



# Integrating iPad's and Electronic Textbooks into Surgical Technology Education

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Program Director – Rolla Technical  
Center

# Background

- iPads can improve student learning and increase engagement
- Improve classroom instruction techniques
- Electronic textbooks can be better than traditional ones
- Many free surgical Apps that can be utilized
- Technology is our future



# RTC Surgical Technology Program

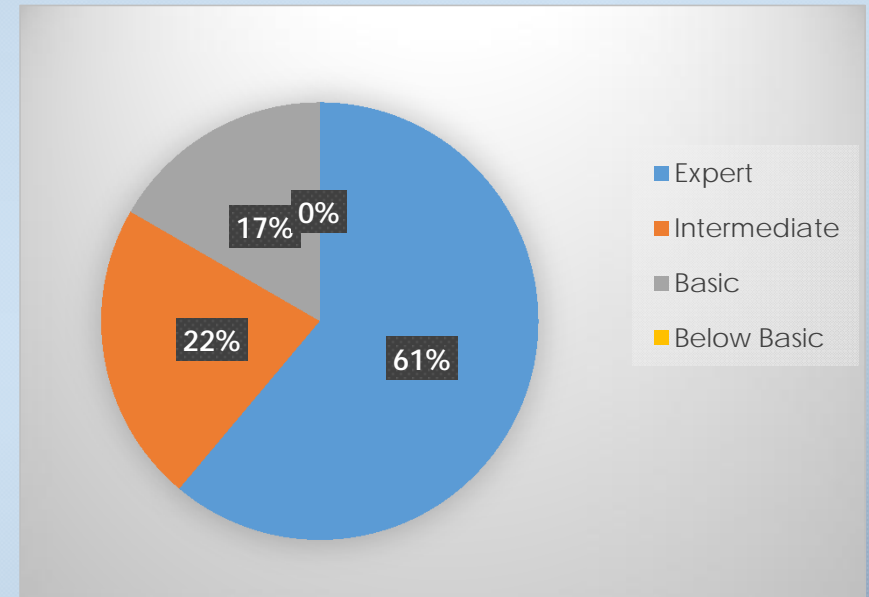
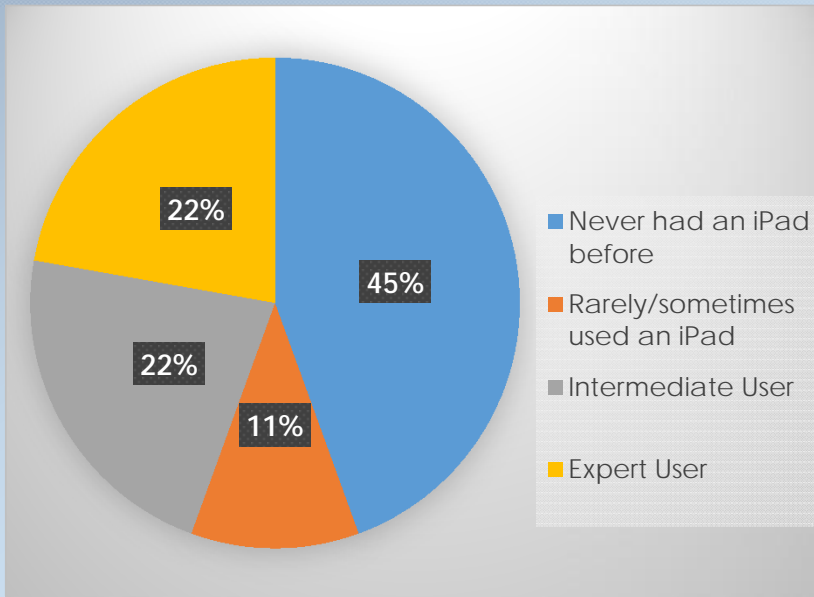
- Did a proposal and became a pilot program for Rolla Public Schools
- Training provided to students
- Student funded, teacher led program
- Student devices contain electronic textbooks and applications

# iPads

- User friendly even for the “not so tech savvy”

Prior To Start

2.5 Weeks



# Why do students love this?

- They get an iPad
- Everything is in one place, easy to carry around, and lightweight
- It's more interactive and engaging
- Makes learning fun
- They create much of the content

# Faculty Uses

- Purchase an iPad for all faculty members
- Download teacher copies of electronic textbooks
- Allow faculty to use iPad's and become familiar with materials to be used
- Other uses include on site clinical evaluations

# Cost Comparison

Electronic Books

\$494



Traditional

\$897

# Electronic Textbooks

- One App can do it all
  - books are in one place
- Highlighting and My Journal
- Sticky Notes
- Search Functions
- Pre Made Flashcards
- Quiz Me





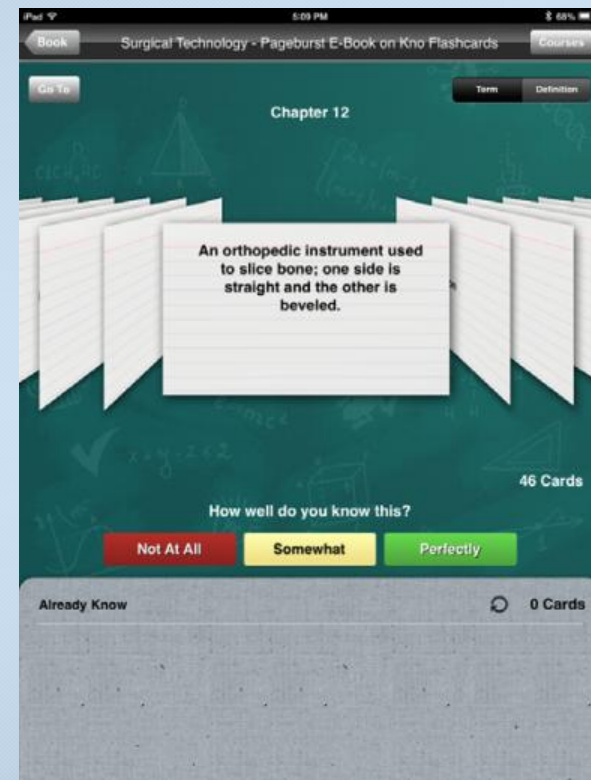
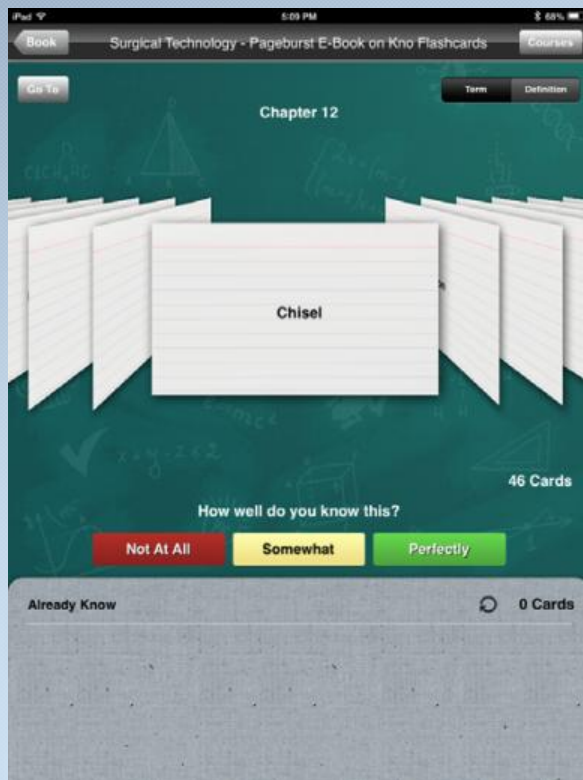
Kno



# Kno - Books




# Kno – glossary flashcards



# Kno - Sticky Notes

276 PHARMACOLOGY FOR THE SURGICAL TECHNOLOGIST



**IMPORTANT!**  
Malignant Hyperthermia treatment steps:  
Hyperventilate  
Dantrolene  
Sodium Bicarbonate  
Temp Management  
Diuretics  
Insulin

Procainamide or lidocaine is given intravenously to treat arrhythmias secondary to electrolyte imbalances. Procainamide (Procan SR, Procanyl) and lidocaine (Xylocaine) are anti-arrhythmic agents used to control cardiac arrhythmias seen in MH. Glucose and insulin are administered to treat hyperkalemia, frequently seen because potassium (K<sup>+</sup>) is released as muscle cells are destroyed. All usually simultaneously and in equal parts. All patient vital to determine response timing of expired CO<sub>2</sub>, establishment of arterial lines, and accurate temperature should be in place treatment steps for an MH crisis.

For additional information, visit the Malignant Hyperthermia Association of the United States website at [www.mhassn.org](http://www.mhassn.org).

A 24-hour hotline staffed by volunteer physicians has been established to assist with information to treat an MH crisis: 1-800-MH-HYPER (1-800-644-9737).

Treatment can be considered successful when vital signs and blood gases return to within normal limits. Elective surgery is discontinued. Life-threatening surgery is resumed, but with different anesthetic agents and a different anesthesia machine to prevent residual inhalation agent from triggering a second crisis. On cancellation or completion of the surgical procedure, the patient is transported to the intensive care unit (ICU) or post-anesthesia intensive care unit (PACU) accompanied with the specialized MH cart, because another episode could yet occur. Always consult

the number of vials reconstituted is adjusted accordingly by patient weight.


Sodium bicarbonate is given intravenously in doses of 1 to 2 mEq/kg to treat the metabolic acidosis resulting from high concentrations of lactate in the blood. Blood gases are monitored frequently. The patient must be rapidly cooled to prevent brain damage. Ice packs are applied to groin, neck, and axilla in an effort to lower the temperature. Level lounge of stomach, rectum, or bladder may be performed to cool the patient's core temperature.

Muscle cells are destroyed during an MH crisis, and the myoglobin that is released in this process tends to accumulate in the kidneys, obstructing flow. To keep the kidneys functioning properly, diuretics such as 20% mannitol (Osmifed) or furosemide (Lasix) are given intravenously. Each 20 mg vial of dantrolene contains 3 mg of mannitol.

**Box 16-2 MALIGNANT HYPERTHERMIA TREATMENT STEPS**

Hyperventilate—with 100% oxygen	Diuretics—administer 2.5 to 10 mg/kg intravenously	Temperature management—treat with ice packs and lounge
Dantrolene—administer 2.5 to 10 mg/kg intravenously	Sodium bicarbonate—administer intravenously to treat metabolic acidosis	Diuretics—administer mannitol or furosemide intravenously
		Insulin—treat hyperkalemia

276 PHARMACOLOGY FOR THE SURGICAL TECHNOLOGIST



**MAKE IT SIMPLE**

The treatment steps for MH are easier to learn if you formulate an easy-to-remember acronym such as "How do surgical technologists do it?" or HDSIDA. "H" stands for hyperventilate, "D" for dantrolene, "S" for sodium bicarbonate, "I" for temperature management, "D" for diuretics, and "I" for insulin.

Procainamide or lidocaine is given intravenously to treat arrhythmias secondary to electrolyte imbalances. Procainamide (Procan SR, Procanyl) and lidocaine (Xylocaine) are anti-arrhythmic agents used to control cardiac arrhythmias seen in MH. Glucose and insulin are administered to treat hyperkalemia, frequently seen because potassium (K<sup>+</sup>) is released as muscle cells are destroyed. All these treatment steps are taken virtually simultaneously and are arranged to help remember key points. All patient vital functions are monitored closely to determine response to treatment. Continuous monitoring of expired CO<sub>2</sub> (capnography) is crucial, as are establishment of arterial lines, frequent blood gas assessment, and accurate temperature measurement. A Foley catheter should be in place to measure urine output. Basic treatment steps for an MH crisis are summarized in Box 16-2.

For additional information, visit the Malignant Hyperthermia Association of the United States website at [www.mhassn.org](http://www.mhassn.org).

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		Insulin—treat hyperkalemia

# Kno – Highlighting and My Journal

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Chapter 18 Emergency Situations 277

dases (rhabdomyolysis), releasing potassium, myoglobin (a muscle cell protein), and creatine kinase.

If untreated, mortality is nearly 80%. Agents known to trigger this disease are succinylcholine (Anectine) and all inhalation anesthetics except nitrous oxide. Although the condition is rare, it is crucial that the surgical technologist understand the signs, treatment, and pharmacology involved in such a crisis in order to provide competent assistance to the anesthesia team. It is important to realize that patients who are identified preoperatively as positive for malignant hyperthermia should not be at risk for an intraoperative MH episode because trigger agents should not be administered to those patients during the course of general anesthesia.

**CAUTION**  
Once MH has been triggered, the patient can die in as short a time as 15 minutes, so prompt diagnosis and treatment are vital.

**CLINICAL SIGNS OF MALIGNANT HYPERTHERMIA**  
Contrary to popular belief, **pyrexia** (rapid increase in body temperature) is not an early indicator of MH (Box 18-1). A rise in patient temperature indicates that a full crisis is in effect. The earliest sign presented is an increase in end-tidal carbon dioxide. An increase of even 3 mm Hg could be significant. End-tidal CO<sub>2</sub> can increase for several reasons other than MH, but when other possibilities have been ruled out, the anesthesia provider may begin to alert the operating room staff that potential exists for an MH crisis.

Additional early signs include **tachycardia** and **tachypnea** (rapid breathing). These conditions may have other causes, but in combination with the signs described here, tachycardia and tachypnea are classic symptoms of MH. Both tachycardia and tachypnea are means the body uses to eliminate the excess carbon dioxide that is accumulating because of the hypermetabolic crisis.

**Box 18-1 CLINICAL SIGNS OF MALIGNANT HYPERTHERMIA**

Increase in end-tidal CO <sub>2</sub>	Acylphrenia
Tachycardia	Cyanosis
Tachypnea	Diaphoresis
Masseter muscle rigidity (MMR)	Pyrexia
Unstable blood pressure	

Muscle rigidity, especially masseter muscle rigidity (MMR), can be an early warning of MH, but there are other, benign causes of MMR. Opinions vary on the correlation here; but if MMR is present, the patient should be closely monitored for MH. In combination with signs described previously, MMR is considered a classic sign of MH. In addition, the patient may exhibit an unstable blood pressure, arrhythmias, cyanosis, diaphoresis (profuse sweating), and a rapid increase in body temperature (pyrexia). Temperatures of higher than 42° C have been reported. Other late signs include skin mottling, myoglobinuria, and hyperkalemia.

**MALIGNANT HYPERTHERMIA TREATMENT PROTOCOL**  
Once MH has been identified, the surgical procedure is stopped if possible and all triggering agents are discontinued. The patient is hyperventilated with 100% oxygen to help eliminate the excess CO<sub>2</sub> that accumulates in the blood. Dantrolene sodium (Dantrolin), a skeletal muscle relaxant developed specifically to treat MH, is administered intravenously (Fig. 16-2). Initial dosage is a bolus of 2.5 mg/kg. Dantrolene is packaged, freeze-dried, in vials of 20 mg with 3 g of mannitol, and must be reconstituted with 60 mL of sterile water. In an adult patient weighing 80 kg (176 lb), 200 mg of dantrolene (10 vials) is required to begin treatment. Dosages may reach 10 mg/kg, so in this case, 800 mg (40 vials) of dantrolene might need to be reconstituted. If additional help is not available (as seen when doing emergency on-call procedures), it may become necessary for the scrubbed surgical technologist to break vials and help reconstitute dantrolene as directed by the anesthesia provider. Once sterile water has been injected into the vial, the mixture must be shaken vigorously until the solution becomes clear yellow, indicating complete reconstitution. Dantrolene may be repeated in a dose of 2 mg/kg every 5 minutes, then 1 to 2 mg/kg/hr, and is administered until symptoms disappear. MH may also be seen in children, so

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Journal - Pharmacology for the Surgical Technologist - Pageburst E-Book on Kno

Book My Content Courses

**MALIGNANT HYPERTHERMIA**

Malignant hyperthermia (MH) is a rare but life-threatening reaction triggered in susceptible individuals by administration of certain anesthetic agents. MH is an inherited muscle condition that causes a hypermetabolic

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**MALIGNANT HYPERTHERMIA**

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Page 277 Add Note


Bookmarked.

**IMPORTANT!**  
Malignant Hyperthermia treatment steps  
Hyperventilate  
Dantrolene  
Sodium Bicarbonate  
Temp Management  
Diuretics  
Insulin

Page 278 Add Note

# Kno - Transparency for Notes

PHARMACOLOGY FOR THE SURGICAL TECHNOLOGIST



**Figure 16-2** Vial of sodium bicarbonate used to treat malignant hyperthermia.

Propranolol or labetalol is given intravenously to treat arrhythmias secondary to electrolyte imbalances. Propranolol (Ivora® SR, Proventil®) and labetalol (Nivelin®) are anti-arrhythmic agents used to control cardiac arrhythmias seen in MH. Glucose and insulin are administered to treat hyperkalemia, frequently seen because potassium (K<sup>+</sup>) is released as muscle cells are destroyed. All these treatment steps are taken virtually simultaneously and are arranged to help remember key points. All patient vital functions are monitored closely to determine response to treatment. Continuous monitoring of expired CO<sub>2</sub>, (capnography) is crucial, as an establishment of arterial lines, frequent blood gas assessment, and accurate temperature measurement. A Foley catheter should be in place to allow for frequent steps for an MH.

**MAKE IT SIMPLE**  
The treatment steps for MH are easier to learn if you formulate an easy-to-remember acronym such as "How do surgical technologists do it?" or HOSTS. "H" stands for hyperventilate, "O" for dantrolene, "S" for sodium bicarbonate, "T" for temperature management, "D" for diuretics, and "I" for insulin.

For additional information, visit the Malignant Hyperthermia Association of the United States website at [www.mhsoa.org](http://www.mhsoa.org).

A 24-hour hotline staffed by volunteer physicians has been established to assist with information to treat MH cases. 1-800-451-1173/1174 (11-800-444-9773).

Malignant hyperthermia is a life-threatening condition that occurs during anesthesia. The condition is caused by a genetic mutation. The condition is triggered by certain anesthetic agents and a different anesthetic machine to prevent residual anesthetic agent from triggering a second crisis. On cancellation or completion of the surgical procedure, the patient is transported to the PACU where the patient is monitored. MH is rare, but another episode could re-occur. Always consult

the number of vials recommended is adjusted accordingly by patient weight.

Sodium bicarbonate is given intravenously in doses of 1 to 2 mEq/kg to treat the metabolic acidosis resulting from high concentrations of lactic acid in the blood. The end gases are monitored frequently. The patient must be rapidly cooled to prevent brain damage. Ice packs are applied to groin, neck, and axilla in an effort to reduce the temperature. Lead linings of stomach, chest, and pelvic flasks may be performed to cool the patient's core temperature.

Muscle cells are destroyed during an MH crisis, and the myoglobin that is released in this process tends to accumulate in the kidneys, obstructing flow. To help the kidneys function properly, diuretics such as furosemide (Lasix®) or furosemidol (Lasix®) are administered intravenously. Each 20 mg vial of dantrolene contains 10 mg of dantrolene.

**Box 16-2 MALIGNANT HYPERTHERMIA TREATMENT STEPS**

Hyperventilate—with 100% oxygen	Temperature management—treat with ice packs and lounge
Dantrolene—administer 2.5 to 10 mg/kg intravenously	Diuretics—administer furosemide or furosemidol intravenously
Sodium bicarbonate—administer intravenously to treat metabolic acidosis	Insulin—treat hyperkalemia

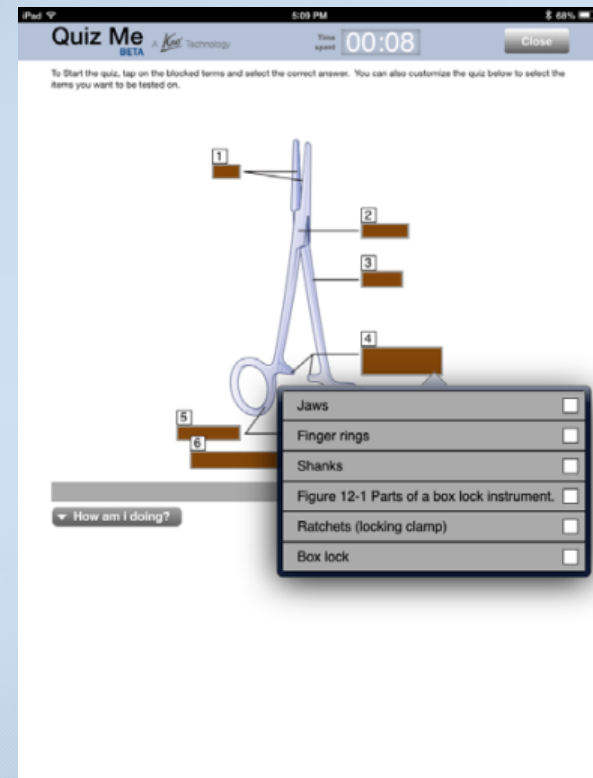
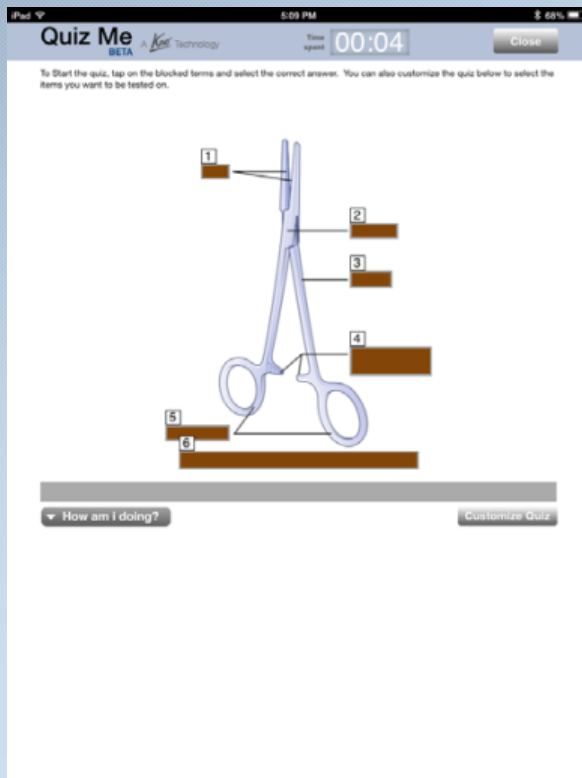
*treatment  
Acronym*

# Kno - Quiz Me

The screenshot shows the Kno app interface. At the top, it displays 'iPad', '6:08 PM', and '69%' battery. The main content area is a page titled 'Fundamental Human Needs - Maslow'. A quiz overlay is positioned in the center, featuring a pyramid diagram with five levels. The levels are labeled from top to bottom: 'Self Actualization', 'Self-esteem', 'Love', 'Security and Safety', and 'Physiological'. Below the pyramid, the text reads 'Figure 6-1 Maslow's hierarchy of human needs.' The quiz overlay includes a 'Quiz Me' button and a 'Close' button. The background page contains text about Maslow's theory, including a definition of 'Physiological needs' and a list of 'Needs'.

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# Kno – Quiz Me





# Kno - Search Options

Pharmacology for the Surgical Technologist - Pageburst E-Book on Kno

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Courses My Highlights and Notes dantrolene

Advanced Search

search within: Book Pharmacology for the Surgical T

media type: All Text Figure Table

highlights & notes: Mine All Highlights And Notes

Apply Filters

13 results, so prompt diagnosis and treatment are vital

### CLINICAL SIGNS OF MALIGNANT HYPERTHERMIA

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Increase in end-tidal CO <sub>2</sub>	Acetone
Tachycardia	Cyanosis
Tachypnea	Diaphoresis
Masseter muscle rigidity (MMR)	Proptosis
Unstable blood pressure	

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Courses My Highlights and Notes dantrolene

17 results for dantrolene

Dantrolene is packaged, freeze-dried, in vials of 20 mg with 3 g of mannitol, and must be reconstituted with 60 mL of sterile water. In an adult patient weighing 80 kg (176 lb), 200 mg of

Pharmacology for the Surgical Technologist - Pageburst E-Book on Kno  
Ch 16, page 277

**IMPORTANT! Malignant Hyperthermia treatment steps Hyperventilate Dantrolene Sodium Bicarbonate Temp Management Diuretics Insulin**

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Page 278

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Ch 16, page 278

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Ch 16, page 278

include **dantrolene** (Dantrium) and agents to treat specific metabolic disorders. If MH symptoms occur during surgery, the ACP alerts the team immediately. Treatment requires immediate

Surgical Technology - Pageburst E-Book on Kno  
Ch 14, page 301

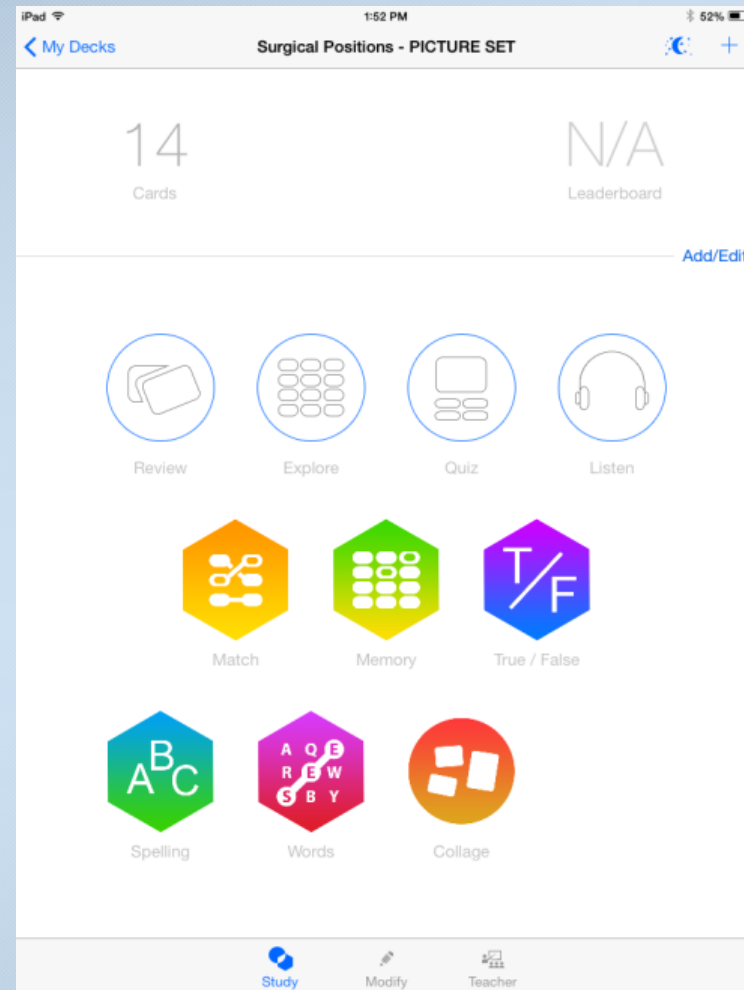
in surgery are powders that must be reconstituted with sterile water or a sodium chloride solution (saline) to make an injectable solution. Other drugs, such as **dantrolene** (Dantrium

Unstable blood pressure

Go To View

# Flashcards + App

- Useful for surgical instruments
- Students make their own
- Can use photos



# Flashcards + App



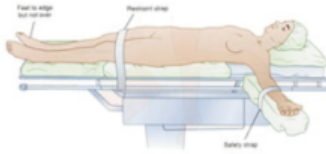
iPad 1:54 PM 52%

Surgical Positions - PICTURE SET Explore

Supine Position aka Dorsal Recumbent (with arms tucked)	Supine Position (with arm boards)	Trendelenburg Position
Reverse Trendelenburg Position	Lithotomy Position	Orthopedic Supine Position
Sitting Position aka Fowler	Lateral Position aka Sims	Prone Position (on raised pad or brace)
Prone Position	Jackknife Position aka Kraske	crutch stirrups
multipurpose stirrups	sling stirrups	

iPad 9:58 AM 54%

Surgical Positions - PICTURE SET Explore

Supine Position aka Dorsal Recumbent (with arms tucked)	<b>Supine Position (with arm boards)</b>	Trendelenburg Position
Reverse Trendelenburg Position		Orthopedic Supine Position
Sitting Position aka Fowler		Prone Position (on raised pad or brace)
Prone Position	0% 25% 50% 75% 100%	crutch stirrups
multipurpose stirrups	sling stirrups	

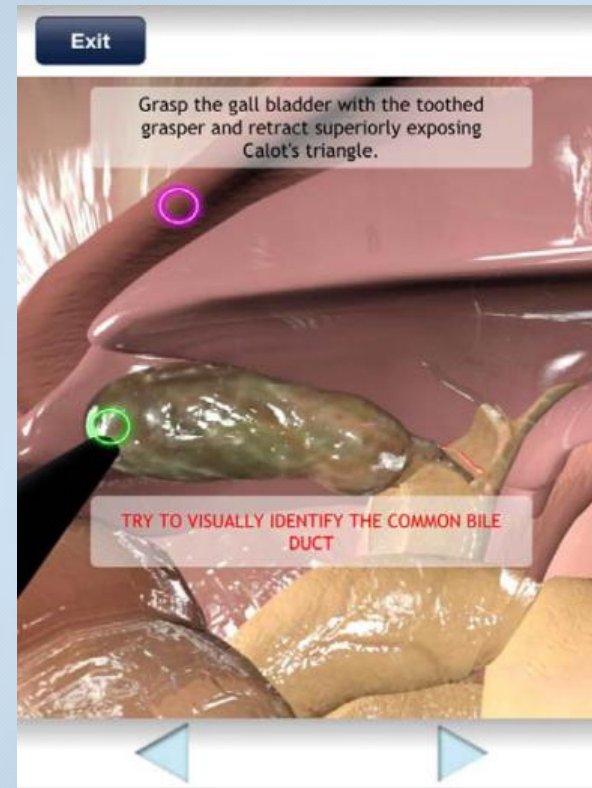
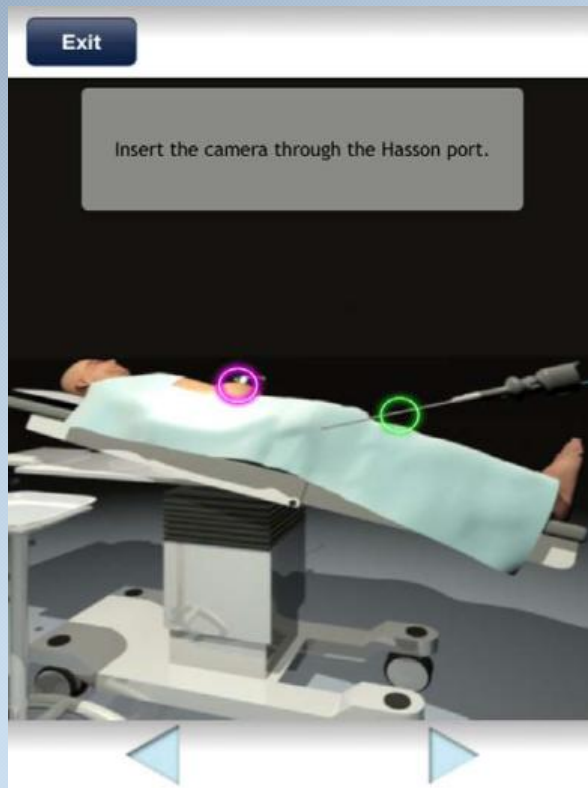
# Touch Surgery App



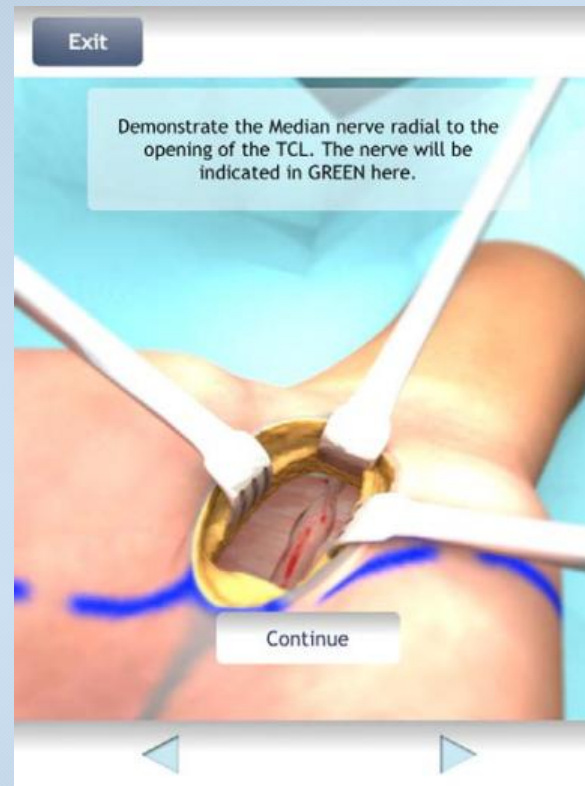
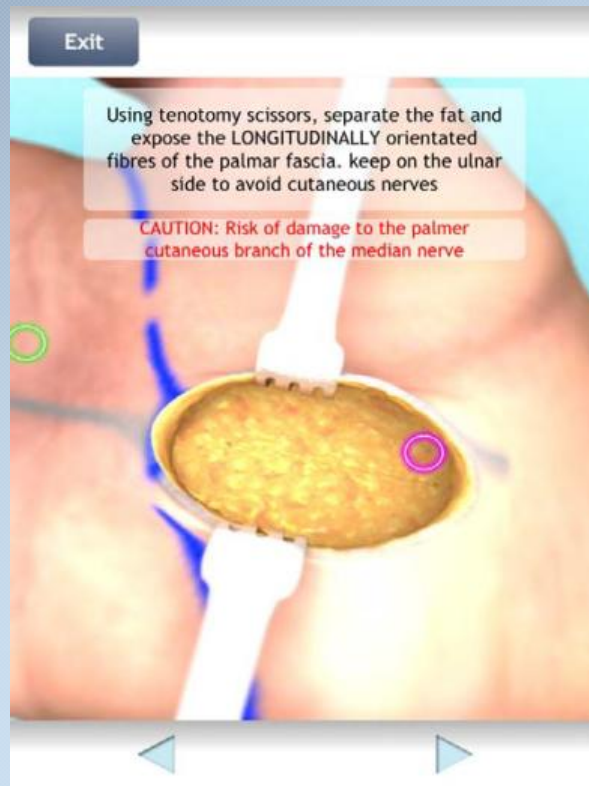
- Practice surgery anytime, anywhere
- Builds confidence before entering the O.R.
- Constantly updating and adding new procedures

[www.touchsurgery.com](http://www.touchsurgery.com)

# Touch Surgery – Cholecystectomy

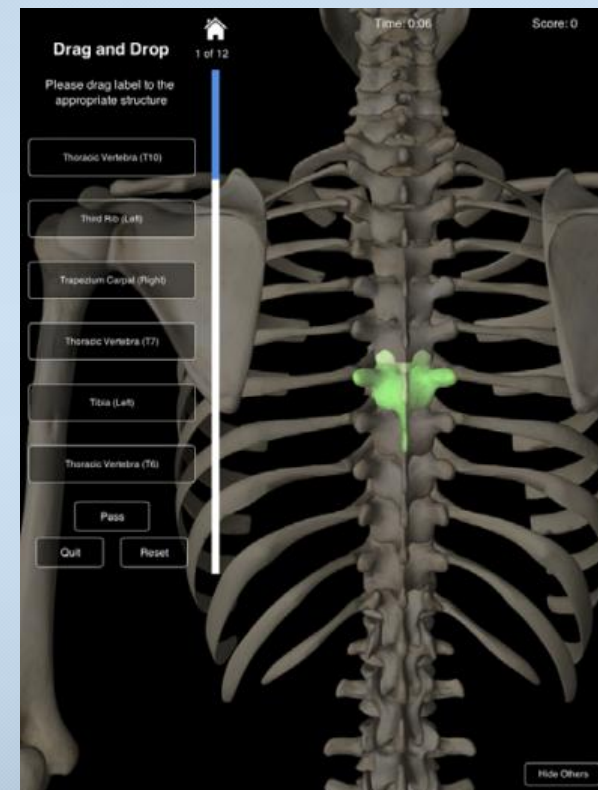
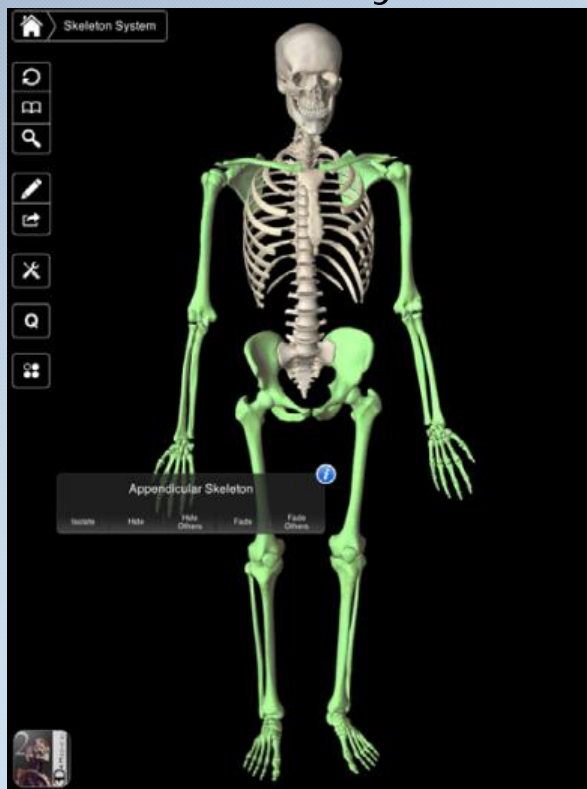


# Touch Surgery – Carpal Tunnel



# Essential Skeleton

- Useful for Anatomy review



# Draw MD APP

The screenshot displays the drawMD app interface. At the top left is a logo of a hand holding a pen. To its right, the text reads "drawMD is available for 13 medical specialties and counting". Below this, a grid of 13 colored icons, each featuring the hand-and-pen logo, represents different medical specialties. The specialties are arranged in two rows: the first row contains six specialties and the second row contains seven.

General Surgery

Cardiology

Ophthalmology

ENT

Anesthesia

Female Pelvic Surgery

OB/GYN

Orthopedics

Pediatrics

Thoracic Surgery

Transplant Surgery

Urology

Vascular Surgery




# Ethicon App




iPad **ETHICON** part of Johnson & Johnson 2:38 PM 48%

**Courses** Podcasts Videos Case Studies


Filter:




Principles of Wound Management




Basics of Suture Selection




Surgical Needles Selection



Suture Product Overview



Surgical Knot Tying



Topical Skin Adhesives

**Principles of Wound Management**

This course defines the critical wound healing period for the learner. The learner is then guided through matching tissue types with the appropriate suture characteristics. The course next focuses on listing the systemic, localized, and surgical/mechanical factors that can affect wound healing. Finally, the course teaches how to assess a wound for optimal suture selection.

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# Google Drive App



- Create a free Gmail account
- 15 GB of free storage
- Documents, spreadsheets, and slide presentations
- No more flash drives
  
- Shared “LIVE” Documents
  - Clinical tracking and case counting





# Form Connect App



- Used for creating electronic form
- Lab Final Evaluation and Count Sheet
- Clinical Student Evaluations by Instructors
  - Exported and emailed
  - Immediate feedback

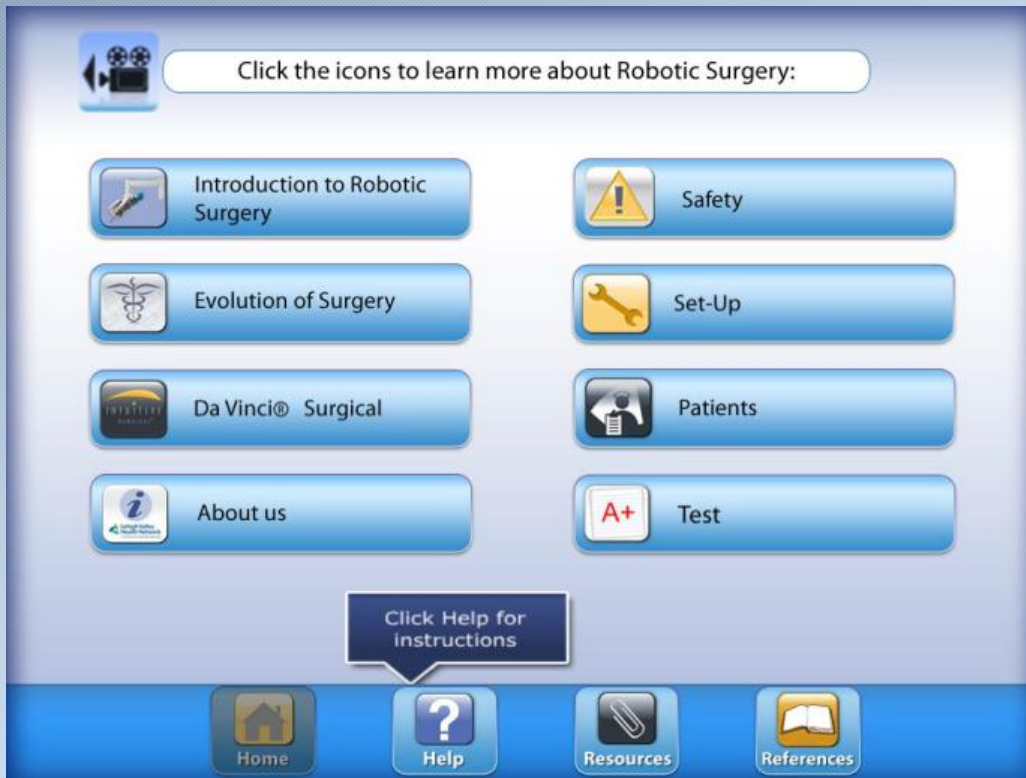
# Form Connect App



# Robotic Surgery App

Robotic  
Surgery

Click the icons to learn more about Robotic Surgery:



The app main menu features a central grid of blue buttons with icons and text. At the top left is a film camera icon. Below it is a text box with the instruction 'Click the icons to learn more about Robotic Surgery:'. The grid contains eight buttons: 'Introduction to Robotic Surgery' (screwdriver icon), 'Evolution of Surgery' (Caduceus icon), 'Da Vinci® Surgical' (robot arm icon), 'About us' (info icon), 'Safety' (warning triangle icon), 'Set-Up' (wrench icon), 'Patients' (person icon), and 'Test' (A+ icon). A speech bubble points to a question mark icon with the text 'Click Help for instructions'. At the bottom is a blue bar with four icons: Home (house), Help (question mark), Resources (paperclip), and References (book).

- Introduction to Robotic Surgery
- Evolution of Surgery
- Da Vinci® Surgical
- About us
- Safety
- Set-Up
- Patients
- Test

Click Help for instructions

Home Help Resources References


Robotic Surgery Final Test

Question 1 of 10

SUBMIT

Which surgical specialties have applications for the da Vinci® Robot?  
(Select all that apply)

- Pediatric Surgery
- Urology
- Gynecology
- Cardiothoracic
- General Surgery



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Score so far : 0 point out of 0

Quit Test

The test interface is dark-themed. It features a 'SUBMIT' button in the top right. The question asks which surgical specialties have applications for the da Vinci® Robot, with five options and checkboxes. An image of the robot is shown on the right. At the bottom, it displays 'Score so far : 0 point out of 0' and a 'Quit Test' button.

# Dupuy Synthes, Stryker

The screenshot shows the DePuy Synthes mobile application interface. At the top left is the DePuy Synthes logo with the tagline 'a Johnson & Johnson company'. A search bar is located at the top right. Below the logo is a grid of category buttons: Trauma, Joint Reconstruction, CMF, Spine, Sports Medicine, Biomaterials, Power Tools, Vet, and Codman Neuro. Each button has a corresponding image. To the right of the grid is a text block: 'We at the DePuy Synthes Companies of Johnson & Johnson are inspired by the opportunity to help people return to living active and fulfilling lives. We deliver a broad array of orthopaedic and neurological solutions—inspired solutions that go beyond quality implants and include services, education, instruments, and emerging technologies.' Below this is another text block: 'As we integrate our operations, we invite you to explore the products, services and educational support the DePuy Companies and the Synthes Companies continue to offer you today.' At the bottom of the text block is a list of links: Company, Legal Notice, Privacy Policy, Health Care Compliance Communication, and Help. At the very bottom is a navigation bar with icons for Back, Home, Settings, Search, and Update. Copyright information is visible at the bottom left: '© DePuy Synthes Companies 2010-2014. All rights reserved. This content is published by DePuy Synthes Companies, which is solely responsible for its contents. It is intended for use by residents of the United States. Current Version: (2014) 02-14-2014 version: 46.2. Also for help: visit our website. Tap outside to get the most content.'

The screenshot shows the Stryker mobile application displaying an anatomical diagram of a human hip. The diagram is titled 'An Arthritic Hip'. A red circle highlights the area of the hip joint. Labels on the left side of the diagram point to the 'Femur (Thigh bone)', 'Dissected Cartilage', and 'Femur (Thigh bone)'. The Stryker logo is visible in the bottom right corner of the diagram. The application interface includes a status bar at the top showing 'Page 2 of 10' and a search bar at the top right.



# Classroom Activities

- Virtual surgery like EdHeads
- Northstar certification review
- Youtube video clips

