("continuous virtual monitoring" OR "patient monitoring" OR "virtual monitoring" OR "patient observation" OR “sitter”) AND (“quality improvement” OR “patient safety” OR “cost benefit analysis” OR “incidence” OR “safety management” OR “quality of health care” OR “health care costs”). The predominance of the evidence in this review revealed three major elements germane to this work including (a) evidence-based suicide risk assessment tools and impulsivity scales; (b) incidence of suicidal and non-suicidal self-injury; and (c) constant observation.

***Evidence-Based Suicide Risk Assessment Tools and Impulsivity Scales***

 The use of an evidence-based suicide risk assessment tool is an effective first step to identifying suicide risk in patients presenting to the hospital who seek or require behavioral health services, since suicidal ideation or gesture is more common in this patient population. Valid and reliable screening tools utilized in patient care include the Columbia-Suicide Severity Rating Scale (Grant & Lusk, 2015; Abarca, Gheza, Coda, & Elicer, 2018; TJC, 2018) and is already available in the Epic electronic health record.

The Columbia-Suicide Severity Rating Scale yields a risk-stratification score. Though it is important to assess the level of suicide risk so that measures may be taken for mitigation purposes, the evidence suggests that the accuracy and predictive value of risk-stratification tools in general are poor, ranging from 1-19%, therefore, unable to guide the most appropriate interventions. Furthermore, of those who successfully act on their suicide intention after hospitalization, more than 50% are initially classified as low risk compared to 5% in the high-risk category (Abarca, Gheza, Coda, & Elicer, 2018).

To distinguish those who are more likely to commit suicide from those who are least likely, behavioral health specialists largely agree that impulsivity measurement is more reflective of the likelihood to commit suicide in conjunction with a positive suicide risk screen. This combination allows clinicians to better gauge suicide risk and prescribe the most appropriate mitigating interventions (Zun & Downey, 2008; Giddens, Sheehan, & Sheehan, 2014; Grant & Lusk, 2015; Simpson, Pidgeon, & Nordstrom, 2017; Abarca, Gheza, Coda, & Elicer, 2018; Kroll et al., 2019).

Other than those at high risk for suicide, the literature is void of any evidence to suggest that some patient attributes make virtual remote monitoring more suitable when compared to traditional one-to-one, face-to-face observations provided by individual sitters (TJC, 2018; AvaSure, 2019). Adult patients who screen positive for suicide and are classified as low or medium risk combined with low impulsivity largely comprise the inclusion criteria for virtual monitoring in this quality improvement initiative. Despite initial findings, it is imperative to note that suicide risk is temporal and requires reassessment at pre-determined time intervals (Kroll et al., 2019).

***Incidence of Suicidal and Non-Suicidal Self-Injury***

 The incidence of lethal self-harm or injury is relatively low among adult suicidal patients presenting to the hospital rendering suicide risk-stratification challenging at best. There is a bi-directional direct correlation between suicidal self-injury and non-suicidal self-injury and perseverance, thereby leading Anestis & Selby (2015) to conclude that “…suicidal behavior [is] a deliberate pursuit of death.” Additionally, a history of non-suicidal self-injury in suicide attempters may lead to more severe suicide behavior and interpersonal violence as compared to suicide attempters without history of non-suicidal self-injury, as discovered by [Sahlin](https://www.ncbi.nlm.nih.gov/pubmed/?term=Sahlin%20H%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), [Moberg](https://www.ncbi.nlm.nih.gov/pubmed/?term=Moberg%20T%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), [Hirvikoski](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hirvikoski%20T%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), & [Jokinen (](https://www.ncbi.nlm.nih.gov/pubmed/?term=Jokinen%20J%5BAuthor%5D&cauthor=true&cauthor_uid=25879375)2015). These studies suggest that suicidality is complex, and any ideation or gesture must be taken seriously.

In the hospital setting, suicide by hanging is the most common means of fatality, thereby suggesting that mitigation of ligature risk is paramount (TJC, 2018; Williams, Schmaltz, Castro, & Baker, 2018). Furthermore, care plans ought to reflect all measures taken to mitigate such risks. Though environment of care standards for ligature risk mitigation outside the inpatient psychiatric unit are significantly more laxed, the electrical cord attached to the mobile camera device is a potential safety hazard though to date hasn’t resulted in patient self-harm, perhaps owing in large part to well-defined patient inclusion/exclusion criteria (AvaSure, 2019). Ceiling-mounted cameras are more optimally used to minimize ligature risk but limit flexibility in the absence of dedicated space for this particular use.

***Constant Observation***

 According to Kroll et al. (2019), there is no research evidence to support the traditional practice of individual sitter-assigned constant observation to each patient with suicide risk. Without such evidence, the development of clearly written policies, procedures and/or guidelines is difficult at best. And, despite all good-faith efforts to provide constant observation, incidences of “…elopement, assault, suicide, or other self-injury” are still reported even with sitter presence.

 While admittedly the literature is void of evidence to support the efficacy of constant observation, Russ (2016) recommends that the focus shift to consensus on an observation protocol to keep patients safe. The Joint Commission (2018) also promotes the consistent use of a policy & procedure to include “…screening, assessment, and management of patients at risk for suicide” and recommends that auditing be conducted to measure and improve adherence to attain high reliability in these elements of performance. More recently, there have been efforts made to attain expert consensus on what observations to record leading to more effective clinical decision-making to ensure patient safety. 51 items around “agitation, self-harm and suicide, violence, negative influence, disengagement and positive behavior” (Chu, Lambert, & Baker, 2019) have emerged following this first-pass initiative.

 Recently, Kroll et al. (2019) engaged The Joint Commission in assisting with the establishment of an observation protocol at Brigham and Women’s Hospital that contained both inclusion and exclusion criteria and encompassed adult patients at low or medium risk for suicide with low impulsivity in the emergency department and non-psychiatric inpatient units. The aim was directed at determining the efficacy of virtual remote monitoring as an alternative to the traditional approach of one-to-one, face-to-face observation. The study found that the outcomes from virtual remote monitoring were the same as the traditional approach but at significantly less cost.

**Organizational Assessment**

To successfully implement a quality improvement project, it is critical that there be an evaluation of the organization’s strengths, weaknesses, opportunities, and threats. This analysis allows stakeholders to leverage strengths and opportunities while acknowledging threats, and to identify and overcome weaknesses (Zaccagnini & Pechacek, 2020).

There are many key strengths applicable to the organization that pave the way for a successful and sustainable implementation. Among them are the following:

1. All existing workflows involving suicide risk assessment utilize the evidence-based Columbia-Suicide Severity Rating Scale.
2. Trinity Health has established AvaSure as its virtual remote monitoring platform. Funds have already been allocated by the System Office for purchase and installation.
3. Behavioral health specialists have already approved the use of virtual monitoring locally to monitor adult patients at low risk for suicide since the onset of the Covid-19 pandemic with the intention of minimizing colleague exposure.
4. Internal stakeholders include the medical director of the inpatient psychiatric service, director of nursing, and clinical nurse specialist. These influencers have embraced the possibilities and are excited to collaborate with a nationally known healthcare organization who very thoughtfully, methodically, and safely implemented virtual remote monitoring for adult patients on suicide watch in the hospital. They especially appreciate the intentionality around patient safety while leveraging System resources.
5. Nurses are authorized by Trinity Health to exercise independent practice to determine the most appropriate method of observation for all patients.

Organizational weaknesses need to be acknowledged to create plans to overcome them. The following constitute major weaknesses:

a) Workflows involving suicide risk assessment do not include impulsivity measurement.

 Therefore, an impulsivity measurement scale needs to be established; the data collected may

 be recorded in the Progress Notes section of the electronic health record in the absence of a

 designated location.

b) Except for very few adult patients at low risk for suicide, behavioral health specialists have

 not utilized virtual remote monitoring to provide observation for most others on suicide

 watch.

c) Response times to notifications from the telemetry monitoring service, another remote

 nursing support service, of potential cardiac rhythm disturbances requiring intervention are

 characteristically one to two minutes on average. Therefore, there is some trepidation with

 respect to response times following duress alarm activation by a remote Virtual Monitoring

 Technician.

There are opportunities that when combined with the organization’s strengths are expected to facilitate a successful and sustainable quality improvement project implementation. Among the most compelling are the following:

a) The Joint Commission has provided explicit permission for hospitals to decide on what

 appropriate safety surveillance methods they choose to use for adult patients at low and

 medium risk for suicide; the more liberal position of The Joint Commission allows for the

 latitude to “experiment” without jeopardizing accreditation.

b) Utilization of a protocol for suicide watch reduces variability and the risk of harm to patients

 and colleagues; sitter training is subsequently standardized and assessed against specific.

 performance expectations.

c) There is a Trinity Health directive to reduce annual sitter expense by 50%.

Finally, there are threats of which one must be made aware to anticipate potential impediments in the implementation phase. These threats include the following:

a) It is feasible that demand could exceed supply of mobile camera devices especially when

 other applications of the same technology are discovered.

b) The admitting physician ultimately approves or disapproves the use of virtual remote

 monitoring for suicide watch. The admitting physician usually defers to the psychiatrist’s

 recommendations but ultimately has the control.

c) Physicians have characteristically determined the appropriate method of observation

 for any patient requiring safety surveillance. This may lead to conflict between physician and

 nurse when the nurse exercises his/her independent practice.

d) Alarm fatigue is a very real and well documented problem in hospitals. The virtual remote

 monitoring platform being utilized for patients on suicide watch relies on a duress alarm

 mechanism by which an immediate response is expected to an imminent threat to patient

 safety.

In conclusion, the strengths, and opportunities attributable to the organization are expected to weigh heavily in favor of a successful implementation of virtual remote monitoring for adult patients outside the inpatient psychiatric unit who are at low or medium risk for suicide and score low on an impulsivity scale. The weaknesses are not insurmountable. The use of a standard protocol for suicide watch helps to ensure that the protocol in its entirety is followed, including the use of impulsivity measurement. The Richmond Agitation-Sedation Scale, if selected to reflect impulsivity, is already built in the Epic electronic health record. Though the use of virtual monitoring for patients at low risk for suicide is significantly low, staff awareness appears to be even lower, thereby providing an opportunity for education and coaching support. Because AvaSure includes a duress alarm that prompts an immediate staff response, reaction to it is likely to be different from the cardiac rhythm disturbance alarms received via phone due to the infrequency with which a duress alarm is likely to be used as well as the publicly audible and irritating sound once activated. The threats are largely insignificant as familiarity with the protocol increases and trust in the process grows with experience.

**Defining the Project**

**Theoretical Framework**

The Quality-Caring Model© (Appendix D), a middle-range theory developed by Duffy (Butts & Rich, 2018), is the theoretical framework selected to support a replication study as described by Kroll et al. (2019). The theory’s foundation is based on the works of Watson (Theory of Human Caring) and Donabedian (Quality Model: Structure-Process-Outcomes).

According to Utley, Henry, & Smith (2018), the Quality Caring Model© is based on four assumptions. These assumptions include:

(a) People are interdependent on others.

(b) Quality outcomes rely on interdependence and partnership among patient, family, nurse, and

 the healthcare teams.

(c) Evidence supporting nursing care outcomes is continually changing.

(d) Caring processes are essential in achieving quality health outcomes.

Furthermore, the Quality Caring Model© proposes the following:

(a) Nursing’s primary role is initiating, cultivating, and sustaining caring relationships with

 patients and families

(b) Nursing has a responsibility to co-create caring relationships with other members of the

 healthcare team to foster teamwork for effective caregiving.

(c) Caring relationships not only positively influence patient health outcomes but also

 interprofessional growth and development, motivation, engagement, and work satisfaction

 (Duffy, 2005).

According to Butts & Rich (2018), concepts from Duffy’s Quality-Caring Model© that are particularly germane to this work include “humans in relationships; relationship with self; relationship-centered professional encounters; caring behaviors; and feeling cared for” as perceived by the patient. The concept of “humans in relationships” refers to the interdependency among all persons, i.e., patient/family, physician, nurse, and technician, each of whom plays a critical role in this dynamic relationship and adjusts based on where the patient/family may be in mind and spirit. The concept of “relationship with self” refers to the subjective experience of the nurse and her assessment of patient inclusion and exclusion criteria. The concept of “relationship-centered professional encounters” refers to both the independent nurse-patient relationship and collaborative relationships with others necessary to foster effective teamwork. The concept of “caring behaviors” refers to the perceptions of patients/families as they relate to caring in meaningful and impactful ways. Duffy identified eight nurse-caring behaviors including “mutual problem solving, attentive reassurance, human respect, encouraging manner, healing environment, appreciation of unique meanings, affiliation needs, and basic human needs”, all of which play a role in this replication study. Finally, the concept of “feeling cared for” as perceived by the patient/family refers to the patient-centered result of the caring relationship between the nurse and patient, whereby the nurse seeks to understand, accepts, and validates the patient/family’s meaning of illness, beliefs, and preferences.

 As a quality improvement project, this replication study focuses on structure, process, and outcomes as depicted by the Quality-Caring Model©. Structure refers to the participants in the care including provider, patient/significant other, and system. Structure includes the establishment of evidence-based tools to assess suicide, stratify risk, and evaluate impulsivity. Structure also encompasses inclusion and exclusion criteria to assist in the identification of appropriate patients for virtual remote monitoring. All structural components are identified and described in a suicide observation protocol making up the system. Process refers to the initial and ongoing assessments conducted by the nurse and psychiatric consultant using standardized tools, as well as the appropriate selection of virtual remote monitoring vs. traditional one-to-one, face-to-face observation provided by a sitter. Process not only includes the independent nurse-patient relationship, but also leverages collaborative relationships to ensure adherence to the use of standardized tools, effective care coordination, and teamwork. Outcomes refer to incidences of patient harm and cost of care as well as provider and patient experience. Patient harm is defined as suicide or self-injury ([Sahlin](https://www.ncbi.nlm.nih.gov/pubmed/?term=Sahlin%20H%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), [Moberg](https://www.ncbi.nlm.nih.gov/pubmed/?term=Moberg%20T%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), [Hirvikoski](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hirvikoski%20T%5BAuthor%5D&cauthor=true&cauthor_uid=25879375), & [Jokinen,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Jokinen%20J%5BAuthor%5D&cauthor=true&cauthor_uid=25879375) 2015).

**Project Scope**

The scope of this quality improvement project includes adult patients presenting to St. Joseph Mercy Oakland with suicidal ideation/gesture, who are classified as low or medium risk for suicide and whose impulsivity is determined to be low. These patients reside on the general medical floors outside the inpatient psychiatric unit; and patients in the emergency department are excluded.

**Purpose Statement**

The overarching aim of this project is to determine if virtual remote monitoring is an acceptable alternative to the constant observation method traditionally deployed, that includes the assignment of an individual sitter to each suicidal patient until active suicide precautions are discontinued. Additionally, this replication study demonstrates the following DNP essentials: “Organizational & systems leadership for quality improvement and systems thinking; information systems/technology and patient care technology for the improvement and transformation of health; and interpersonal collaboration for improving patient and population health outcomes” (AACN, 2006).

**Project Objectives**

 To assess the efficacy of virtual remote monitoring for adult suicidal patients who meet specific inclusion criteria, the following structure, process, and outcome measures have been identified:

a) Establish a suicide observation protocol that describes inclusion/exclusion criteria for virtual

 remote monitoring (structure).

b) Utilize the Columbia-Suicide Severity Rating Scale to stratify suicide risk (process).

c) Incorporate the use of an impulsivity scale for patients at low or moderate risk for suicide

 (process).

d) Determine the incidence of patient harm utilizing virtual remote monitoring vs. the

 traditional assignment of individual sitters to provide constant observation (outcome).

e) Compare/contrast the cost of care related to the use of virtual remote monitoring vs. the

 traditional method of constant observation (outcome).

f) Assess caregiver experience (outcome).

Attainment of the structure and process-related objectives are leading indicators of the favorability of the anticipated outcome measures and attainment of the overarching goal.

**Methods**

***Setting and Sample***

St. Joseph Mercy Oakland is a 497-bed community teaching hospital and Level 2 trauma center located in an urban setting outside the City of Detroit. The targeted patient population is comprised of patients 18 years of age and older presenting with suicidal ideation and/or gesture who have not yet been admitted to an inpatient psychiatric unit but reside on general medical floors. Their suicide risk is classified as low or medium combined with low impulsivity.

***Design***

 This work constitutes a replication study of a quality improvement initiative undertaken at Brigham and Women’s Hospital in which virtual remote monitoring was evaluated as an alternative to the traditional assignment of individual sitters to adult suicidal patients outside of an inpatient psychiatric unit. The selection of patients for whom this intervention was deemed appropriate is guided by inclusion and exclusion criteria specified within an established suicide observation protocol (Kroll et al., 2019).

***Intervention***

  To utilize virtual remote monitoring for patients on suicide watch and meet the conditions of the Mental Health Code Act 258 (1974), no video recording of patient activity is permitted. Additionally, the Michigan Penal Code Act 328 (1931) requires that patients be informed when video surveillance is in progress .

While the AvaSure product has been adopted as the standard Trinity Health platform for virtual remote monitoring, this study is not intended to endorse any specific product. The only requirements of the technology imposed by The Joint Commission are a 360-degree view of the clinical area where the patient resides, constant observation capability by a staff member, and a mechanism by which to illicit an immediate response when the patient is in imminent danger. Each virtual monitoring technician may observe up to 12 patients at a time but is empowered to adjust caseload based on acuity, perceived dangerous behaviors demonstrated by the patient despite redirection, and/or previous unsuccessful encounters with the same patient (Kroll et al., 2019).

***Hardware and Software***

When Trinity Health established a common video remote monitoring platform, a hub-and-spoke model was used for economies of scale. Trinity Health of New England based in Hartford, CT served as one hub where virtual remote monitoring was centralized to support St. Joseph Mercy Oakland, one of 15 spokes. As such, construction, hardware, and software costs were allocated to the local ministries at start-up. The software, though not a dealbreaker, was included with the purchase price. At the local level, these one-time costs were rather insignificant at $262,500. This included the allocation of 20 mobile cameras, each equipped with two-way communication capability, duress alarm, privacy mode, and documentation software (R. Jones, personal communication, August 18, 2020).

Following the infrastructure build, staffing costs would constitute the remaining ongoing annual expense in addition to equipment repair/replacement as needed. Staffing costs would be based on utilization of virtual remote monitoring with an expected reduction in local sitter expenses by 50% or approximately $1M in the first-year post-implementation at St. Joseph Mercy Oakland (M. Corbat, personal communication, January 23, 2020).

***Project Management***

 All aspects of the project are directed by an oversight team comprised of the medical director of psychiatry, service line director, clinical nurse specialist, nursing education coordinator, nurse manager of logistics, chief medical officer, and chief nursing officer. Structure and process elements have been identified, educational needs assessed, pilot units determined, project plan and timeline developed, and accountabilities assigned.

***Structure and Process***

A suicide observation protocol (Appendix E) developed by Kroll et al. (2019) and customized by the project management oversight team includes the option to provide observation using virtual remote monitoring for adult patients at low or medium risk for suicide with low impulsivity. Inclusion and exclusion criteria are specified and assessed by both the behavioral health specialist (psychiatrist and psychiatric social worker or advanced practice provider) and nurse assigned to the patient. The protocol utilizes the full Columbia-Suicide Severity Rating Scale to screen and stratify suicide risk as well as the Behavioral Activity Rating Scale to assess impulsivity.

Education on the suicide observation protocol as well as the procedure for virtual remote monitoring including request generation and ongoing communication was intended for key stakeholders beginning the week of December 14, 2020. The key stakeholders were comprised of psychiatric social workers, advanced practice providers, psychiatrists, clinical house supervisors, nurse managers, registered nurses, nurse assistants, and sitters. The virtual monitoring technicians who reside remotely at the hub were already trained on procedures supporting virtual remote monitoring including observations of behaviors that might place the patient at risk for harm, interventions, and documentation using the software accompanying the AvaSure product for tracking and trending purposes.

***Implementation Strategies***

 The application of inclusion/exclusion criteria followed by the decision to select virtual remote monitoring as the preferred method of observation for an adult patient on suicide precautions were the result of a consensus between the behavioral health specialist (psychiatrist and psychiatric social worker or advanced practice provider) and nurse caring for the patient. In the absence of agreement, an individual sitter was assigned to provide constant observation. In general, the patient who met criteria was calm, cooperative, and follows directions. Once the nursing order for virtual remote monitoring was generated, execution depended on camera availability, virtual monitoring technician comfort and capability, and patient implied consent (Kroll et al., 2019).

 Virtual remote monitoring was accomplished using a mobile or fixed camera placed in the patient’s room, thereby transmitting a real-time visual feed to a remote workstation staffed by a virtual monitoring technician. The AvaSure product was also equipped with a two-way communication device capable of language translation as well as a duress alarm. A setting on the camera filtered audio or visual signals whenever privacy was required and for a pre-determined amount of time to account for the human element in reactivation. Each virtual monitoring technician monitored up to 12 patients simultaneously but was empowered to decline a new patient with supervisor approval depending on acuity. The virtual monitoring technician also communicated with the caregiver using a mobile telephone device. If the patient could not be visualized or demonstrated potentially harmful behavior, the virtual monitoring technician used the duress alarm to illicit an immediate response from caregivers closest to the patient. Just as in all cases where suicide precautions remain active, virtual remote monitoring was used until suicide precautions were discontinued, the patient was discharged, or the patient manifested behaviors that precluded its use, such as frequent redirection by the virtual monitoring technician/clinical staff, or patient/nursing staff request for an individual sitter based on preference or emergence of harmful behavior (AvaSure, 2019).

Virtual remote monitoring was initially launched on three medical surgical units in one of the patient-care towers on 2021, January 14. Six additional medical-surgical units were included on 2021, March 5 in keeping with the full scope of work for this replication study.

**Ethical Considerations**

To assure protection of human subjects, the project proposal, once approved by the Project Chair and prior to implementation, was submitted to the Institutional Review Board (IRB) at St. Joseph Mercy Health System/Mercy Health. After IRB approval was secured from the site, the proposal was submitted to the University of Detroit Mercy IRB for final approval.

 The suicidal patient in the hospital setting is unique insofar as following a petition for evaluation and certification by a physician, the patient may be held legally against their will for up to 72 hours pending psychiatric evaluation and disposition, according to section 330.1425 of Mental Health Code Act 258 (1974). During this period, whatever reasonable means are necessary to ensure patient safety may be taken. As mentioned previously, every individual has the right to know if video surveillance is in progress. However, whether to use virtual remote monitoring vs. the assignment of an individual sitter is based on meeting specified patient criteria and implied consent. In other words, only if the qualified patient refuses to permit camera surveillance is a sitter instead assigned. This is consistent with Trinity Health’s core values of safety and reverence for the human being. Observation is not optional regardless of which method is deployed. It should also be noted that when conducting research, even a suicidal patient can refuse to participate (MDHHS, 2016, p. 1). Since this activity constitutes quality improvement and not research, implied consent seems like a reasonable tenet. All these aspects are considered by the IRB in the approval process.

**Evaluation Methods**

 The following outcome measures were identified: a) Incidence of patient harm; b) sitter expense; and c) provider experience (Kroll et al., 2019). Patient harm occurrences were recorded and retrieved through the hospital’s incident reporting system generated by clinicians managing patient care. Sitter expense was recorded and tracked through the hospital’s payroll system using a pay code that has been standardized across the enterprise. Provider experience was assessed using a Nurse Preference Survey developed by Kroll et al. (2019) (Appendix F).

Data were captured pre- and post-implementation to aid in the evaluation of virtual remote monitoring compared to the traditional deployment of individual sitters, except for caregiver experience which was measured post-implementation as it related specifically to observation method preferences. Additionally, data were reported in aggregate and deidentified.

**Results**

Descriptive and inferential statistics were used to evaluate the degree to which virtual remote monitoring (VRM) may be an acceptable alternative to constant observation or 1:1 individual sitting for each adult suicidal patient admitted to St. Joseph Mercy Oakland hospital meeting inclusion criteria and residing on the general medical floor outside the inpatient psychiatric unit. It should be noted that a definitive conclusion for a single healthcare project was impractical to reach because it did not allow for uncertainty, based on a critical evaluation, interpretation, and open-ended discussion of the results (Mattick et al., 2018). Additionally, one person was unable to capture all the relevant perspectives to address a complex problem in a single project using a “yes” or “no” answer (Gelman & Hennig, 2019).

The results of the data analysis were organized into the following four sections:

1. A description of how VRM was implemented;
2. A comparison of the incidence of patient harm using VRM vs. constant observation;
3. A comparison of the cost of care related to the use of VRM vs. constant observation; and
4. An analysis of nurse preference for VRM vs. constant observation based on the responses to the Nurse Preference Survey (Kroll et al., 2019).

 The inferential statistical analysis applied to this project complies with the guidelines of the American Statistical Association (Wasserstein & Lazar, 2016; Wasserstein et al., 2019); asserting that statistical significance alone, indicated by a *p*-value, does not reliably reflect the meaningfulness or importance of the results. The conclusions of this project also comply with the conclusion of a survey of over 800 scientists that called for the concept of statistical significance to be reconsidered (Amrhein et al., 2019, p. 307).

 The interpretation of the results of this project complies with the assertion of Leppink et al. (2016, p. 122) that, in the context of studies in healthcare, “statistical significance does not imply a real effect” and that “The primary product of a research inquiry is one or more measures of effect size, not *p-*values” (Sullivan & Feinn, 2012, p. 279). Accordingly, the presentation of the results of this project complies with the guidelines of Hayat et al., (2019, p. 444) designed for “moving nursing research beyond *p* < .05” as follows:

1) When a *p* value is reported, state its value regardless of how small or large it may be.

2) Avoid using .05 or any other cutoff for a *p* value as the basis for a decision about the

meaningfulness/importance of an effect. 3) In reporting a *p* value, a measure of the

effect size should be included.

Ferguson’s (2016, p. 533) effect size criteria for researchers and clinicians were applied to identify the results that are “practically significant”, meaning the results that are strong enough to be meaningful and important in the context of healthcare, even though they may not be statistically significant. The effect size to indicate the strength of the difference between mean values was measured using Cohen’s *d*, and interpreted by .41 = minimum value of *d* to indicate a practically significant effect; 1.15 = moderate effect, and 2.70 = strong effect. The effect size to indicate the strength of the differences between median values was measured using *η2* and interpreted by 0.04 = minimum value to indicate a practically significant effect; 0.25 = moderate effect, and 0.64 = strong effect.

***1. Implementation of VRM and Description of Patients***

Prior to the implementation of VRM, 100% of the total sitter time at St. Joseph Mercy Oakland was spent on constant observation. The total time spent on constant observation per year increased from 69204 hours (hrs) in 2019 to 118008 hrs in 2020. VRM was implemented in nine units from 2021, Jan 14 to 2021, May 14; however, VRM was not fully implemented in all hospital units, excluding the inpatient psychiatric unit (6E) and emergency department (ED), until 2021, March 5.

Table 1 compared the main reasons for the monitoring of patients, and the times spent on VRM vs. constant observation after the implementation of VRM. Safety was one category of reasons; but this was not the intended primary use of VRM. Active Suicide Precautions (ASP) was the other category. VRM was primarily intended for ASP since before the implementation of VRM, 95% of reasons for sitter requests were due to ASP.

Most of the total time (19584 hrs) in the medical-surgical units was spent on VRM to ensure the safety of patients (73.0%) and less time was spent on ASP (8.9%). The remainder of the total time on the general medical floors was spent on constant observation (3.7% for safety and 14.3% for ASP).

 Table 2 showed that a total of 1337 shifts for VRM were required between January and May 2021, of which 146 (10.9%) were used for ASP cases. A total of 38 shifts were required during January and February, before VRM was fully implemented, and 15 (39.5%) of these shifts were for ASP cases. A total of 1299 shifts for VRM were required during March to May, when VRM was fully implemented, and 131 (10.1%) of these shifts were for ASP cases.

***2. Incidence of Patient Harm***

Table 3 summarized the number of ASP cases and the incidence of patient harm during the implementation of VRM between 2021, January 14 and 2021, May 14. Among the 36 ASP cases admitted to the general medical floors, VRM was used for most cases (55.6%). These cases were patients for whom VRM was deemed to be appropriate as guided by the inclusion criteria specified within an established suicide observation protocol. A total of 4560 hrs were spent on both VRM and constant observation, of which less total time (38.4%) was spent on VRM. During this period, no adverse events (i.e., incidences of patient harm) were reported among the 36 ASP cases.

***3. Cost of Care***

Figure 1 illustrated the time-series of sitter Full-Time Equivalent (FTE) usage/pay period from 2020, September 5 (day 0) to 2021, May 29 (day 266). The trend demonstrated a reduction in FTE usage after the full implementation of VRM on 2021, March 5 compared to before the full implementation of VRM. The results of a one-tailed independent samples *t*-test assuming equal variances (*t* (18) = 3.39, *p* = .002) indicated that, before the full implementation of VRM, on 2021, March 15, the mean sitter FTE usage/pay period (*M* = 5.92, 95% *CI* = 42.14, 49.29) was greater than after the implementation (*M* = 37.51, 95% CI = 34.60, 40.43). The effect of the implementation of VRM resulted in a reduction of FTE usage/pay period on average by 8.20 (95% *CI* = 3.12, 13.29). The effect size (Cohen’s *d* = 1.58) reflected a moderate level of practical significance of this reduction in FTE usage.

 Figure 2 illustrated the time-series of the labor cost of sitting (i.e., the total sitter wages/pay period) from 2020, September 5 (day 0) to 2021, May 29 (day 266) corrected for 3.84% inflation between 2020 and 2021. The trend demonstrated a reduction in FTE usage after the full implementation of VRM on 2021, March 5, compared to the period before the full implementation of VRM. The results of a one-tailed two-sample *t-*test assuming equal variances (*t* (20) = 2.24, p = .022) indicated that, after the full implementation of VRM, on 2021, March 15, the mean labor cost/pay period (*M* = 65,812, 95% CI = $54283, $77340) was less than before the implementation (*M* = $78, 738, 95% CI = $70352, $87124). The effect of the implementation of VRM resulted in a reduction in labor cost/pay period on average by $12,926 (95% CI = $268, $21620). The effect size (Cohen’s d = 0.91) reflected a moderate level of practical significance of this reduction in labor cost associated with changes in skill mix and use of VRM.

 The other economic impact of the implementation of VRM was to lower the expenditure on the higher-cost resources required for constant observation. Without factoring in the reduction in labor cost due to the changes in skill mix associated with the use of VRM, the estimated savings of implementing VRM were over $500K/year. After considering the annual System allocation of infrastructure expense associated with the establishment of a remote hub-and-spoke VRM model, the net saving after the implementation of VRM was approximately $350K/year.

***4. Nurse Preference***

A total of 69 nurses working at St. Joseph Mercy Oakland between January 2021 and May 2021 responded to the Nurse Preference Survey. One respondent who utilized VRM did not answer 5 (62.5%) of the 8 items, and was excluded from the data analysis, because the results of a survey are compromised if any respondents answer less than about 80% of the items (Enders, 2010). The responses to Q8 contained two missing values, provided by two other nurses, both of which were replaced by the median score for Q8.

 The responses to the eight questions in the Nurse Preference Survey were compared between the 24 respondents who participated in constant monitoring and the 44 nurses who participated in VRM between January and May 2021. The 5-point scores for each question (1 = strongly disagree; 2 = disagree; 3 = neutral, 4 = agree; 5 = strongly agree) were measured at the ordinal level, and were not normally distributed, therefore parametric statistics to compare the mean scores with 95% CI were not appropriate. The Kruskal-Wallis test, a non-parametric method of analysis, was appropriate to compare the two groups of respondents using median scores.

Table 4 presented the results of the tests including grouped median scores for each of the eight items in order of magnitude of the effect sizes. The median responses to “*I felt comfortable that the patient being monitored for suicide precautions was safe”,* were stronger among the constant observation group (*Mdn* = 4.40, reflecting a high level of agreement with the item) than for the VRM group (*Mdn* = 3.42, reflecting a lower level of agreement with the item). Although the effect size (η2 = 0.11) was small, it was larger than the minimum effect size required to indicate a practically significant effect (η2 = 0.04).

The median responses to “*I would choose that this patient has continuous virtual monitoring rather than 1:1 observation”,* were higher among the VRM group (*Mdn* = 2.17, reflecting disagreement with the item) than for the constant observation group (*Mdn* = 1.45, reflecting a higher level of disagreement with the item). Although the effect size (η2 = 0.11) was small, it was larger than the minimum effect size required to indicate a practically significant effect (η2 = 0.04).

 The median responses to “*I would choose that this patient has 1:1 observation rather than continuous virtual monitoring”,* were stronger among the constant observation group (*Mdn* = 4.68, reflecting a high level of agreement with the item) than for the VRM group (*Mdn* = 4.14, reflecting a lower level of agreement with the item). Although the effect size (η2 = 0.07) was small, it was larger than the minimum effect size required to indicate a practically significant effect (η2 = 0.04).

 The median responses to “*The patient’s behavior remained calm and appropriate while on suicide precautions”* were similar among the constant observation group (*Mdn* = 3.00) and the VRM group (*Mdn* = 3.24) reflecting a neutral level of agreement, with a negligible effect size (η2 = 0.01). The median responses to “*Having the patient monitored for suicide precautions was easy for me”* were similar among the constant observation group (*Mdn* = 3.27) and the VRM group (*Mdn* = 3.16) reflecting a neutral level of agreement, with a negligible effect size (η2 = 0.01). The median responses to “*The patient on suicide precautions could have done something to harm himself or herself, and there is nothing I could have done about it*” were similar among the constant observation group (*Mdn* = 2.53) and the VRM group (*Mdn* = 3.04) reflecting a low to neutral level of agreement, with a negligible effect size (η2 = 0.01). The median responses to “*It took a lot of time for me to care for the patient who was monitored for suicide precautions”* were similar among the constant observation group (*Mdn* = 2.56) and the VRM group (*Mdn* = 2.87) reflecting a low to neutral level of agreement, with a negligible effect size (η2 = 0.01). The median responses to “*The patient being monitored for suicide precautions caused trouble for me*”were similar among the constant observation group (*Mdn* = 2.63) and the VRM group (*Mdn* = 2.74) reflecting a low to neutral level of agreement, with a negligible effect size (η2 = 0.01).

To summarize, most of the sitter time on the general medical floors was spent on VRM to ensure the safety of patients as compared to ASP. During this period, no adverse events (i.e., incidences of patient harm) were reported among the 36 ASP cases.

The main economic effect of the implementation of VRM was to reduce the FTE usage/pay period, and to reduce the labor cost, with a moderate effect size, reflecting the practical significance of this reduction. The other economic impact of the implementation of VRM was to lower the expenditure on the higher-cost resources required for constant observation.

The median responses to the eight questions in the Nurse Preference Survey were compared between the 24 respondents who participated in constant monitoring and the 44 respondents who participated in VRM between January and May 2021. The practical significance of the differences between the two groups were reflected by small effect sizes for three of the items. The responses to “*I felt comfortable that the patient being monitored for suicide precautions was safe”,* indicated a higher level of agreement among the constant observation group compared to the VRM group. The responses to “*I would choose that this patient has continuous virtual monitoring rather than 1:1 observation”*, indicated a higher level of disagreement among the constant observation group than the VRM group. The responses to “*I would choose that this patient has 1:1 observation rather than continuous virtual monitoring”,* indicated a higher level of agreement among the constant observation group compared to the VRM group. The responses to the other five items (concerned with issues relating to the patients’ behavior; ease of monitoring, harm to the patients, time taken for monitoring, and trouble with patients) indicated similar low to neutral levels of disagreement among both the constant observation and VRM groups, with negligible effect sizes.

**Sustainability**

 Virtual remote monitoring has been adopted by Trinity Health as a standard leading practice of providing safety surveillance for patients at risk for harm. While the use of virtual remote monitoring is new for adult patients at low and moderate risk for suicide, the practice has been approved by the enterprise. In fact, a 50% reduction in overall sitter utilization is expected to be achieved within one year of implementation. Nurses are ultimately empowered to determine the appropriate method of observation unlike in the past when the responsibility aligned with medical staff practice. The suicide observation protocol further legitimizes the practice and provides a frame of reference should clinicians need to justify their choices for this patient population.

**Implications for Practice**

 Using virtual remote monitoring as an alternative observation method for suicide watch for adult patients meeting inclusion criteria provides for a cost-effective solution to exorbitant sitter resource consumption associated with the traditional method. Additionally, leveraging technology to maintain patient safety also represents the potential for more effective and timely utilization of existing resources for all patients leading to increased caregiver satisfaction.

 Suicidality is temporal meaning that intention may become stronger or weaker over time. Therefore, it is essential that reassessment occur at a pre-determined frequency. Though it is not clear from the literature how often is enough, the project oversight team recommends every two hours for patients at high risk and every four hours for patients at low and medium risk, based on the experience of the behavior health specialists on the team. Changes in condition are reported to the psychiatrist who uses both suicide risk and impulsivity to inform subsequent plans of care.

 Nurse preference for in-person sitting over VRM may have been influenced by the condition of the patient as well as a lack of familiarity/comfort with the technology and procedures built around it to ensure safety. Since the technology has only been available for use for four months and experience with it is minimal at best, a suicide observation protocol guiding clinical decision-making is instrumental in effecting the desired change. It is also beneficial to establish a gatekeeper with formal authority to review application of the protocol to each case and challenge decisions made when indicated, i.e., observation method implemented differs from what the protocol suggests.

 Based on small sample size and limited experience with established structural and process elements, additional studies over multiple short-term acute care facilities are recommended. This project may also serve as the foundation for extending the use of the suicide observation protocol including VRM in the emergency department where most of the sitter resources are consumed based on traditional care management.

**Conclusions**

An adult patient at low or medium risk for suicide residing on a general medical floor outside the inpatient psychiatric unit previously required the assignment of an in-person sitter to provide constant observation until active suicide precautions were discontinued. This quality improvement initiative assessed the use of virtual remote monitoring as an alternative to the traditional method and its effects on patient health and well-being, cost, and experience of care.

Based on the study results, it was concluded that virtual remote monitoring may be a safe and cost-effective solution for adult suicidal patients who meet specified inclusion criteria. Though nurses preferred in-person sitting over virtual remote monitoring, a clearly defined suicide observation protocol along with a gatekeeper ensured adoption of the technology as appropriate.

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**Table 1**

*Reasons for Monitoring and Time of VRM vs Constant Observation (Jan 14 to May 14, 2021)*

|  |  |  |  |
| --- | --- | --- | --- |
| Hospital units | Reasons for monitoring | VRM | Constant observation |
| Time(h) | % Of Total | Time (h) | % Of Total(h) |
| Medical-Surgical Floors | Safety | 14292 | 73.0% | 732 | 3.7% |
| Medical-Surgical Floors  | ASP | 1752 | 8.9% | 2808 | 14.3% |

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**Table 2**

*Frequency of VRM Shifts*

|  |  |  |
| --- | --- | --- |
| Time period | Reason for VRM | Total  |
| Safety | ASP |
| Jan | 14 | 2 | 16 |
| Feb | 9 | 13 | 22 |
| Mar | 216 | 54 | 270 |
| Apr | 395 | 22 | 417 |
| May | 557 | 55 | 612 |
| Total | 1191 | 146 |  1337 |

**Table 3**

*Incidence of Patient Harm on Medical-Surgical Floors During Implementation of VRM*

|  |  |  |  |
| --- | --- | --- | --- |
|  | VRM | Constant observation | Total |
| ASP cases  | 20 | 16 | 36 |
| Time (h) | 1752 | 2808 | 4560 |
| Adverse events | 0 | 0 | 0 |

**Table 4**

*Responses to Nurse Preference Survey (N = 68)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Grouped median score | Kruskal-Wallis*H* | *p* | EffectSizeη2 |
| Constant observation group (*n* = 24) | *VRM group**(n = 44)*  |
| *1. I felt comfortable that the patient being monitored for suicide precautions was safe.* | 4.40 | 3.42 | 8.31 | .004 | 0.11 |
| *8. I would choose that this patient has continuous virtual monitoring rather than 1:1 observation.* | 1.45 | 2.17 | 7.78 | .005 | 0.10 |
| *7. I would choose that this patient has 1:1 observation rather than a continuous virtual monitoring.* | 4.68 | 4.14 | 5.58 | .018 | 0.07 |
| *6. The patient’s behavior remained calm and appropriate while on suicide precautions.* | 3.00 | 3.24 | 0.31 | .580 | 0.01 |
| *5. Having the patient monitored for suicide precautions was easy for me.* | 3.27 | 3.16 | 0.10 | .752 | 0.01 |
| *4. The patient on suicide precautions could have done something to harm himself or herself, and there is nothing I could have done about it.* | 2.53 | 3.04 | 1.45 | .228 | 0.01 |
| *3. It took a lot of time for me to care for the patient who was monitored for suicide precautions.* | 2.56 | 2.87 | 1.54 | .214 | 0.01 |
| *2. The patient being monitored for suicide precautions caused trouble for me.* | 2.63 | 2.74 | 0.44 | .510 | 0.01 |

**Figure 1**

*Time Series of Sitter FTE Usage/Pay Period*



**Figure 2**

*Time Series of Labor Cost/Pay Period*

**

**Appendix A**

**Columbia-Suicide Severity Rating Scale**



(The Columbia Lighthouse Project, 2016)

**Appendix B**

**Richmond Agitation and Sedation Scale**



(Sessler et al., 2002)

**Appendix C**

**Behavioral Activity Rating Scale (BARS)**



(Simpson, S., Pidgeon, M., & Nordstrom, K., 2017)

**Appendix D**

**Quality-Caring Model©**



(Duffy & Hoskins, 2003, p. 77-88)

**Duffy’s Quality-Caring Model© modified to include project-specific components**

**Structure** **Process** **Outcomes**

(Causal Past) Caring Relationships (Future)

 **Participants** ***Relationship-centered*** **Terminal Outcomes**

**Provider**

**(↑ satisfaction)**

**Patient**

**(↑safety & experience)**

**System**

**(↓ sitter utilization)**

**(↓ resource consumption)**

**(↓ cost of care)**

**Independent Relationships**

**Patient / Significant Other-Nurse (discipline-specific)**

**+**

**Collaborative Relationships**

**(psychiatrist + designee + nurse)**

**(Multi-disciplinary use of C-SSRS + & BARS)**

**Provider** **(psychiatrist and advanced practice provider or psychiatric social worker with guidance from the Clinical House Supervisor)**

**Patient / Significant Other**

**(inclusion / exclusion criteria for virtual remote monitoring)**

**System**

**(Observation protocol for active suicide precautions: constant observation or sitter vs. virtual remote monitoring)**

Professional Encounters

***Professional*** ***Encounters***

**Appendix E**

**Suicide Observation Protocol**

**PURPOSE:**

The purpose of this protocol is to establish standard work for adult suicidal patient observation including the option of virtual remote monitoring as one method of safety surveillance. This option is based on patient inclusion criteria and assessment by a registered nurse and psychiatric consultant.

**PROTOCOL**:

* Virtual remote monitoring will be initiated based on inclusion criteria and agreement between the registered nurse and psychiatric consultant. Subsequently, additional assessments will be performed by the registered nurse at a pre-determined frequency based on level of suicide risk, i.e., every two hours for high risk and every four hours for low and medium risk..
* Virtual remote monitoring will occur at an off-site location except for patients observed in the Behavioral Health Observation Unit (BHOB) where electronic surveillance will occur locally. As such, it will be critical to understand and follow established communication procedures between caregivers and video monitoring technician/safety attendant.
* An order for virtual remote monitoring will be required and may be generated as a nursing order as a component of independent nursing practice, but only after the psychiatric consultation is completed and upon consensus of the consultant and nurse caring for the patient. Unless and until that work has been completed, a sitter will be assigned to the patient.
* If privacy mode on the camera is required, an individual sitter will be assigned to the patient for direct observation during this time until privacy mode is discontinued. Communication will occur between caregivers and virtual monitoring technician before privacy mode is established.
* If the patient meets inclusion criteria, as determined by the nurse and psychiatric consultant, and a portable or fixed camera is not available depending on patient location, an individual sitter will instead be assigned.
* An individual sitter will be assigned to the patient who does not meet inclusion criteria.
* Virtual remote monitoring will be discontinued when active suicide precautions (ASP) are discontinued, the patient no longer meets inclusion criteria, or the patient is transferred to another facility.
* **Inclusion criteria** for video remote monitoring will include:
* A psychiatric consultation has been completed by
	+ a psychiatrist, or
	+ psychiatric social worker or advanced practice provider after discussion with the psychiatrist.
* The patient has been placed on ASP.
* The patient is determined to be low or moderate risk for suicide as evidenced by the Columbia Suicide Severity Risk Scale (C-SSRS) and low impulsivity as evidenced by the Behavioral Activity Rating Scale (BARS = <6).
* The psychiatric consultant and registered nurse caring for the patient agree that the patient meets criteria for virtual remote monitoring.
* **Exclusion criteria** for virtual remote monitoring will include:
* Restraints for violence are being used.
* The patient is unable to follow commands.
* The patient is hearing impaired or understands a foreign language for which an accommodation cannot be made.
* The patient/family objects to virtual remote monitoring.
* The patient is determined to be at high risk for suicide as evidenced by the C-SSRS.
* The patient has a history of elopement or attempts to elope while in the hospital.
* The patient has history of suicide attempt or self-injury.
	+ The patient has engaged in active self-injurious or suicidal behavior.
	+ The patient’s impulsivity is high, i.e., BARS > 5.
	+ The patient is diagnosed with psychotic disorder (e.g., schizophrenia, psychotic mania).
	+ The patient is incarcerated or under arrest.
	+ The patient is at risk for physically destructive behavior with a history of aggressive or antisocial behavior.
	+ The virtual monitoring technician is unable to observe the patient due to workload acuity as verified by the team leader or based on negative interactions between the patient and virtual monitoring technician.
	+ The patient is < 18 years of age.

**PATIENT/FAMILY EDUCATION**:

* Camera signage
* Patient door/room signage

**RELATED POLICIES/GUIDELINES/PROCEDURES**:

* Safe Room
* Care of the Suicidal Patient
* See virtual remote monitoring SharePoint

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(D.S. Kroll, personal communication, September 16, 2020)

**Appendix F**

**Nurse Preference Survey**

**Survey to assess nurses’ preferences for method of observation**

**Your alias** (first 4 letters of the street name you grew up on followed by the month of your birthday in MM format):

**Patient MRN**:

**Type of monitoring received (check all that apply):**

\_\_\_1:1 observation \_\_\_Continuous Virtual Monitoring (CVM) Other\_\_\_\_\_\_\_\_\_\_\_

**Please respond to the following statements according to a scale ranging from 1 to 5, with 1 meaning you “strongly disagree” and 5 meaning “strongly agree.”**

**1. I felt comfortable that the patient being monitored for suicide precautions was safe.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**2. The patient being monitored for suicide precautions caused trouble for me.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**3. It took a lot of time for me to care for the patient who was monitored for suicide precautions.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**4. The patient on suicide precautions could have done something to harm himself or herself, and there is nothing I could have done about it.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**5. Having the patient monitored for suicide precautions was easy for me.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**6. The patient’s behavior remained calm and appropriate while on suicide precautions.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**7. I would choose that this patient has 1:1 observation rather than a continuous virtual monitoring.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

**8. I would choose that this patient has continuous virtual monitoring rather than 1:1 observation.**

 1 2 3 4 5

strongly disagree disagree neutral agree strongly agree

(Kroll et al., 2019)