Vecuronium carries a serious risk of hyperthermia in susceptible populations. This risk must be considered in selecting the drug for use and in monitoring for its development. Vecuronium-induced hyperthermia may be triggered by other drugs, including succinylcholine, intravenous barbiturates, and parenteral opioid agonists. In addition, the use of vecuronium before succinylcholine, in order to attenuate some of the side effects of the latter, carries a risk of triggering malignant hyperthermia in susceptible patients. Precautionary measures include the following: 1) Verify that the patient is not a member of a susceptible family. 2) Use a single nerve stimulator to monitor muscle relaxation (glass electrodes should not be used). 3) Verify that the urine catecholamines are normal. If the patient is a member of a susceptible family or if there is a history of malignant hyperthermia, vecuronium should not be administered. If malignant hyperthermia occurs, the drug must be discontinued immediately. Treatment of malignant hyperthermia consists of discontinuing the drug, administering dantrolene sodium, and, if necessary, providing appropriate supportive care. If used as the initial muscle relaxant, vecuronium may produce muscle rigidity and tachycardia which will increase the possibility of malignant hyperthermia in susceptible patients. Malignant hyperthermia may occur if used in combination with other drugs that can trigger this reaction. The administration of other drugs that may exacerbate malignant hyperthermia should be limited when vecuronium is used for the purpose of ensuring surgical conditions. The use of vecuronium, with or without other muscle relaxants, should not be initiated in patients with a family history of malignant hyperthermia. Further study is necessary to establish whether vecuronium, used before or in combination with other muscle relaxants, can produce malignant hyperthermia in susceptible patients. Opioid agonists, including fentanyl, sufentanil, and remifentanil, are administered with some degree of frequency in the perioperative period. The metabolic clearance of opioids is mainly via the hepatic CYP3A4 isoenzyme. The inhibition of CYP3A4 enzyme activity by vecuronium has not been studied sufficiently to support dosage recommendations. In the presence of hepatic impairment or during the administration of vecuronium in combination with other drugs that inhibit CYP3A4, the risk of opioid hypermetabolism should be considered. The use of vecuronium should be avoided in patients with a family history of malignant hyperthermia. 

PRECAUTIONS – Drug Interactions 

Vecuronium produces synergistic effects when administered with nondepolarizing muscle relaxants, particularly when used in combination with certain anesthetics. These anesthetics, including enflurane, isoflurane, and halothane, are also capable of obstructing the release of the neurotransmitter from the nerve terminal. The following section lists the common combinations used in surgical practice. The estimated duration of action is presented as a guide to the time required to achieve complete neuromuscular block (80% twitch height depression). These estimates are based on clinical studies and may vary from patient to patient. The exact duration of action depends on many factors, including the dose of the nondepolarizing muscle relaxant used. 

 Vecuronium + Ketamine: experience suggests the addition of ketamine to vecuronium in doses of 1 mg/kg may provide a smooth and rapid induction of anesthesia. Ketamine may produce dose-related increases in blood pressure and heart rate which may amount to 50% of baseline values. 

 Vecuronium + Pancuronium: the use of pancuronium is somewhat controversial due to its well-known potentiation of vecuronium's action. 

 Vecuronium + Atracurium: atracurium, like pancuronium, is a long-acting muscle relaxant which potentiates the effects of vecuronium. The time to clinically significant neuromuscular blockade with atracurium is 20 to 70 minutes. 

 Vecuronium + Rocuronium: rocuronium is a short-acting muscle relaxant which potentiates the effects of vecuronium. The time to clinically significant neuromuscular blockade with rocuronium is 15 to 45 minutes. 

 Vecuronium + Doxacurium: doxacurium is a short-acting muscle relaxant which potentiates the effects of vecuronium. The time to clinically significant neuromuscular blockade with doxacurium is 15 to 45 minutes. 

 Vecuronium + Saropavulin: saropavulin is a long-acting muscle relaxant which potentiates the effects of vecuronium. The time to clinically significant neuromuscular blockade with saropavulin is 60 to 240 minutes. 

 Vecuronium + Aminoglycosides: aminoglycosides, including gentamicin, tobramycin, and amikacin, have been reported to increase the duration of action of nondepolarizing muscle relaxants, including vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with gentamicin. 

 Vecuronium + Quinidine: administration of quinidine concomitantly with vecuronium has been reported to delay the recovery of muscle strength in humans. Quinidine is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. 

 Vecuronium + Procainamide: Procainamide is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with procainamide. 

 Vecuronium + Halothane: halothane is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with halothane. 

 Vecuronium + Quinine: quinine is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with quinine. 

 Vecuronium + Enflurane: enflurane is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with enflurane. 

 Vecuronium + Isoflurane: isoflurane is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with isoflurane. 

 Vecuronium + Halothane: halothane is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with halothane. 

 Vecuronium + Quinine: quinine is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with quinine. 

 Vecuronium + Enflurane: enflurane is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium. The duration of action of vecuronium is prolonged by 60% when administered with enflurane. 

 Vecuronium + Quinidine: administration of quinidine concomitantly with vecuronium has been reported to delay the recovery of muscle strength in humans. Quinidine is a potent inhibitor of hepatic CYP3A4, which is the main enzyme for the metabolism of vecuronium.
Infants under 1 year of age but older than 7 weeks, also tested under subsection for recommendations for use in pediatric patients 7 weeks to 16 years of age. The safety and effectiveness of vecuronium in pediatric patients less than 7 weeks of age have not been established.

**WARNINGS**

Preparations containing vecuronium have been associated with anaphylactoid reactions, including bronchospasm, diarrhea, nausea and vomiting, rash, and urticaria. These reactions have been reported in patients with and without a history of atopy. Administration of vecuronium should be preceded by the usual precautions to minimize the risk of anaphylactoid reactions. Vecuronium has been reported to cause ataxia and postoperative weakness. In rare cases, prolonged or residual neuromuscular blockade has occurred with vecuronium. Vecuronium should be used with caution in patients with a history of delayed recovery from neuromuscular blockade.

**PRECAUTIONS – Use in Pediatrics**

Many drugs are excreted in human milk, caution should be exercised when vecuronium is administered. The umbilical venous plasma concentrations were 11% of maternal concentrations 30 minutes after vecuronium administration to the mother. Vecuronium has been reported in the literature. Following tracheal intubation with succinylcholine, muscle atrophy have been reported after long-term use to support mechanical ventilation until recovery is judged adequate. Little or no increase in intensity of block occurs with vecuronium in patients with decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy. Close monitoring of neuromuscular function is recommended in these circumstances, the management is the same as that of prolonged neuromuscular blockade. Under such circumstances, the primary treatment is maintenance of a patent airway and ventilation is properly maintained.

**OVERDOSAGE**

Prior administration of succinylcholine may enhance the neuromuscular blocking effect of vecuronium. The clinical condition of the patient should be monitored closely. Vecuronium for injection is for intravenous use only. Vecuronium should be given only by or under the supervision of experienced clinicians. Vecuronium should not be infused at rates of more than 1 mcg/kg/min.

**CLINICAL PHARMACOLOGY**

This drug should be administered by or under the supervision of experienced clinicians. The initial dose of vecuronium is 0.08 to 0.1 mg/kg (1.4 to 1.75 times the ED$_{95}$) given as an intravenous bolus injection. This dose can be expected to produce good or excellent non-emergency intubation conditions in 2.5 to 3 minutes.

**Long-term Use in ICU**

This table provides dosing information for vecuronium based on patient weight: mg/kg (1 mcg/kg/min) (mL/kg/min). Amount of vecuronium required is equal to the sum of the relative requirements (mg/kg) as adults and pediatric patients (1 to 10 years of age) may require a slightly higher initial dose and may also have higher maintenance requirements.

<table>
<thead>
<tr>
<th>Patient Weight (kg)</th>
<th>mg/kg</th>
<th>mcg/kg/min</th>
<th>mL/kg/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>0.40</td>
<td>0.26</td>
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<td>20 to 30</td>
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<td>0.23</td>
<td>0.90</td>
</tr>
<tr>
<td>30 to 40</td>
<td>0.35</td>
<td>0.23</td>
<td>0.80</td>
</tr>
<tr>
<td>40 to 50</td>
<td>0.32</td>
<td>0.21</td>
<td>0.70</td>
</tr>
<tr>
<td>50 to 60</td>
<td>0.30</td>
<td>0.20</td>
<td>0.60</td>
</tr>
<tr>
<td>60 to 70</td>
<td>0.28</td>
<td>0.19</td>
<td>0.50</td>
</tr>
<tr>
<td>70 to 80</td>
<td>0.26</td>
<td>0.18</td>
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<tr>
<td>80 to 90</td>
<td>0.24</td>
<td>0.17</td>
<td>0.30</td>
</tr>
<tr>
<td>&gt;90</td>
<td>0.22</td>
<td>0.16</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**CLINICAL PHARMACOLOGY – Use in Labor and Delivery**

Vecuronium bromide for injection is for intravenous use only. This drug should be administered by or under the supervision of experienced clinicians. Vecuronium should not be infused at rates of more than 1 mcg/kg/min.

**ADVERSE REACTIONS**

This table provides dosing information for vecuronium based on patient weight: mg/kg (1 mcg/kg/min) (mL/kg/min). Amount of vecuronium required is equal to the sum of the relative requirements (mg/kg) as adults and pediatric patients (1 to 10 years of age) may require a slightly higher initial dose and may also have higher maintenance requirements.

**PRECAUTIONS – Drug Interactions**

For diluents compatible with vecuronium, see Precautions. Vecuronium bromide is compatible in solution with: Dextrose 5% and Sodium Chloride 0.9% Injection, or Lactated Ringer's Injection. Infusion solutions of vecuronium bromide can be prepared by adding vecuronium bromide to the following diluents: Injection, Dextrose 5% and Sodium Chloride 0.9% Injection, or Lactated Ringer's Injection. Vecuronium may be incompatible with alkaline solutions (e.g., barbiturate solutions such as thiopental) in the same syringe or administered concurrently. Following tracheal intubation with succinylcholine, muscle atrophy have been reported after long-term use to support mechanical ventilation until recovery is judged adequate. Little or no increase in intensity of block occurs with vecuronium in patients with decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy. Close monitoring of neuromuscular function is recommended in these circumstances, the management is the same as that of prolonged neuromuscular blockade. Under such circumstances, the primary treatment is maintenance of a patent airway and ventilation is properly maintained.

**ADVERSE REACTIONS**

The following table provides dosing information for vecuronium based on patient weight: mg/kg (1 mcg/kg/min) (mL/kg/min). Amount of vecuronium required is equal to the sum of the relative requirements (mg/kg) as adults and pediatric patients (1 to 10 years of age) may require a slightly higher initial dose and may also have higher maintenance requirements.