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Improvement of venous thromboembolism prophylaxis by attaching printed thrombosis risk assessment tool and recommendations to patients hospital charts

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REZUMAT

Ameliorarea profilaxiei accidentelor tromboembolice venoase prin utilizarea instrumentelor de evaluare a riscului de tromboză și a recomandărilor tipărite din spital

Evidențele sugerează că profilaxia tromboembolismului venos (VTEP) este încă subutilizată semnificativ, în ciuda relației acesteia cu morbiditatea și mortalitatea. Studii anterioare au demonstrat creșterea ratei VTEP prin utilizarea computerului pentru reamintirea folosirii protocoalelor în vigoare. Din păcate, acest sistem nu este disponibil în cele mai multe spitale din țările în curs de dezvoltare. Am pornit de la ipoteza că atașarea unor recomandări scrise în fișa pacientului, la momentul internării ar acționa ca un mijloc de aducere aminte a acestor protocoale.

Metode: *acest studiu pre- și postintervenție a inclus trei părți: (i) supravegherea frecvenței inițiale a evenimentelor tromboembolice venoase; (ii) pe parcursul următoarelor nouă luni am atașat un mod de calculare a riscului evenimentelor tromboembolice venoase printat și recomandările spitalului, pe prima pagină a fișei bolnavului de la momentul admiterii acestuia în spital; (iii) reevaluarea evenimentelor tromboembolice venoase similar fazei unu.*

Rezultate: *acest studiu prospectiv pre- și postintervenție s-a desfășurat pe 1202 pacienți chirurgicali evaluați pentru riscul tromboembolic și performanța VTEP. Orice tip de profilaxie a fost folosită la 20% din pacienți înaintea intervenției și la 37,6% după intervenție ($p<0,001$). Profilaxia a fost corectă la 19,1% înaintea intervenției și la 33,8% după intervenție ($p<0,001$). După intervenție rata VTEP a crescut de la 8,5% la 19,3% în grupul de risc moderat, de la 18,5% la 39,1% în grupul de risc înalt și de la 28,1% la 45,1% în grupul de risc foarte înalt.*

Concluzii: *O metodă de intervenție simplă poate îmbunătăți rata VTEP în locațiile în care modalitatea de alertă electronică nu este disponibilă. VTEP este subutilizat; în ciuda beneficiilor evidente există totuși un decalaj între evidențe și practică.*

Cuvinte cheie: *accidente tromboembolice venoase, profilaxie, evaluare risc*

ABSTRACT

Evidence suggests that venous thromboembolism prophylaxis (VTEP) is still significantly underused despite its relationship with morbidity, mortality. Previous studies showed that computerized reminders have resulted in increased rates of VTEP. However, this system is not available in most hospitals especially in developing countries. We hypothesized that attaching written guidelines to patients hospital chart during admission would act as reminder.

Methods: *This pre and post-interventional study included three parts: (i) Baseline survey of VTEP (ii) over the following nine months we attached a printed risk assessment tool and recommendation during admission to first page of patient chart. (iii) We reevaluated VTEP similar to phase one.*

Result: *This prospective pre-intervention post-intervention study was conducted in 1202 surgical patients evaluated for venous thromboembolism risk and VTEP performance. Any type prophylaxis was 20.0% before and 37.6% after intervention (p value<0.001). Appropriateness of prophylaxis was 19.1% before and 33.8% after intervention (p value<0.001). After intervention VTEP rate increased from 8.5% to 19.3% in moderate risk group, from 18.5% to 39.1% in high risk and from 28.1% to 45.1% in highest risk group.*

Conclusion: *A simple intervention can improve VTEP rate in settings where electronic alert is not available. VTEP is underused despite improvement. There is still a high gap between evidence and practice.*

Key words: *venous thromboembolism, prophylaxis, thrombosis risk assessment tool*

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Introduction

Venous thromboembolism (VTE), which encompasses both deep vein thrombosis (DVT) and pulmonary thromboembolism (PTE), is a frequent cause of preventable disease and death in hospitalized patients. It is the third most common cause of all hospital-related deaths[1]. It is described that hospitalized patients are at 100 times greater risk for VTE than people in the community[2,3]. About 25% of all cases of VTE are associated with hospitalization[4]. PTE was seen in 31% autopsies in surgical patients; and the diagnosis of PTE was not suspected ante-mortem in about 70% of patients who died of PTE confirmed by autopsy[3]. Since VTE prophylaxis (VTEP) is highly effective in reducing VTE, the American colleague of chest physician (ACCP) published consensus guidelines and recommended VTEP[5]. However, several studies have showed a clear gap between guidelines and actual clinical practice. Surveys show persistent underuse of VTEP[6,7]. This gap is higher in developing countries. Surveys in Iran show that VTEP was used only in 16.7% with only 9.9% receiving ACCP recommended prophylaxis[8]. It has been shown that the use of computerized reminders to physicians raised the rate of VTEP[9-12]. However, this system requires significant investment and is not readily available in all hospitals especially in developing countries.

This is a pre and post intervention study designed to assess whether attaching to patients hospital chart a printed copy of risk assessment and recommendation tool for VTEP as reminder would cause improvement in VTEP in hospitalized surgical patients.

Methods

Thrombosis risk assessment tool:

Caprini[13,14] developed the Thrombosis Risk Assessment Tool (TRAT) to augment the ACCP guidelines. In this tool, approximately 40 risk factors are listed with weights of 1 to 5 points each. The total score determines the level of risk for each patient. Patients' scores place them into the one of four categories „low risk," „moderate risk," „high risk," and „highest risk". Each category has recommended VTEP regimen associated with it. Additional questions address prophylactic safety concerns about increased risks of bleeding. We used TRAT after getting permission from Caprini.

Place of study and sample: This cross-sectional prospective pre-and-post intervention was performed among surgical patients in general, thoracic surgery, urology, neurosurgery and ICUs of Imam Khomeini teaching hospital, a tertiary referral center in Urmia, Iran.

The study had ***three phases:***

Initial phase: In first step we evaluated VTE risk by using TRAT and VTEP performance by reviewing orders, nursing charts, and directly observing patients. Physicians in charge of patients were not informed of the aims of the study in order to avoid bias due to previous information.

Intervention phase: After first phase, we attached printed TRAT and recommendation during admission to patient hospital chart to act as daily reminder to physician and nurses. Our idea was that observing this tool by physician in every day visit would lead to alertness and will act as reminder.

After 9 months while reminder was in patient's chart we reevaluated VTEP similar to phase one and compared the two phases.

Statistical analysis:

Data were analyzed by means of PASW Statistics 18. We compared VTEP rate before and after intervention by using χ^2 statistics with differences at p value, 0.05 being considered statistically significant.

Results

In pre-intervention phase 617 patients, 323 (52.4%) male and 294 (47.6%) female were checked for VTE risk and receiving VTEP. In post-intervention 585 patients; 313(53.5%) male and 272 (56.5%) female were assessed similar to phase 1. Patients' risk scores place them into one of the four categories „low risk," „moderate risk," „high risk," and „highest risk". For low risk group, no specific VTEP was required except early ambulation. So 92 patients were in low risk group and no prophylaxis required.

Table I and figure 1 show VTEP rate pre and post-intervention among moderate, high, and highest risk group.

Patients were grouped to two groups: „No prophylaxis" when patient had no VTEP, „Any prophylaxis" when patient had VTEP whether it was according to recommendation or not (for example VTEP with aspirin which is not recommended), appropriate when it was according to recommendation.

Table II and figure 2 show VTEP rate in patients who required prophylaxis but some patient had inappropriate prophylaxis, i.e. aspirin which is not recommended.

Discussion

This study showed VTEP is underused in our teaching hospital, even despite improvement after intervention there is still a high gap. Large prospective studies show that VTEP is significantly underutilized, often with only 30–50% eligible patients receiving prophylaxis[6,15].

A recent survey in 358 medical centers from 32 countries (ENDORSE study)[6] shows that only 39.5% of medical patients and 58.5% of surgical patients were on prophylaxis consistent with ACCP recommendations. A large multicenter study in Middle Eastern countries (AVAIL ME) showed VTEP and guidelines application are low (37%), where the majori-

Table I.
Comparison of total thromboprophylaxis before and after intervention according to risk group

Risk group	Before intervention N: 559 patients			After intervention n: 541 pacients			P value
	Any prophylaxis	No prophylaxis	Total	Any prophylaxis	No prophylaxis	Total	
Moderate	9 (8.5%)	97 (91.5%)	106	21 (19.3%)	88 (80.7%)	109	0.018
High risk	47 (18.5%)	207 (81.5%)	254	97 (39.1%)	151 (60.9%)	248	0.001
Highest	56 (28.1%)	143 (71.8%)	199	89 (45.9%)	105 (54.1%)	194	0.001

Figure 1.
Prophylaxis rate pre- and post intervention according to risk group

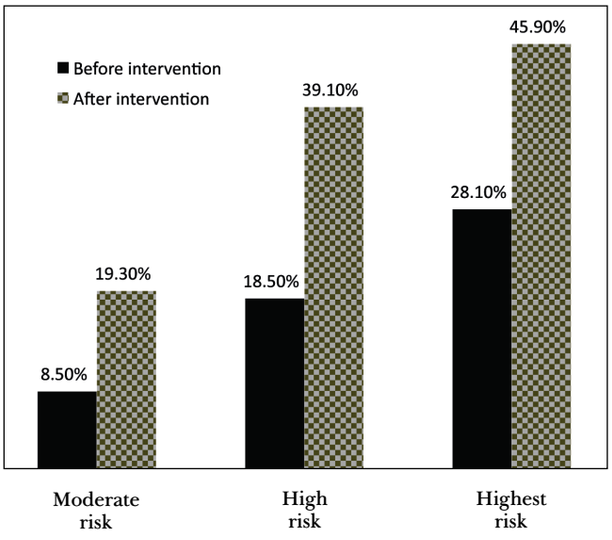
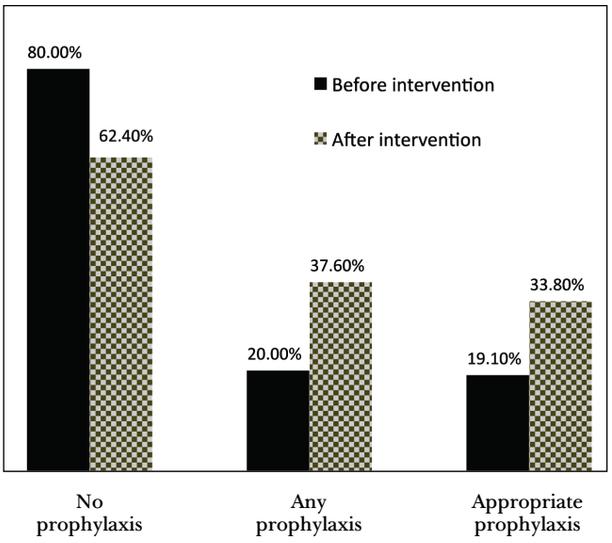


Figure 2.
Prophylaxis rate pre and post-intervention according to prophylaxis type



ty of patients were found to be at high risk of VTE. Underutilization of VTEP was very higher in our center [7].

Improving VTEP practices is difficult and the best intervention for reaching this goal is unclear [16] .Six general categories of quality improvement strategies are stated: provider reminder systems and decision support, provider education, audit and feedback, education of patients, organizational change, and financial incentives, regulation, and policy[1,17].

Table II.
Prophylaxis rate before and after intervention total and appropriate prophylaxis (p<0.001)

	Before intervention N: 559 pts	After intervention N: 551 pts
Any type prophylaxis	112 (20.0%)	207 (37.6%)
Appropriate prophylaxis	107 (19.1%)	186 (33.8%)
No prophylaxis	447 (80.0%)	344 (62.4%)

Tooher[18] et al by a systematic reviewing (studies published between 1996 and May 2003) of strategies to improve VTEP in hospitals concluded that a number of active strategies are likely to achieve optimal outcomes by combining a system for reminding clinicians to assess patients for VTE with assisting the selection of prophylaxis. Michota[1] reviewed articles published between May 2003 and May 2006 and stated that risk assessment models may be helpful for deciding which patients should receive prophylaxis and for matching VTE risk with the appropriate intensity of VTEP. Reminding the provider enhances the practice of prescribing appropriate VTEP.

Recent studies focused upon electronic and computer-based decision-support systems, interventions that require significant investment, and are not readily available in all settings especially in developing countries. Kucher et al[10] assessed the effects of a computerized reminder system on both the use of heparin and outcomes among 2501 inpatients identified by the computer program to be at high risk. The intervention group included 1255 hospitalized patients whose physicians received an electronic alert of patient risk of VTE, control group (1251 hospitalized patients) whose physicians did not receive such an alert. They found that the computer alert was associated with a significant increase VTEP than control group (34% *vs* 15%, p<0.001) with reduction in the incidence of DVT or PE at 90 days, with a hazard ratio of 0.59 (95% confidence interval: 0.43, 0.81) (4.9% *vs* 8.2%, p<0.001). Conversely other study demonstrated that increasing the VTEP rate by using a computerized reminder system is not associated with decreasing the rate of VTE. However, in that study the baseline rate of VTEP was already good 89.9% which increased to 95.0% after using of the computerized reminder system[9].

We used printed TRAT as reminder. Passive dissemination of guidelines to hospital staff did not increase VTEP rate (28% *vs* 31% after presentation P=0.59).) among 1,128 patients in two UK hospitals[19]. But our study was not a simple dissemination guideline. TRAT with recommendation to VTEP was attached to patient hospital chart and attendant physician, residents, other medical students and nurses saw it in every day visit to remind them.

Several previous studies showed that physician education will raise VTEP[20-23]. Cohn *et al* showed that after educational intervention VTEP increased from baseline 47% to 86% at 12 months[20]. In a study that evaluated the use of VTEP in 15 community hospitals before and after a targeted continuing medical education program was conducted showed increased VTEP rate (increase: 28% *vs* 11%; p< 0.001)[22].

The advantage of this study was that it was prospective, however its potential limitation is that part of the improvement in VTEP may be caused by increasing awareness of physicians by other ways.

Conclusion

These studies demonstrate that a quality-improvement initiative by attaching of written TRAT tool to patients charts is an effective method for improving VTEP. It can be applied in developing countries where electronic alert is not available.

Second VTEP in our center is lower than in western countries, despite improvement after intervention still there is high gap.

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