Tech-Check-Tech Program

Developed and Approved by the Minnesota Society of Health-System Pharmacists. Approved by the Minnesota State Board of Pharmacy July 2003.

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I.   Overview

A. Description
This packet is a compilation of materials for the Tech-Check-Tech (T-C-T) Program. The program was designed by the Minnesota Society of Health-System Pharmacists (MSHP) and approved by the Minnesota State Board of Pharmacy (MN BOP). These materials describe the program and requirements and provide a sample training packet.

B. Audience
This packet is intended to provide hospital inpatient pharmacies the necessary information needed to implement the T-C-T program.

C. Board Variance
A variance approval from the Minnesota Board of Pharmacy must be obtained before the site can begin implementation of the T-C-T program.

D. Goal of Tech-Check-Check
The goal of this program is to utilize well-trained pharmacy technicians to perform daily non-judgmental pharmacy functions, and allow the pharmacist to perform more clinical and patient counseling services.

E. Definitions
Automated Medication Distribution Systems (AMDS)
>   A secured device that stores and distributes applicable medications upon request and requires an electronic personnel identification system

Error in AMDS
>   Any occurrence of a wrong drug, dose, quantity, dosage form or an expired date in a line item (each line counts as one error).

Error in Unit of use cart
>   Any occurrence of a wrong drug, dose, quantity, dosage form or an expired date. Each dose counts as one error.

Hospital Coordinator
>   Person responsible for adherence to the T-C-T program requirements.

Line Item
>   A checking unit for AMDS restocking (example: a single product of a specific drug and dose, regardless of quantity).

Technician Checker
>   An individual who has completed the T-C-T validation process and is currently authorized to check another technician's work.

Tech-Check-Tech (T-C-T)

    A program utilizing specifically trained and qualified pharmacy technicians to check AMDS medications and unit dose batches filled by another technician.

T-C-T Site Coordinator

    The pharmacist responsible for meeting the T-C-T program requirements listed in this document.

Unit Dose

    A physical quantity of drug product designed to be administered to a patient specifically labeled as to identify the drug name, strength, dosage amount and volume, if applicable. Unit of use can be obtained from the manufacturer of the drug, repackaged from an external re-packager, or repackaged on-site through a batch repackaging process that includes a registered pharmacist as a check. Unit dose examples include oral solids individually packaged by a manufacturer or re-packaged, oral liquids drawn up in a labeled oral syringe, injectable products, and pre-mixed IV products.

    Unit dose cassettes or envelopes are modes of delivering a hospital inpatient's medication doses for a predefined period of time, usually 24 hours. Cassette drawers or envelopes are labeled with the patient's name and location and are typically delivered to the patient care area by a pharmacy technician.

II. History of the Tech-Check-Tech program

History

The Tech-Check-Tech (T-C-T) program was designed by the Minnesota Society of Health-System Pharmacists in the late 1980's.

Prior to 1978 there were no specific MN Board of Pharmacy laws stating that pharmacists were required to check unit dose carts or that technicians were prohibited from doing so. There were several hospitals around the country and in MN that had technicians routinely checking patient unit-dose carts. In 1978, the Minnesota Board of Pharmacy (MN BOP) established a law that stated that this was a pharmacist's function.

In 1989, MSHP worked in conjunction with the MN BOP to develop guidelines for the use of technicians in the non-judgmental task of checking unit-dose batches. These guidelines established strict training and quality assurance (QA) parameters governing the use of "Tech-Check-Tech" (T-C-T) in hospital pharmacies and to assure QA while verifying the accuracy of the technicians and the process. The guidelines also limited T-C-T to hospitals by requiring that "The drug distribution system must be structured such that a minimum of one additional check by an independent party must be completed prior to the administration of the T-C-T checked medications to the patient. (E.g. nursing)." The intent of this program is to free pharmacists from non-judgmental distributive functions so that the unique skills of pharmacists can be better utilized to improve the medication related patient outcomes in hospitalized patients.

In 2002, the MN BOP asked MSHP to revise the T-C-T guidelines to incorporate processes related to automation. . The MSHP group also reviewed the QA and validation processes of the original guidelines, as these guidelines had not been changed since the initial three-year study ended in 1991. The 2003 revisions modify the original QA measures to a scope that allows smaller hospitals to utilize this program. These revisions still validate the technician's ability to perform the function, but establish a more practical system to implement and monitor this program.

Hospital sites that utilize the T-C-T program have patients that continue to receive medications with a high accuracy rate and pharmacist labor has been utilized to further improve patient safety by focusing on assessing the accuracy and appropriateness of the medications ordered and educating staff and patients.

III. Tech-Check-Tech Requirements (Minnesota State Board of Pharmacy and MSHP Program)

A. Hospital Requirements

To participate in the Tech-Check-Tech program, the hospital pharmacy must meet the following requirements:

1. The participating hospital must work with the appropriately titled hospital specific committees and/or groups for acceptance and approval before the T-C-T program can be implemented. These groups should have representation of hospital administration, nursing, pharmacy, risk management, patient safety and care. Some examples are P&T committee, Patient Safety committee, Nursing and Pharmacy committee, etc.
2. The participating hospital must have one pharmacist designated as the responsible person for meeting the T-C-T program requirements listed in this document. This person shall be called the *T-C-T Site Coordinator.*
3. The participating hospital must have a drug distribution system that is structured to allow for one additional check of the dispensed medications by a licensed nurse (or other licensed health care professional with authority to administer medications) after the delivery of checked medications.
4. The participating hospital must have adequate staffing to support a consistent utilization of the T-C-T program.
5. The participating hospital should develop a policy and procedures for the T-C-T program and have them available for board inspectors. The hospital should define a list of high-risk medications that are exceptions to T-C-T and include this list in the policy and procedures.
6. The T-C-T program is a tool to allow the re-direction of pharmacists from a distributive task to cognitive tasks. It is designed to allow pharmacists to further improve patient safety by focusing on assessing the accuracy and appropriateness of the medications ordered and educating staff and patients. The program must not be used as a mechanism to reduce pharmacist staff.
7. The participating hospital must include T-C-T as a technician duty and must have the pharmacists-in-charge submit it to the Minnesota Board of Pharmacy.
8. The participating hospital must obtain a T-C-T variance from the Minnesota Board of Pharmacy.
9. The drug description on the batch fill document or label must contain the same description as the one on the labeling of the unit of use package.
10. A pharmacist must perform a daily review of patient profile containing pertinent clinical information about the patient (i.e. Allergies, current medication, etc.).
11. A pharmacist must check the preparation of all products extemporaneously packaged and IV admixtures prepared in the pharmacy.
11. The participating hospital must incorporate the T-C-T program into the department's general orientation process.
12. The Pharmacist-in-Charge must review all records on an annual basis to assure compliance with this document.

B. Technician Eligibility

In order for a technician to participate in the T-C-T program, a technician must fall into one of the following categories:

1. A registered intern (in pharmacy school) with 6 months experience in unit dose filling.
2. A technician working full or part time with one-year equivalent experience in unit dose filling.

C. Training

The participating hospital must use this MSHP approved T-C-T module to formalize didactic training and quality control.
- All technicians are required to undergo specific training to participate in the program. The goal of this training process is to have the technician checker become validated and accomplish all the necessary didactic objectives. The training process must include the following:

  1. Didactic lecture (or equivalent training with a self-learning packet)
  2. Practical sessions (one-on-one training) that consists of observation of a pharmacist checking a unit dose medication batch and/or cart
  3. Validation
     - Initial validation
     - On-going QA audits performed quarterly for the first year then once every six months

  *If at any time a T-C-T technician loses his/her validation, that individual must be reassigned to another task until he/she is retrained and revalidated.

- The practical session will start with the trainee observing a technician checker performing either the unit dose batch or the AMDS stocking check process. Then the trainee performs the initial check with a registered pharmacist verifying all doses. During the final stages of the practical session, the technician will complete the validation process. The training process will include introducing artificial errors (see validation)**,** into a live or simulated environment**,** to monitor the ability of the technician to catch errors. Artificial errors introduced into the live environment, which are not corrected by the technician, shall be removed. A pharmacist must maintain initial validation and documentation for each validated T-C-T technician as well as notify a technician checker of any errors found during audits.

- Development of individualized training programs will be the responsibility of each site in order to tailor the program to the patient population and medication distribution system of the institution. Assessment questions should be tailored to the site and be changed periodically as appropriate. It will be the responsibility of the hospital coordinator to ensure that all training is completed and documented.

A summary report of each pharmacy technician trained as a technician checker will be kept on file by the hospital coordinator. Note: An organization may choose to place a copy of the training documentation in the employee's personnel file.

D. Process

1. A pharmacy technician fills the medication for the unit dose or Automated Medication Distribution System restocking batch.

2. A validated technician checker may check the accuracy of unit dose batches or automated medication distribution system restocks. The technician checker reviews the medications for the correct drug, dose, dosage form, quantity and reviews the expiration date.

3. If a filling error is found, the technician checker records the error and the product is given back to the technician who originally filled it (if available) or another technician. The technician then corrects the error and technician checker checks the correction. A pharmacist or another validated technician checker must check any dose corrected/filled by a technician checker.

4. If a validated checker is not available, then all doses must be checked by a pharmacist.

5. This process continues until all doses have been checked.

E. Validation and QA Process

1. Initial Validation (and re-validation if needed)

Unit of Use Batch: For initial validation, the technician checker must obtain a 99.8% accuracy rate in 1500 consecutive doses (divided in at least 5 separate audits). The audit process will consist of a registered pharmacist checking the accuracy of a unit of use medication after the technician has checked them. Any errors determined to be due to the improper checking by the technician checker will be documented and discussed with the technician. In each audit, the pharmacist will artificially introduce at least three errors. The pharmacist coordinating the audit will keep a record of the introduced errors to ensure that all are removed prior to distribution. All audit results will be documented by the pharmacist and kept in the quality assurance file. Errors will include an occurrence of a wrong drug, dose, quantity, dosage form, or an expired medication. Each dose will count as one error. If the technician checker misses more than three errors in 1500 doses, they fail the validation.

AMDS: For initial validation, the technician checker must obtain a 99.8% accuracy rate in 500 total line items (divided in at least 5 separate audits). The audit process

will consist of a registered pharmacist checking the accuracy of the AMDS medications after the technician has checked them. Any errors determined to be due to the improper checking by the technician checker will be documented and discussed with the technician. In each audit, the pharmacist will artificially introduce at least three errors. The pharmacist coordinating the audit will keep a record of the introduced errors to ensure that all are removed prior to distribution. All audit results will be documented by the pharmacist and kept in the quality assurance file. Errors will include an occurrence of a wrong drug, dose, quantity, dosage form or an expired medication. Each dose will count as one error. If the technician checker misses more than one error in 500 doses, they fail the validation.

2. Quality Assurance Process

1. The hospital coordinator shall maintain documentation of the quality assurance checks (audits). Audits should be conducted in the same manner as in the initial validation process. The audits should occur at random and unannounced times. The audit sample should be at least 300 doses for the unit of use batch and 100 line items for the AMDS batch. To maintain validation, no more than one error can be made.   The audit reports should include each specific error encountered, the total number of errors, the total number of doses or line items checked and the percent error rate. Once the technician has successfully completed three consecutive monthly audits, specific audits for that technician may be reduced to quarterly for a period of one year. After a year, audits can be reduced to semi-annually. If a technician does not perform the T-C-T duties for more than six months, that technician must be revalidated.

3. If a validated technician checker fails any of the audits, the audit should be repeated in the same month. If the technician fails the re-audit, they should be reassigned to another duty and must be revalidated prior to checking any more doses.

IV. Tech-Check-Tech Training Module

A. Purpose

The purpose of the training module is to provide a template of the information necessary to meet the required didactic, process orientation training and quality control necessary to participate in the Tech-Check-Tech program. This information is intended to be combined with one-on-one training in the automated batch, cart fill, and pre-made IV checking process.

B. Program Overview

Train technician on the Tech-Check-Tech Requirements and Program (Section III Of this packet)

C. Training - Checking

Upon completion of this portion of training, the pharmacy technician will be able to:

- Identify the information required on the label of extemporaneous products packaged by the pharmacy.
- Differentiate between the packaging, labeling, and product characteristics for various oral, injectable, and intravenous medications.
- Identify expired or contaminated products.
- List the main product characteristics that need to be checked for each drug packaged by the pharmacy.
- Identify products requiring special handling or special storage conditions.
- Identify the generic names associated with common brand names through the use of common references.
- State the appropriate size of common bulk items to be dispensed.
- Describe how AMDS's work and their associated risks and limitations (where applicable).

1. Therapeutic Drug Classifications (ASHP Formulary Service)

   a. Antihistamines
      These drugs provide symptomatic relief of allergic symptoms and common cold symptoms. They can be used as a sedative, antiemetic, or for motion sickness. These drugs antagonize histamine.

   b. Anti-Infective drugs
      These drugs will kill or stop the growth of infective organisms in the body. This group includes anti-viral, antibacterial, and anti-fungal agents.

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c. Antineoplastic Drugs

Use of these types of drugs is known as chemotherapy. They are used in cancer treatment, often in conjunction with surgery, radiation therapy, or immunotherapy. They affect cell growth by several different mechanisms.

d. Autonomic Drugs

1. Parasympathomimetic (cholinergic): These drugs increase muscle tone of the smooth muscles of the bladder and gastrointestinal tract. They are used for urinary retention and to increase gastric motility.

2. Parasympatholytic (cholinergic blockers): These drugs inhibit motility of the gastrointestinal tract and urinary tract. They also decrease secretions of the body (saliva, pancreatic, gastric). These drugs are commonly used before surgery.

3. Sympathomimetic (adrenergic): These drugs can be bronchodilators by relaxing bronchial smooth muscle by stimulation of beta-2 adrenergic receptors. These drugs can cause cardiac stimulation (increase the force of contraction) by acting on beta-1 adrenergic receptors. They can also cause vasoconstriction by acting on alpha-receptors (nasal decongestants) and vasodilatation in skeletal muscle.

4. Sympatholytic (adrenergic blockers): These drugs block alpha-adrenergic action. They cause direct stimulation of smooth muscle (vasoconstriction) and vasodilatation by direct relaxation of vascular muscle.

5. Skeletal Muscle Relaxants: These drugs are generally central nervous system (CNS) depressants, which have sedation and skeletal muscle relaxant effects.

e. Blood Formation and Coagulation Drugs

1. Antianemia: Iron is needed by our body in hemoglobin so we can utilize oxygen in our blood.

2. Anticoagulants: Warfarin prevents harmful clot formation in blood vessels by decreasing the activity of certain clotting factors. Heparin is used when an immediate effect is required. It can be used for treatment or prevention of clots. Protamine is a heparin antagonist. It neutralizes heparin activity by binding to it.

f. Cardiovascular Drugs

1. Cardiac Drugs: These drugs have several actions, which affect the heart. Some are antiarrhythmic drugs. They are used in life

threatening arrhythmias, such as suppressing ventricular or arterial fibrillation, flutter, or tachycardia. Other drugs increase the force and speed of the contraction of the heart. They help in congestive heart failure. Some drugs block beta-adrenergic receptors in the heart (beta-blockers slow down heart rate). They also reduce blood pressure and are useful in angina pectoris, cardiac arrhythmias and migraine headaches.

2. Antilipemic Agents: These drugs are used to decrease elevated serum cholesterol and triglyceride levels.

3. Hypotensive Drugs: These drugs are used in the treatment of hypertension. Diuretics are usually used first, and then other types of medications are added if necessary. Some are vasodilators, others affect the autonomic system, and some are beta-blockers.

4. Vasodilating Drugs: These drugs are used as coronary vasodilator to treat angina pectoris. Some are used for long-term prophylactic management and others for acute relief.

g. Central Nervous System Drugs

1. Analgesics and Antipyretics: This large group of drugs kills pain and decreases fever in the body. Narcotics are also in this category. Narcotics analgesics may produce physical dependence. Nonsteroidal anti-inflammatory agents represent a large newer group of painkillers.

2. Anticonvulsants: These drugs are used to reduce the frequency and/or severity of seizures in epilepsy.

3. Psychotherapeutic Drugs: Antidepressants are used in endogenous depression and other depressive illnesses. Tranquilizers are used in acute and chronic psychoses, including schizophrenia. Some have other uses in hiccups and as antiemetics. Hydroxyzine is used to relieve anxiety, control emesis, and reduce narcotic requirements following surgery.

4. Sedatives and Hypnotics: These drugs are used to treat insomnia, relieve anxiety, and provide routine sedation. They cause CNS depression. Barbiturates can cause physical and psychological dependence. Benzodiazepines are used for anxiety, insomnia, and as anticonvulsants and skeletal muscle relaxants.

2. Drug Classifications

Controlled substances

- CI
- CII
- CIII
- CIV
- CV

Non-Controlled medications

3. Generic vs. Brand names

   Identify the generic names associated with common brand names through the use of common references.

   During the drug development process, a medication is given a generic and chemical name. Once the FDA approves the drug, the manufacturer proposes a brand name for their form of the drug. During the patent life of the drug, no generic forms are made; therefore, ordering the drug by brand name is the same as ordering it by generic name. In general, generic forms of medications are used whenever possible. Therefore, drugs should be referred to whenever possible by the generic name. CMARs, cart fill lists and AMDS fills should always list the generic name of the drug.

   Generic and brand names can be found in common references. Common references may include:
   - Micromedex
   - American Hospital Formulary Service
   - Pediatric dosage handbook
   - Drug facts and Comparisons

   Identify common drugs and their brand names.

4. Special handling or storage conditions

   Some products may require special handling or storage conditions like:
   protect from light; bagged separately when in refrigerator; needs refrigeration etc.

   Identify products requiring special handling or storage conditions.

5. Product Characteristics

   IV products: colorless or lightly colored clear solution (in general); exceptions to this include Primaxin and Rifampin

   Oral products: can be colorless or densely colored; suspensions are cloudy and may tend to separate out to form more than one layer.
   - Example: furosemide (Lasix) - oral solution is yellow/orange and IV preparation is a clear solution

♦ Some drugs (suspensions) may separate out (precipitate) and cannot be re-suspended

Identify expired or contaminated products.
♦ Expiration dates must be checked on each dose of medication. If packaged (unit dose) from the manufacturer, this date must be on that packaging.

♦ Some products have special stability characteristics or are prone to contamination because of packaging

Identify the product characteristics that need to be checked for each medication dispensed by the pharmacy:
♦ Right Dose
♦ Right strength
♦ Right number of unit doses
♦ Right drug
♦ Right dosage form
♦ Right packaging
♦ Valid expiration date

6. Dosage Forms

Some medications have unique dose forms. This affects how the drug can be given (e.g. whether or not it can be crushed or split).
Examples include:
• Nifedipine (Procardia XL) is a matrix tablet that slowly releases the medications from a "web-like" structure through a special hole in the tablet coating into the GI tract.
• Valproic acid (Depakote Sprinkles) are small beads that slowly release the drug in the small intestine; they must not be chewed but can be sprinkled on soft food and swallowed.
In caring for children and adults with special needs, we often must use/create dosage forms that are unique to our patient population.
Examples include IV dilutions and oral liquid medications not available from the manufacturer

Identify medications with various dosage forms.

7. Expiration Dates

Expiration dates should be visible on each individual dose. Items that are normally stored in the refrigerator should be marked with the appropriate expiration for room temperature. All outdated medications should be considered an error in the cart fill or ADM batch fill.

Identify examples of commonly missed expiration dates.

8. Labels

Information required on the label of extemporaneous products (including drawn-up doses for cart fill) dispensed by the pharmacy (for inpatient use) includes:

♦ Generic/Trade Name of Drug
♦ Strength of Drug
♦ Special Instructions
♦ Dose
♦ Expiration
♦ Manufacturer Lot number
♦ Hospital name

Various dosage forms require specific packaging and storage because of the stability or other characteristics of the drug and should be noted on the label.

Identify examples of correct product labeling.

D. Training - Accuracy and Medication Errors

Upon completion of this portion of training, the pharmacy technician will be able to:

- Understand the potential impact of the variety of medication errors by reviewing a sample of past errors as reported in nationally distributed periodicals, such as *Hospital Pharmacy* and ISMP Medication Safety Alert newsletters as well as those experienced at the participating hospital.
- Recognize and identify various dosage forms.
- Describe the training, validation, and audit process for technicians participating in the T-C-T project, including accuracy requirements.
- Describe the use of the pharmacy and nursing profile systems (including the Medication Administration Record if used as a checking document).

1. Common Workplace Errors

Understand the potential impact of medication errors by reviewing past errors as reported in *Hospital Pharmacy* as well as ISMP.

Medication errors are episodes of a drug misadventure that should be preventable through effective system controls involving pharmacists, physicians, other prescribers, nurses and others. It is the responsibility of all staff to prevent medication errors through accurate job performance.

2. Look-a-like Sound-a-like medications

   Identify look-a-like sound-a-like medications.

   - Ampicillin / Amoxicillin
   - Nifedipine / Nicardipine
   - Timentin / Ticar
   - Potassium Chloride / Potassium Gluconate
   - Dopamine / Dobutamine

3. Route of Administration

   Identify common errors with routes of administration.

4. Dilution Errors

   Many medications have more than one concentration available. This may result in an overdose or underdose of medication.

   Identify possible errors with multiple concentrations.

5. Abbreviations

   Recognize and identify various abbreviations:

   - Common medical abbreviations and symbols used in Pharmacy:

MS = morphine sulfate	Na = sodium
K = potassium	Ca = calcium
Mg = magnesium	Cl = chloride
SO4 = sulfate	PO4 = phosphate
HCO3 = bicarbonate	D5W = 5% dextrose (in water)
NS = normal saline	LR = lactated ringers

   - Common abbreviations related to drug strength:

     g = grams (also abbreviated incorrectly as G or gm)
     mg = milligrams (1/1000 of a gram)
     mcg = micrograms (1/1000 of a milligram)
     meq = milliequivalents
     U = improper abbreviation for units
     Gr = grains, an apothecary volume measure = 60 mg
     Kg = kilograms = 1000g = 2.2 pounds

   - Common abbreviations related to volume:

     L = liter (1000 ml)   ml = milliliter (often written as cc)

Gtt = drop (not drip)   dram = 5ml = 1 teaspoon
Oz = ounce = 30 ml   ss = ½ (ss oz = ½ oz)

- Common abbreviations related to route:

    po = oral
    IM = intramuscular (a "shot")
    SQ = SC = SubQ = subcutaneous (under the skin)
    IV = intravenous (into the vein)
    IT = intrathecal (into the spinal fluid)
    Pr = rectal

    Au = both ears   ou = both eyes
    Ad = right ear   od = right eye
    As = left ear   os = left eye

    GT1 = via gastrostomy tube
    NG = via nasogastric tube
    NJ = via nasojejunal tube
    JT = via jejunostomy tube

    The difference between the above tubes is based on their point of entry and at the point in which the end is located. The nasojejunal and nasogastric tubes are temporary tubes that are inserted through your nose. The gastrostomy and jejunostomy tubes are permanent tubes that are implanted (surgically) through the skin. GTs and NGs continue down into the stomach and end there. JTs and NJs end in your upper small intestine (jejunum). Some medications cannot be given through some of these types of tubes because of how they affect the body. For example, sucralfate (Carafate®) is a drug that coats the lining of the <u>stomach</u> to prevent ulcer formation; it does not make sense to give this drug through a JT or NJ because it will bypass the stomach.

- Common abbreviations in Frequency:

    q = every or each   qd = every day
    qod = every other day   bid = twice a day
    tid = three times a day   qid = four times a day
    h = hr = hour   q2h = every 2 hours
    prn = as needed   ac = before meals
    pc = after meals

    The following are usually site specific. There may be several different meanings for each.

    STAT   Demand
    ASAP   PRN
    ONE   IRR

E. Training - Calculations

Upon completion of this portion of training, the pharmacy technician will be able to:

- Demonstrate an understanding and a working knowledge of the basic mathematical principles involved in pharmacy calculations, including: Fractions, Percentages, Proportions, Significant figures
- Make mathematical conversions between and within the Metric, Avoirdupois, and Apothecary systems.
- Fraction: a way of describing a portion of a whole (e.g. 1/2 or 3/8)
- Percentages: a way of describing a portion out of a hundred (e.g. 50%, 72%).
- Proportions: the relation of one part to another or to the whole - often described by a fraction or percentage (e.g.1:1000 vs. 1:10000).

1. Practice calculations

(Sample exam – the hospital coordinator should change the questions and examples on a periodic basis)

Please complete the following exercises. The answers are included for your education. (Questions taken from the Pharmacy Certified Technician Calculations Workbook) – should reference this like a regular reference (and really should have permission)

a. Section 1
1. 4 mg = _____g
2. 2 g = _____mg
3. 4000 g = _____kg
4. 10 mg = _____g
5. 20 cc = _____ml
6. 0.75 L = _____ml
7. 0.4 L = _____cc
8. 600 cc = _____L
9. 3 ml = _____L
10. 30 ml = _____cc

b. Section 2

Calculate the following dosages. Round your answer to the nearest tenth.

1. Acetaminophen (Tylenol) elixir 160 mg/5 ml
   Dose: 320mg
   How many ml?

2. Albuterol liquid 2 mg/5 ml

Dose: 6 mg
How many ml?

3. Furosemide 10 mg/ml
   Vial size: 10 ml
   Total vial strength?

4. Dexamethasone 40 mg/10 ml
   Concentration per ml?

5. Lidocaine 1% injection 10ml vial
   What is concentration in mg/ml?

6. Midazolam 2 mg/2 ml
   What is the concentration per ml?

7. Bumetanide injection 0.25 mg/ml
   Dose: 2 mg
   How many ml?

8. Carbamazepine 200 mg
   Dose: 1 tab qid
   How many tablets are needed for 24 hours?

9. Metformin HCL 850 mg
   Dose: 1 tab BID PC
   How many tabs and when does the patient receive the doses?

10. Methylprednisolone 40 mg/1 vial
    Dose: 40 mg q4 hrs
    How many vials are needed?

C. Answers

Section 1
1. 0.004
2. 2000
3. 4
4. 0.01
5. 20
6. 750
7. 400
8. 0.6
9. 0.003
10. 30

Section 2
1. 10 ml
2. 15 ml
3. 100 mg
4. 4 mg/ml
5. 10 mg/ml
6. 1 mg/ml
7. 8 ml
8. 4 tabs
9. 2 tablets per day, 1 after each of 2 meals
10. 6 vials

F. Sample Test Questions

On the following pages are sample test questions than may be used to assess competency with the T-C-T module. As with the module, the tests may be altered to fit site specific information. The questions should be changed periodically.

1. History of the T-C-T Program

To verify competency, the following questions must be answered correctly. Please complete the quiz and turn into to your hospital coordinator.

1. True   or   False

    The Minnesota Board of Pharmacy established a law that stated a pharmacy technician could check patient unit dose carts.

2. True   or   False

    The intent of the program is to free pharmacists from non-judgmental distributive functions so that their unique skills can be better utilized to improve the medication outcomes in hospitalized patients.

3. Multiple choice

    What year did the Minnesota Board of Pharmacy require that there be an additional independent check of all medications prior to the administration to the patient?

    A. 1979
    B. 2002
    C. 1989
    D. 1991

2. Requirements of the T-C-T Program

To verify competency, the following questions must be answered correctly. Please complete the quiz and turn into to your hospital coordinator.

1. Multiple choice

    To participate in the T-C-T program, a hospital must follow these guidelines:

    A. The nurse must check the patient profile daily.
    B. Floor stock medications can be checked by a technician checker
    C. The hospital must receive a variance from the Board of Pharmacy.
    D. A technician can be the hospital coordinator.

2. True   or   False

    A part time technician can become a checker if they have one year's equivalent experience in unit dose filling.

3. Multiple choice

    All technicians must undergo the following training to participate:

    A. Practical session
    B. Didactic lecture
    C. Validation
    D. All of the above

3. Elements of Checking

To verify competency, the following questions must be answered correctly. Please complete the quiz and turn into to your hospital coordinator.

1. True   or   False

    A medication that is to be used as a nebulized dose must be labeled with a "Not for Injection" sticker.

2. True   or   False

    A formulary is a system managed by the P&T Committee that limits duplication of drug supplies in the hospital.

3. Multiple choice

    IV medications that are not clear and colorless include the following:

    A. Furosemide (Lasix) IV
    B. Rifampin
    C. Imipenem/Cilastatin (Primaxin)
    D. B and C

4. Match the product with the correct special handling or storage requirement.

    _____ Ipratropium (Atrovent)   A. 24 hour stability

    _____ Famotidine (Pepcid) IV   B. Needs refrigeration

    _____ Acyclovir (Zovirax)   C. Send in an amber bag

4. Accuracy and Medication Errors

To verify competency, the following questions must be answered correctly. Please complete the quiz and turn into to your hospital coordinator.

1. Name four types of errors that are commonly experienced at your site.

2. Multiple choice

    All of the following are TRUE about the process of checking unite dose medications by a technician except:

    A. If filling errors are found, the technician checker may correct then without further checking by anyone

    B. The technician checker cannot check drawn up (extemporaneous) doses prepared by another technician.

    C. A pharmacist must check all unit dose medications that a technician checker reviews during the validation process.

3. Match the abbreviation with the correct term:

    _____ pr   A. oral   F. left ear

    _____ au   B. both ears   G. milligrams

    _____ ng   C. nasogastric tube   H. rectal

    _____ mcg   D. micrograms   I. nasojejunal tube

    _____ os   E. left eye   J. magnesium

5. Validation and QA Process

To verify competency, the following questions must be answered correctly. Please complete the quiz and turn into to your hospital coordinator.

1. True   or   False

   Training for the T-C-T includes a validation process that requires a technician to check 3500 consecutive doses.

2. True   or   False

   After initial validation, weekly audits are to be conducted at random.

3. Multiple choice

   Which of the following are TRUE regarding the validation process?

   A. A pharmacist must check the accuracy of the technician checker during the validation process

   B. Documentation of the technician checking errors must be completed by the nurse and discussed.

   C. An error of the wrong drug (2 doses) in a unit dose cart is counted as 2 checking errors.

   D. The technician filler artificially introduces at least 5 errors into an audit.

   E. A and C

6. Answers to Test 1-5

Test 1

1. False
2. True
3. E

Test 2

1. C
2. True
3. D

Test 3

1. True
2. True
3. D
4. C, B, A

Test 4

1. Wrong drug, wrong dose, wrong quantity, wrong dosage form
2. A
3. H, B, C, D, E

Test 5

1. False
2. False
3. A, C, E

A. Sample Variance Request Letter*

Minnesota Board of Pharmacy
2829 University Ave SE, #530
Minneapolis, MN 55414-3251

Dear _____:

I am requesting a variance to utilize the Tech-Check-Tech program in accordance with the Minnesota Board of Pharmacy approved MSHP proposal.

The Tech-Check-Tech program will be conducted in accordance with the MSHP guidelines for training, validation and quality assurance approved by the Minnesota Board of Pharmacy.

Please see attached copy of site specific required policies and procedures.

Thank you.

(Insert your name & site information)

* NOTE: A MN BOP Variance Request Form must be completed for the initial variance request and for renewals. Data submitted with the initial request to initiate T-C-T should include the policy and procedure for T-C-T, the policy and procedure around high risk medications and evidence of the hospital committee approval of the program (e.g., meeting minutes). Renewals should include the policy and procedure for T-C-T, the policy and procedure around high-risk medications and QA audit documentation.

B.   T-C-T Training Checklist

Name: _____   Date: _____

- Qualifications: (check all that apply)

    ☐   A registered intern (in Pharmacy school) with six month's experience in Unit Dose filling

    ☐   A technician working full or part time in Unit Dose filling with one year's equivalent experience

- Areas trained in as a Technician: (check all that apply)

    ☐   IV   ☐   First Fill
    ☐   UD   ☐   OR
    ☐   Pyxis   ☐   CartFill
    ☐   DSC   ☐   Billing

- T-C-T Training

Didactic   completed: _____ (enter date)

Process (1:1)   completed: _____ (enter date)

Quizzes   completed: _____ (enter date)

Validation   completed: _____ (enter date)

T-C-T Training completed: _____

C. Initial Validation Form

To obtain T-C-T validation, a 99.8% accuracy rate must be achieved.

Unit of Use Batch: Must achieve required accuracy rate in 1500 consecutive doses (divided in at least 5 separate audits). If candidate misses more than three errors they will fail the validation process.

AMDS Batch: Must achieve required accuracy rate in 300 doses for unit of use and 100 line items in an AMDS batch. If candidate misses more than one error they will fail the validation process.

DATE	# DOSES	# ERRORS	% ACCURACY

D. **T-C-T Audit Tool**

Date of Audit: _____

T-C-T being audited: _____

RPh conducting Audit: _____

Introduced Errors:

Medication	QTY	Area (AMDS;Unit of Use;etc.)	Description of Error

Audit Results:

# Doses	# Errors	Error Description	% Accuracy

E. Tech-Check-Tech Monthly/Quarterly/Semiannual QA Tracking Form
(Each new T-C-T must complete 1500 consecutive doses in 5 separate audits of Unit of Use and 300 doses or 100 line items of AMDS batches and obtain a 99.8% accuracy rate to become/remain validated)

Technician: _____

Date	#Doses	#Errors	%Acc.	RPh	A	B	C	D	

Error Types:
A = Too Few Doses
B = Too Many Doses
C = Wrong Drug
D = Wrong Dose
E = Wrong Dosage Form
F = Drug Expired

F. T-C-T Yearly Program Summary

1st Qtr.

2nd Qtr.

2003	Date	Doses	Errors	%	RPh	Date	Doses	Errors	%
Tech Name	X/X/X	#	#	#%					

3rd Qtr.

4th Qtr.

2003	Date	Doses	Errors	%	RPh	Date	Doses	Errors	%
Tech Name	X/X/X	#	#	#%					

V.   References

A. Tech-Check-Tech

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B. Safety References

1. Institute for Safe Medication Practices (ISMP). http://www.ISMP.org

2. Safest In America Initiatives

3. JCAHO Standards

4. Site-specific reported errors