Optimizing Respiratory Therapy Resources by De-Implementing Low-Value Care

Kellianne Fleming, Jessica L George, Sarah J Bazelak, Julie A Roeske, Adam D Biggs, Curtis M Landry, Randolph J Lipchik, and Jonathon D Truwit

BACKGROUND: Our institution was experiencing a respiratory therapy staffing crisis during the COVID-19 pandemic, in part due to excessive workload. We identified an opportunity to reduce burden by limiting use of 3% hypertonic saline and/or N-acetylcysteine nebulizer therapies (3% HTS/NAC). METHODS: Leveraging the science of de-implementation, we established a policy empowering respiratory therapists to discontinue 3%HTS/NAC not meeting the American Association for Respiratory Care (AARC) Clinical Practice Guideline: Effectiveness of Pharmacologic Airway Clearance Therapies in Hospitalized Patients. After a 3-month period of educating physicians and advanced practice practitioners the policy went to into effect. Outcomes measured included monthly number of treatments, orders, and full-time employees associated with administering nebulized 3%HTS/NAC. RESULTS: Post policy activation, the monthly mean 3%HTS/NAC treatments were significantly reduced to 547.5 ± 284.3 from 3,565.2 ± 596.4 ($P < .001$) as were the associated monthly mean of full-time employees, 0.8 ± 0.41 from 5.1 ± 0.86 ($P < .001$). The monthly mean 3%HTS/NAC orders also fell to 93.8 ± 31.5 from 370.0 ± 46.9 ($P < .001$). Monthly mean non-3%HTS/NAC treatments remained stable; post policy was 3,089.4 ± 611.4 and baseline 3,279.6 ± 695.0 ($P = 1.0$). CONCLUSIONS: Implementing a policy that empowers respiratory therapists to promote adherence to AARC Clinical Guidelines reduced low-value therapies, costs, and staffing needs. *Key words: De-implemention; nebulizer; N-acetylcysteine; hypertonic saline; health workforce.* [Respir Care 2023;68(5):559–564. © 2023 Daedalus Enterprises]

Introduction

During the COVID-19 pandemic, burnout rates have been high among respiratory therapists (RT). Studies have identified poor leadership, inadequate staffing, excessive work load, patient acuity, and poor patient outcomes as factors leading to burnout.[1-3] At our institution, we have been experiencing an RT staffing crisis exacerbated by the COVID-19 pandemic. This crisis resulted from staffing vacancies induced by burnout and increased patient acuity, both of which led to an increased work load. Froedtert Health and the Medical College of Wisconsin responded by providing resources for resiliency and mental health, increasing compensation, and employing costly RT travelers. We hypothesized that the work load could be further reduced through de-implementation.

De-implementation can be defined as identifying and eliminating non–cost-effective care, historical practices that lack evidence-based efficacy, or harmful interventions. Van Bodegom-Vos et al[4] define de-implementation as reducing or eliminating low-value care on a structural basis with a thoughtful process based on replicable actions. The process of de-implementation is met with considerable resistance for multiple reasons.[5] Individuals review new studies with biases arising from their preconception. Confirmation bias results in greater acceptance of studies that confirm their biases and greater scrutiny of studies that oppose them.[6] This polarization impedes de-implementation. Clinician decision-making is also impacted by memorable patient cases, termed availability heuristic.[7] Recalling that a therapy worked in an individual case leads to reluctance to abandon the therapy, even when a trial fails to show benefit. Even if not truly seeing causality, the personal experiences can be believed to be data and thus scientific in nature. Lastly, de-implementation takes away practices and in the act of losing these practices clinicians value them even more, termed the endowment effect.[5] Change management strategies are needed to overcome the barriers for successful de-implementation. Assembling groups of clinicians allows for

collective decision-making which can overcome individuals unable to separate from their biases. This moves the discussion from opinion to data. Understanding the psychology of confirmation bias, availability heuristic, and endowment effect can enhance the discussion between those driving change and those reluctant to change.[5]

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In examining the work load of our RTs, we noted that our practice regarding 3% hypertonic saline solution and/or N-acetylcysteine (3%HTS/NAC) was not consistent with the American Association for Respiratory Care (AARC) Clinical Practice Guideline: Effectiveness of Pharmacologic Airway Clearance Therapies in Hospitalized Patients.[8] This discrepancy provided an opportunity to apply a de-implementation process on a structural basis.

In May of 2021, 9,086 nebulized treatments were delivered throughout our 700-bed academic medical center. Of those 9,086 treatments, 4,648 were non–evidence-based treatments: specifically, 3%HTS/NAC. Time spent delivering the 4,648 non–evidenced-based treatments was calculated to equal 6.7 full-time employees. This sparked an RT-driven de-implementation initiative aimed at reducing the number of non–evidence-based treatments in hopes of conserving respiratory therapy resources.

Methods

The project met standards for a quality improvement initiative and approved as per standard policy of Institutional Review Board authorized delegates. We approached the de-implementation process in several steps. First, we identified the opportunity and shared data with physician leaders.

QUICK LOOK

Current knowledge

Respiratory therapist staffing and burnout are related to workload. There are limited indications for nebulized hypertonic saline and/or N-acetyl cysteine as established in the 2015 AARC Clinical Practice Guideline: Effectiveness of Pharmacologic Airway Clearance Therapies in Hospitalized Patients. Adopting to change is hard, and failing to follow the AARC Clinical Practice Guideline imposes unnecessary workload on respiratory therapists for low-value treatments.

What this paper contributes to our knowledge

The science of de-implementation can be applied to reduce the frequency of low-value treatments. Empowering respiratory therapists to limit the use of nebulized hypertonic saline and/or mucomyst resulted in 90% reduction of these low-value treatments.

Baseline data from the electronic medical record that captured 3%HTS/NAC administration for each ICU were provided to the critical care committee (ICU, medical and nursing directors) along with the AARC Clinical Practice Guideline.[8] Second, we then asked physician and advanced practice practitioner leaders to approve a policy that enables RTs to discontinue non–evidence-based 3%HTS/NAC treatments. Having the policy endorsed by these groups would eliminate one known barrier to successful de-implementation because now RTs would clearly have hospital and medical staff leadership backing.[9] RTs would still communicate with providers before discontinuing 3%HTS/NAC orders that were not consistent with the AARC Clinical Practice Guideline.[8]

The Critical Care Committee unanimously supported a policy empowering RTs to discontinue orders for 3% HTS/NAC in patients without an AARC guideline indication for treatment. This recommendation was presented to the Medical Executive Committee, along with baseline data and the AARC Clinical Practice Guideline.[8] The committee voted unanimously for a policy that empowers RTs to discontinue orders for 3% HTS/NAC in patients without an AARC guideline treatment indication. The third de-implementation process step took place during the time needed to establish and enact the policy. We leveraged a change management education strategy by sharing the AARC Clinical Practice Guideline[1] and providing data specific to ICUs with ordering providers because it has been shown that education and data can facilitate de-implementation.[10]

Monthly data on the frequency of all nebulizer orders and treatments were collected for all acute care units and

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The project occurred at Froedtert Hospital, Milwaukee, Wisconsin.

A version of this paper was presented by Ms Fleming as an Editors' Choice abstract at the American Association for Respiratory Care Congress 2022, held November 9–12, 2022, in New Orleans, Louisiana.

The authors have disclosed no conflicts of interest.

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DOI: 10.4187/respcare.10712

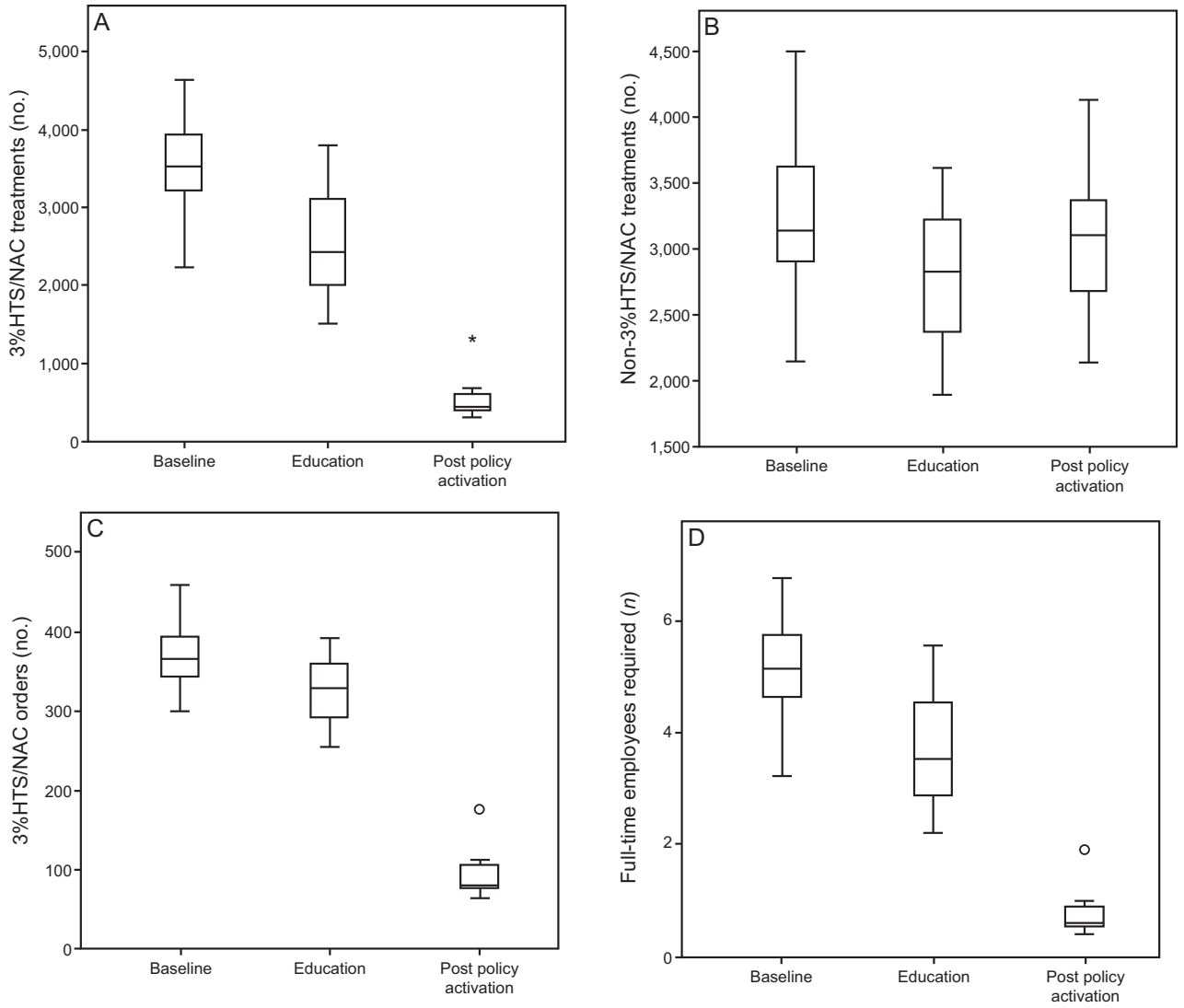

Fig. 1. Box plots (median, 25th percentile, 75th percentile, minimum value that is not an outlier, maximum value that is not an outlier) for A: 3% hypertonic saline solution and/or N-acetylcysteine (3%HTS/NAC) treatments, B: non–3%HTS/NAC treatments, C: 3%HTS/NAC orders entered, and D: full-time employees required for 3%HTS/NAC treatments. Asterisk indicate extreme outlier and circles are mild outliers (all in the first month post-policy activation).

Table 1. Impact of 3%HTS/NAC De-implementation Process

Parameter	Baseline	Post–Policy Activation	Education	Overall *P*	*P*, Baseline vs Post–Policy Activation	*P*, Baseline vs Education	*P*, Education vs Post–Policy Activation
Months, no.	14	10	3				
Full-time employees, no.	5.1 ± 0.86	0.8 ± 0.41	3.7 ± 1.7	<.001	<.001	>.99	.14
3%HTS/NAC treatments, no.	3,565.2 ± 596.4	547.5 ± 284.3	2,582.7 ± 1153.3	<.001	<.001	>.99	.14
3%HTS/NAC orders, no.	370.0 ± 46.9	93.8 ± 31.5	324.0 ± 68.1	<.001	<.001	>.99	.10
Non-3%HTS/NAC treatments, no.	3,279.6 ± 695.0	3,089.4 ± 611.4	2,776.0 ± 863.6	.50	>.99	.76	>.99

Data are shown as mean ± SD unless otherwise noted.
* Kruskal-Wallis test, adjusted by the Bonferroni correction for multiple measurements.
3%HTS/NAC = 3% hypertonic saline solution and/or N-acetylcysteine

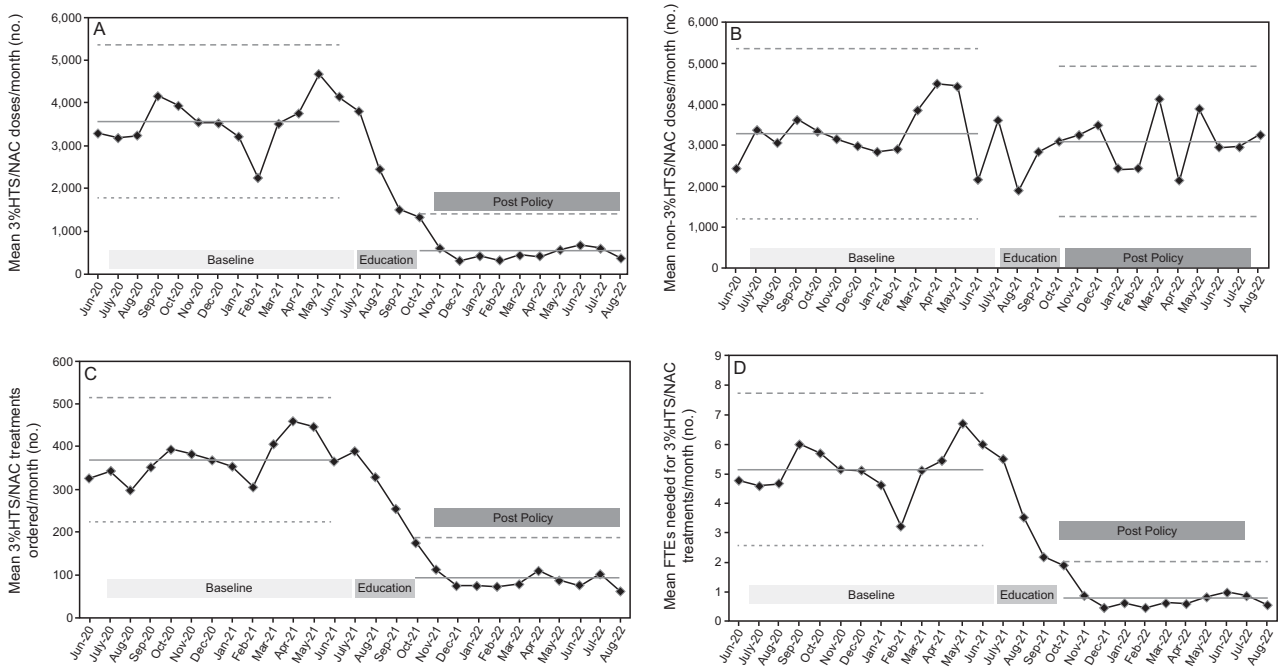

Fig. 2. Control charts: A: Monthly mean 3%HTS/NAC treatments, B: monthly mean non-3%HTS/NAC treatments, C: monthly mean 3% HTS/NAC orders entered, and D: monthly mean full-time employees required for 3%HTS/NAC treatments. Time periods depicted are baseline, education, and post policy.

ICUs. Nebulizer treatments and orders were stratified as 3% HTS/NAC or non–3%HTS/NAC. The baseline period included 3%HTS/NAC data from June 1, 2020, through June 30, 2021. The education and ICU specific data-sharing period included 3%HTS/NAC data from July 1, 2021, through September 30, 2021. The post–policy activation included 3%HTS/NAC data from October 1, 2021, through August 31, 2022. As a counterbalance, we also collected data on other nebulizer treatments (non–3%HTS/NAC) as a surrogate control during the same 3 time periods: baseline, education, and post–policy activation.

Outcome measures were the number of administered 3%HTS/NAC nebulizer treatments and RT time measured in full-time employees required for 3%HTS/NAC administration. We used the AARC Uniform Reporting Manual standard RT time for aerosol treatments of 15 min for 3%HTS/NAC standard time, inclusive of preparation, administration, and equipment disposal.[11] RT time, in terms of full-time employees per month, was calculated from the product of the standard time and number of 3%HTS/NAC treatments divided by 173.3 hours/month (173.3 = 2,080 annual hours/12 months). The numbers of 3%HTS/NAC nebulizer treatments were determined from those administered and not from the electronic medical record order. Data were analyzed to account for daily census and days in the month.

Statistical Analysis

The Kruskal-Wallis test was used to assess for differences in baseline, post–policy activation, and education periods by using SPSS v27 (IBM, Armonk, New York). Data presented as control chart were constructed in Microsoft Excel v16.70 (Redmond WA, Microsoft Corporation).

Results

Data were analyzed to account for daily census and days in the month, which were found to be correlated with the number of treatments ($r = 0.996$). In comparing baseline to post policy activation periods, monthly mean 3%HTS/NAC treatments were reduced from 3,565.2 ± 596.4 to 547.5 ± 284.3; $P < .001$. The monthly mean number of full-time employees administering 3%HTS/NAC was reduced from 5.1 ± 0.86 to 0.8 ± 0.41; $P <$ 001. Monthly mean 3% HTS/NAC orders declined from 370.0 ± 46.9 to 93.8 ± 31.5 (Table 1, Figure 1). In addition to the reduction in monthly mean treatments, full-time employees needed, and mean orders for 3%HTS/NAC, Figure 2 (control charts) also demonstrated the process post policy activation was in control and with less variation.

A process is out of control when any of following elements are met; one data point is outside upper or lower control limits, two of three successive data points are more than 2 SD from the mean and on the same side of

the center line, four out of five successive data points are more than 1 SD form the mean and on the same side of the center line, eight successive data points are on the same side of the center line, six successive data points are increasing or decreasing or data points exhibit an obvious cyclic behavior. The process shown in our control chart is in control as none of these elements were met.

There were no significant differences between periods for the monthly mean non-3%HTS/NAC doses (Table 1, Figure 1). The control chart demonstrates no meaningful change in the mean non-3%HTS/NAC treatments nor change in control or variation (Figure 2).

Discussion

At Froedtert Health and the Medical College of Wisconsin, the pandemic highlighted a shortage in RTs and our dependence on expensive RT travelers. As our efforts to increase staffing without RT travelers were fruitless, we needed to reduce the work load. Recognizing that 3%HTS/NAC treatments used outside the AARC Clinical Practice Guideline[8] have not been shown to be effective and are both time consuming and costly, we sought to de-implement non-effective work that our RTs were being asked to do in hopes of reducing burnout and dependence on RT travelers. In an AARC survey, one third of respondents suggested that innovations to reduce nebulization time were needed.[12] We chose to eliminate unwarranted nebulizer treatments to achieve this reduction.

Our results demonstrate the effectiveness of applying a de-implementation approach; identifying an opportunity of low-value care, providing education and data as a change management strategy, and establishing a policy that empowers RTs was effective in reducing RT time and the number of treatments. We also saw a reduction in the number of orders. It is interesting that all outlier points occurred during the first month post policy activation (Figure 1), suggesting RTs were not confident in the process and likely worried about conflict. The impact of education alone was not significant; however, there were only 3 months of data, and we cannot discern whether the impact of education extended into the post–policy activation period, although the reduction in orders suggests that it did. While not statistically significant after Bonferroni correction, monthly 3%HTS/NAC treatments were lower post–policy activation, and fewer full-time employees were needed for those treatments than during the education period, which suggests empowerment of RTs to de-implement could be more effective than education alone. Changing practice is difficult, even with national guidelines, because providers will challenge the data or argue that the recommendations apply to a population but not to specific patients.[9,13-17] Empowering RTs to de-implement overcomes these barriers in a systematic fashion. In addition, the small number of RTs compared with the number of physicians and advanced practice practitioners should make the practice change more consistent.

The frequency of non–3%HTS/NAC treatments did not change over the study duration. We might have seen an increase of non–3%HTS/NAC treatments with the elimination of 3%HTS/NAC treatments because providers could have wanted more RT time with patients. We could have also seen a reduction in non–3%HTS/NAC treatments because the providers could have thought that the initiative was broader. Perhaps the number of non-3% HTS/NAC treatments were not impacted because our initiative focused on discontinuation of 3%HTS/NAC treatments not conforming to AARC Clinical Practice Guideline.[1]

Conclusions

We demonstrated that, through de-implementation, over 90% of 3%HTS/NAC treatments could be eliminated through education, data sharing, and empowering RTs.

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