BAXTER POTASSIUM CHLORIDE (0.15% OR 0.224%) AND GLUCOSE (5%) INTRAVENOUS INFUSION

Name of the Medicine

Composition: The active ingredients are Glucose and Potassium Chloride.

Chemical Structure/ Molecular formulae: The chemical name of glucose is D-(+ ) glucopyranose. Molecular formulae of glucose and potassium chloride are C6H12O6 and KCl, respectively.

![Chemical Structure of Glucose](image)

Description

Glucose is a monosaccharide, having physical characteristics as a white crystal or granular powder and freely soluble in water. Potassium chloride occurs as a colourless or white crystal, which is freely soluble in water.

Potassium Chloride (0.15% or 0.224%) and Glucose (5%) Intravenous Infusions [Potassium Chloride and Glucose IV Infusions] are sterile, non-pyrogenic solutions. The concentrations of the active ingredients dissolved in 1 litre of water for injections are shown in Table 1 (see Presentation and Storage Conditions). They do not contain antimicrobial agent or added buffer and have a pH of 3.5 – 6.5. Their osmolarities are in the upper level of the isotonic range as listed in Table 1 (Presentation and Storage Conditions).

Pharmacology

Mechanism of Action:
Glucose is readily metabolised into carbon dioxide and water, with a release of energy. As such, an administration of a glucose solution either by oral or parenteral route provides water for body hydration as well as energies (see Table 1 Presentation and Storage Conditions for conversion to KJ units). In addition it may reduce catabolic loss of nitrogen from the body and aid in prevention of depletion of liver glycogen. That is, in the absence of glucose, amino acids undergo deamination followed by oxidation in order to release energy.

Potassium is the major cation of intracellular fluid (approximately 160 mmol/L of intracellular water) and it controls the body fluid composition and electrolyte balance; 98% of the total body potassium is intracellular. In the extracellular fluids (interstitial and vascular compartments) sodium ions predominate whilst potassium ions are generally low ranging from 3.5 to 5.0 mmol/L. A membrane bound enzyme, sodium- potassium activated ATPase (Na/K-ATPase), actively pumps sodium ions out of the cells and potassium into the cells through a gate-mechanism against a concentration gradients in order to maintain a homeostasis of electrolytes of the cells. Potassium participates in carbohydrate utilisation, protein synthesis, and is critical in the regulation of nerve conduction and muscle contraction, particularly in the heart. Chloride, the major extracellular anion, closely follows the physiological disposition of sodium
cation in maintenance of acid-base balance, isotonicity and electrodynamic characteristics of the cells. Thus, Potassium Chloride and Glucose IV Infusion has a value as a source of water, electrolytes and energy (835 kJ/L); see Table 1 (Presentation and Storage Conditions) for the strength of the solution.

**Pharmacokinetics:**
Potassium Chloride and Glucose IV Infusion is directly administered to the systemic circulation by infusion, the bioavailability (absorption) of the active components is complete (100%). After its distribution into the extracellular compartments, these ions are actively pumped into the cells by the action of Na/K-ATPase. Glucose, insulin and oxygen facilitate the movement of potassium into the cells. Thus, in insulin-deficient diabetic patients, the tolerance of potassium load is impaired.

Under normal conditions, the kidney primarily excretes the excess of potassium, if any, with only a small amount appearing in the faeces. The capacity of the kidney to conserve potassium ions is poor, and a deficiency of these ions will develop rapidly if intake drops significantly. In the kidney, it is secreted in the distal tubules, where the sodium-potassium exchange takes place. A small amount of potassium is lost in sweat.

**Indications**
Potassium Chloride and Glucose IV Infusion is indicated for replenishing fluid losses, as an energy source and for restoration or maintenance of potassium and chloride ion concentrations. This is also an alternative route of administration for the patients who are unable to take potassium orally or if hypokalaemia is severe. It may be used as a vehicle of drug delivery where intravenous delivery is appropriate and the drug is compatible with this solution.

**Contraindications**
Although the level of potassium ions in Potassium Chloride and Glucose IV Infusion is relatively low, administration of this product is contraindicated:
- in patients who have known hypersensitivity to the product
- in patients suffering from renal impairment with oliguria, anuria or azotemia; untreated chronic adrenocortical insufficiency (Addison’s disease); hyperadrenalism associated with adrenogenital syndrome; extensive tissue breakdown such as in severe burns; hyperkalaemia of any form; clinically significant hyperglycaemia.

Potassium is contraindicated in patients having a disease associated with abnormality of AV conduction in the heart, because an increased potassium level (hyperkalaemia) may worsen the degree of this heart block syndrome.

Cornstarch is the raw material for the production of glucose. Therefore, for patients known to have an allergy to corn, or corn products, Potassium Chloride and Glucose IV Infusion is contra-indicated.

**Precautions**
Potassium Chloride and Glucose IV Infusion is available in Viaflex bag. The safety of the Viaflex plastic bag has been confirmed in tests with animals according to the USP biological tests for plastic containers, as well as by tissue culture toxicity studies. Nevertheless, care should be
exercised regarding possible incompatibility outcomes resulted either from the interaction between the plastic container or active ingredients and the added therapeutic substances (see also Dosage and Administration).

The introduction of additives to any parenteral solution, regardless of the type of container, requires special attention so that it will not be adversely affected by an incompatibility problem. While some incompatibilities are readily observed, one must be aware that subtle physical, chemical and pharmacological incompatibilities can occur. The product information of those added drugs must be examined thoroughly to ensure compatibility with Potassium Chloride and Glucose IV Infusion.

Do not administer Potassium Chloride and Glucose IV Infusion solutions unless clear, colourless and free of particles (see Dosage and Administration), and the seals are intact.

Under a dilute condition, osmolality/L is approximately the same with osmolality/kg. The osmolality of the Potassium Chloride and Glucose IV Infusion is listed in Table 1 (Presentation and Storage Conditions). Administration of substantially hypertonic solutions may lead to a wide variety of complications, such as crenation (shrinkage) of red blood cells and general cellular dehydration.

Administration should be carried out under regular and careful surveillance. Regular monitoring of clinical status, plasma electrolyte concentrations, and ECG is essential in patient receiving potassium therapy, particularly those with preexisting imbalances and those with hepatic, cardiac or renal impairment. Plasma potassium levels may not be directly related to tissue levels.

Due to the risk of pseudo-agglutination precipitated by its glucose content, Potassium Chloride and Glucose IV Infusion must not be added to or administered simultaneously through the same tubing with citrate anticoagulated/preserved blood (see Interactions with other medicines).

The intravenous administration of Potassium Chloride and Glucose IV Infusion can cause fluid and/or solute overloading resulting in dilution of the serum electrolyte concentrations, overhydration, congested states, or pulmonary oedema. The risk of dilution states is inversely proportional to the electrolyte concentrations of the injections. Whilst the risk of solute overload causing congested states with peripheral and pulmonary oedema is directly proportional to the electrolyte concentrations of the injections.

Potassium Chloride and Glucose IV Infusion should be used with caution in patients with overt or subclinical diabetes mellitus (see Interactions with other Medicines) as they contain glucose.

Hypersensitivity Reactions
Hypersensitivity/infusion reactions, including anaphylaxis, have been reported with other potassium chloride and glucose intravenous products (see Adverse Effects). Stop the infusion immediately if signs or symptoms of hypersensitivity/infusion reactions develop. Appropriate therapeutic countermeasures must be instituted as clinically indicated.

Risk of Hyperkalaemia
Hyperkalaemia is the most common and serious hazard of potassium treatments. Since the exact measurement of potassium deficiency is not usually possible, potassium supplements should be administered slowly and with caution, especially in patients with cardiac disease including congestive heart failure, conditions predisposing to hyperkalaemia such as renal dysfunction, hepatic insufficiency and those that are digitalised.
Potassium Chloride and Glucose IV Infusion should be administered with caution, if at all to patients with conditions predisposing to hyperkalaemia and/or associated with increased sensitivity to potassium, such as patients with:

- severe renal impairment
- acute dehydration
- extensive tissue injury or burns
- certain cardiac disorders such as congestive heart failure or atrioventricular (AV) block (especially if they receive digitalis)
- potassium-aggravated skeletal muscle channelopathies (e.g., Hyperkalaemic periodic paralysis, paramyotonia congenita, and potassium-aggravated myotonia/paramyotonia)

Thus, the presence of adequate renal function must be confirmed and frequent observation of clinical status of the patient and periodic ECGs and/or determinations of serum concentrations should be made.

Potassium Chloride and Glucose IV Infusion should be administered with caution to patients who are at risk of experiencing hyperosmolality, acidosis, or undergoing correction of alkalosis (conditions associated with a shift of potassium from intracellular to extracellular space) and patients treated concurrently or recently with agents or products that can cause hyperkalaemia or increase the risk of hyperkalaemia (see Interactions with other medicines).

Other groups of patients in whom Potassium Chloride and Glucose IV Infusion should be used with caution include patients with cardiac arrhythmia. Arrhythmias can develop at any time during hyperkalaemia. Frequently, mild or moderate hyperkalaemia is asymptomatic and may be manifested only by increased serum potassium concentrations and, possibly, characteristic ECG changes.

**Use in patients at risk of severe renal impairment**

Potassium Chloride and Glucose IV Infusion should be administered with particular caution, to patients at risk of severe renal impairment. In such patients, administration of Potassium Chloride and Glucose IV Infusion may result in or predispose to hyperkalaemia and/or fluid overload.

**Hyperglycaemia**

Rapid administration of glucose solutions may produce substantial hyperglycaemia and hyperosmolar syndrome. In order to avoid hyperglycaemia, the infusion rate should not exceed the patient’s ability to utilise glucose. To reduce the risk of hyperglycaemia-associated complications, the infusion rate must be adjusted and/or insulin administered if blood glucose levels exceed levels considered acceptable for the individual patient.

Intravenous glucose should be administered with caution in patients with, for example:

- impaired glucose tolerance (such as in diabetes mellitus, renal impairment, or in the presence of sepsis, trauma, or shock),
- severe malnutrition (risk of precipitating a refeeding syndrome),
- thiamine deficiency, e.g., in patients with chronic alcoholism (risk of severe lactic acidosis due to impaired oxidative metabolism of pyruvate),
- water and electrolyte disturbances that could be aggravated by increased glucose and/or free water load.
Other groups of patients in whom Potassium Chloride and Glucose IV Infusion should be used with caution include:

- patients with ischaemic stroke. Hyperglycaemia has been implicated in increasing cerebral ischaemic brain damage and impairing recovery after acute ischaemic strokes.
- patients with severe traumatic brain injury (in particular during the first 24 hours following the trauma). Early hyperglycaemia has been associated with poor outcomes in patients with severe traumatic brain injury.
- Newborns.

Prolonged intravenous administration of glucose and associated hyperglycaemia may result in decreased rates of glucose-stimulated insulin secretion.

**Risk of hypo- and hyper-osmolality, serum electrolytes and water imbalance**

Depending on the volume and rate of infusion and depending on a patient’s underlying clinical condition and capability to metabolise glucose, intravenous administration of glucose can cause:

- hypoosmolality
- hyperosmolality, osmotic diuresis and dehydration
- electrolyte disturbances such as,
  - hyponatraemia,
  - hypophosphataemia,
  - hypomagnesaemia,

- acid-base imbalance
- overhydration/hypervolaemia and, for example, congested states, including central (e.g., pulmonary congestion) and peripheral edema. Particular caution should be taken in patients with conditions that may cause sodium retention, fluid overload, and edema (central and peripheral).
- hyponatraemia and a decrease in extracellular sodium concentrations related to hyperglycaemia causing a transcellular shift of water. Infusion of Potassium Chloride and Glucose solution corresponds to the increasing body’s load of free water, possibly leading to hypoosmotic hyponatraemia.

Clinical evaluation and periodic laboratory determinations may be necessary to monitor changes in fluid balance, electrolyte concentrations, and acid-base balance during prolonged parenteral therapy or whenever the condition of the patient or the rate of administration warrants such evaluation.

Particular caution is advised in patients at increased risk of and from water and electrolyte disturbances that could be aggravated by increased free water load.

**Hyponatraemia**

The use of Potassium Chloride and Glucose IV Infusion may result in hyponatraemia. Close clinical monitoring may be warranted. Hyponatraemia can lead to headache, nausea, seizures, lethargy, coma, cerebral oedema, and death. Acute symptomatic hyponatraemic encephalopathy is considered a medical emergency.

The risk of hyponatraemia is increased, for example,
- in children
- in elderly patients
- in women
- postoperatively
- in persons with psychogenic polydipsia
- in patients treated with medications that increase the risk of hyponatraemia (such as certain antiepileptic and psychotropic medications).

The risk for developing hyponatraemic encephalopathy is increased, for example,
- in paediatric patients (≤16 years of age)
- in women (in particular, premenopausal women)
- in patients with hypoxemia
- in patients with underlying central nervous system disease

**Hypokalaemia**
The infusion of solutions with Potassium Chloride and Glucose may result in hypokalaemia. Hypokalaemia can lead to arrhythmias, muscle weakness, paralysis, heart block, and rhabdomyolysis.

Potassium Chloride and Glucose IV infusion should be used with particular caution, warranting close clinical monitoring, for example:
- in patients with metabolic alkalosis,
- in patients with thyrotoxic or hypokalaemic periodic paralysis,
- in patients with increased gastrointestinal losses (e.g. diarrhoea, vomiting)
- in patients on prolonged low potassium diet (e.g. undernourished or cachectic patients)
- in patients with primary hyperaldosteronism,
- in patients treated with medications that increase the risk of hypokalaemia (e.g. hydrochlorothiazide, loop diuretics, beta-2 agonists, or insulin).

**Refeeding syndrome**
Refeeding severely undernourished patients may result in the refeeding syndrome that is characterised by the shift of potassium, phosphorus, and magnesium intracellularly as the patient becomes anabolic. Thiamine deficiency and fluid retention may also develop. Careful monitoring and slowly increasing nutrient intake while avoiding overfeeding can prevent these complications.

**Use in patients at risk of severe renal impairment**
Potassium Chloride Glucose IV Infusion should be administered with particular caution, to patients at risk of severe renal impairment. In such patients, administration of Potassium Chloride and Glucose IV Infusion may result in fluid overload and/or may predispose to hyperkalaemia.

**Blood**
Potassium Chloride and Glucose IV Infusion should not be administered simultaneously with blood through the same administration set because of the possibility of pseudoagglutination or haemolysis.

**Risk of Air Embolism**
Do not connect flexible plastic containers in series in order to avoid air embolism due to possible residual air contained in the primary container.

Pressurising intravenous solutions contained in flexible containers to increase flow rates can result in air embolism if the residual air in the container is not fully evacuated prior to administration.

Use of a vented intravenous administration set with the vent in the open position could result in air embolism. Vented intravenous administration sets with the vent in the open position should not be used with flexible plastic containers.

**Use in pregnancy** (Category C)
Animal reproduction studies have not been conducted with Potassium Chloride and Glucose IV Infusion. It is also not known whether this product can cause foetal harm when administered to a pregnant woman or can affect reproduction capacity.

Intrapartum maternal intravenous glucose infusion may result in foetal hyperglycaemia and metabolic acidosis as well as rebound neonatal hypoglycaemia due to foetal insulin production (See **Paediatric Use**). Potassium Chloride and Glucose IV Infusion should be given to pregnant women only if clearly needed after careful consideration of the potential risks and benefits.

**Use in lactation**
Safety in lactation has not been established. Use of this product in a nursing woman only when is clearly needed and the potential benefit outweigh the potential risks to the baby.

**Paediatric Use**
Neonates, especially those born premature and with low birth weight, are at increased risk of developing hypo- or hyperglycaemia and therefore need close monitoring during treatment with intravenous glucose solutions to ensure adequate glycaemic control in order to avoid potential long term adverse effects. Hypoglycaemia in the neonate can cause prolonged seizures, coma and brain damage. Hyperglycaemia has been associated with cerebral injury, including intraventricular haemorrhage, late onset bacterial and fungal infection, retinopathy of prematurity, necrotizing enterocolitis, bronchopulmonary dysplasia, increased oxygen requirements, prolonged length of hospital stay, and death.

Children (including neonates and older children) are at increased risk of developing hyponatraemia as well as developing hyponatraemic encephalopathy. The infusion of hypotonic fluids together with the non-osmotic secretion of ADH may result in hyponatraemia. Hyponatraemia can lead to headache, nausea, seizures, lethargy, coma, cerebral oedema, and death; therefore, acute symptomatic hyponatraemic encephalopathy is considered a medical emergency.

Plasma electrolyte concentrations should be closely monitored in the paediatric population. Rapid correction of hyponatraemia is potentially dangerous (risk of serious neurologic complications). Dosage, rate, volume and duration of administration should be determined by a physician experienced in paediatric intravenous fluid therapy.

**Use in the elderly**
In general, the type of infusion solution, the volume/rate of infusion and dose selection for an elderly patient should be cautious, usually starting at the low end of the dose range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function and of concomitant disease or drug therapy.

**Genotoxicity/ Carcinogenicity**
The active ingredients, glucose and potassium chloride are not carcinogenic or mutagenic. They are basic nutrients in all living cells.

**Interactions with other medicines**

Potassium Chloride and Glucose IV Infusion should not be administered simultaneously with blood preparation through the same administration set, because of the possibility of pseudo-agglutination or haemolysis.

Potassium Chloride and Glucose IV Infusion should be used with caution in patients treated concurrently or recently with agents or products that can cause hyperkalaemia or increase the risk of hyperkalaemia. Administration of potassium in patients treated with such agents is associated with an increased risk of severe and potentially fatal hyperkalaemia, in particular in the presence of other risk factors for hyperkalaemia. These products should not be administered concomitantly with potassium sparing diuretics (such as amiloride, spironolactone, triamterene), angiotensin converting enzyme (ACE) inhibitors or angiotensin-2 receptor antagonists (A2RAs). Simultaneous administration of either of these drugs or potassium supplements with Potassium Chloride and Glucose IV Infusion can result in severe hyperkalaemia.

Potassium Chloride and Glucose IV Infusions should also be used with caution in patient treated with corticosteroids, ciclosporin, tacrolimus and drugs that contain potassium.

If using this solution to administer drugs, the Product Information document(s) of such drug(s) must be reviewed to ensure compatibility with the solution.

Concurrent use of these products with insulin will decrease serum potassium. Use of these infusions may necessitate review of a patient’s oral hypoglycaemic or insulin requirements, so close monitoring of serum glucose levels is also required.

Both the glycaemic effects of Potassium and Glucose IV Infusion and its effects on water and electrolyte balance should be taken into account when using these products in patients treated with other substances that affect glycaemic control, or fluid and/or electrolyte balance.

Potassium Chloride and Glucose IV infusion should be used with caution in patients treated with medications that can increase the risk of hyponatraemia, or sodium and fluid retention, such as corticosteroids.

**Adverse Effects**

Adverse reactions may occur because of the solution or the technique of administration, including fever response, infection at the site of injection, venous thrombosis or phlebitis extending from the site of injection, extravasation and hypervolema. If an adverse reaction does occur, discontinue the infusion, evaluate the patient, institute appropriate therapeutic countermeasures and save the remainder of the fluid for examination if deemed necessary.

Physiologically, an excessive administration of any potassium preparation may result in symptoms of hyperkalaemia. This is particularly manifested in patients with renal impairment. The clinical signs and symptoms of potassium intoxication include paresthesia of the extremities, weakness or heaviness of the legs, cardiac arrhythmias, heart block, cardiac arrest and mental confusion. Intravenous infusion of potassium at rate of exceeds 20 mmol/hour, or concentrations of potassium exceed 40 mmol/L or less in the case of renal
impairment, may lead to a dangerous level of hyperkalaemia. Potassium serum levels of greater than 6mmol/L commonly manifest cardiac arrhythmias.

Symptoms and signs of potassium intoxication include:

**Cardiovascular:** fall in blood pressure, cardiac depression, arrhythmias, heart block and cardiac arrest. Hyperkalaemia is usually asymptomatic but may exhibit the following ECG abnormalities: disappearance of the P wave, prolongation of the QT interval, widening and slurring of the QRS complex, changes of the ST segment and tall peaked T waves.

**Other:** listlessness, mental confusion, paraesthesia of the extremities, muscle weakness, heaviness of the legs, paralysis.

Anaphylactic reactions, hypersensitivity, pyrexia and chills have also been reported for similar solutions containing glucose.

**Post-marketing**
The following adverse reactions have been reported in the post-marketing experience.

- General Disorders and Administration Site Conditions: Infusion site rash, Infusion site pain

**Other reactions (Class reactions)**
Other adverse reactions reported with potassium chloride and glucose intravenous injections/infusions include:

- Immune System Disorders: anaphylactic reaction / hypersensitivity
- Metabolism and Nutrition Disorders: hyperkalaemia, hypokalaemia
- General Disorders and Administration Site Conditions: infusion site reactions, including Infusion site vesicles, Infusion site pruritus, Infusion site phlebitis, Chills, Pyrexia
- Cardiac Disorders: Cardiac arrest (as a manifestation of hyperkalaemia)

**Dosage and Administration**

To be used as directed by the physician. The choice of specific potassium chloride and glucose concentrations, dosage, volume, rate and duration of administration depends on the age, weight, concomitant treatments and clinical condition of the patient as well as laboratory determinations; and administration should be determined by a physician. For patients with electrolyte and glucose abnormalities and for pediatric patients, consult a physician experienced in intravenous fluid therapy.

Parenteral drug products should be inspected visually for particulate matter and discolouration prior to administration whenever solution and container permit (see Precautions). Do not administer unless the solution is clear, colourless and free of particles and the seals are intact.

Electrolyte supplementation may be indicated according to the clinical needs of the patient. A gradual increase of flow rate should be considered when starting administration of glucose-containing products.

Hyperosmolar solutions may cause venous irritation and phlebitis. Thus, any hyperosmolar solutions are recommended to be administered through a large central vein, for thorough and rapid dilution of the hyperosmolar solution. See Presentation and Storage Conditions for information on the products’ osmolality.
Except in the presence of severe renal impairment, hyperkalaemia is not likely to occur from slow intravenous administration of a dilute solution of potassium chloride. However, hyperkalaemia may result from rapid intravenous administration of potassium chloride. Generally, the concentration of potassium in an intravenous fluid should not exceed 40 mmol/L and the rate of administration should not exceed potassium 20 mmol/hour (see Table 1 Presentation and Storage Conditions for comparison).

Potassium Chloride and Glucose IV Infusion is intended for intravenous administration using sterile and non-pyrogenic equipment. They are a pre-mixed potassium chloride in isotonic glucose solution, which are readily available for restoration of potassium, such as in the treatment of hypokalaemia.

The equipment should be primed with the solution in order to prevent air embolism due to residual air in the system. Additives may be introduced before infusion or during infusion through the injection site. Additives may be incompatible. Check additive compatibility with both the solution and container prior to use. Complete information is not available. Those additives known to be incompatible should not be used. Consult with a pharmacist, if available.

If in the informed judgment of the physician, it is deemed advisable to introduce additives, use aseptic technique. Mix thoroughly and carefully when additives have been introduced. After addition, if there is a color change and/or the appearance of precipitates, insoluble complexes or crystals, do not use. Do not store solutions containing additives.

The product should be used once only. Any unused portion should be discarded. Do not reconnect partially used bags.

**Direction for use of Viaflex plastic container**

Do not remove unit from over-wrap until ready for use. The inner bag maintains the sterility of the product. Do not use plastic containers in series connections. Such use could result in embolism due to residual air being drawn from the primary container before administration of the fluid from the secondary container is completed. Vented intravenous administration sets with the vent open, or pressurising intravenous solutions contained in flexible plastic containers to increase flow rate can result in air embolism if the residual air in the container is not fully evacuated prior to administration.

**To open:**
Tear over wrap down side at slit and remove solution container. Some opacity of the plastic due to moisture absorption during the sterilisation process may be observed. This is normal and does not affect the solution quality or safety. The opacity will diminish gradually. Check for minute leaks by squeezing inner bag firmly. If leaks are found, discard solution as sterility may be impaired. If supplemental medication is desired, follow directions below.

**Preparation for Administration:**
(1) Suspend container from eyelet support. (2) Remove plastic protector from outlet port at the bottom of container. (3) Attach administration set.

**To Add Medication:**
Additives may be incompatible. Before adding a substance or medication, verify that it is soluble and/or stable in Potassium Chloride and Glucose IV Infusion and that the pH range...
of Potassium Chloride and Glucose IV Infusion is appropriate. The Product Information Document(s) of the medication(s), the instructions for use of the medication(s) to be added and other relevant literature must be consulted prior to their addition to Potassium Chloride and Glucose IV Infusion.

To add medication before solution administration: Prepare medication site. Using syringe with 19 to 22-gauge needle, puncture resealable medication port and inject. Mix solution and medication thoroughly. For high-density medication such as potassium chloride, squeeze ports while ports are upright and mix thoroughly.

To add medication during solution administration: Close clamp on the set. Prepare medication site. Using syringe with 19 to 22-gauge needle, puncture resealable medication port and inject. Remove container from IV pole and/or turn to upright position. Evacuate both ports by squeezing them while container is in the upright position. Mix solution and medication thoroughly. Return container to in-use position, re-open the clamp and continue administration.

After addition, if there is a color change and/or the appearance of precipitates, insoluble complexes or crystals, do not use. Do not store solutions containing additives.

Overdosage

Symptoms
There is no overdose experience with Potassium Chloride and Glucose IV Infusion preparations. However, excessive administration or impaired excretion of potassium may lead to:

- hyperglycaemia, adverse effects on water and electrolyte balance, and corresponding complications. For example, severe hyperglycaemia, severe dilutional hyponatraemia, hyponatraemia (which can lead to CNS manifestations including seizures, coma, cerebral oedema) and their complications, can be fatal,

- fluid overload (which can lead to central and/or peripheral oedema)

- development of potentially fatal hyperkalaemia. It is usually asymptomatic and may be manifested only by an increased serum potassium concentration and characteristic ECG changes (peaking of T waves, depression of the ST segment, disappearance of P wave, prolongation of the QT interval, and widened QRS complex). Extremely high serum potassium concentrations (8 -11 mmol/L) may cause death from cardiac depression, arrhythmia or arrest (see Adverse Effects).

However, the correlation between potassium levels and ECG changes is not precise, and whether or at which potassium level certain ECG signs develop depends on factors such as patient sensitivity, the presence of other electrolytes disorders, and the rapidity of the development of hyperkalaemia. Manifestations of hyperkalaemia may also include:
- disturbances in cardiac conduction and arrhythmias, including bradycardia, heart block, asystole, ventricular tachycardia, ventricular fibrillation
- hypotension
- muscle weakness up to and including muscular and respiratory paralysis, paresthesia of extremities
- gastrointestinal symptoms (ileus, nausea, vomiting, abdominal pain).

When assessing an overdose, any additives in the solution must also be considered. Clinically significant overdose of Potassium Chloride and Glucose IV Infusion may, therefore, constitute a medical emergency.
Treatment
No specific antidotes to this preparation are known. Should overdose occur, interventions include discontinuation of solution administration, dose reduction, administration of insulin and other measures as indicated for the specific clinical constellation.

If hyperkalemia is present or suspected, discontinue the infusion immediately and institute close ECG, laboratory and other monitoring and, as necessary, corrective therapy to reduce serum potassium levels. Treatment of hyperkalaemia depends on its severity. It must be kept in mind that rapid lowering of serum potassium concentrations in digitalised patients can cause cardiac toxicity.

Clinically, only the intravascular potassium concentration causes the cardiac disorders. Therefore, infusion of the potassium chloride solution and other exogenous sources of potassium, such as potassium-rich containing foods or medications causing potassium retention (potassium-sparing diuretic) must be discontinued immediately. In patients with severe hyperkalaemia, measures which facilitate the shift of potassium ions from the vascular to the intracellular space should be initiated. It can be achieved by administration of sodium bicarbonate, glucose/insulin, or calcium gluconate infusions.

In patients with serum potassium concentrations greater than 6.5 mmol/L, intravenous infusion of 40-160 mmol of sodium bicarbonate over a 5-minute period has been recommended. This dose may be repeated every 15 minutes if ECG abnormalities persist. This treatment results in a temporary alkalosis and lowers serum potassium levels by 0.6 mmol/L for every 0.1 increase of the pH.

Glucose/insulin infusion is another treatment for overdose episode with potassium chloride medications. It consists of 300-500 mL of 10 - 25% Glucose Intravenous Infusion containing 5 -10 IU Insulin per 20 g of glucose infused over a 1-hour period.

Patients whose ECGs show the absence of P waves or a broad QRS complex and who are not receiving cardiac glucosides should immediately be given intravenously 0.5 -1.0 g (5 -10 mL of a 10% solution) of calcium gluconate or another calcium salt over 2-minute period (with continuous ECG monitoring) to antagonize the cardiac toxic effects of potassium. If ECG abnormalities persist, repeated doses of calcium salt may be given, allowing 1-2 minutes between doses.

When the ECG approaches normal, efforts should be directed toward removal of excess potassium from the body. This is a choice of treatment, when the removal of the potassium should be initiated as soon as possible. This is accomplished by administration of sodium polystyrene sulphonate resin orally or rectally, where sodium is exchanged with potassium in the gastrointestinal tract. One gram of resin will remove 1 mmol of potassium, but at the same time it will add 2 to 3 mmol of sodium, which may lead to a sodium-over load. To overcome the constipating effect by the resin, it is formulated in sorbitol solution (20%). The initial dose of 30 to 60 g of resin in 120 to 240 mL of 20 % sorbitol has been recommended. It can be repeated every 1 - 2 hours.

As a last resort, haemodialysis or peritoneal dialysis can be used to remove potassium from the body, in particular, patients with renal impairment. The infusion of furosemide (high ceiling diuretics) with substantial amount of sodium chloride and bland solution will excrete potassium at the distal tubules of the renal system by sodium exchange mechanism into the urine.

For information on the management of overdose, contact the Poisons Information Centre on 131126 (Australia).
### Presentation and Storage Conditions

Potassium Chloride and Glucose IV Infusion preparations are supplied in Viaflex plastic bags as a single unit dose. The attributes of these 2 strengths are shown in Table 1.

<table>
<thead>
<tr>
<th>Code No</th>
<th>Name and quantity of the active components [energy (kJ)]</th>
<th>Osmolarity (mOsmol/L)</th>
<th>ARTG/ AUSSTR</th>
<th>Pack Size* (mL)</th>
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</thead>
<tbody>
<tr>
<td>AHB1134</td>
<td>Potassium Chloride 0.15% (20 mmol/L) and Glucose 5.0% (278 mmol/L) [835 kJ/L]</td>
<td>317.0 (318.0)</td>
<td>19465</td>
<td>1000</td>
</tr>
<tr>
<td>AHB1174</td>
<td>Potassium Chloride 0.224% (30 mmol/L) and Glucose 5.0% (278 mmol/L) [835 kJ/L]</td>
<td>340.0 (338.0)</td>
<td>19469</td>
<td>1000</td>
</tr>
</tbody>
</table>

Note: Osmolarity[^1] is a calculated figure, whilst figures in the bracket are approximately Osmolality (mOsmol/kg). 1 gram of glucose provides 16.7 kiloJoules (kJ) of energy.

* Not all packs are marketed.

Storage: Exposure of pharmaceutical products to heat should be minimised. Avoid excessive heat. It is recommended that the product should be stored below 30 °C.

### Name and address of the sponsor

Baxter Healthcare Pty Limited
1 Baxter Drive
Old Toongabbie NSW 2146

### Poison Schedule

Unscheduled.

### Date of first inclusion on the Australian Register of Therapeutic Goods (ARTG)

30 September 1991

### Date of most recent amendment

11 July 2016

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