



MINISTRY OF NATIONAL GUARD HEALTH AFFAIRS  
KINGDOM OF SAUDI ARABIA

# Quality & Patient Safety Newsletter



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## ABOUT THE NEWSLETTER

"By providing important and relevant information to healthcare providers, this Newsletter aims to enhance communication of quality and patient safety information, raise awareness of reported adverse events and maintain an ongoing link to all the medical departments of the National Guard Health Affairs (NGHA) facilities. "



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# A **SAFE NURSE** always ensures **SAFETY FIRST**: A 'Blood transfusion dilemma': Right patient; Right blood component; Right time; Right observations.

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## Introduction

Patient safety is an essential aspect of health care, because when people are admitted to hospital, they expect to have their illness or disease treated, receive quality health care and not be harmed in the process. The purpose of this article is to revisit the fundamental concept of patient safety when transfusing blood components and products.

A blood transfusion practice is the administration of a blood component or plasma derived product to the patient, which is a common clinical nursing practice, with a basic principle to ensure patient safety. However, despite an acknowledgment that a blood transfusion is a common practice, it is also a complex multi-step process; which involves nurses, doctors, laboratory scientists and technicians, and does not exclude the blood donor and recipient. This multi-step procedure has several risk points which may compromise patient safety and put them at risk. The 'at risk' times are typically the result of the omission of essential checks, taking 'shortcuts' and perhaps the assumption that patient safety is someone else's responsibility (Bolton-Maggs & Cohen, 2013). SHOT (2008) demonstrated that 'wrong blood into patient' was a frequently reported transfusion hazard and that these slips were primarily due to human error

resulting from incorrect identification of the patient during blood sampling, blood component collection and blood transfusion administration. Concern about wrong transfusions was also expressed by McClelland (1998) whether because of the administration to the wrong patient or wrong blood product; the outcomes resulted in major patient morbidity due to ABO incompatibility. Casey, (2011), concurred, but added that other transfusion related threats included, allergic, anaphylactic, febrile, circulatory overload, and hospital acquired infections. Nevertheless, transfusion therapy is considered a relatively safe and often life-saving intervention where the benefits for the recipient outweigh the risks (Wilkinson & Wilkinson, 2001), when implemented correctly and the right patient receives the right blood component (Gray, 2007). McClelland & Walsh (2005) recommended that clinicians should regard a blood transfusion, as they would a tissue-organ transplant. This would highlight that prescribing blood is not a minor decision and that the decision to transfuse a blood product should be based on clinical signs and symptoms which are supported by related laboratory findings, such as respiratory distress in conjunction with a low haemoglobin / haematocrit (Kyriazi, 2011).





## Transfusion errors

A blood transfusion saves life, but an error in the transfusion process can just as easily take life. The number of transfusion errors is currently underestimated, because one third of the adverse events that have obvious clinical consequences are not reported (Kyriazi, 2011). As previously stated, the transfusion practice is a complex multi-step process with numerous critical points that offer the possibility for error that could result in an acute haemolytic reaction due to ABO incompatibility, which maybe the final result of failures having occurred during patient identification; sample labelling, collection and administration (Stainsby et al, 2006). In transfusion medicine, errors may result from a lack of knowledge or incomplete information, but more often results from distraction and fatigue (Dzik, 2007). While it is a medical responsibility to prescribe blood components, the completion of the blood product requisition form, the pre-transfusion sampling and the administration of the blood component is typically delegated to the nurse (Sullivan, 2005).



Labeled Blood Bag

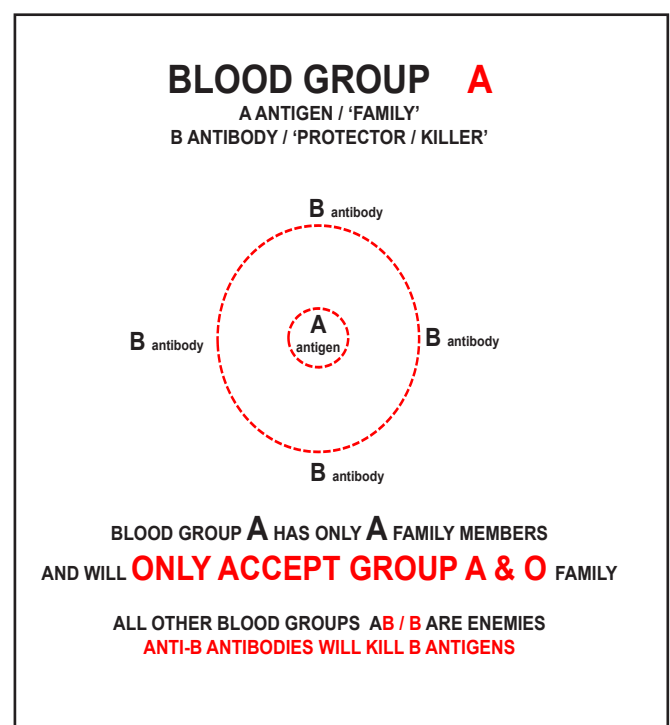
Failure of some aspect of the checking procedure, either patient, blood component-product or monitoring the patient during the process has been consistently the most common cause of error (Stainsby et al, 2006). SHOT (2008) acknowledged an encouraging downward trend in the number of ABO incompatibility errors between 2001 – 2006, however, despite the range of safety initiatives, best practice articles and professional guidance pertaining to blood administration (Gray et al, 2005; 2007), patient identification checks prior to commencing a blood transfusion was linked to non-compliance, which was a major contributing factor for wrong blood incidents (Kyriazi, 2011; Taylor, et al, 2008; Dzik, 2007; Gray et al, 2005).

Nurses' are integral to the transfusion process, as they are often involved in pre-transfusion sampling, provision of patient information, requesting blood from the laboratory, collecting blood, administration of the transfusion and monitoring the patient's response during and after the transfusion. However, at the present time, there is a great concern about the global transfusion practices in clinical departments and by reason of the final bedside check pre-transfusion; nurses can reduce the error potential (Gray et al, 2005). As professionals, nurses are accountable for their practice, and if errors occur during the transfusion process, it must be acknowledged that they may be related to inadequate nursing interventions, lack of understanding of the transfusion process or a failure to comply with the organizational policies and procedures.

## The ABO blood group system

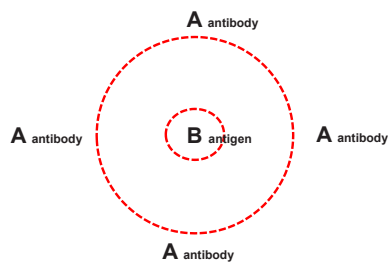
**Discovered by Austrian scientist Karl Landsteiner in 1901 and Classified by Czech scientist Jan Jansky in 1907**

The ABO red blood cell (RBC) group system (Figure 1) is the most common of the identified 33 global blood groups (ISBT, 2012); and because of their reactive nature are considered with caution when transfusing.



### BLOOD GROUP B

B ANTIGEN / 'FAMILY'  
A ANTIBODY - 'PROTECTOR / KILLER'



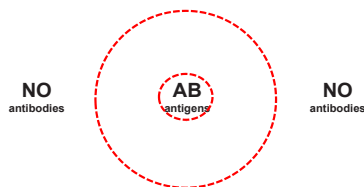
BLOOD GROUP B HAS ONLY B FAMILY MEMBERS  
AND WILL **ONLY ACCEPT GROUP B & O** FAMILY

ALL OTHER BLOOD GROUPS **AB / A** ARE ENEMIES  
**ANTI-A ANTIBODIES WILL KILL A ANTIGENS**

### BLOOD GROUP AB

UNIVERSAL RBC RECIPIENT

A & B ANTIGENS / 'FAMILIES'  
NO ANTIBODIES - NO 'PROTECTORS' / 'KILLERS'



BLOOD GROUP AB HAS BOTH A&B FAMILY MEMBERS

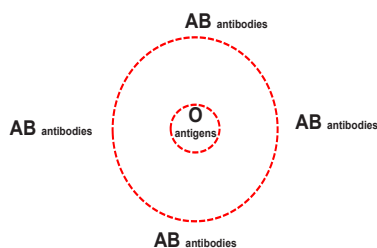
**ALL BLOOD GROUPS A - B - AB ANTIGENS ARE FAMILY / FRIENDS**

**NO ANTIBODIES / KILLERS ARE REQUIRED**

### BLOOD GROUP O (ZERO)

UNIVERSAL RBC DONOR

NO ANTIGENS / NO 'FAMILY'  
BOTH A & B ANTIBODIES - 'PROTECTOR / KILLERS'



BLOOD GROUP O HAS NO ANTIGENS - FAMILY MEMBERS  
AND WILL **BE ACCEPTED BY ALL GROUP A - B - AB & O** FAMILY  
**THEREFORE BLOOD GROUP O CAN VISIT ANY BLOOD GROUP**  
UNIVERSAL RBC DONOR

BUT GROUP O CAN NEVER HAVE OTHER BLOOD GROUPS VISIT 'HIM'  
BECAUSE **ALL BLOOD GROUPS A - B - AB ANTIGENS ARE ENEMIES**  
BLOOD GROUP O HAS **ANTI-A & B ANTIBODIES / THEY WILL KILL EVERYONE**

### Figure 1: The ABO blood groups

The RBC groups are classified according to the antigen that is located on the surface of the RBC.

- **Blood group A** – has an **A antigen** and the anti B antibody
- **Blood group B** – has an **B antigen** and the anti A antibody
- **Blood group AB** – has both **A and B antigens**, but no antibodies
- **Blood group O** – has **no (zero) antigens**, but has both anti A and anti B antibodies

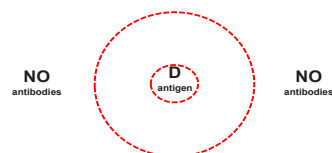
### The Rhesus blood group system

**Discovered by Austrian Karl Landsteiner in 1937**

The Rhesus blood group system (Figure 2) is the second most common of the blood groups (ISBT, 2012). Rhesus D group is very sensitive in nature and must be considered with caution when transfusing.

### BLOOD GROUP RhD +VE

HAS D ANTIGENS / 'FAMILY'  
NO ANTIBODIES - 'PROTECTOR / KILLERS'



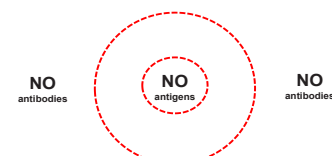
BLOOD GROUP RhD +VE HAS D 'FAMILY' MEMBERS

**THERE ARE NO ANTI-D ANTIBODIES**  
NO 'PROTECTORS / KILLERS'

**CAN BE** TRANSFUSED / ADMINISTERED TO **RhD +VE**  
**SHOULD NOT BE** TRANSFUSED / ADMINISTERED TO **RhD -VE**

### BLOOD GROUP RhD -VE

NO D ANTIGENS / 'FAMILY'  
**OR**  
NO ANTIBODIES - 'PROTECTOR / KILLERS'



BLOOD GROUP RhD -VE HAS NO D 'FRIENDS/ FAMILY' MEMBERS  
**THERE ARE NO ANTI-D ANTIBODIES**  
NO 'PROTECTORS / KILLERS'

**CAN BE** TRANSFUSED / ADMINISTERED TO **RhD -VE**

**CAN BE** TRANSFUSED / ADMINISTERED TO **RhD +VE**

The Rhesus group is classified according to whether the antigen is present on the surface of the RBC (**RhD + ve**) or if it is absent (**RhD – ve**).

### The ABO & Rhesus blood group system

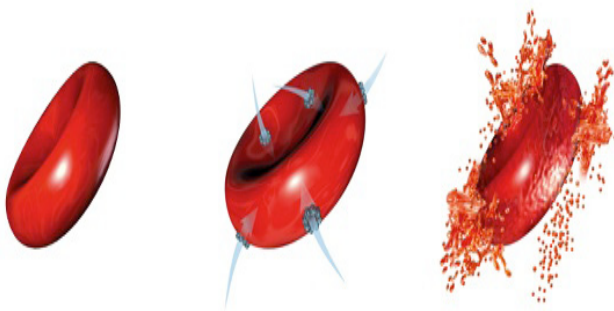
The ABO and Rhesus blood group system (Figure 3) are conjoined.

Whether the blood group is A, B, AB or O, they will be either RhD + or RhD –.

Therefore, the combinations will be either: **A+ / A- / B+ / B- / AB+ / AB- / O+ / O-**

### Transfusion reactions

#### Acute Hemolytic Transfusion Reaction (AHTR)



**Pathophysiology** - Transfusion of incompatible donor blood to the recipient

**Aetiology** - Wrong patient / wrong blood

Administration of the wrong blood causes mixing of incompatible blood groups which results in Antibodies (protectors) attacking antigens that do not belong to the blood group

When the antibodies (protectors) attack-kill the different antigens (RBC), hemolysis of the RBC occurs, which could be life threatening to the patient who receives the wrong blood.

#### Signs & Symptoms / Rationale

1. **Anxiety** - 'Fight & flight' sympathetic nervous system (SNS) activation
2. **Tachycardia** - 'Fight & flight' SNS stress response
3. **Tachypnea / Dyspnea** - 'Fight & flight' SNS stress response

4. **Flushed skin** - Inflammatory response Histamine release - dilates blood vessels
5. **Hypotension** - Inflammatory response Histamine release - dilates blood vessels
6. **Fever / Rigors** - Inflammatory response / cytokines, bacterial contamination
7. **Pain IV site** - Inflammatory response / Bradykinin release - nociceptors
8. **Pain** - Disseminated Intravascular Coagulation / Coagulopathy (DIC); Lumbar – Flank 'Renal'; Chest – Cardiac / Pleuritic - Abdominal
9. **Petichiae** - DIC
10. **Dark urine** - Hemolysis – Hb in the urine
11. **Hemorrhage** - DIC
12. **Acute renal failure** - Shock / DIC

#### Febrile / Non Haemolytic Transfusion Reaction (FNHTR)

**Pathophysiology** - Recipient antibodies interact with Donor leucocytes antigens

**Aetiology** - Possible Allo-immunisation from previous transfusions

**NB: Must eliminate AHTR & bacterial contamination as the cause**

#### Signs & Symptoms

1. Fever greater than 38 ° Centigrade
2. Temperature change greater than 0.5 - 1 ° C from the baseline
3. Chills or rigors

#### Allergy Related Transfusion Reactions

**Pathophysiology** - Recipient antibodies interact with Donor leucocytes antigens

**Aetiology** - Possible Allo-immunisation from previous transfusions

## **NB: Can be Mild - Severe -Life threatening Signs & Symptoms**

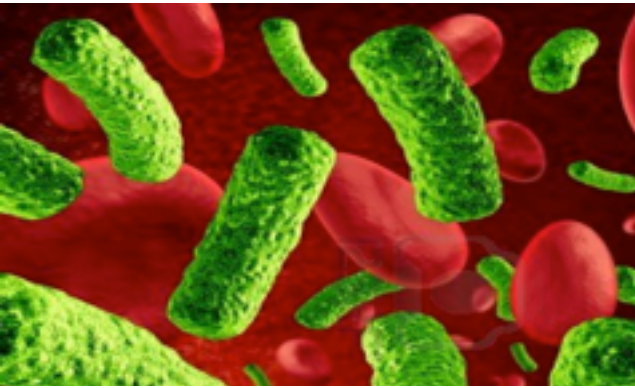
### **Mild allergy**

1. Urticaria – hives
2. Pruritis – itchy rash
3. Local edema – Eyes / Lips / Tongue / Neck

### **Severe allergy - anaphylaxis**

1. Anxiety
2. Laryngeal edema – Hoarse voice / Stridor
3. Tachypnea / Dyspnea
4. Hypotension / Shock

## **Transfusion Transmitted Infections (TTI)**



**Pathophysiology** – Bacterial contamination (60% Mortality)

**Aetiology** - Contamination of blood components / especially Platelets as they are stored at 22 – 24 ° C for up to 5 days **NB: Could be the Donor / Phlebotomist / Laboratory scientist / Nurse**

### **Signs & Symptoms**

1. Tachycardia
2. High fever / Rigors
3. Hypotension / Septic shock / DIC

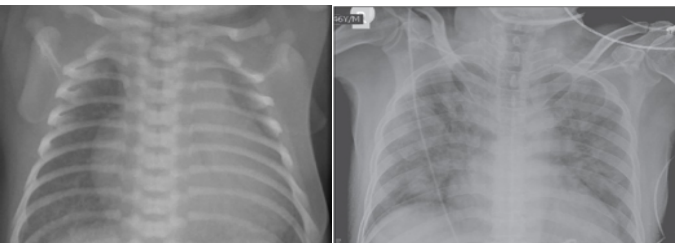
## **Transfusion Associated Circulatory Overload (TACO)**

**Pathophysiology** – Circulatory overload

**Aetiology** – Blood is transfused too quickly into a small or compromised cardiovascular circulation, **Such as neonates and geriatrics or patients with cardiac or renal impairment**

### **Signs & Symptoms**

1. Tachycardia / Bounding pulses
2. Tachypnea / Dyspnea
3. Hypertension
4. APO



## **Transfusion Related Acute Lung Injury (TRALI)**

**Pathophysiology** – Acute Respiratory Distress Syndrome (ARDS)

**Aetiology** – Donor leucocytes react with recipient lungs

**NB: More common with FFP**

### **Signs & Symptoms**

1. Tachycardia
2. Tachypnea / Dyspnea / Respiratory distress
3. Respiratory failure



**Before transfusion**

**Post transfusion**

## **Ministry of the National Guard Health affairs (MNG-HA) strategies**

The global practice of blood and blood product administration errors remain a concerning subject which involves patient morbidity and mortality. The irony pertaining to these transfusion errors is that they are potentially fatal and also potentially preventable (SHOT, 2008). Therefore, under the direction of the MNG-HA Chief Executive Officer, H.E Dr. Bandar Knawy, a strategy that will increase healthcare provider knowledge, understanding and alertness of the hazards and risks associated with the processes of transfusing blood and blood products will be employed.

The most transparent strategy commencing with an annual Safe Transfusion Awareness Day, followed by reinforcement strategies that will involve clinical education and competence according to best practice evidence based recommendations.

### **Conclusion**

The MNG-HA **mission** is to provide safe, evidence-based quality care to patients with core values that include, accountability, work ethic, patient safety, and quality (NGHA, 2013). We; as healthcare providers must endeavour to apply best evidence based practices and exercise a duty of care when providing high risk therapies such as administration of blood and blood products to our patients.

**References:** Available upon request



# Specialized Stroke Nursing Program using an Inter-professional Learning Approach: One step towards improving patient safety and stroke care

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## Introduction

Stroke is becoming a rapidly increasing problem and an important cause of mortality and morbidity in Saudi Arabia. However, compared with developed countries, research regarding the incidence, prevalence and the socio-demographic properties of stroke is still insufficient due to lack of appropriate studies being conducted in these specified areas (Robert and Zamzami 2014). King Abdulaziz Medical City in Riyadh has envisioned an approach to stroke care in that all stroke patients should be directly admitted to a highly specialized emergency unit where suspected stroke patients will have a rapid access to computerized tomography (CT) imaging. Those eligible patients are treated with thrombolysis or a clot busting treatment within 4.5 hours of stroke onset. The stroke patient, regardless whether they are thrombolized or not, would then be transferred to the high dependency stroke unit (HDSU) in order to receive integrated and specialized stroke care from highly trained nurses, doctors and a multidisciplinary team. From the HDSU, the stroke patient, once stable, will then be transferred to an acute stroke unit for on-going rehabilitation and with medical support. The new stroke model is aimed to reduce mortality rate of stroke, decrease the patient's length of stay and enhance the patients' quality of life after stroke.

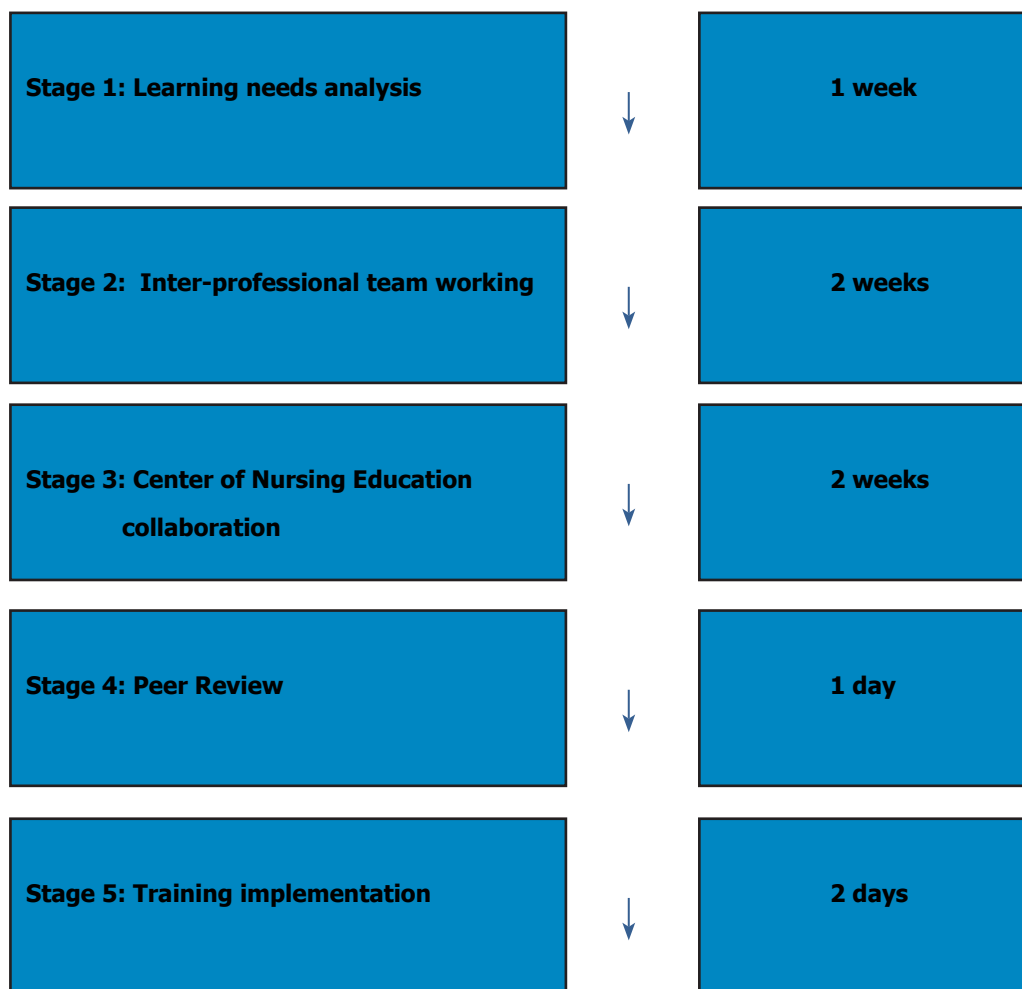
In preparation for the implementation of this approach to stroke care, a high priority was given to ensure the nursing staff received specialized training in order to provide the highest possible care and to enhance safety for this patient population.

The aim of this article is to outline the development and implementation of a Specialized Stroke Nursing Program (SSNP) as a continuing education initiative using an inter-professional learning approach. It will describe the sequential planning stages, the processes, its content and the timeline of its development. The article will also highlight the implications of the inter-professional learning approach towards improving stroke nursing care and patient safety.

### Method:

A nurse-led faculty group from professionals with expertise in stroke care developed a SSNP aimed at clinical training of nurses. The goal is for specialists from members of the stroke team to develop acute care nurses, involved in stroke patient care, using a framework of inter-professional learning approach. The core faculty group in stroke care with collaborative effort of the Nursing Services' Center of Nursing Education determined the action plan necessary for the development and implementation stages of the SSNP. Figure 1 describes the development of the SSNP, the sequential planning stages and its time line for implementation.

Figure 1                      SSNP Planning Stages                      Duration

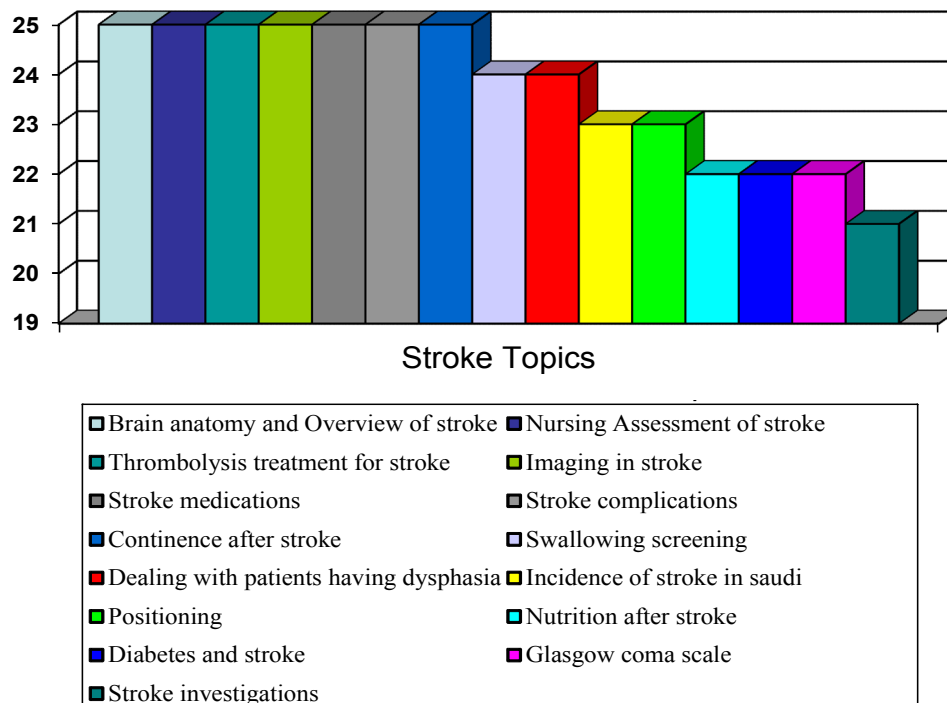


### Stage 1: Learning Needs Analysis (LNA)

A learning needs analysis (LNA), as a process of identifying specific stroke care topics, was conducted among 24 nurses from the acute stroke unit. A questionnaire checklist was sent to them and retrieved within 1 week. The analysis shows the topics of greatest interest to the nursing team and are highlighted in fig. 2



**Figure 2: LNA results**



The data implied that the use of an inter-professional learning approach is needed in order to capture all the key concepts of stroke care, particularly input from therapists such as the dietician, speech and language pathologist (therapists), specialist nurses, and physiotherapists.

### Stage 2: Inter-professional team working

A core of faculty, consisting of clinical resource nurses (CRNs), nurse specialists and therapists (speech language pathologists, dietician and physiotherapists), is organized and developed which aims to discuss the development of the specialized stroke nursing program as a team. This faculty will also serve as speakers during the actual training. Liedtka and Whitten (1998) explained that inter-professional team work requires a management of team processes as well as individual identities, whilst maintaining agreement within the team that each member's expertise and contribution to patient care is valuable.

### Stage 3: Collaboration with Nursing Services' Center of Nursing Education

Collaboration with the Nursing Services' Center of Nursing Education (NS-CNE) was an essential step in order to ensure the highest quality of clinical education program that included curriculum development, preparation of program learning objectives, implementation and evaluation of the course. Ongoing meetings were conducted to raise important challenges in clinical education approach such as incorporating interactive case scenarios that include simulation and clinical practice session, group quiz, audio- visual presentations that make learning fun, and clinical competency achievement that reinforces theoretical knowledge. These methods serve as a framework allowing the participant to experience different patients scenarios pertinent to practice aimed at enhancing patient safety.

### Program framework

The SSNP is a two-day training program which encapsulates two conceptual frameworks: overview of stroke care / team working and specialized stroke nursing care. Day 1 includes conceptual framework that explores

the key concepts of stroke, its causes, prevention, investigations, assessment and treatment options. It also highlights the roles of each multidisciplinary team member in the acute management of stroke. On the other hand, Day 2 covers information that is central to the specialized stroke nursing care for stroke and patient safety. It covers topics pertaining to the role of a nurse in early detection and prevention of complications during the acute phase of stroke

#### Stage 4: Peer Review

Prior to implementing the program a 'dry-run' of the course content was piloted by the course presenters of the SSNP for peer review and written feedback. Constructive critique was received and the necessary adjustments were made to fine-tune the presentations, including the flow and timing of each segment of the sessions to ensure adequate time for clinical practice sessions so that application of theory to practice was achieved.

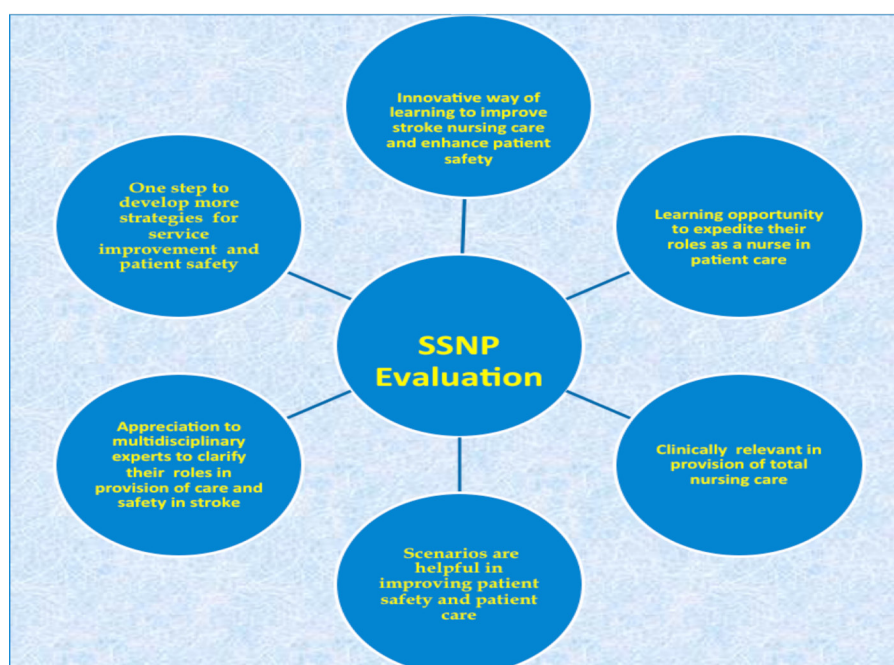
#### Stage 5: Training implementation

The selection of target participants are initially attended by a group of nursing educators, then unit nurse managers, followed by clinical resource nurses (CRNs), and clinical nurse coordinators and lastly a group of all nurses who are taking care of patients with stroke ( Figure 3). The SSNP runs every Monday and Tuesday at the Nursing Services' Center of Nursing Education (NS-CNE) in Riyadh.

#### Results and evaluation

The SSNP has been conducted weekly for six months to date and has been attended by more than 300 nurses. The sessions are evaluated using a feedback form focusing on delivery of clinical education content and presentations. The results show (fig. 4) 5 major themes emerging from participants' feedback .

**Figure 4: Themes from SSNP Evaluation ( taken from participant's feedback)**



## Discussion

Working as a team is a key challenge in provision of comprehensive stroke care. Inter-professional teamwork requires management of team processes as well as individual identities, while maintaining agreement within the team that each member's expertise and contribution to patient care is valuable (Williams et al 2007). Catangui and Slark (2012) advocate that the principles of the inter-professional learning approach help to gain the benefits of collaborative learning and in understanding the differences among professional groups. It has also been very beneficial for nursing staff to gain an understanding of interpersonal, group, organizational and inter-organization relations and processes in order to improve all aspects of collaborative practice and ultimately improving stroke care and patient safety.

The participants perceived SSNP as an innovative way of learning new concepts of stroke care and ways to improve patient safety through the use of evidence-based practice. The participants also expressed that the use of various teaching learning strategies utilized (such as lecture, audio-visual presentation, practical tips, patient case scenarios, role playing and simulation) supported their learning experience and helped them realize the importance of bedside stroke nursing care and the clinical relevance of this to patient safety. Clinical education relying on multiple learning activities and engaging patients in educational exploration is central to advancing evidence-based practice (Olaisen et al , 2013).

As reflected in fig. 4, some participants viewed SSNP as a learning opportunity to advance their role as a nurse in triage, assessment, care and evaluation of stroke patients. The SSNP gives them a viewpoint that gaining knowledge on stroke care does not only apply at work but also in day to day life especially the early recognition of stroke symptoms and its prevention. The participants disclosed that all topics are clinically relevant in provision of total nursing care, regardless of stroke or medical patients. They feel that this helps them to provide an effective and safe care to all patients.

The participants expressed that the use of expert speakers from a multidisciplinary stroke team helped them to understand and clarify their roles as therapists and nurse specialists in provision of stroke care, safe and therapeutic communication among the members of the team

## Future plan:

We are currently reviewing the need to have a stroke champion nursing project. It is a nurse-driven initiative to introduce stroke care innovations, service improvement projects, and safety quality measures so that clinical bedside nurses embrace safety and quality of care for stroke patients with passion. Concurrently we have supported our nursing colleagues in Al Ahsa in their nursing program by their active participation in Riyadh so that this approach is replicated in other regions of MNG-HA.

## Conclusion:

Patient safety is essential in every aspect of stroke nursing care. The launching of the Specialized Stroke Nursing Program that uses stroke care expertise translated a vision into reality. Clinical nursing education is crucial to provide safe and integrated stroke care. The development of the SSNP at the King Abdulaziz Medical City (Riyadh) using an inter-professional learning approach has shown to be an effective way of learning collaboratively. It is a nursing achievement as a result of highly committed and dedicated team whose goal is to achieve the highest possible standards of care and to deliver safe care to our patients.

**References:** Available upon request



# Improving patient safety in diabetes care. Safe injection technique; hypoglycemia and the administration of dextrose 50% and glucagon in adult patients with diabetes.

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This fourth article from Nursing Services Center of Nursing Education aims to highlight the importance of recognizing hypoglycemia, aligns itself to the third article 'Blood Glucose Monitoring in the patient with diabetes; safe practice' and guides the reader to the rationale and correct administration for dextrose 50% and glucagon in adult patients with diabetes. It also serves as a reminder for the aspiration of the National Guard Health Affairs Journey to Becoming a High Reliability Organization (HRO)<sup>1</sup> and the Joint Commission International Accreditation (JCIA) six International Patient Safety Goals<sup>2</sup> (see table 1) and Administrative Policy and Procedures (APP) 1430-45: Occurrence/Variance/Accident Reporting (2010)<sup>3</sup>, 1430-16: Patient Identification (2012)<sup>4</sup> 1435-03: Extravasation management (2014)<sup>5</sup>. Departmental Policy and Procedures (DPP) Difficult IV Access Team Anesthesia (2013)<sup>6</sup>.

Table 1

IPSG 1	Improve Accuracy of Patient Identification
ISPG 2	Improve effective communication
IPSG 3	Improve the Safety of High-Alert Medications
IPSG 4	Ensure Correct-Site, Correct-Procedure, Correct-Patient Surgery
IPSG 5	Reduce the Risk of Health Care–Associated Infections
ISPG 6	Reduce the Risk of Patient Harm Resulting from Falls

## Introduction

The growing prevalence of diabetes within Saudi Arabia has been accompanied by an even greater increase of diabetes in hospitalized patients' many of whom are being treated with insulin or an oral agent that may cause hypoglycemia. Nurses are often the first healthcare team member to interact with patients and are being called upon to apply their knowledge, training, and skills to educate and motivate patients with diabetes. He/ she coordinates, and is aware of, the multiple services required by the patient, for example travel off unit to the physical therapy department or X-ray, and is in a prime position to observe the amount of food eaten (carbohydrates), recommend order changes in medications, review the risks for falls (ISPG 6), administer medications and monitor blood glucose readings as well as tending to the patient's spiritual and cultural beliefs needs; holistic twenty four hour nursing care. Of paramount importance and in relation to the patient with diabetes is the nurses responsibility to recognize hypoglycemia, as this is the most feared complication for a diabetes patient on insulin therapy. It has a significant impact on quality of life measures in patients with both type 1 diabetes (T1 DM) and type 2 diabetes (T2 DM) which presents a major barrier to satisfactory long term glycaemic control. It is also the most common endocrine emergency which must be treated immediately. Insulins available on the MNGHA Formulary can be seen [http://portal.ngha.med/ngha/smsc/Documents/Insulin\\_Therapy\\_used\\_in\\_NGHA.pdf](http://portal.ngha.med/ngha/smsc/Documents/Insulin_Therapy_used_in_NGHA.pdf)<sup>9</sup>

*By definition, hypoglycemia is a lower than normal level of blood glucose [3.9mmol/L70mg/dL]*

## Related physiology for hypoglycemia

The pancreas is a digestive gland that sits near the liver in the right upper abdominal quadrant. It secretes digestive enzymes into the duodenum through the pancreatic duct. Cell groups called the Islets of Langerhans secrete hormones—mainly glucagon and insulin. When the pancreas secretes insulin, it circulates in the bloodstream and enables glucose to enter the cells, thus lowering the amount of glucose in the bloodstream. As the blood glucose drops, so does the secretion of insulin (diagram 1).

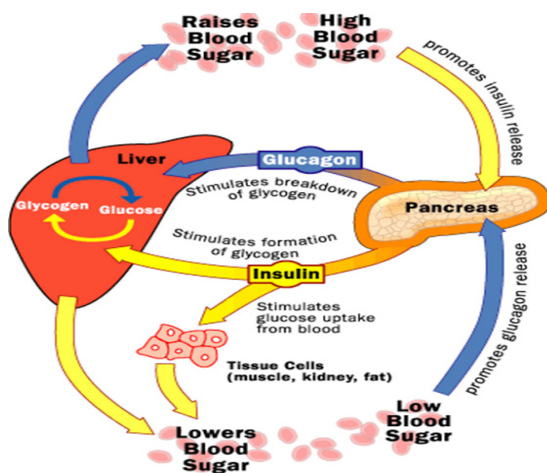


Diagram 1

Glucagon a single-chain polypeptide that contains 29 amino acid residues and is secreted when blood glucose levels are reduced; it stimulates the liver by metabolizing stored glycogen into glucose when insulin levels are low.

## Signs and symptoms of hypoglycemia

Acute hypoglycemia impairs many aspects of cognitive function, particularly those involving planning and multitasking. Severe hypoglycemia can cause coma, hemiparesis, and seizures and increased mortality<sup>11</sup> and results from an imbalance between glucose supply, glucose utilization and current insulin levels. It should be excluded in any person with diabetes who is acutely unwell, drowsy, unconscious, unable to co-operate, presenting with aggressive behavior or seizures.

The symptoms of hypoglycemia warn an individual of its onset and vary considerably between persons. The brain is dependent on a continuous supply of circulating glucose as the substrate to fuel cerebral metabolism and support cognitive performance. If blood glucose levels fall sufficiently, cognitive dysfunction is inevitable<sup>12</sup> patients become confused, experience headache, and then progress into semi consciousness and unconsciousness, progressing rapidly to brain damage and death if not treated.

The 11 most common symptoms form the Edinburgh Hypoglycemia Scale are reproduced in table 2 below<sup>13</sup>

Table 2: Edinburgh Hypoglycemia Scale

Autonomic	Neuroglycopenic	General malaise
• Sweating	• Confusion	• Headache
• Shaking	• Drowsiness	• Nausea
• Palpitations	• Odd behavior	
• Hunger	• Speech difficulty	
	• Incoordination	

### Third party treatment options for hypoglycemia

#### The credentials of the administering nurse

The administration of glucagon and dextrose 50% must be completed by a Registered Nurse who is licensed both with his/her own countries Licensing Board and Saudi Council for Commission for Health Specialties Licensing Board. He/she must have undertaken skills competencies throughout the nurse training.

#### Administration of dextrose 50%

Correct identification of the patient and site is a primary consideration (ISPG 1, ISPG 4) when administering any medication and this should always be at the forefront of any nurses' approach. If the patient is unconscious or has an altered mental status, IV administration of glucose (D50) through a large bore catheter into a large vein (see diagram 3 & 4) is the treatment of choice, avoiding extremities with poor venous circulation. Onset of action is rapid; approximately two to five minutes. The usual dosage of D50 is 25 grams; another dose of 25 grams can follow. The administration of 50 mL of 50% dextrose raises blood glucose by an average of 166 mg/dL ( 9.2 mmol/L) the response varies widely<sup>14</sup>. It's important to administer glucose slowly through an intact IV line as severe tissue damage can result from extravasation (diagram 5) as the drug leaks into the surrounding tissue causing blistering and tissue necrosis, with severe injury and subsequent functional impairment and residual cosmetic defects<sup>14</sup>. In the event of extravasation the APP<sup>5</sup> and DPP<sup>6</sup> should be followed and reported within the Safety Reporting System.

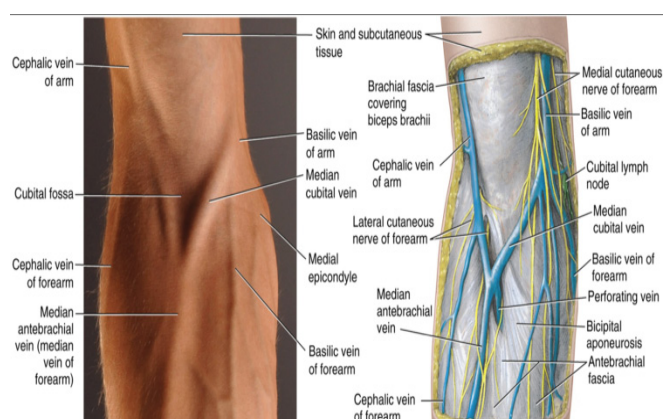


Diagram 3



Diagram 4



## Extravasation injury

Diagram 5



## Administration of glucagon

Glucagon is an alternative or adjunct to the administration of glucose and maybe given as an intravenous, intramuscular or subcutaneous injection. Recovery time is significantly longer in patients prescribed with a sulphonylurea and can be less effective in those who are chronically malnourished, or who have had prolonged period of starvation and have depleted glycogen stores or in those with severe liver disease. Generally Glucagon may take up to 15 minutes to take effect as it mobilizes glycogen from the liver<sup>15</sup>.



## How to Use Glucagon

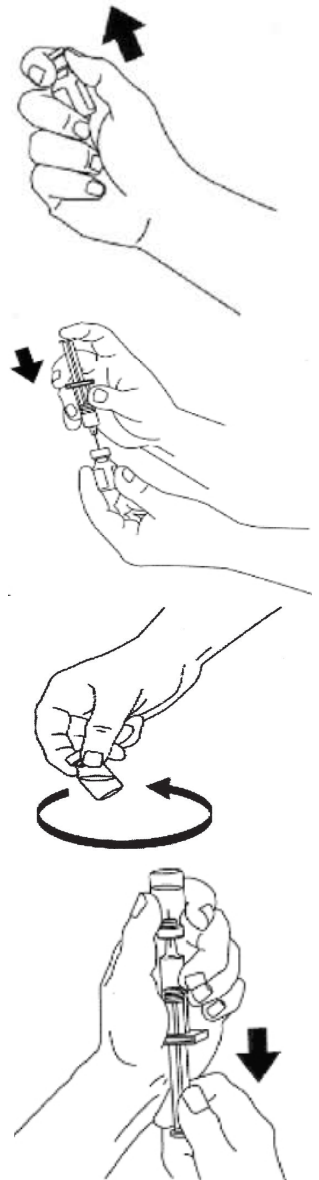


This glucagon emergency kit has a syringe that contains liquid (diluent) and a bottle that contains the glucagon powder and a bottle of diluent<sup>16</sup>.

1. Remove the flip-off seal from the bottle of glucagon. Wipe rubber stopper on bottle with alcohol swab.
2. Remove the needle protector from the syringe, and inject the entire contents of the syringe into the bottle of glucagon. Do not remove the plastic clip from the syringe. Remove syringe from the bottle.

Swirl bottle gently until glucagon dissolves completely. Glucagon should not be used unless the solution is clear and of a water-like consistency.

3. To inject glucagon use the same technique as for injecting Insulin
4. Using the same syringe, hold bottle upside down and, making sure the needle tip remains in solution, gently withdraw all of the solution (1 mg mark on syringe) from bottle. The plastic clip on the syringe will prevent the rubber stopper from being pulled out of the syringe; however, if the plastic plunger rod separates from the rubber stopper, simply reinsert the rod by turning it clockwise.
5. Inject glucagon immediately after mixing.
6. Cleanse injection site on buttock, arm, or thigh with alcohol swab.
7. Insert the needle into the loose tissue under the cleansed injection site, and inject all of the glucagon solution. Apply light pressure at the injection site, and withdraw the needle. Press an alcohol swab against the injection site.



### Conclusion

Hypoglycemia is a medical emergency and should be treated without delay. This article demonstrates the importance of sharing knowledge and evidence based practice to ensure the safety of the patient. It highlights the correct site for administration of Dextrose 50% intravenously and the technique for drawing up glucagon.

### References: Available upon request

This is your Newsletter and we value your comments. Please recommend Quality Improvement Projects in your area. We strongly encourage you to share patient safety information.

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