Early Mobilization and Deep Vein Thrombosis: A Literature Review

**Clinical Question:** In the hospitalized adult with deep vein thrombosis, how does early mobilization effect risk for pulmonary embolism and hospital length of stay?

**Background and Significance:** Over the past decades, patients with acute deep vein thrombosis (DVT) in the lower limbs were traditionally hospitalized and immobilized. This practice was commonly thought to prevent complications and provide some relief of pain and swelling to the affected limb. However, a growing body of evidence shows that the biological conditions of the endothelium play a central role in the pathophysiology of DVT recanalization. Moreover, hypertensive stasis due to prolonged bed rest with immobilization in patients with DVT is likely to impair the endogenous endothelial fibrinolytic activity. Bed rest has not been proven scientifically as a preventative measure for clot dislodgement and is not recommended per guidelines endorsed by various scientific/professional organizations, including the American College of Chest Physicians.

**Key Summary of the Literature:** A literature review was conducted on the clinical topic of inquiry, using a targeted clinical question. The evidence revealed an overwhelming consensus that early ambulation is beneficial for patients diagnosed with lower extremity DVT contrary to the traditional intervention of bed rest and immobilization of the affected limb. The literature additionally articulated that early ambulation does not increase the risk for PE in patients with acute DVT.

**Early Ambulation versus Bed Rest:**
- The systematic recommendation of bed rest as part of the early management of patients presenting with DVT, PE or both, is not scientifically supported.
- Bed rest is a potentially harmful treatment, both in patients with venous thromboembolism and in those with other medical conditions.
- Early mobilization is safe and beneficial, with positive outcomes appreciated from the first days after start of treatment.
- Early ambulation was associated with a trend toward a lower event rate of DVT and was not associated with a significant risk and/or prevention of new PE, as compared with bed rest.

**Use of Anticoagulation:**
- In all studies, the anticoagulant was low-molecular weight heparin (LMWH).

**Other Considerations: Pulmonary Embolus (PE):**
- Early ambulation does not increase the risk for PE in patients with acute DVT.
- One study did reveal similar results in patients presenting with acute PE.

**Demographics for Patient Developing a Pulmonary Embolism:**
- Age less than 65 years (odds ratio [OR], 3.1; 95% confidence interval [CI], 0.98 to 11) and cancer (OR, 3.0; 95% CI, 0.98 to 9.1) were associated with an increased rate of new PEs.

**Limitations:**
- The literature did not discuss in detail how length of stay was impacted, only that due to early mobilization, earlier discharge from the hospital could be considered due to lack of restriction on activity.
- Timing of ambulation was not precise and ranged from day 0 to day 2.
- Three of the four references were research studies with small sample sizes.

**Future Research:**
- More research is needed to quantify if length of stay has been reduced by implementing early mobilization, as well as institutional/organizational cost savings related to hospital early discharge.
Evidence Synthesis: Early mobilization should be promoted in patients with DVT to avoid new occurrence of DVT and/or progression of embolus formation and other adverse events.\textsuperscript{1,2,3,4} One citation demonstrated that patients who were allowed to ambulate were less severely ill than patients confined to bed.\textsuperscript{1} Bed rest and immobilization is not supported in the literature as an effective method of preventing complications.\textsuperscript{2} To the contrary, this outdated practice has been found to cause patients to be at greater risk for pulmonary embolism (PE) and other complications.\textsuperscript{3}

Key recommendations:
\begin{itemize}
  \item Implement current evidence-based guidelines for DVT treatment, which include anticoagulation, early ambulation, use of compression stockings, and home treatment in persons whose living conditions are adequate (American College of Chest Physicians).\textsuperscript{3}
\end{itemize}
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References


**Electronic Database Search Methodology**

**Search Dates:** October to November 2014

**Literature search topic/clinical question:** In the hospitalized adult with deep vein thrombosis, how does early mobilization effect the risk for pulmonary embolism and length of stay in the hospital?

<table>
<thead>
<tr>
<th>Database</th>
<th>Key Word(s) and/or Controlled Vocabulary Terms</th>
<th>Total References Identified (hits)</th>
<th>No. of Relevant References</th>
<th>No. of Total Duplicate Articles</th>
<th>No. of Articles Selected for Review</th>
<th>No. of Articles Excluded</th>
<th>Final Total Relevant References</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>0</td>
<td>1</td>
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<td>5</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td><strong>Name: Google Scholar</strong></td>
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<td>Deep vein thrombosis, ambulation, pulmonary embolism</td>
<td>7,062 (limited to first 50)</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td>159</td>
<td>12</td>
<td>2</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

*Controlled vocabulary (subject terms, MESH terms, tagged terms specific to database)*

*Use the first database as the main comparison for subsequent database searches and identifying duplicate articles*

**Total Articles Included in Literature Review:** Database (4) + Contextual Links (0) = 4
### Clinical Question

<table>
<thead>
<tr>
<th>Population and/or Patient(s)</th>
<th>Intervention/Interest Area</th>
<th>Comparison Intervention (Often current practice)</th>
<th>Outcome</th>
<th>Time Period (If Applicable; Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P: Adult, inpatient with deep vein thrombosis</td>
<td>I: early mobilization</td>
<td>C: no mobilization</td>
<td>O: effect on the risk for pulmonary embolism</td>
<td>T: hospital LOS</td>
</tr>
</tbody>
</table>

Final Clinical Question: In the hospitalized adult with a deep vein thrombosis, how does early mobilization effect risk for pulmonary embolism and hospital length of stay?

### Searchable Question

| Key Search Terms: Deep vein thrombosis (dvt), ambulation, early mobilization, pulmonary embolism |
| Inclusion Criteria: Adult, inpatient |
| Exclusion Criteria: No grey literature, pediatrics, |
| Limitors (Open year or year ranges, age ranges, and language, etc): 10 years, English only |
| Databases: CINAHL, PubMed, Ovid |
| Web Browser: Google Scholar |

**Database search methodology:** To conduct a thorough literature search, PubMed and Cochrane were the initial databases accessed using the following terms: adult, inpatient, dvt, deep vein thrombosis, ambulation, and pulmonary embolism. English language only and articles that were between 2004-2014 were set limitations due to the number of articles yielded. Grey literature, pediatric population, and non-English language articles were excluded.

7,737 articles were identified. Relevant articles were then retrieved, with 12 initially selected for inclusion. Two duplicate articles were removed. Ten records were accepted for full-text review. The criteria for inclusion for more detailed analysis were (a) ambulation, (b) adult hospitalized patient, (c) deep vein thrombosis, and (d) risk for pulmonary embolism. No contextual articles were added. After further examination, 6 articles were eliminated, as they were conducted in inappropriate settings or did not answer the clinical question. The remaining 4 articles were included in the final literature review. The evidence consisted of 1 meta-analysis, 1 independent review of the literature, 1 retrospective study with findings from a RIETE registry in Spain and 1 retrospective study done in Italy. The meta-analysis used the combined endpoint of a) occurrence of a new PE, b) progression of DVT, and c) new DVT, and found no heterogeneity among studies. Total N=3,052 from all the studies combined.
Early Mobilization in Patients with Deep Vein Thrombosis and the risk for Pulmonary Embolism Integrative Review

Literature Search Databases
Conducted October –November 2014

Cochrane (n = 1)
OVID (n = 616)
PubMed (n = 58)
Google Scholar (n = 7,062)

Search terms: adult, inpatient, dvt, deep vein thrombosis, ambulation, pulmonary embolism
Limits: English, articles from 2004-2014, adult only 18 yrs and over
Exclusion criteria: Non-English, pediatrics, no grey literature

Relevant hits (n =12)
Duplicate records removed (n=2)

Records accepted for full-text review (n =10)

Full text articles excluded (n=6)
Did not answer clinical question (n=5)

Full –text articles assessed for eligibility (n = 4)

Included in final evidence review (n = 4)
<table>
<thead>
<tr>
<th>LEVEL</th>
<th>DESCRIPTION</th>
<th>RELEVANT ARTICLES</th>
<th>ARTICLE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Meta-analysis of multiple large sample or small sample* randomized controlled studies, or meta-synthesis of qualitative studies with results that consistently support a specific action, intervention, or treatment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>Well-designed controlled studies, both randomized and nonrandomized, prospective or retrospective studies, and integrative reviews with results that consistently support a specific action, intervention, or treatment</td>
<td>3</td>
<td>2,3,4</td>
</tr>
<tr>
<td>C</td>
<td>Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results</td>
<td></td>
<td></td>
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<tr>
<td>D</td>
<td>Peer-reviewed professional organizational standards, with clinical studies to support recommendations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Theory-based evidence from expert opinion or multiple case reports, case studies, consensus of experts, and literature reviews</td>
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<tr>
<td>MA</td>
<td>Manufacturer’s recommendation; Anecdotes</td>
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</tr>
<tr>
<td>LR</td>
<td>Laws and Regulations (local, state, federal; licensing boards; accreditation bodies, etc.)</td>
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<td></td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>4</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

* A large sample has adequate power to detect the observed effect with confidence (as seen in significant Confidence Intervals). A small sample may lack confidence in the power of the desired effect (Polit & Beck, 2008)

Designed by Emma M. Cuenca and Cecelia L. Crawford, Collaborative Center for Integrative Reviews and Evidence Summaries (CCIRES); ©Kaiser Permanente SCAL Regional Nursing Research Program, May 2011

*Adapted from AACN Evidence Leveling System (2009) and Canadian Medical Association & Centre for Evidence-Based Medicine, Levels of the Evidence (2001)*
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