

## **Supplemental File 1: Impact of Physician Navigators on Productivity Indicators in the Emergency Department**

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## **1.0. Background Information About the Physician Navigator Program**

The following describes relevant information behind the duties of the Physician Navigator (PN) in the PN program at our institution.

### **1.1. Purpose**

On any given shift, a PN is paired with an emergency physician (EP) in the Emergency Department (ED). The PN performs various non-clinical and clerical tasks that EPs would otherwise have to do, so that the EP may maximize their time spent on patient care. Therefore, the overall purpose of the PN program is to:

- Improve the quality of the patient experience
- Improve the efficiency and productivity of the physician
- Improve the communication between members of the healthcare team

### **1.2. Duties of the Physician Navigator: Before the Shift**

Prior to their shift, PNs must contact their EP (i.e. texting or calling) to find out what time the shift starts. Shifts may start earlier or later depending on patient volume and wait times. If the EP is called-in before the PN has contacted their assigned EP, the EP is responsible for communicating with the PN.

The PN should arrive approximately 15 minutes before each shift. They are responsible for picking up the EP pager and checking the ED tracking board and anticipate which area of the ED the EP will start. If the EP is working with a physician assistant, the PN should introduce

themselves and brief them on the workflow process (i.e. on how it differs with a PN), and any preferences of the EP.

In general, EPs have different preferences in what they want their PN to do to enhance EP productivity. It is the responsibility of the PN to become acquainted with these preferences over time. For example, common requests from EPs may include creating a list of patients that they have seen, a list of all referrals, a list of all EKGs completed, a list of patients with bloodwork or advanced imaging.

### **1.3. Duties of the Physician Navigator: During the Shift**

The main objective of the PN is to enhance EP productivity by minimizing ‘wasted’ time between tasks. Accordingly, the PN should be monitoring the ED tracking board throughout the shift. During physician assessments, PNs can bring the longest-wait patient to an assessment room, print-out relevant clinical history (dictated reports, pertinent tests, previous ED face-sheets, etc.), and bring necessary equipment to the room (see Section 1.4).

The PN should be aware of where different types of paperwork are situated throughout the department. It is not uncommon to have a PN asked by an EP to retrieve certain forms for completion. Common examples include imaging requisitions, Workplace Health Professional’s Report (Form 8), Public Health Report Forms (i.e. animal bites), or Application by Physician for Psychiatric Assessment (Form 1). Please note that some of these forms are available online or within the hospital intranet.

Alternatively, if there is a patient ready for reassessment, the PN can bring the patient to an assessment room and print the relevant results. For imaging results, the PN can help by opening the image on PACS, and print out any radiology reports.

These steps should be completed such that once the EP is available, they may go directly to the next patient. During the shift, PNs should be constantly monitoring the tracking board and be aware of the status of their EP's patients.

The EP will usually hand the PN the chart as soon as they are finished charting. It is the PN's responsibility to take the chart and hand the EP a new patient chart. PNs should ensure that any necessary requisitions are filled out and signed correctly and place the chart in the correct order box.

As PNs decide which patients to see, EPs often go extended periods of time without having to check the tracking board. As such, the PN must be familiar with department policies on prioritization. Except for resuscitations or nursing requests, EPs should always see the longest waiting patient unless there are reassessments available. As a guideline, if the longest wait surpasses 60 minutes, EPs should alternate initial assessments and reassessments. Initial assessments are fully prioritized when the longest wait surpasses 120 minutes.

Most EPs prefer to have the PN carry the physician pager for them. The PN responsible for paging in-hospital specialists, and initiating communication with other healthcare professionals (e.g. CritiCall, poison centre, coroner). PNs triage all incoming calls on the pager. This means

interrupting EPs while they are assessing patients for medical calls, but not administrative calls that can wait until the patient interaction has been completed. In general, PNs are the first point of contact for members of the healthcare team who want to speak with or require something from the EP. As such, PNs must ensure that the EP's time is used to maximize both patient-care quality and the EP's efficiency.

### **1.3. Duties of the Physician Navigator: After the Shift**

At the end of the shift, PNs ensure that all of their EP's patients have been dispositioned, referred to a specialist, or handed-over to the next EP. Handover patients are generally patients who have been seen by the EP but still have pending tests. This task acts as a 'double-check' to ensure that the EP has not forgotten about any patients they have seen.

With handovers, PNs must fill out the official ED Handover Document with non-clinical patient information (i.e. attaching a patient sticker), and update the tracking board to reflect the handover of care.

When the EP completes the ED Handover Document, please photocopy the document. The original will go to the incoming EP, and the photocopy will be kept by your EP.

### **1.4. Duties of the Physician Navigator: Medical Procedures**

EPs are often involved in performing various procedures within the ED. For common procedures in the ED, you may be asked to collect equipment for the EP to perform the procedure. As part of

your orientation in our ED, you will become acquainted with where equipment is stored in the ED. In general, the act of retrieving equipment is relatively simple as it often consists of getting one pre-made tray or package for the EP (i.e. obstetrical tray, lumbar puncture kit) with a few additional items. The ED has 'Procedure Cards' available online and in-print for reference.

One of the most common procedures requiring various pieces of equipment is the laceration repair. For patients with lacerations, it is good practice to bring suture equipment to the assessment room in preparation for the EP's assessment. Typical suture equipment includes a suture kit, chlorhexidine antiseptic, a blunt 18G 1.5 inch needle, a 25G 5/8 inch needle, and a 10 cc syringe. Your EP may make a further request to bring a local anesthetic with or without epinephrine (i.e. Lidocaine or Bupivacaine), suture thread of a particular size and material, and sterile gloves of a particular size. As you work with a given EP over time, you will become acquainted with these preferences and nuances.

Procedural sedations involve 2 EPs, a nurse, and a respiratory therapist (also known as a RT). The PN for the EP who initially assessed the patient is responsible for coordinating the healthcare team (i.e. when and where the procedural sedation will occur). This coordination involves communicating an agreed-upon time to the nurse, the second EP or his PN, and paging the respiratory therapist at the correct time.

### **1.5. Duties of the Physician Navigator: Other**

PNs may be asked by EPs to bring (or order) food and drinks for a shift. This is not a job requirement, and you may always refuse without consequence. Nonetheless, EPs at our

institution believe in feeding our PNs, and understand its importance in promoting a collegial environment. On occasion, prior to a shift, you may be asked to purchase sustenance for yourself and the EP. If this is the case, you will always be compensated fully for your purchase. Any deviations from this rule should always be brought to the attention of the PN administration. EPs at our institution have an understanding that purchases made by PNs of their behalf should be completed on the EP's own credit.

Please do not feel obligated to bring any sharable food for consumption during shifts. You are not responsible for feeding the EP; however, you are responsible for feeding yourself during a shift.

The PN does not participate in any direct patient care. The PN will not have any physical contact with any patient in the ED.

The PN must always have their photo ID in a visible location. When a PN interacts with a patient, they must introduce themselves as a PN.

## **2.0. Logistics and Administration**

The following describes relevant information behind the operations of the PN program. EPs who participate in the PN program pay a \$30 administration fee for each shift with a PN. This administration fee is separate from the salary of the PN.

### **2.1. Leadership**

The PN program is managed by a PN Manager. The PN manager is not an EP. The PN manager is primarily responsible for scheduling PNs, reviewing PN invoices and coordinating payments by EPs, PN recruitment, and addressing any PN-EP disputes.

Although the PN manager is responsible for training new PNs, the PN Manager may delegate this role to an established PN. The PN Manager may also act as a PN, and complete shifts with EPs.

The PN Manager is responsible for collecting all administration fees, and managing it within the PN Administration Fund. The PN Managers compensation is derived from the PN Administration Fund, and has been set at the equivalent of two 8-hour shifts per week.

### **2.2 Credentialing**

The Medical Staff Administration Office at our institution is responsible for credentialing. All PNs are required to complete police checks, complete confidentiality agreements, complete a declaration of understanding, and abide by hospital dress codes.

The PN is an employee of the EP. The PN is not an employee of the hospital. The EP is fully responsible for the PN's conduct and safety while the PN is acting on his or her behalf. The hospital is not responsible for liability or insurance for the PN's actions, or for personal injury in the course of a PN's duties.

### **2.3. Training**

After the application and interview process, new PNs go through one computer training session and 6-8 training shifts with a PN trainer. The computer training session involves becoming acquainted with the ED tracking board. During training shifts, new PNs are paired with their PN trainer on a shift with an EP.

The initial training is largely observational. During this period, the new PN should become acquainted with the layout and patient flow within the ED. As the training period progresses, the trainee takes on additional responsibilities, eventually becoming effectively autonomous by the end of the training period. Training compensation is \$720 split into two lump sums: \$360 after the completion of their training shifts and \$360 after their first 12 shifts as an independent PN. Any subsequent re-training required would be unpaid.

### **2.4. Scheduling**

The PN is responsible for emailing shift availabilities to the PN Manager by the 15<sup>th</sup> of every month. The schedule for the upcoming month is released on the 22<sup>nd</sup> of every month.

## **2.5. Salary and Compensation**

The PN is responsible for submitting monthly invoices by the 3<sup>rd</sup> of every month. The invoices must include every shift worked, including the EP you worked with and the hours worked.

The starting wage for PNs is \$12 per hour. The new starting wage for PNs, effective July 2016 will be \$14 per hour. Several new policies for compensation were introduced alongside the increase in starting wage:

- The minimum compensation for any shift, regardless of hours worked, is \$100 (EPs may be sent home early if there are low patient volumes). This would still be billed to the physician.
- If an EP shift has been cancelled or called off, the affected PN will bill 4 hours to the PN Administration Fund
- An \$80 stipend from the PN Administration Fund can be issued at the discretion of the PN Manager for shifts where a PN has been called-in to replace a PN who is unable to attend to their shift
- Any shifts on December 24, December 25, January 1, and January 2 are paid at 1.5x the normal pay rate

### **3.0. Statistical Analysis**

This section provides further details behind the methods and how results were generated.

#### **3.1. Additional Details on Data Analysis**

A physician assistant was hired in January 2014 and worked on average 12 shifts per month. Since our physician assistant was randomly assigned to a particular physician for the entire shift, we excluded those shifts from primary analysis.

There were over 30 EPs with staff privileges at Southlake ED during the study period. The Physician Navigators program was officially started on April 1, 2013. During the month prior to the program start-date, the first cohort of 6 Physician Navigators were trained. Meetings between EPs and other ED healthcare providers were held to discuss the impact Physician Navigators would have on the ED. There were 16 Physician Navigators working in March 2015. The administration and scheduling of Physician Navigators was completed by one of the original Navigators. EP and institutional involvement were not required in the day-to-day operations of the Physician Navigator program.

For the main objective, measures of physician productivity were compared by matching physician shifts with Physician Navigators against shifts completed by the same physician without Navigators. In this clustered study design, physician shifts were nested by physician and analyzed to produce intraphysician productivity data.

The means and standard deviations (SD) of productivity variables were calculated across physicians. Intraclass correlations (ICC) were calculated to describe the proportion of total variance in each variable that could be accounted for by clustering. (**Appendix Table 1**) ICCs represented the percent of variation that could be attributed to physician differences. This meant that statistical models which accounted for correlation among observations in the same cluster were required.<sup>1</sup>

Since shifts were nested within EPs, a mixed linear model was used to evaluate the mean effect of Physician Navigators on outcome variables of productivity. Mixed models accounted for differences between and within physicians, the fact that repeated measures in the same physician were correlated, and for unequally sized clusters. Univariate analysis based on linear mixed models examined the impact of Physician Navigators. A subgroup analysis using mixed linear models was performed to examine the potential for difference in the effect of Physician Navigators on Pt/hr and TAT to discharge based on the different ways they were utilized. Group 0 consisted of 7 physicians who did not use Physician Navigators, and included 1 EP who trialed Navigators for 8 shifts in early 2014 (4.8% of total shifts) but decided not to use them thereafter. The 8 shifts were excluded for analysis. Group 1 consisted of 7 physicians who used Physician Navigators regularly, defined as using Navigators for 30-85% of total shifts since April 2013 (mean 54.7%, standard deviation [SD] 17.3%). Group 2 consisted of 6 physicians who used Physician Navigators for almost every shift, defined as >85% of total shifts since April 2013 (mean 92.4%, SD 6.1%). There were no EPs who met inclusion criteria that went ungrouped. Under this design, Group 0 acted as a negative control group, and Groups 1 and 2 could assess whether the impact of Physician Navigators on productivity measures varied on how frequently

the EP employed Physician Navigators. There were no EPs who met inclusion criteria that went ungrouped.

We performed a separate primary analysis using a multivariate linear mixed model to evaluate whether other variables which could be associated with EP productivity had an impact on performance indicators during the study period. In this model, we included Physician Navigators, daily patient volume, number of physicians per day, Group 1 EPs, and Group 2 EPs as dependent variables. We were interested in whether the improvements in performance indicators associated with Physician Navigators differed significantly in the multivariate analysis. Overall, this did not occur and we opted to present the univariate analysis results within the manuscript for its simplicity and relative ease of understanding (data not shown).

### *References*

1. Preisser JS, Reboussin BA, Song EY, et al. The importance and role of intracluster correlations in planning cluster trials. *Epidemiology*. 2007;18(5):552-60.

### **Section 3.2. Results**

The following tables provide additional results describing the impact of Physician Navigators on measures of EP productivity using a mixed linear model.

**Appendix Table 1:** Descriptives of Independent Variables and Outcome Variables (Productivity Indicators)

Independent Variables		
Physician (n = 6845 shifts)	% PN	Patients per physician
Mean	47	39.1
SD	0.75	5.9
ICC	0.51	0.17
Outcome Variables		
Physician (n = 6845 shifts)	Pt/hr	TAT to Discharge
Mean	4.9	157
SD	1.7	46.6
ICC	0.29	0.18

PN = Physician Navigator; % PN = percentage of physician shifts with a physician navigator; ICC = Intraclass correlations; Pt/hr = number of patients treated per hour; TAT = Turn-around-time

#### **4.0. Other**

The following describes other details in the manuscript that readers may find of interest.

#### **4.1. Physician Navigator Survey**

The following survey was administered to 24 EPs who had used Physician Navigators during the study period. The shifts of 10 of the 24 EPs did not meet study inclusion criteria. However, we wanted to quickly get a sense of EP opinions on the Physician Navigator program. The survey was developed by the study investigator AL. AL is not a staff physician and Southlake, and does not have any role within the administration of Physician Navigators. The anonymous 3-question survey on 5-point Likert scales was completed online via SurveyMonkey (SurveyMonkey, San Mateo, CA, United States). Given the relatively uncomplicated design, the survey was not piloted. All 23 responses were collected within 1 month of the survey initiation. The survey follows:

1. Overall, I am satisfied with the Physician Navigator Program at Southlake Regional Health Centre. *Choose one*

- Strongly Agree
- Somewhat Agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

2. Overall, Physician Navigators improve the quality of care I provide to patients. *Choose one*

- Strongly Agree
- Somewhat Agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

3. Overall, Physician Navigators make my practice more efficient. (i.e. I see more patients per shift in the same number of hours, or I see the same number of patients in less time than before)

*Choose one*

- Strongly Agree
- Somewhat Agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

#### **4.2. Physician Navigator and Patient Satisfaction Survey Results**

The results of the surveys follow in **Appendix Table 2** and **Appendix Table 3**.

**Appendix Table 2:** Survey of physicians who used Physician Navigators at any point from April 1, 2013 to March 31, 2015

Physicians (n = 23)	Strongly Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I am satisfied with the Physician Navigator Program at Southlake	19	3	1	0	0
Physician Navigators improve the quality of care I provide to patients	18	5	0	0	0
Physician Navigators make my practice more efficient. (i.e. I see more patients per shift in the same number of hours, or I see the same number of patients in less time than before)	20	3	0	0	0

**Appendix Table 3:** Excerpt of patient satisfaction survey results from a standardized survey which routinely collects patient satisfaction data every quarter at Southlake Regional Health Centre

Satisfaction domain surveyed	Percent positive score before Physician Navigators (mean)	Percent positive score after Physician Navigators (mean)	P-value
Courtesy of ED staff	84.9	87.3	p>0.05
Explanation of what ED did	90.4	90.7	p>0.05
Overall quality of ED care	86.4	88.0	p>0.05

## **Section 4.2. Limitation in EDLOS Measurement**

Question: *Why was overall LOS reduction was so small? If PIA and TAT are down, why is LOS only down by 1%?*

We have been aware of where the gains lost occurred. At our institution, nursing is responsible for documenting the time a patient physically left the ED (i.e. determining LOS). During the study period, nurses were the only ED personnel who could complete this task. However, the time ‘the patient left the ED’ documented by nursing staff did not always match when the patient physically left the ED.

This is best demonstrated by a clinical example. For instance, consider a patient with a laceration that needs a special dressing. The EP would write the order for a dressing and then subsequent discharge. This task is placed in the “Order” bin. While the nurse is attending to the dressing, the EP might be re-assessing a patient with ankle pain who turns out to most likely have an ankle sprain after imaging. The EP would discuss the results with the patient and discharge the patient. The physician documents the ‘time of discharge’ and places the chart in the “Discharge” bin.

After the nurse completes the dressing and requisite paperwork, the nurse documents the time the patient physically left the ED, which is used to calculate LOS – which is accurate in this case. Without any further tasks in the “Order” bin, the nurse may then decide to address the charts in the “Discharge” bin. Accordingly, the nurse picks up the chart of the patient with the ankle sprain. Even though this patient left before the nurse picked up the chart, the time that the nurse picks up the chart is the time documented (they are not allowed to write in anything earlier). This

artificially creates a delay between the time the EP made the disposition for discharge, and when a patient leaves the ED.

As patient volumes increased in the ED (without a concomitant rise in nursing), the number of charts within the “Order” and “Discharge” bins increased. Naturally, nursing prioritizes tasks within the “Order” bin because he/she knows that the patients whose charts are in the “Discharge” bin have already left the department.