**Quality improvement scientific symposium virtual session three: rapid-fire presentation – Karen O’Keeffe**

**Accessible transcript**

**Visual**

**Karen O’Keeffe, a short haired woman with red framed glasses, appears in a live feed in the top-right corner of the screen. A slide with a white background fills the screen. Blue text reads: ‘Opioid-induced ventilatory impairment in the post-op patient or Let sleeping dogs lie. Karen O’Keeffe, Improvement Advisor NDHB.’ A banner runs along the bottom of the slide. The banner shows four photos – a group of people on a beach, a pair of teenage girls smiling together, a smiling woman at a small boy’s hospital bedside, and the last photo shows two men in a sitting by a girl’s hospital bed. Next to the photos is the interlocking white and blue koru logo for the Northland District Health Board. Te Poari Hauora Ā Rohe O Te Tai Tokerau. Under this, it reads ‘A Healthier Northland. He Hauora Mo Te Tai Tokerau.’**

**Audio**

(Karen): Good afternoon. Thank you for the opportunity to present at this symposium today. My name is Karen O'Keeffe, and I work for Northland District Health Board as an improvement advisor. The improvement project I am presenting today was part of the Health Quality & Safety Commission's 'Safe use of opioids' project that started in late 2014.

**Visual**

**A title on a new slide in a black text reads: ‘Is there a problem’ followed by three question marks. A list of bullet points appears beside a sketch of a sharped-toothed sleeping dog beside a sign reading ‘Do not disturb’. The bullet points are in blue text:**

* **Initially a challenge to identify there was an issue**
* **Limited information available   
  – GGT  
  – Incidents   
  – Stories**
* **Coding investigated   
  – Y450 (Eureka!!)**

**Audio**

(Karen): Our project team's first challenge was to gain an understanding of how safe we were in our DHB in using opioid medications with our patients. As in many projects, we were keen to get on and do something. However, in the early stages, we really did not understand the scope of the problem that we were trying to solve. We did look at recent literature for guidance and reviewed some of the earlier work we had undertaken with our global trigger tool data. This clearly indicated that opioids presented significant risk to the patients. However, we initially struggled to understand the types of harm or the extent of the issue within our DHB. We spent a lot of our initial time in data mining and looking for indicators of opioid-related harm. We reviewed our incident data, complaints, naloxone use, and we investigated unplanned admissions to the ICU. None of these were particularly helpful. At the next stage we sort of investigated, would coding data be helpful? This is a bit of a eureka moment for us. We learned that by pulling data for patients with a Y450 code captured those patients who had experienced an adverse event related to opioids. Using this data, we were able to see the types of opioid-related harm and both categorise them and understand the frequency of events.

**Visual**

**The next slide is titled: 161 Opioid Adverse events utilising Y450 coding data. This slide shows a line and bar graph titled Opioid Related Harm Jan 2014 – July 2015 161 events. The Y axis of the graph is labelled Number of Patients. The X axis is labelled Harm Type. A row of squat bars trending downward run along the X axis. They each have a label: In-pat OIC, Post-op OIVI, N&V, Admit OIC, Conf/Delirium, OIVI non post op, Hypotension, Tramol reaction and Other. The blue line graph is trending upwards, marked with different percentages from zero to 100.**

**Audio**

(Karen): From January 2014 to July 2016, we were able to identify 161 patients who experienced an opioid-related adverse event. These were all pulled using the Y450 code. We were then able to categorise these events and put them on a Pareto chart. The Pareto chart you see there demonstrates our initial finding. We were quite surprised to learn that we had a much higher than expected number of respiratory depression events. It was also interesting to learn that despite seeing a significant number, that none of these ever appeared in our incident reporting system.

**Visual**

**The next slide is titled: OIVI Opioid induced ventilatory impairment – all patients. Below this is a line graph titled: All OIVI patients NDHB. The X axis is labelled Date/Time/Period/Number and has different dates from 2014 to 2016 running along it. The line of the graph spikes sharply up and down, with its highest peak being on the 7/06/15.**

**Audio**

(Karen): The team, at this point, decided that we would focus on respiratory depression events. We were quite concerned of the safety of this issue, and that was the most useful thing that we thought we could do. We were able to quantify the frequency of these events by using a rare event chart. Our initial baseline data indicated the time between events occurring was at a median of nine days. Again, we were quite surprised at the frequency of these events and that we really had not picked this up in any other way prior to initiating this project.

**Visual**

**A new slide has a title in black text: OIVI – Opioid Induced Ventilatory Impairment. Blue text in bullet points below the title reads:**

* **“Respiratory depression” only describes part of the risk.**
* **OIVI – a more complete term.**
* **– central respiratory depression (decreased drive)**
* **– Decrease LOC (sedation)**
* **– Upper airway obstruction**
* **All or any combination may decrease alveolar ventilation.**

**Audio**

(Karen): In addition, we went back to the literature and starting to understand that. We found that using the term 'respiratory depression' really didn't cover many events that we were looking at, and that we would actually move to using the term 'Opioid Induced Ventilatory Impairment'. And it was a more accurate description of the issue that we were trying to address.

**Visual**

**A slide is titled: Post op OIVI Data. Under the title are two line and bar graphs side by side. The one on the right is titled: Post op OIVI Sub Spec and shows the number of OIVI in different surgery areas, these being Gyne with 13 OIVI, Gen Surg with 12, Ortho with 11 and Mat with 1. The second graph is titled: Age Range for post-op OIVI. The bars on this graph are labelled 50 years or less with 17 OIVI, 66-80 with 10 OIVI, 51-65 with 7 OIVI and greater than 80 years with 3 OIVI.**

**Audio**

(Karen): As we further reviewed the data, we recognised that there appeared to be two distinct population types that were experiencing OIVI events – patients in the operative pathway, and patients in the non-operative pathway. At this point, we scoped the project further to focus on reducing opioid-induced ventilatory impairment events in the post-operative patient population. This did allow us to narrow our focus to a smaller suite of changes. We continued to develop our improvement theory by trying to understand some of the contributing factors and further learn about what the patients were experiencing, who was experiencing opioid-related events. The Pareto chart that we put out on this slide shows us that we were quite surprised to learn that those patients experiencing OIVI were of the younger age group bracket. In addition, we were surprised to see that although our gyne patients are a smaller volumes and numbers, they were seeing a lot higher number of opioid events, related to other surgical cases.

**Visual**

**A new slide has a title in bold black text: Identifying triggers for OIVI. In smaller black text below this: Review of patients with OIVI event:**

**Bullet points in blue text:**

* **Opioid doses**
* **LOS PACU**
* **Episode of decreases RR in PACU**
* **Naloxone use**
* **Sedation scores**
* **PCA use**

**Above a small illustration of a dog with a magnifying glass in its paw examining an empty bowl, along with an empty tin of cat food, blue text reads: Conducted a random audit of surgical patients to look for these triggers and any relationships.**

**Audio**

(Karen): A further review of the cases helped identify a number of triggers that might predict OIVI events. We looked at longer stays in the recovery unit. We looked at any episodes of patients having decreased respiratory rates in recovery room, any evidence of excessive sleepiness, use of patient-controlled analgesia, and patients who had received higher doses of opioids through their perioperative period.

**Visual**

**A slide shows two line graphs, one above the other. The graph at the top of the slide is titled Opioid equivalent doses given in post-op patients with OIVI. The Y-axis is labelled Opioid dose, and the X-axis is labelled Cases. The line of the graph goes up and down in small peaks. The graph below is titled: Random audit opioid equivalent doses given. The Y-axis of this graph is labelled Morph Equigesic, and the X-axis is labelled Cases. This graph’s line has far more extreme peaks and troughs.**

**Audio**

(Karen): We did review the data of opioid dosing and found that the patient group who had experienced an OIVI event had a much higher median opioid-equivalent dose they had received than a random sample of surgical patients of the same patient group size. The difference was in the OIVI group, they were having a median opioid-equivalent of 111mg, and the non-OIVI patients were 61mg.

**Visual**

**A slide is titled in bold black text: Initial change concepts. Bullet points in blue text:**

* **Identify those at risk – OSA**
* **Better communication of opioids doses given**
* **Identify triggers for OIVI – in PACU level of sedation**
* **Risk mitigation**
* **- naloxone guideline**

**An illustration of dog wearing glasses in the bottom corner of the slide. The dog is seated at a desk reading a book titled New Tricks. Small bones fill a shallow bowl on the desk.**

**Audio**

(Karen): So our initial change ideas were to identify those patients who are at risk. We looked at patients that were undiagnosed with obstructive sleep apnoea. We looked at improving communication on the opioid doses given in the operative period. And we also looked at risk mitigation in clarifying treatment guidelines, and about how we would use naloxone, and created naloxone guidelines.

**Visual**

**A slide appears with the title: Improved communications of opioid doses. Green text below this reads: Cumulative opioid sticker. Under the green text are blue bullet points:**

* **Sticker now updated and to be spread through surgical areas**
* **Version for medical patients to be tested.**

**Beside this is an example of a cumulative opioid sticker. The sticker resembles a table with rows and columns. Red text along the top of the sticker reads: Caution- opiates given in the peri-operative department. Patient may be at risk of opioid-induced ventilatory impairment. Yellow highlighted text in a red font reads: OSA risk identified by anaesthetist yes/no. Naloxone given yes/no. Epidural yes/no. PCA yes/no. Intrathecal morphine yes/no. PCA total dose in PACU. Below this is a table with columns labelled Drug, Route, Dose intra-op and Dose PACU. There are two drugs listed in the ‘drug’ column -- Morphine and Fentanyl. There is an asterisk at the bottom of the sticker followed by black text: Consider other sedative/opioid drugs (e.g. pethidine, cyclizine, benzodiazepines) Under this, red text reads: PACU nurse – please complete and use for ward handover. Please cross through if not relevant.**

**Audio**

(Karen): The slide you're looking at was an example of a sticker that we used as a way of communicating total doses of opioids that patients had received.

**Visual**

**A title on a slide in bold black text reads: STOPBANG - OSA assessments. Two images fill the slide. The image on the left shows a pair of cartoon eyes with feet holding a red octagonal sign with the words STOP Bang on it. A thought bubble blooming from the cartoon’s eyeballs shows an acrostic of the word Stop. S - snoring, T - tiredness/sleepiness/fatigue. O - observed apnoea. P - BP(>140/90) Rx or no. Below the thought bubble is the word ‘Questionnaire’ in red. The image on the right of the slide is a line graph titled: Percentage of Elective pt with STOPBANG completed. The line travels in upward moving spikes as it goes along the X-axis which is labelled with different months from January 2014 to May 2016.**

**Audio**

(Karen): The next slide is showing us the 'STOPBANG' process that we used in perioperative process to look at people who had an indication of obstructive sleep apnoea.

**Visual**

**A new slide bears the title: First iteration learning. Below this, bullet points are listed in blue text:**

* **STOPBANG - seem screening effective**
* **Sticker - improved awareness**
* **Some hawthorn effect - changing in anaesthetics**
* **Almost all OIVI patients had PCAs**
* **Difficult to reliably identify those at risk of OIVI**
* **Gaps in knowledge recognising and management of OIVI**
* **Practice issues in monitoring sedation**
* **Safe care monitoring ability.**

**Audio**

(Karen): Our learning from our first iteration of changes – our key finding was that the STOPBANG process, and doing that early in the perioperative process was effective and it was easily done. We got good compliance with that. We found that we did have improved communication and awareness when patients were receiving large doses of opioids, and the stickers were being effective that way. We found out that we didn't need better monitoring for patients on patient-controlled analgesia. We found it was difficult to reliably identify those at risk of an OIVI event, and we also found that there was a real gap in knowledge around recognising OIVI. We found that there were some practice gaps in effective monitoring of sedation scores, and that we realised that we had very limited access to other monitoring equipment such as SpO2 monitoring or end-tidal CO2 monitoring.

**Visual**

**A slide is titled Post Op OIVI Results. This slide shows a line graph titled: Time between post op OIVI. The Y-axis is labelled ‘Time between events’ and the X-axis is labelled ‘Date/Time/Period/Number’. The plotted points along the line stay fairly close to the bottom of the graph until the line sharply shoots upward between March 2016 and January 2017. The word ‘good’ appears beside the graph with an arrow pointing upward.**

**Audio**

(Karen): Our outcome results, however, were very encouraging with our first iteration, and we did see an increase in time between events, so we were encouraged, and we moved forward with updating our theory.

**Visual**

**A slide is titled: Updated theory and changes now being tested. Under the title, bullet points in blue:**

* **Moved from respiratory depression to OIVI.**
* **Reducing variation - guideline for prescribing, administration and monitoring for acute pain.**
* **Revised process for dx criteria from PACU.**
* **Sedation score monitoring - integrated into EWS.**
* **Revised PCA processes.**
* **Revised pre-op process for Gyne.**
* **Further education in conjunction with EWS and PCA monitoring.**

**Audio**

(Karen): So, we looked at further change ideas. Some of the initial changes ideas that we came up with was a significant education programme around recognising OIVI, the risks for OIVI, and how to early detect it. We looked at dosing guidelines for acute pain management and monitoring requirements for those receiving opioids. We improved the guidance on sedation score monitoring for both in PACU, and in those patients having patient-controlled analgesia. We also revised some processes related to people undergoing gynaecological surgery.

**Visual**

**A new slide has a title in bold red text: Key Message. Under this, blue text reads: Falling asleep mid-sentence implies excessive sedation and risk of OIVI. Under this are two images. One is a cartoon of a man sleeping on a bed with a series of Zs emanating from his nose. The second is a photo of a woman and a brown coloured dog asleep with their heads on the same pillow.**

**Audio**

(Karen): One of the key messages that we used, and a real focus of our education, was about over-sedation - and that one of the key indicators was falling asleep mid-sentence, or rapidly drifting off after being roused. And that was one of our key messages that we really push.

**Visual**

**A slide is titled in a bold black font: Key Area of Focus Post-op. Below this is a line graph titled: Days between Post-op OIVI events. The Y-axis is labelled ‘Time between Events’ and the X-axis is labelled ‘Date/Time/Period/Number.’ The zig-zagging line spikes suddenly over the date 24/01/2019. Next to the highest plotted point is a upward pointing arrow and the word ‘good’ in green.**

**Audio**

(Karen): We continued this improvement work, and we continued on following the end of the collaborative. We now have up-to-date data from the end of 2020. And what we have found is that we have had sustained changes over the last two years. We have gone down from an initial median of nine days between events, to now a sustained effort of between 55 days between OIVI events in post-operative patients. We also have not seen a significant harm event from OIVI in this population for over four years.

**Visual**

**A new slide is titled: 2020 review and learning. Blue text below this reads: Recent review of patient who experienced OIVI by a RMO. Under this, bullet points appear in black:**

* **Good at monitoring sedation score – is included in EWS sheet, so required to be filled out for all patients**
* **Naloxone dosing guidelines are rarely followed**
* **Often Given full 400mcg dose straight away.**
* **Seems that the more junior doctors (house officers) tend to follow the guidelines 🡪 as unfamiliar with using naloxone**
* **Do not seem to be good at reducing dose for opioid naïve patients**
* **Do not seem to be good at reducing dose in the elderly**
* **Not good at assessing/documenting risk factors**
* **Not following guidelines for altering dose based on OIVI risk factors**
* **No delays in recognising OIVI - would be hard to tell from notes if there was actually a delay. Regular GCS monitoring and RR monitoring helps, though.**

**Audio**

(Karen): This remains an ongoing effort, and we are just in the process of reviewing patients who have experienced an OIVI event in compliance with our current guidelines. We are seeing that we have some things that have really stuck well, but there is further work to be done. We understand that we've still got some work to do with reliably following our guidelines for naloxone use and continuing to get compliance with our prescribing guidelines, so that will be ongoing work as well.

**Visual**

**A slide is titled: Recent Changes. Below this, text in blue reads: The modified Pasero/Sedation Scale has been integrated into AVPU level of consciousness scale, for use with the NZEWS chart. Below this is a chart divided into four columns and five rows, charting scores, descriptions of the patient’s state and the corresponding category of opioid management. Next to this chart is more blue text in bullet points:**

* **Agreement to upgrade PCAs**
* **Now will have ETC02 monitoring**
* **In process of rolling out.**

**Below these bullet points is an image of a PCA monitoring machine with a number pad and digital display.**

**Audio**

(Karen): The recent changes that we've undertaken – we have just adopted using a modified Pasero/Sedation Scale and integrated this into our EWS chart using the AVPU section. We are also just about to roll out a new PCA pump with integrated end-tidal CO2 monitoring. We were able to advocate strongly when we were replacing our pump fleet to be able to include end-tidal CO2 as part of this project work.

**Visual**

**A slide is titled ‘Question’ followed by four question marks. A small cartoon picture of a bulldog appears on the left side of the slide. The dog is ringed by the words Wireless Watchdog. Text in blue appears in quotation marks: “All that stands between us and universal post-operative monitoring is the will to require it.” Lenore Alexander.**

**Audio**

(Karen): Thanks for listening. I would like to acknowledge all the team that have supported this work. Our pain team and medication committee have been key to our progress. And I'd like to thank the Health Quality & Safety Commission for their initial focus, and it was a great benefit to our DHB.