ABSTRACT

Background: Tracheostomy is often performed for critically ill patients who are anticipated to have a prolonged intensive care unit (ICU) stay, in order to prevent the complications of endotracheal intubation. The timing of a tracheostomy has been much studied over the past 40 years with many analyses differing in methodology, patient population and outcomes. The purpose of this study was to investigate if early tracheostomy (≤ 7 days) in critically ill trauma patients increase ventilator and ICU-free days, reduce hospital days and decrease hospital costs.

Materials and methods: Trauma patients admitted to a level 1 Trauma Center requiring tracheostomy (2006–2013) were retrospectively identified. Patients receiving early tracheostomy (≤7 days) were compared to late tracheostomy (>7 days) for demographics, clinical data and outcomes. Dichotomous variables were compared by Chi-square or Fisher’s exact tests, where appropriate, and continuous variables were compared using Student’s t or Mann-Whitney U tests.

Results: Five hundred and twenty-nine patients required a tracheostomy during the study period [292 (55.2%) early and 237 (44.8%) late]. Patients requiring early tracheostomy were more often male (80.5 vs 70.5%, p = 0.007) and younger (41.5 ± 18.6 years vs 50.5 ± 21.2 years, p < 0.001). There were no differences in injury severity scores (ISS 28.4 ± 12.5 vs 27.2 ± 11.1, p = 0.161) but early tracheostomy patients were more likely to sustain severe traumatic brain injury (81.2 vs 65.0%, p < 0.001). There were no differences in transfusion requirements or need for intracavitary procedures. When outcomes were analyzed, while there was no difference in mortality (8.9 vs 5.1%, adjusted p = 0.126), early tracheostomy patients had significantly shorter ventilator days (8.7 ± 7.2 days vs 19.0 ± 10.4 days, adjusted p < 0.001), hospital days (22.3 ± 17.9 days vs 30.0 ± 18.4 days, adjusted p < 0.001) and ICU days (11.6 ± 8.4 days vs 22.8 ± 11.6 days, adjusted p < 0.001). In addition, ventilator-associated pneumonia rates were lower among early tracheostomy patients (8.6 vs 17.7%, adjusted p = 0.002). Hospital costs were unsurprisingly less in early tracheostomy patients ($ 36,280 ± $ 93,702 vs $ 55,371 ± 36,280 vs $ 93,702 ± 51,427, adjusted p < 0.001).

Conclusion: In critically ill trauma patients, early tracheostomy was associated with shorter duration of mechanical ventilation, ICU and hospital days, and lower ventilation associated pneumonia rates. In addition, total hospital costs were significantly decreased in the early tracheostomy group. In this cohort alone, early tracheostomy would have resulted in a potential hospital cost saving of 2.5 million/year.

Keywords: Brain injuries, Costs and cost analysis, Critical illness, Length of stay, Outcome research, Pneumonia, Ventilator-associated, Tracheostomy.


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Conflict of interest: None

ORIGINAL RESEARCH

Financial Implications of Early Tracheostomy in the Healthcare Cost Containment Era

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6Randall S Friese, 7Peter Rhee, 8Terence O’Keeffe

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Conclusión: En pacientes post trauma, críticamente enfermos, la traqueotomía temprana se asoció con una menor duración de la ventilación mecánica, menos días en la UTI y el hospital, así también como una menor tasa de neumonía asociada a la ventilación mecánica. Además, los costos hospitalarios totales fueron significativamente menores en el grupo de traqueotomía temprana. En solo esta cohorte, la traqueotomía temprana habría dado lugar a un potencial ahorro de costos hospitalarios de 2,5 millones de dólares anuales.

Palabras claves: Costos y análisis de costos, Enfermos críticos, Investigacion de resultados, Lesiones cerebrales, Neumocia asociada a ventilación mecanica, Tiempo de estadia, Traqueostomia.

INTRODUCCIÓN

Tracheostomía es a menudo realizada por críticos enfermos que tienen un prolongado manejo de cuidados intensivos (ICU) en el que el riesgo de complicaciones del intubación endotraqueal a largo plazo.1,2 El momento óptimo de la traqueostomía ha sido mucho debatido durante los últimos 40 años.2 Las investigaciones disponibles sobre este tema varían en metodología, población de pacientes, y los resultados de los estudios.5 Controversia se ha manifestado diferenciando a aquellos pacientes que requieren un manejo prolongado de intubación, y si se espera que el procedimiento beneficie a los pacientes. Como consecuencia, el momento de la traqueostomía se ha individualizado, dándole como consecuencia el término de la ‘aparición anticipada’3,5 Durante la Conferencia de Consenso sobre Aires Artificial en 1989, un consenso estableció que ‘el tiempo de la apariencia anticipada del espacio aéreo artificial mayor de 21 días, debe realizarse la traqueostomía’.4

Después de que el consenso reporte, se empezó a surgir la idea de que una traqueostomía temprana puede ser beneficioso en los pacientes de trauma.6,7 Sin embargo, una reciente revisión sistemática de la literatura realizada por Dunham et al mostró no haber ninguna diferencia en los resultados entre la traqueostomía temprana y tardía en pacientes de trauma; a pesar de esto, la meta-análisis sugirió que la traqueostomía temprana se asocia con un descenso en la ventilación y días en la ICU para los pacientes con trauma severo, y que la investigación adicional es necesaria.8 Para pacientes sufriendo de lesión cerebral traumática grave (81.2 vs 65.0%, p < 0.001). No hubo diferencias en los requisitos de transfusión sanguínea o necesidad de procedimientos intracavitarios. Cuando se analizaron los resultados, mientras que no hubo diferencia en mortalidad (8,9 vs 5,1%, p = 0,126 ajustado), los pacientes con traqueotomía temprana tuvieron menos días de uso de ventilación mecánica (8,7 ± 7,2 días vs 19,0 ± 10,4 días, p ajustado < 0,001), menos días de hospitalización (22,3 ± 17,9 días frente a 30,0 ± 18,4 días, p ajustado < 0,001) y menos días en la UTI (11,6 ± 8,4 días frente a 22,8 ± 11,6 días, p ajustado < 0,001).

En pacientes post trauma, críticamente enfermos, la traqueotomía temprana se asoció con una menor duración de la ventilación mecánica, menos días en la UTI y el hospital, así también como una menor tasa de neumonía asociada a la ventilación mecánica. Además, los costos hospitalarios totales fueron significativamente menores en el grupo de traqueotomía temprana. En solo esta cohorte, la traqueotomía temprana habría dado lugar a un potencial ahorro de costos hospitalarios de 2,5 millones de dólares anuales.

MATERIALS AND METHODS

After institutional review board approval, all trauma patients admitted to the University of Arizona Medical Center (UMC) from 1st Jan 2006 to Dec 31st 2013 were retrospectively reviewed. Patient variables were extracted including age, gender, mechanism of injury, intubation requirements, admission vitals, Glasgow coma scale (GCS), injury severity score (ISS), associated injuries, procedures required, complications, such as ventilator associated pneumonia and acute renal failure, ventilation days, ICU LOS, hospital LOS, hospital costs and mortality. In addition, hospital charges, costs and reimbursements were also extracted. Patients receiving early tracheostomy (≤7 days) were compared to late tracheostomy (> 7 days). Continuous variables were dichotomized using the following clinically relevant cut-points: age (≥ 55 vs < 55), respiratory rate on admission (≤ 10 or > 24 vs ≥ 10 or ≤ 24 breaths/min), systolic blood pressure (SBP) on admission (< 90 or ≥ 90 mm Hg), GCS on admission (≤ 8 vs > 8), and ISS (≥ 16 vs < 16).

Dichotomous variables were compared utilizing Chi-square or Fisher’s exact tests whereas continuous variables were compared utilizing unpaired Student’s t or Mann-Whitney U tests. The summary data is presented as a raw percentage or mean ± SD. The p-values were significantly different at p < 0.05.

The primary outcome measures of this study were ventilation days and hospital costs. Secondary outcome measures were mortality, HLOS, ICU LOS, complications, hospital charges and reimbursements. Logistic regression modeling was performed to control for confounders that were significantly different at the p < 0.05 level among the groups. Values are reported as means ± standard deviation (SD); median (range) for continuous variables and as percentage for categorical variables. All analysis were performed using the Statistical Package for Social...
During the 8-year study period, a total of 529 patients required a tracheostomy. Of those, 292 (55.2%) underwent early tracheostomy (≤7 days) and 237 (44.8%) late tracheostomy (>7 days). Patients requiring early tracheostomy were more likely to be male (80.5% vs 70.5%, p = 0.007) and younger (41.5 ± 18.6 years vs 50.5 ± 21.2 years, p < 0.001). There were no differences in ISS (70.5% vs 27.2 ± 11.1, p = 0.161) but early tracheostomy patients were more likely to sustain severe traumatic brain injury (Head AIS ≥3: 81.2% vs 65.0%, p < 0.001). There were no differences in pRBC requirements or need for intracavitary procedures (Table 1).

When outcomes were analyzed, hospital charges and reimbursements were also lower in the early tracheostomy group (Table 2). There was no difference in mortality (8.9% vs 5.1%, adjusted p = 0.126), early tracheostomy patients had significantly shorter ventilator days (8.7 ± 7.2 days vs 19.0 ± 10.4 days, adjusted p < 0.001), hospital LOS (22.3 ± 17.9 days vs 30.0 ± 18.4 days, adjusted p < 0.001) and ICU LOS (11.6 ± 8.3 days vs 22.8 ± 11.6 days, adjusted p < 0.001). Hospital costs were also lower in early tracheostomy patients ($55,371 ± 36,280 vs $93,702 ± 55,371). The p-values were derived from Chi-square or Fisher’s exact tests; *p-values are significantly different (p < 0.05); SD: Standard deviation; SBP: Systolic blood pressure; GCS: Glasgow coma scale score; pRBC: Packed red blood cell; ISS: Injury severity score; AIS: Abbreviated injury scale.

Table 1: Demographic and clinical data of patient groups

<table>
<thead>
<tr>
<th></th>
<th>Total (n = 529)</th>
<th>Early tracheostomy (≤7 d) (n = 292)</th>
<th>Late tracheostomy (&gt;7 d) (n = 237)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y), mean ± SD; (median) (range)</td>
<td>45.5 ± 20.2; (46) (4–91)</td>
<td>41.5 ± 18.6; (40) (7–87)</td>
<td>50.5 ± 21.2; (52) (4–91)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Age ≥ 55 (%)</td>
<td>35.0% (185)</td>
<td>34.9% (113)</td>
<td>35.2% (74)</td>
<td>0.950</td>
</tr>
<tr>
<td>Male (%)</td>
<td>76.0% (402)</td>
<td>75.8% (221)</td>
<td>76.1% (147)</td>
<td>0.674</td>
</tr>
<tr>
<td>Blunt (%)</td>
<td>88.1% (466)</td>
<td>88.1% (251)</td>
<td>88.1% (215)</td>
<td>0.931</td>
</tr>
<tr>
<td>Intubated on admission (%)</td>
<td>92.7% (471)</td>
<td>93.5% (279)</td>
<td>92.2% (192)</td>
<td>0.389</td>
</tr>
<tr>
<td>SBP on admission, mean ± SD; (median) (range)</td>
<td>135.1 ± 33.8; (137) (0–273)</td>
<td>134.9 ± 34.5; (137) (0–245)</td>
<td>135.1 ± 33.1; (136) (50–273)</td>
<td>0.614</td>
</tr>
<tr>
<td>SBP on admission &lt;90 mm Hg (%)</td>
<td>7.6% (40)</td>
<td>7.5% (22)</td>
<td>7.6% (22)</td>
<td>0.970</td>
</tr>
<tr>
<td>GCS on admission ≤8 (%)</td>
<td>53.9% (285)</td>
<td>53.8% (193)</td>
<td>53.9% (192)</td>
<td>0.959</td>
</tr>
<tr>
<td>pRBC transfusion (%)</td>
<td>48.8% (258)</td>
<td>48.7% (176)</td>
<td>48.9% (182)</td>
<td>0.959</td>
</tr>
<tr>
<td>Massive transfusion protocol activated (%)</td>
<td>3.8% (20)</td>
<td>3.8% (7)</td>
<td>3.8% (13)</td>
<td>0.614</td>
</tr>
<tr>
<td>ISS, mean ± SD; (median) (range)</td>
<td>27.8 ± 11.8; (27) (1–75)</td>
<td>28.4 ± 12.5; (27) (1–75)</td>
<td>27.2 ± 11.1; (27) (1–66)</td>
<td>0.161</td>
</tr>
<tr>
<td>ISS ≥ 16 (%)</td>
<td>83.9% (443)</td>
<td>84.2% (246)</td>
<td>83.5% (197)</td>
<td>0.810</td>
</tr>
<tr>
<td>Head AIS ≥ 3 (%)</td>
<td>73.9% (391)</td>
<td>74.1% (277)</td>
<td>73.7% (114)</td>
<td>0.256</td>
</tr>
<tr>
<td>Chest AIS ≥ 3 (%)</td>
<td>40.1% (212)</td>
<td>40.1% (153)</td>
<td>40.1% (99)</td>
<td>0.994</td>
</tr>
<tr>
<td>Abdomen AIS ≥ 3 (%)</td>
<td>12.3% (65)</td>
<td>12.6% (49)</td>
<td>12.2% (26)</td>
<td>0.860</td>
</tr>
<tr>
<td>Craniotomy/craniectomy (%)</td>
<td>14.2% (75)</td>
<td>14.6% (45)</td>
<td>14.0% (30)</td>
<td>0.472</td>
</tr>
<tr>
<td>Thoracotomy (%)</td>
<td>3.2% (17)</td>
<td>3.2% (12)</td>
<td>3.2% (5)</td>
<td>0.994</td>
</tr>
<tr>
<td>Laparotomy (%)</td>
<td>18.1% (96)</td>
<td>18.3% (69)</td>
<td>18.0% (27)</td>
<td>0.776</td>
</tr>
</tbody>
</table>

The p-values for categorical variables were derived from Chi-square or Fisher’s exact tests; p-values for continuous variables were derived from unpaired Student’s t or Mann-Whitney U tests; *p-values are significantly different (p < 0.05); SD: Standard deviation; SBP: Systolic blood pressure; GCS: Glasgow coma scale score; pRBC: Packed red blood cell; ISS: Injury severity score; AIS: Abbreviated injury scale.

Table 2: Financial and length of stay data

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SD; (median) (range)</th>
<th>Mean ± SD; (median) (range)</th>
<th>Mean ± SD; (median) (range)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital charges ($)</td>
<td>271,690 ± 173,405; (231,912) (118–1,254,708)</td>
<td>209,075 ± 128,165; (182,483) (118–977,872)</td>
<td>348,011 ± 189,415; (289,282) (95,860–1,254,708)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Hospital costs ($)</td>
<td>72,781 ± 47,755; (60,534) (11–318,705)</td>
<td>55,371 ± 36,280; (49,433) (11–318,705)</td>
<td>93,702 ± 51,427; (78,467) (23,596–316,160)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Hospital reimbursements ($)</td>
<td>79,096 ± 57,523; (67,863) (205–320,941)</td>
<td>61,876 ± 51,808; (49,587) (205–320,050)</td>
<td>98,627 ± 57,601; (87,776) (306–320,941)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Ventilation days</td>
<td>13.3 ± 10.1; (11–10) (1–80)</td>
<td>8.7 ± 7.2; (7) (1–53)</td>
<td>19.0 ± 10.4; (16) (2–80)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>ICU days</td>
<td>16.7 ± 11.4; (14–10) (1–92)</td>
<td>11.8 ± 8.3; (10) (1–52)</td>
<td>22.8 ± 11.6; (20) (5–92)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Hospital days</td>
<td>25.8 ± 18.6; (22–1) (1–154)</td>
<td>22.3 ± 17.9; (17–1) (1–123)</td>
<td>30.0 ± 18.4; (25) (10–154)</td>
<td>&lt;0.001*</td>
</tr>
</tbody>
</table>

The p-values were derived from multivariable analysis; The p-values were obtained after adjustment for demographics and clinical data; *p-values are significantly different (p < 0.05); ICU: Intensive care unit.
51,427, adjusted p < 0.001) (Table 3). In addition, ventilator associated pneumonia rates were also lower among early tracheostomy patients (8.6 vs 17.7%, adjusted p = 0.002).

Graph 1 depicts the relationship between the time of tracheostomy and ventilation days, ventilator associated pneumonia rates and hospital costs. There was a stepwise increase in these outcomes as timing of tracheostomy increased.

**DISCUSSION**

Our findings demonstrate that patients receiving an early tracheostomy (≤7 days) not only positively affect the clinical outcomes for the patient, but also demonstrate economic benefits for patients and hospitals. The early tracheostomy group spent significantly less time in the ICU, less time on mechanical ventilation, an overall decreased LOS in the hospital, and lowered costs and charges for both the patient and the hospital. The data was also consistent with other studies in demonstrating no significant effect on mortality to the patient.14,15

Early tracheostomy has been reported to decrease the amount of time spent on mechanical ventilation, require less sedation, and lower ICU and overall hospital LOS.16,17 The study by Alali et al included a cohort of adults with isolated TBI who underwent tracheostomy within one of 135 participating centers in the American College
of Surgeons’ Trauma Quality Improvement Program, during 2009 to 2011. They used propensity matching to compare patients who underwent early (≤ 8 days) vs late (>8 days) tracheostomy. They were able to demonstrate that early tracheostomy was associated with a shorter duration of mechanical ventilation, ICU stay, and hospital stay.16 Our data is consistent with these previous findings. In our analysis, early tracheostomy decreased mean ventilator days by 50%, decreased ICU LOS by 11 days, and overall hospital LOS by 7 days. While in this study, we have defined early tracheostomy to be ≤ 7 days, the exact timing of tracheostomy can also significantly impact ventilator days and hospital costs. An apparent linear association is also demonstrated as the length of time increases from performing a tracheostomy to ventilator days and hospital costs. However, as stated above, no clinical guidelines exist as to predict a patient’s need for tracheostomy based on presenting injuries or clinical factors. Previous studies that have attempted to predict the necessity of tracheostomy in ventilated patients have not been universally accepted.18 Therefore, if a patient’s anticipated ventilator course will require more than 21 days of endotracheal intubation, we suggest that a tracheostomy be performed as soon as possible in order to capitalize on the observed benefits of this study.

The association between tracheostomy and ventilator-associated pneumonia (VAP) has been studied quite extensively. Some studies have suggested that tracheostomy may be associated with higher rates of VAP,18,19 while others have pointed to tracheostomy as an independent risk factor for the development of VAP.20-23 However, many of these studies are limited in design or fail to examine the exact timing of tracheostomy. More recently, studies have found early tracheostomy was associated not only with shorter mechanical ventilation days, ICU and hospital LOS, but also decreased rates of VAP.24-26 Our results are consistent with these findings in that more than 50% of late tracheostomy patients (ET 8.6 vs LT 17.7%) developed VAP. However, when looking at the exact timing of each patient’s tracheostomy, only the group who received a tracheostomy within the first 3 days of admission demonstrated significantly lower rates of VAP. Subsequent groups were still able to benefit slightly from an earlier tracheostomy. Regardless, our data is consistent with other papers that have been published on this same topic.

While this clinical data reinforces the positive consequences of performing early tracheostomy, the more important and relevant conclusion that can be drawn from this study is financial gain that both the patient and hospital can benefit from. In our cohort study of 529 patients, the 292 patients that received early tracheostomy saved a mean total of $138,936 in hospital charges due to LOS reduction. Hospitals also saved $38,331 from performing an early tracheostomy mainly due to less time using mechanical ventilation, smaller amounts of sedative medications, and reduced costs in airway hygienic maintenance. If all the patients within our cohort received early tracheostomy, it is estimated that up to $2.5 million/year could have been saved in hospital costs.

Our study is not without its limitations. First and foremost, this is a retrospective analysis, and thus unknown confounding variables may exist within the data set that we were unable to control for. The age distribution between early and late tracheostomy is significant in that patients > 55 years of age were more likely to receive a late tracheostomy. Due to our study being retrospective in nature, it can only be postulated that the decision to delay tracheostomy placement was influenced by the patient’s age and if the patient was less likely to tolerate the procedure. The patients who did receive early tracheostomy were younger than 55 years of age and could conceivably respond better to the procedure. The majority of patients who received an early tracheostomy also had certain clinical factors at the time of presentation that most likely influenced whether a tracheostomy was performed immediately or not. Most patients who received an early tracheostomy had a GCS score of ≤8 and had significant head, chest, and abdominal injuries. While this makes our results more difficult to generalize to all trauma patients, it does highlight that recognizing critically ill patients as potential early tracheostomy recipients can have important benefits. Finally, while our study has demonstrated decreased rates of VAP, these rates can differ significantly between various ICUs due to varying protocols, staff, and other unknown differences that could potentially affect the development of VAP.

Overall, our study has been able to not only reinforce the positive clinical outcomes when performing a tracheostomy within the first 7 days of admission for critically ill trauma patients, but also the economical and financial implications that this procedure can have on hospitals’ and patients’ healthcare costs. Future prospective research should be directed towards predicting those subgroups that are likely to benefit most from early tracheostomy.

CONCLUSION
In critically ill trauma patients, early tracheostomy was associated with shorter duration of mechanical ventilation, ICU and hospital LOS, and lower ventilation-associated
pneumonia rates. In addition, total hospital costs were significantly decreased in the early tracheostomy group. In this cohort alone, early tracheostomy would have resulted in a potential hospital cost saving of 2.5 million/year.

REFERENCES

Early Tracheostomy (ET): Not Just Financial Implications

Despite the increasing number of studies including several randomized control clinical trials comparing early vs late tracheostomy, there continues to be a perplexing lack of specific recommendations when trying to answer the following ‘simple’ question: Should we perform a tracheostomy on this patient?

The results presented in this manuscript confirm findings from previous retrospective studies, showing that patients who undergo ET in this case defined as less than 7 days have a reduced number of days in the ventilator, reduced rate of VAP, reduced length of stay both in the ICU and the hospital and, as expected, this reduction translated in decreased hospital cost. Unfortunately, this study does not help us answering the question formulated above and does not confirm the results from evidence-based medicine data available from most recent RCT studies on the issue of timing of tracheostomy. Nevertheless, the authors recommend, that if a patient’s anticipated ventilator course will require more than 21 days then an ET should be performed as soon as possible. How can we predict on day 3 or 7 whether the patient will remain intubated by day 21 remains a great challenge however.

From the evidence currently available in the literature, clinicians have learned one thing: a significant number of ventilated patients deemed to require a tracheostomy within the next 10 days may end up being separated from the ventilator in 55% of the cases. This means that there is a 50/50 chance of being wrong when trying to decide not just who needs a trach but how much longer should we wait before submitting the patient to a procedure that may not be necessary (should we have waited long enough). No wonder current evidenced based medicine data cannot fully answer these complex set of circumstances.

The reader should go back and analyze the data of this current publication from a practical viewpoint; the majority of patients benefiting from ET in this retrospective review were multiple injured individuals with evidence of TBI and a GCS < than 8. This finding confirms previous observations made in this population and suggest a favorable role for ET in head injured patients. No further attempt to generalize these finding should be made.

There are recent editorials, several systematic reviews, including a Cochrane publication and a meta-analysis all dealing with the issue of timing of tracheostomy. The current recommendations from all these publications is that when ET is studied among all patients on mechanical ventilation, ET showed no significant difference in clinical outcomes compared to that of patients undergoing prolonged intubation and all recommend that more rigorously designed and adequately powered RCTs are required to confirm these findings. The Cochrane review indicates that the evidence is considered to be of moderate quality but is not more than suggestive of recommending early (as against late) tracheostomy for reducing mortality among critically ill patients on prolonged mechanical ventilation. However, the available evidence should be considered with caution, information is insufficient to permit conclusions about any subgroup or individual characteristic(s) potentially associated with the best indications for early or late tracheostomy because clinical heterogeneity is a characteristic inherent to patients in the ICU.

In my opinion, it is not feasible, nor appropriate to compare all patients on MV and their indications for tracheostomy in a single large RCT. The underlying conditions for which a patient is requiring a prolonged intubation in any given time are remarkably different among ICU patient population. A medical ICU with a large percent of chronic pulmonary disease patients will have a population of individuals not all comparable with those in a poly-trauma ICU or within a neurotrauma ICU. Should we then be surprised when despite the availability of some EBM class I data from several controlled clinical trials performed so far we still get controversial results?

To simply suggest that we should adopt a ‘wait and see’ strategy for at least 10 days is also as unreasonable as to expect that this mixed bag of respiratory failure patients are included in a single clinical trial in order to answer this very same question: Should we perform a tracheostomy on this patient?

REFERENCES


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