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Research Article

Systematic Approach To Ventilator Efficient Management (SAVE)

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ABSTRACT

Covid 19 pandemic a challenge to all, Apollo Hospital, Delhi too had to face this challenge. As the number of cases increased the mortality rate and COVID management being new for hospitals and health care set up, hence a lot of pressure was on the healthcare providers. Hospitals were burdened to keep certain number of beds along with the medical equipment within the hospital infrastructure to cater and upgrade its equipment as well as human resources to manage Covid 19 patients. This project Systematic Approach to Ventilator Efficient Management (SAVE) was started for nurses to enable them to manage critical patients, with adequate applied and technical knowledge on ventilators with minimum disruptions and downtime since it is the key for ensuring Safe and Quality care for the patients. With a view to strengthen our preparedness to handle this situation, we initiated this project as a Proactive Approach in which various training activities, audits were done keeping in mind all aspects of the information received in the pre-analysis phase. After implementing the project, a post analysis survey was done in the year 2020 to check the breakdown of ventilators along with the competency of the nursing staff and it was found out that:

- 579 staff have completed this competency skill assessment, the average score increased to 10.02 out of 12 points.
- Reduction in the number of Breakdown calls from 75 (January) to 20 (October)
- Average reduction in downtime of ventilator from 49.96 hours (January) to 9.58 hours (October)

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INTRODUCTION:

A lot of pressure was on the healthcare providers with the daily changes of Protocols, Treatment Guidelines and other Advisories by the Government and other Healthcare bodies like WHO, ICMR, etc. The hospitals were further burdened to keep certain number of beds along with the medical equipment within the hospital infrastructure to cater and upgrade its equipment as well as human resources to manage Covid 19 patients.

As per nytimes.com[1], a total number of cases as of 22th December 2020 in India was 10 million plus and given the likelihood of a surge in Covid cases amid winters and the festival season, there may be a rise in demand for ventilators as per livemint.com[2].

Breakdown & non availability of ventilators can lead disruption and time taken to repair the ventilator, arranging spare parts if damaged, is a challenging task during Covid 19 when the nation is busy fighting against the deadly virus. Further, errors arising due to mishandling of ventilators and solely depending on the Biomedical Engineering Department for all rectification of issues, could lead to the addition of the cost to the hospital.

With a view to strengthen our preparedness to handle this situation, we initiated this project as a Proactive Approach. During the pre-analytic phase, based on the Assessment Checklist prepared to check the knowledge and competency of nurses on ventilator, following opportunities for improvements were found:

1. Root cause of alarm not investigated/acted upon/communicated properly to the doctor by the nurses
2. Enhancing the knowledge on basic terminologies used in mechanical ventilation, alarm & clinical settings as per doctor's advice, connections etc.
3. Ward nurses not getting enough hands on the ventilator, hence their competency is less as compared to ICU nurses.
4. Further continuous monitoring of all call logs of breakdown to Biomedical Department was analyzed which clearly showed that there was an increasing trend of breakdown calls, many of which could easily be handled at user level, without depending entirely on Biomedical department

III (a) Goal

1) To Enhance & Ensure Patient Safety
2) To Enhance handling & competency skills for all ICU as well as Ward nurses.
3) To Reduce the no. of breakdown of the ventilators, thus rationalizing the manpower by reducing the frequent visit of Biomedical staff going to attend the ventilator related breakdown calls.
4) To Reduce the average breakdown time of a ventilator.
5)To Increase the functionality of the system hence, Patient Care. More the availability of functional ventilators, more patients can be treated on it.

So, as to improve the competency of the staff on the ventilator and reduce breakdown of the same , PDCA (Plan, Do, Check & Act) Approach was incorporated & implemented as an ongoing process where continous trainings , retrainings and reinforcements are done for all the newly joined staff as well as the existing staff.

III (b) Projected Business Benefits

The projected bussiness benefits are enclosed below:

1.It will enhance the quality of patient care and services provided by our hospital.
2. Enhancing the competency of nurses would reduce the unnecessary cost to our hospital.
3. It will decrease the average downtime of the ventilators; thus more patients can be treated on the same if there is any requirement. Thus, Increase the functionality of the system hence, more effective patient Care.

IV. MATERIALS AND METHODS

In the view of the above stated problems, the project was initiated as a Proactive Approach in which various training activities, observations were done keeping in mind all the aspects of the information received in the pre-analysis phase**.** The stages incorporated to carry out the project are given below:

Stage 1:

30 samples each from ICU & Wards were audited in the pre-analysis phase.

Stage 2:

Identification of problem statement as per the pre analysis data.

Stage 3: To strengthen the process, the following measures were taken up**:**

1)_Hospital wide Ventilator hands-on training and return demonstration for all the nurses.

2)Virtual sessions on ventilator operation,management, basic terminologies used in mechanical ventilation,aseptic technique used, alarm management as per doctor's advice.

3)A video was prepared & shared by Nursing Training Team and Biomedical Engineer (Nursing) so as to make our nurses learn about the concept,operational aspect & management of the ventilator.

4) Virtual sessions (using Zoom app) on Cleaning & Disinfection protocol of ventilator & its accessories as well as availability and knowledge of SOP on the same was reiterated.

5) Cross Trainings were done for the ward nurses, the period of the training for one ward being, one nurse/week.

6) Dosily module on ventilator powered by Medvarsity was shared to all the staff so as to enhance their competency and skills on the same.

Stage 4: A post competency test was circulated to all the staff via Google forms to check their knowledge and competency on ventilator Medtronic PB 840 along with the random practice tests on grounds.

Stage 5: The breakdown log for ventilator was maintained & analyzed for the period Jan-October 2020.

Stage 6: To control and sustain the plan, various trainings as well as cross trainings of the staff are implemented as an ongoing process to strengthen the competency of nurses on ventilator & thus reduce the breakdown of the ventilators.

- Continous monitoring by random audits to check the competency of staff on the ventilator and is being documented.

Non compliant staff were retrained at the same time.

- Coordination with Biomedical Department and ground units for any training needs, issues and rectification.

RESULTS

The impact of the SAVE project was monitored to check the effectiveness of the project carried out. There were drastic improvements in the findings and the benefits from the project are envisaged below:

- ❖ Improvement in the skills and competency of staff on ventilators and able to handle most of the user end issues related to ventilator by themselves. In the pre analysis phase, the **average score obtained by the** Ward nurses were 7.06 out of 12 points and that for ICU nurses were 9.10 out of 12 points.
- ❖ After effective training plan, a google form was circulated to check the knowledge of the staff on ventilator operation and management, a total 579 staff have completed this competency assessment, the average score increased to 10.02 out of 12 points. Thus, improving the competency, skills & confidence of staff on the ventilator.
- ❖ The graphical comparison between pre & post competency test of the above is made (Figure 1).

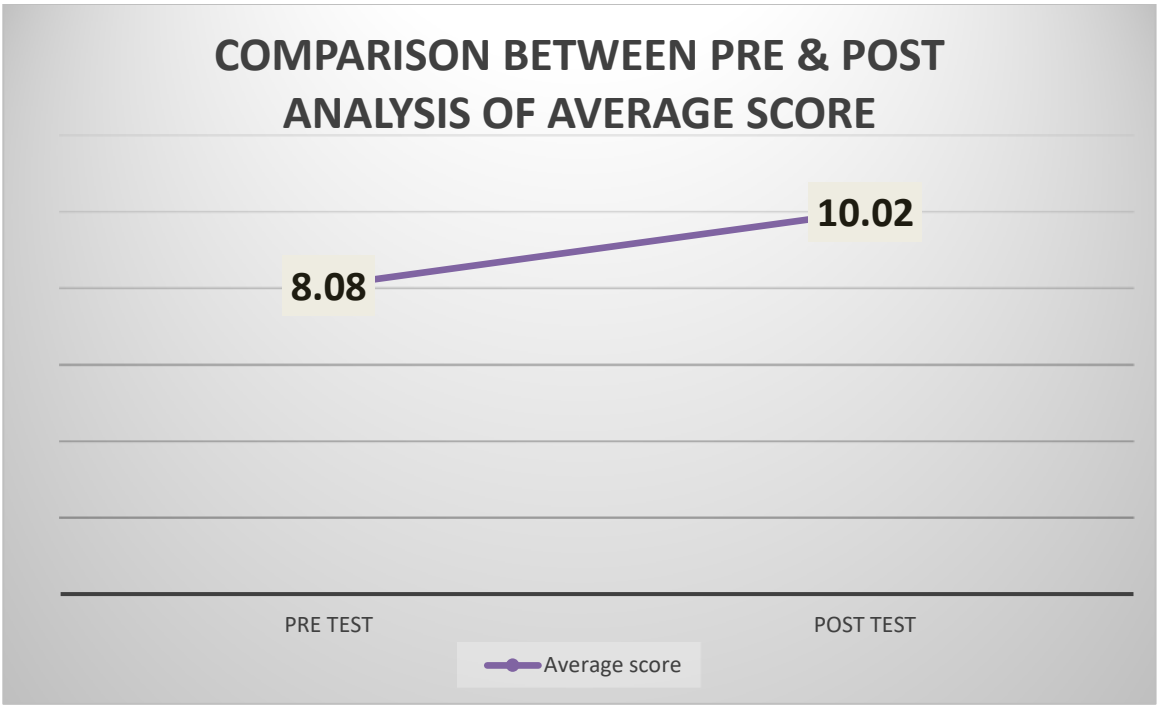

***Figure* 1**

- Online Dosily module powered by Medvarsity on Ventilator Training Program was circulated to all the staff in which **1052 nurses have completed the same successfully**.
- In hands on training, **1069 staff were covered on ventilator**.
- On analyzing the breakdown log of the ventilators (Jan-October 2020), following points were inferred (Figure 2):
  - **Reduction in the number of Breakdown calls from 75(January) to 20(October)**, thus saving the man hours of Biomedical Department as well.
  - **Average reduction in downtime of ventilator from 49.96 hours (January) to 9.58 hours (October)** has given us an opportunity to treat more effective number of patients than being treated before, keeping the quantity of ventilators same.

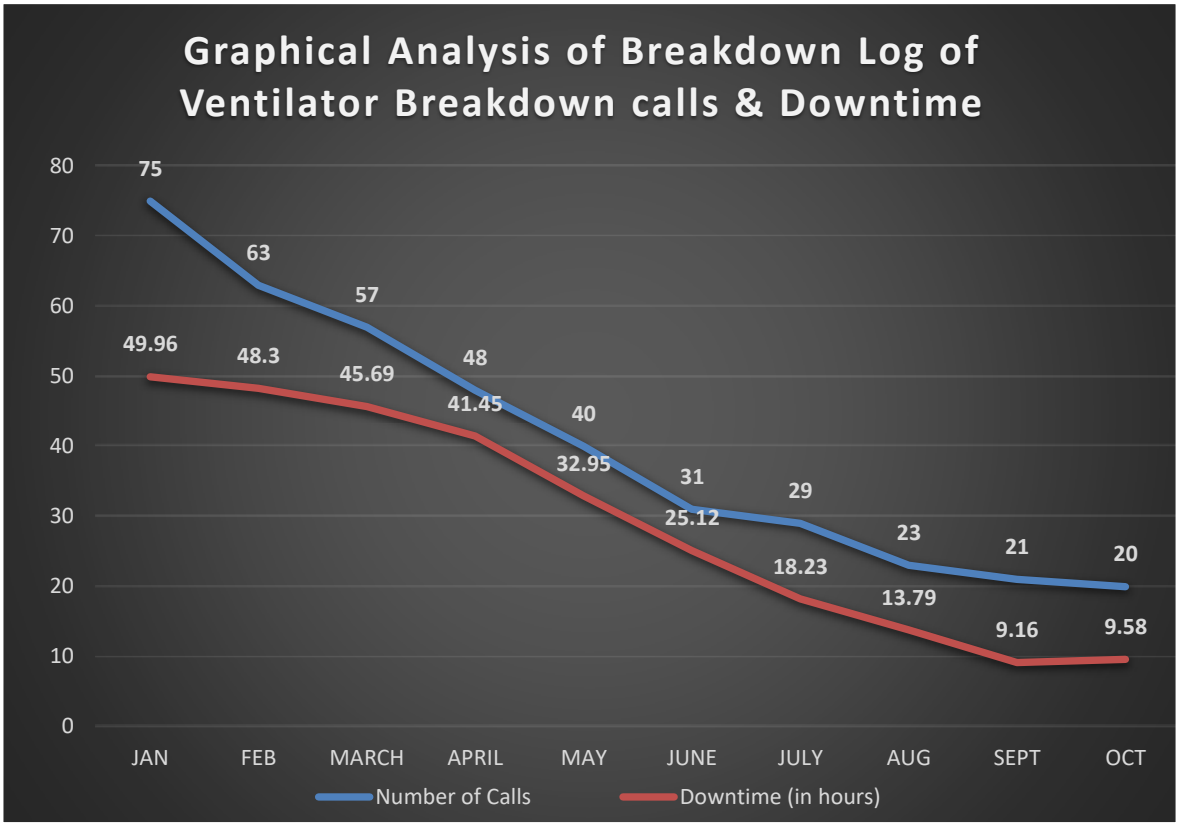

Figure 2

To make the whole process sustainable and efficient, an online feedback form was also circulated to all the staff in which the following questions were asked:

- How much do you rate the effectiveness of the Biomedical Equipment training on Ventilators?
- After how much time do you require the retraining on ventilators?
- Any suggestions/feedback so as to enhance & strengthen the competency of staff on ventilators.

As per the responses received and to sustain the plan, the following trainings were made as an ongoing process:

1) Mandatory Reinforcement Training on Ventilator once a month for all the nurses and as and when required.
2) Induction Training for new joiners on ventilator
3) Suits Meet Scrubs (Reinforcement Training) every week that includes ventilator atleast once a month.
4) Post Error Training, for any errors related to ventilator.
5) Alarm Management Training on ventilator once a month for all the staff.
6) Mandatory topic on ventilator in the Monthly Practicum also ciculated to all the staff atleast once per year .
7) Training on Cleaning & Disinfection protocol of ventilator & its accessories taken for all the staff on a monthly basis.
8) Mandatory training is held for all the staff once a year.

Monitoring:

1) Random audits are done to check the competency of nurses on ventilator.
2) Non compliant staff are retrained, followed up again and reinforcement done till they are compliant.
3) Documentation of the above is maintained regularly.

The above mentioned steps can also be taken up at other locations so as to increase the competency of all

the nurses and thus help in strengthening quality of patient care and services rendered.

DISCUSSION

This project Systematic Approach to Ventilator Efficient Management (SAVE) was taken up to manage critical patients, make more availability of functional ventilators with minimum disruptions and downtime since it is the key for ensuring Safe and Quality care for the patients. Breakdown & non availability of ventilators can lead disruption and time taken to repair the ventilator, arranging spare parts if damaged, is a challenging task during Covid 19 when the nation is busy fighting against the deadly virus. Further, errors arising due to mishandling of ventilators and solely depending on the Biomedical Engineering Department for all rectification of issues, could lead to the addition of the cost to the hospital.

CONCLUSION

With the advent of new technology and situations, it will challenge the nurses at the point of care. Covid 19 pandemic was a challenge to all and tackling the situation with the existing hospital infrastructure and resources was our key goal when the Nation had called out to all the healthcare providers.

Implementation of project has led to the increase in the competency of ICU as well as Ward nurses. They are more confident in handling ventilated patients along with the basic troubleshooting that can be handled at the user end, thus saving more time for the patient care. Effective training has also led to reduction in the number of breakdown calls related to ventilator. Thus, giving us an opportunity to treat more effective number of patients than being treated before, keeping the quantity of ventilators same. The average downtime of the ventilator has also gone down which has saved the man hours of Biomedical Department as well. So, it has enhanced the quality of patient care with prompt delivery of clinical services, lesser breakdown of ventilator will save our cost incurred on repairing the ventilators, thus making our system more robust and efficient.

ACKNOWLEDEMENTS

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How To Cite This Article:

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