JHARKHAND
Rai University
UGC RECOGNISED UNIVERSITY
ACCREDITED BY NAAC

PRACTICAL LAB MANUAL

HOSPITAL & CLINICAL PHARMACY

D. Pharm IInd Year

INDEX

EXPERIMENT 1

Aim: Systematic approach to drug information queries using primary / secondary / tertiary resources of information.

Reference: https://my.clevelandclinic.org/patients/information/medical-records

•https://midamericaortho.com/blog/204-8-questions-to-ask-during-your-first-orthopaedic-appointment

Theory: Drug information center provides in-depth, unbiased source of crucial drug information to meet needs of the practicing physicians, pharmacists and other health care professionals. They provide current, critically examined data about drugs and drug use in a given patient. These informations are very important for rational drug use. Primary sources of drug information provides up to date information about a particular topic. Secondary sources provide quick access to primary literature.

Procedure:

1. Secure requestor demographics.

It's important to know your audience, as your response technique may differ depending on whether the question comes from a health care professional or a patient. For example, you'd use the word "renal" with a pharmacist and "kidney" with a patient. It's always best to inquire how the requestor would like the information delivered (eg, phone or fax), as this will help ensure adequate follow-up.

2. Obtain background information.

This is historically the most difficult step because you must act as a detective. Determine whether it's a general or patient-specific question, and then identify resources the requestor has already consulted to help facilitate the process. For patient-specific questions, it's important to inquire about pregnancy, weight, and renal function.

3. Determine and categorize the question

If a pharmacist requests information about whether a patient who's breastfeeding can take amoxicillin, this would be classified as a lactation question. Various categories may include pregnancy, drug interaction, pharmacy law, or pill identification.

4. Develop a strategy and conduct a search.

First, begin with tertiary literature, which is a compilation of primary literature. This may include text books like *Drugs in Pregnancy and Lactation* or drug information databases like *Clinical Pharmacology* or *Lexicomp*. Next, consult your secondary literature resources, which is the path to primary literature. Secondary resources include PubMed and EMBASE, which will enable you to locate primary literature or original research. It's important to use reputable resources when researching. When using websites, be sure to consult ones ending in .gov or .org.

5. Perform evaluation, analysis, and synthesis.

Objectively critique all of the information you retrieve from your comprehensive literature search. Also, consider the background information of your question. Consult with pharmacists and other health care professionals with expertise in your specific drug information question.

6. Formulate and provide a response.
Inform the requestor when one course of action is more desirable. Present competing viewpoints and considerations. Also, describe your evaluation of the research. Written responses should always be concise and fully referenced.

7. Conduct follow-up and documentation.
Following up is important for ensuring the information was received. Always document your drug information questions so you can refer back to them. You'll likely see the same question in the future, and this well help serve as a reference point.

Handling of Prescription for drug information queries:
The following procedure should be adopted by the pharmacist while handling the prescription for compounding and
1. Receiving dispensing: The prescription should be received from the patient by the pharmacist himself.
2. Reading and checking: On receiving a prescription, always check it that it is written in a proper format i.e., doctor's pad or OPD slip of the hospital/nursing home and signed by the prescriber along with date.
3. Collecting and weighing the materials: Before compounding the prescription, all the materials required for it, should be collected O the left-hand side of the balance. After weighing the material, it should be shifted to right hand side of the balance.
4. Compounding, labelling and packaging: Compounding should be carried out in a neat place. All the equipment etc. required should be thoroughly cleaned and dried. Only one prescription should be com1pounded at one time. The compounded medicaments should be filled in suitable containers depending on its quantity and use. The filled containers are suitably labelled. White plain paper of good quality should be used for labelling the containers. The size of the label should be proportional to the size of the container which is written or typed, giving all the desired information. While delivering the prescription to the patient, the pharmacist should explain the mode of administration, direction for use, and storage.

Orthopedics
Orthopedics, also called orthopedic surgery, medical specialty concerned with the preservation and restoration of function of the skeletal system and its associated structures, i.e., spinal and other bones, joints, and muscles.

These parts include the:
• bones
• muscles
• joints
• tendons
• ligaments

An orthopedist often works as part of a larger orthopedic treatment team. This team may include:
• physician assistants
• nurse practitioners
• occupational and physical therapists
• athletic trainers

Patient Queries about orthopedics.

1. What do you need to know about my medical history?
2. What does this pain mean?
3. How can I prevent other orthopedics issues?
4. What foods, drinks, or activities should I avoid for my treatment?
5. What are the risks and benefits of this treatment plan?
6. Can I have more information to take with me?
7. What resources can I trust for medical information?
8. What experience do you have in treating my condition?

General medicine

The branch of medicine that deals with the diagnosis and (nonsurgical) treatment of diseases of the internal organs (especially in adults). Treatment for patients of all ages, including adults, adolescents, and children.

May have training in family medicine and become a family doctor. Mostly treats outpatients

Queries for general medicine

- **What is the disease or condition?**
- **How serious is my disease or condition and how will it affect my home and work life?**
- **What is the short-term and long-term prognosis for my disease or condition?**
- **Will I need more medical tests?**
- **Do I need a follow-up visit and if so, when?**
- **Do I need to take precautions to avoid infecting others?**
- **How is the disease or condition treated?**

Observation: The entire process of drug information queries and response was understood and information was provided about different resources of information.

Result: Systematic approach to drug information queries using primary, secondary and tertiary resources of information was studied.

EXPERIMENT 2

Aim: Interpretation of laboratory reports to optimize the drug therapy in a given clinical case.

Reference:

Theory: Lab tests are used to help diagnose, screen, or monitor a specific disease or condition. Other tests provide more general information about your organs and body systems. ab results are often shown as a set of numbers known as a reference range. Laboratory values must be interpreted on basis of reference interval that is used to differentiate between healthy and diseased person. More than 70% of diagnosis is based on the laboratory results and laboratory certainly has a role and responsibility in providing clinicians with adequate information that can assist them in correct interpretation of data.

Components of a Typical Lab Report

Some items included on lab reports deal with administrative or clerical information:

• **Patient name and identification number or a unique patient identifier and identification number.** These are required for proper patient identification and to ensure that the test results included in the report are correctly linked to the patient on whom the tests were run.

• **Name and address of the laboratory location where the test was performed.** Tests may be run in a physician office laboratory, a laboratory located in a clinic or hospital, and/or samples may be sent to a reference laboratory for analysis.

• **Date report printed.** This is the date this copy of the report was printed. Often, the time that the report was printed will also be included. The date of printing may be different than the date the results were generated (see below), especially on cumulative reports.

• **Test report date.** This is the day the results were generated and reported to the ordering physician or to the responsible person.

Name of doctor or legally authorized person ordering the test(s). This information enables the lab to forward your results to the person who requested the test(s). Sometimes a report will also include the name of other health practitioners requesting a copy of your report. For example, a specialist may order tests and request that a copy of the results be sent to your primary healthcare provider.

Other elements found on reports deal with the specimen that was collected and with the test itself:

• **Specimen source, when appropriate.** Some tests can be performed on more than one type of sample. For example, protein can be measured in blood, urine or *cerebrospinal fluid*, and the results from these different types of specimens can indicate very different things.

• **Date and time of specimen collection.** Some test results may be affected by the day and time of sample collection. This information may help your health practitioner interpret the results. For example, blood levels of drugs are affected by the time a dose of the drug was last taken, so results of the test and its interpretation can be affected by when the sample was collected.

• **Laboratory accession number.** Number(s) assigned to the sample(s) when it arrives at the laboratory. Some labs will have a single accession number for all your tests and other labs may have multiple accession numbers that help the lab identify the samples.

• **Name of the test performed.** Test names are often abbreviated on lab reports. You may want to look for abbreviated test names in the pull-down menu on the home page of this site or type the acronym into the search box to find information on specific tests.
• **Test result**. Some results are written as numbers when a substance is measured in a sample as with a cholesterol level (*quantitative*). Other reports may simply give a positive or negative result as in pregnancy tests (*qualitative*). Still others may include text, such as the name of bacteria for the result of a sample taken from an infected site.
• **Abnormal test results.** Lab reports will often draw attention to results that are abnormal or outside the reference range (see "Reference intervals" below) by setting them apart or highlighting them in some way.
• **Critical results.** Those results that are dangerously abnormal must be reported immediately to the responsible person, such as the ordering physician.
• **Units of measurement (for quantitative results).** The units of measurement that labs use to report your results can vary from lab to lab. It is similar to the way, for example, your health practitioner chooses to record your weight during an examination.

Procedure:

CASE 1

A.B. is a retired 69-year-old man with a 5-year history of type 2 diabetes. Although he was diagnosed in 1997, he had symptoms indicating hyperglycemia for 2 years before diagnosis. He had fasting blood glucose records indicating values of 118–127 mg/dl, which were described to him as indicative of "borderline diabetes." He also remembered past episodes of nocturia associated with large pasta meals and Italian pastries. At the time of initial diagnosis, he was advised to lose weight ("at least 10 lb."), but no further action was taken.
Referred by his family physician to the diabetes specialty clinic, A.B. presents with recent weight gain, suboptimal diabetes control, and foot pain. He has been trying to lose weight and increase his exercise for the past 6 months without success. He had been started on glyburide (Diabeta), 2.5 mg every morning, but had stopped taking it because of dizziness, often accompanied by sweating and a feeling of mild agitation, in the late afternoon.
A.B. also takes atorvastatin (Lipitor), 10 mg daily, for hypercholesterolemia (elevated LDL cholesterol, low HDL cholesterol, and elevated triglycerides). He has tolerated this medication and adheres to the daily schedule. During the past 6 months, he has also taken chromium picolinate, gymnema sylvestre, and a "pancreas elixir" in an attempt to improve his diabetes control. He stopped these supplements when he did not see any positive results.
He does not test his blood glucose levels at home and expresses doubt that this procedure would help him improve his diabetes control. "What would knowing the numbers do for me?," he asks. "The doctor already knows the sugars are high."
A.B. states that he has "never been sick a day in my life." He recently sold his business and has become very active in a variety of volunteer organizations. He lives with his wife of 48 years and has two married children. Although both his mother and father had type 2 diabetes, A.B. has limited knowledge regarding diabetes self-care management and states that he does not understand why he has diabetes since he never eats sugar. In the past, his wife has encouraged him to treat his diabetes with herbal remedies and weight-loss supplements, and she frequently scans the Internet for the latest diabetes remedies.

During the past year, A.B. has gained 22 lb. Since retiring, he has been more physically active, playing golf once a week and gardening, but he has been unable to lose more than 2–3 lb. He has never seen a dietitian and has not been instructed in self-monitoring of blood glucose (SMBG).

A.B.'s diet history reveals excessive carbohydrate intake in the form of bread and pasta. His normal dinners consist of 2 cups of cooked pasta with homemade sauce and three to four slices of Italian bread. During the day, he often has "a slice or two" of bread with butter or olive oil. He also eats eight to ten pieces of fresh fruit per day at meals and as snacks. He prefers chicken and fish, but it is usually served with a tomato or cream sauce accompanied by pasta. His wife has offered to make him plain grilled meats, but he finds them "tasteless." He drinks 8 oz. of red wine with dinner each evening. He stopped smoking more than 10 years ago, he reports, "when the cost of cigarettes topped a buck-fifty."

The medical documents that A.B. brings to this appointment indicate that his hemoglobin A1c (A1C) has never been <8%. His blood pressure has been measured at 150/70, 148/92, and 166/88 mmHg on separate occasions during the past year at the local senior center screening clinic. Although he was told that his blood pressure was "up a little," he was not aware of the need to keep his blood pressure ≤130/80 mmHg for both cardiovascular and renal health.**11**

A.B. has never had a foot exam as part of his primary care exams, nor has he been instructed in preventive foot care. However, his medical records also indicate that he has had no surgeries or hospitalizations, his immunizations are up to date, and, in general, he has been remarkably healthy for many years.

Physical Exam

A physical examination reveals the following:

• Weight: 178 lb; height: 5′2″; body mass index (BMI): 32.6 kg/m2
• Fasting capillary glucose: 166 mg/dl
• Blood pressure: lying, right arm 154/96 mmHg; sitting, right arm 140/90 mmHg
□□Eyes: corrective lenses, pupils equal and reactive to light and accommodation, Fundi-clear, no arteriolovenous nicking, no retinopathy
• Thyroid: nonpalpable
• Lungs: clear to auscultation
• Heart: Rate and rhythm regular, no murmurs or gallops
• Vascular assessment: no carotid bruits; femoral, popliteal, and dorsalis pedis pulses 2+ bilaterally
• Neurological assessment: diminished vibratory sense to the forefoot, absent ankle reflexes, monofilament (5.07 Semmes-Weinstein) felt only above the ankle.

Lab Results

Results of laboratory tests (drawn 5 days before the office visit) are as follows:

• Glucose (fasting): 178 mg/dl (normal range: 65–109 mg/dl)
• Creatinine: 1.0 mg/dl (normal range: 0.5–1.4 mg/dl)
• Blood urea nitrogen: 18 mg/dl (normal range: 7–30 mg/dl)
• Sodium: 141 mg/dl (normal range: 135–146 mg/dl)
• Potassium: 4.3 mg/dl (normal range: 3.5–5.3 mg/dl)
• Lipid panel

• Total cholesterol: 162 mg/dl (normal: <200 mg/dl)
• HDL cholesterol: 43 mg/dl (normal: ≥40 mg/dl)
• LDL cholesterol (calculated): 84 mg/dl (normal: <100 mg/dl)

• Triglycerides: 177 mg/dl (normal: <150 mg/dl)
• Cholesterol-to-HDL ratio: 3.8 (normal: <5.0)

- □□AST: 14 IU/l (normal: 0–40 IU/l)
- ALT: 19 IU/l (normal: 5–40 IU/l)
- Alkaline phosphotase: 56 IU/l (normal: 35–125 IU/l)
- A1C: 8.1% (normal: 4–6%)
- Urine microalbumin: 45 mg (normal: <30 mg)

Assessment

Based on A.B.'s medical history, records, physical exam, and lab results, he is assessed as follows:
• Uncontrolled type 2 diabetes (A1C >7%)
• Obesity (BMI 32.4 kg/m2)
• Hyperlipidemia (controlled with atorvastatin)
• Peripheral neuropathy (distal and symmetrical by exam)
• Hypertension (by previous chart data and exam)
• Elevated urine microalbumin level
• Self-care management/lifestyle deficits

Case 2:

An 11-year-old female with no significant past medical history presented with symptoms suggestive of hyperthyroidism (weight loss, heat intolerance). She has also experienced a decline in grades at school. Family history is significant for thyroid disease in both grandmothers (both on thyroid replacement therapies). The clinician ordered thyroid function tests including Free T4, T3, TSH, anti-TSH receptor antibodies, antithyroglobulin and antithyroid peroxidase antibodies.
The results for the tests follow:
Free thyroxine (FT4) 2.87 ng/dL (Prepubertal 0.73-1.77 Pubertal/Adult 0.73-1.84) Total triiodothyronine paediatric (T3) 374.00 ng/dL (123-211) Thyroid-stimulating hormone (TSH) <0.018 uU/ml Thyroxine (T4) 18.2 ug/dL (5.0-12.0) Antithyroglobulin antibodies >3000 IU/ml (Negative <60 IU/mL Equivocal 60-100IU/mL Positive >100 IU/mL) Antithyroid peroxidase antibodies 2667 IU/mL (<60) Anti-TSH receptor antibodies 69.6 % Inhibit. (<=16.0 Unit: %).

The laboratory findings confirmed the clinical impression and a diagnosis of Graves's disease (hyperthyroidism with thyrotoxicosis) was made.
The patient was started on methimazole right away but after approximately two weeks of treatment she developed severe adverse reaction to it with significant joint pain and swelling over her upper and lower extremities with hives; Methimazole was stopped immediately and she was started on Benadryl and Advil; her symptoms improved after few days, although she did have some residual intermittent hives that were transient.
She has been given some brief course of Prednisone as well, and Atenolol 50 mg twice a day was also started.
After approximately two weeks, due to the fact that the medical management for hyperthyroidism failed, the patient was considered to have radioiodine ablation of her thyroid next day and for that she underwent a thyroid imaging with uptake showing enlarged thyroid gland, with homogeneous increased uptake, consistent with Graves' disease with 24-hour uptake equalling 86%.
The patient underwent radio-iodine ablation as scheduled and she was stable on Atenolol 50 mg twice a day. She was discharged home.

At her next follow-up appointment in 2 weeks her thyroid functions tests lab values were as follows: T4, Free, >12.00 ng/dl (Prepubertal 0.73-1.77 Pubertal/Adult 0.73-1.84) T3, 1173.00 ng/dL (123-211 ng/dL) TSH, <0.018 uIU/Ml.

Observation: The cases were studied and the results were interpreted.

Result: We were able interpret the results of the laboratory from the given cases.

EXPERIMENT 3

Aim: To study and fill the IPC's ADR Reporting Form and perform causality assessments using various scales (orthopedics).

Reference:

•https://cdsco.gov.in/opencms/export/sites/CDSCO_WEB/Pdfdocuments/Consumer_SectionPDFs/ADRRF_2.pdf
• https://website.aiimsraipur.edu.in/Downloads/
• https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5061681/

Theory

What is ADR reporting form?

ADR reporting is an important aspect of an efficient and effective pharmacovigilance program. Although Medwatch, Yellow Card, CDSCO form, etc. are the protocol forms of ADR collection and reports, a number of countries design and use their respective ADR forms.

What should I report in ADR?

ADRs related with the use of allopathic medicines, vaccines, traditional medicines, medical devices, contrast media, etc., can be reported.

What should I report in ADR?

ADRs related with the use of allopathic medicines, vaccines, traditional medicines, medical devices, contrast media, etc., can be reported.

When should ADR be reported?

Report if the patient was at substantial risk of dying at the time of the adverse reaction or it is suspected that the use or continued use of the product would result in the patient's death. Report if admission to the hospital or prolongation of a hospital stay results because of the suspected adverse reaction.

How to fill ADR Reporting Form and Causality Assessment?

Different Types of ADR Reporting Forms

• Suspected Adverse Drug Reaction Reporting Form
(For voluntary reporting of Adverse Drug Reactions by Healthcare Professionals)
• ADR Reporting Form for Consumer
• Transfusion Reaction Reporting Form (TRRF)
(Haemovigilance Program of India)
• Medical Device Adverse Event Reporting Form
(Materiovigilance Program of India)

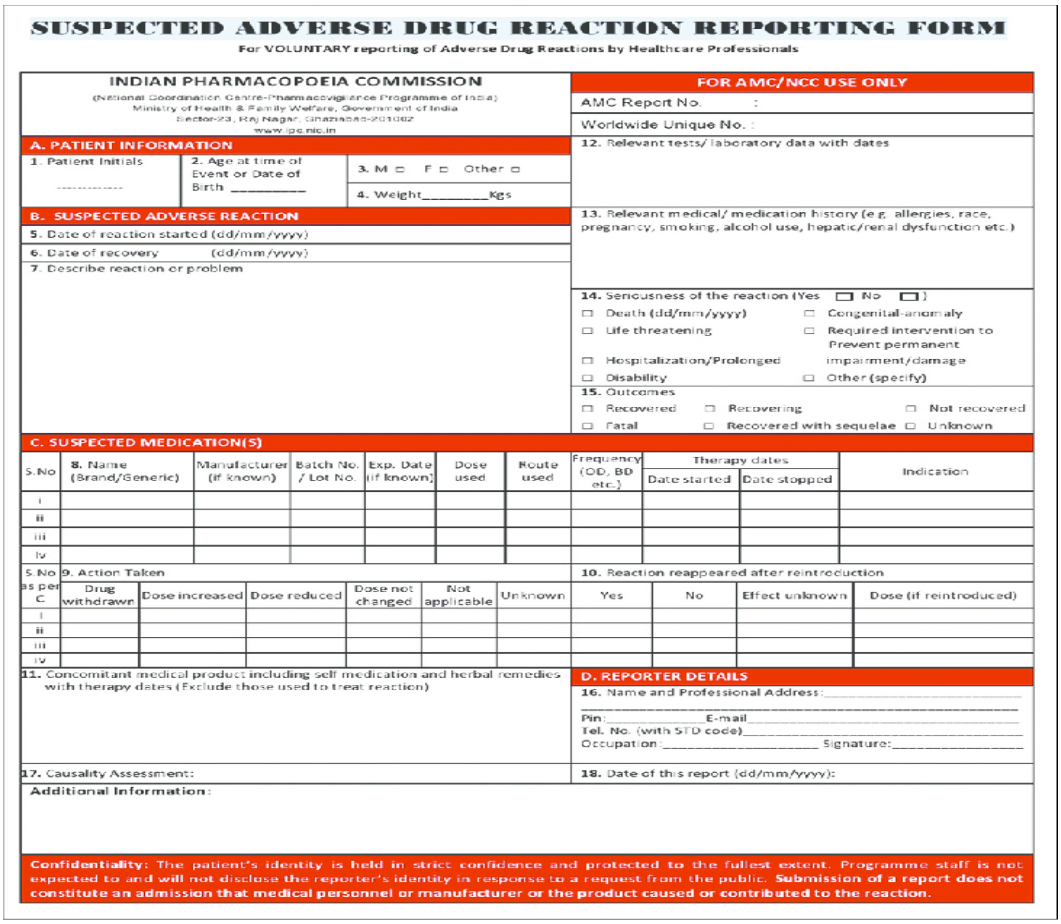
Who can report?

Doctor, Dentist, Pharmacist, Patient, Nurse.

Where to report

• Nearest ADR Monitoring Center (AMC)
– AIIMS Raipur
– Pt. JNMC, Raipur
• Directly to NCC, IPC Ghaziabad
• pvpi.ipcindia@gmail.com pvpi@ipcindia.net
• Toll free no. – 1800 180 3024

• ADR Reporting Android app
What to report?
Serious or Non-serious ADR
Unknown ADR
Frequent or Rare
Related to medicine, vaccine, herbal products



SUSPECTED ADVERSE DRUG REACTION REPORTING FORM

For VOLUNTARY reporting of Adverse Drug Reactions by Healthcare Professionals

INDIAN PHARMACOPOEIA COMMISSION

(National Coordination Centre-Pharmacovigilance Programme of India)
Ministry of Health & Family Welfare, Government of India
Sector-23, Raj Nagar, Ghaziabad-201002
www.ipc.nic.in

FOR AMC/NCC USE ONLY

AMC Report No. :

Worldwide Unique No. :

A. PATIENT INFORMATION

1. Patient Initials ----------
2. Age at time of Event or Date of Birth _____
3. M ☐ F ☐ Other ☐
4. Weight_____Kgs

12. Relevant tests/ laboratory data with dates

B. SUSPECTED ADVERSE REACTION

5. Date of reaction started (dd/mm/yyyy)
6. Date of recovery (dd/mm/yyyy)
7. Describe reaction or problem

13. Relevant medical/ medication history (e.g. allergies, race, pregnancy, smoking, alcohol use, hepatic/renal dysfunction etc.)

14. Seriousness of the reaction (Yes ☐ No ☐)
☐ Death (dd/mm/yyyy) ☐ Congenital-anomaly
☐ Life threatening ☐ Required intervention to Prevent permanent
☐ Hospitalization/Prolonged impairment/damage
☐ Disability ☐ Other (specify)

15. Outcomes
☐ Recovered ☐ Recovering ☐ Not recovered
☐ Fatal ☐ Recovered with sequelae ☐ Unknown

C. SUSPECTED MEDICATION(S)

S.No	8. Name (Brand/Generic)	Manufacturer (if known)	Batch No. / Lot No.	Exp. Date (if known)	Dose used	Route used	Frequency (OD, BD etc.)	Therapy dates		Indication
								Date started	Date stopped	
i										
ii										
iii										
iv										

S.No as per C	9. Action Taken						10. Reaction reappeared after reintroduction			
	Drug withdrawn	Dose increased	Dose reduced	Dose not changed	Not applicable	Unknown	Yes	No	Effect unknown	Dose (if reintroduced)
i										
ii										
iii										
iv										

11. Concomitant medical product including self medication and herbal remedies with therapy dates (Exclude those used to treat reaction)

D. REPORTER DETAILS

16. Name and Professional Address:_____
_____
Pin: E-mail_____
Tel. No. (with STD code)_____
Occupation:_____ Signature:_____

17. Causality Assessment:

18. Date of this report (dd/mm/yyyy):

Additional Information:

Confidentiality: The patient's identity is held in strict confidence and protected to the fullest extent. Programme staff is not expected to and will not disclose the reporter's identity in response to a request from the public. **Submission of a report does not constitute an admission that medical personnel or manufacturer or the product caused or contributed to the reaction.**

ADR Case – 1

Madan Lal, a 65-years old male patient admitted to hospital on 12.01.2016 with chief complaints of pain in upper abdomen and nausea since last 5 days. On physical examination, he had yellowish discoloration of palm, conjunctiva and nail bed. His weight was 72 kg.

He had few episodes of psychotic attacks, for which he was on Chlorpromazine therapy since last 4 weeks. On enquiry, he said that he was taking Tab. Largactil (Chlorpromazine) 100 mg, 4 tablets at bed time.

He was also taking Tab. Diclofenac 50 mg twice-a-day (self-medication) for abdominal pain for three days before admitting to hospital. He was investigated on the day of admission for laboratory parameters which are as follows:

– Alkaline Phosphatase = 180 U/L (Normal range: 25 – 100 U/L)
– ALT = 205 U/L (Normal range: 10 – 40 Units/L)
– Total Bilirubin = 5.0 mg/dL (Normal range: 0.8 – 1.2 mg/dL)

On admission, Chlorpromazine and Diclofenac therapy was stopped. After 7 days of stopping the medications, the intensity of pain decreased. Also, he was re investigated for above parameters which are as follows:
– Alkaline Phosphatase = 110 IU/L

ALT = 98 Units/L
– Total Bilirubin = 1.8 mg/dL
• **Note:** Tab Chlorpromazine
Brand Name: LARGACTIL,
Manufacturer: Wedley labs
Batch number: LGL0881,
Expiry date: Dec 2018

A. Patient Information

1 Patient Initials – ML
2 Age at the time of Event or Date of Birth – 65 years
3 Sex -Male Female Other
4 Weight (kg) – 72 kg

B. Suspected Adverse Reaction

5 Date of Reaction started (dd/mm/yyyy): 07.01.2016
6 Date of recovery (dd/mm/yyyy):
7 Describe reaction or problem
Patient was taking Chlorpromazine since 12.12.2015. He developed pain in abdomen and nausea since 07.01.2016. Examination revealed yellowish discoloration of conjunctiva, palm and nails. Pt. was admitted on 12.01.2016 and investigated. Liver function tests indicated raised serum bilirubin, ALT and alkaline phosphatase. Drugs were discontinued. On discontinuation of drug, reaction subsided in one week.

C. Suspected Medication

8 Name (Brand and/or Generic): Tab. Chlorpromazine (Largactil)
Manufacturer (if known): Wedley labs
Batch No. /Lot No.: LGL0881
Exp. Date (if known): Dec. 2018
Dose used: 400 mg
Route used: Oral
Frequency (OD, BD, etc): OD
Therapy dates
Date Started 12.12.2015 Date Stopped 12.01.2016
Indication: Psychosis
Causality Assessment: Probable

Causality Assessment – ADR Case1

Categories	Time sequence	Other drug disease ruled out	DE challenge	Rechallenge
Certain	Yes	Yes	Yes	Yes
Probable	Yes	Yes	Yes	No
Possible	Yes	No	No	No
Unlikely	No	No	No	No

ADR Case – 2

Mr. Sushant A Gupta, a 30-years old male with 68 kg weight was diagnosed as a case of bacterial meningitis. He was started empirically with Inj. Ceftriaxone 1 g IV BD and Inj. Vancomycin 500 mg IV QID on 12.01.2016. First dose of Inj. Ceftriaxone was given at 8 am and Inj. Vancomycin was given at 9 am on 12.01.2016. After 10 minutes of second drug administration, he started developing chills, rigors, fever, urticaria and intense flushing. He was treated with Inj. Pheniramine 25 mg IM, following which the reaction completely subsided. Inj. Ceftriaxone was continued. However, next doses of Inj. Vancomycin scheduled on day 1 were not given. On day 2, the Inj Vancomycin was re-introduced at 9 am to the patient. Similar symptoms developed again and quickly resolved after Inj. Pheniramine 25 mg IM.

Note:

• Inj. Vancomycin – Brand Name: Vanzid
– Manufacturer: SWACH Healthcare
– Batch number: KKIL098
– Expiry date: Mar 2016

• Inj. Ceftriaxone – Brand Name: Taximax
– Manufacturer: Wedley Labs
– Batch number: OPO659
– Expiry date: Dec 2016

Causality Assessment – ADR Case 2 Categories	Time sequence	Other drug disease ruled out	DE challenge	Rechallenge
Certain	Yes	Yes	Yes	Yes
Probable	Yes	Yes	Yes	No
Possible	Yes	No	No	No
Unlikely	No	No	No	No

Observation: Studied about ADR reporting and also performed causality assessments of the given cases.

Result: We studied and filled the IPC's ADR Reporting Form and performed causality assessments using va.

EXPERIMENT 4

Aim: Demonstration, administration and identification of different types of Orthopaedical and Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking sticks, etc

Reference: https://www.1mg.com/otc/dr-ortho-knee-cap-otc451704

Theory:

Knee caps

Knee caps are supposed to provide support to the knee region by applying a certain amount of compression and pressure on it. A knee cap can be used by:
• Individuals with knee pain
• People who have undergone a knee surgery
• People suffering from chronic knee problems like arthritis or osteoarthritis
• Individuals who have had an accident and injured the knee
• Overweight individuals
• Senior citizens who need additional support

The benefits of knee caps are multifarious in nature, including:
• Providing support to the knee region
• Providing compression to relieve knee pain
• Improving blood circulation in the knee area
• Protecting the knee from the risk of further damage
• Limiting the movement of the patella
• Increasing proprioception
• Providing warmth to the knee region
• Stabilizing the knee

When to use a knee cap?

It is okay to wear a knee sleeve at any time since the material is usually skin-friendly, it is best used when you know the knee would be put under pressure. Individuals can consult a physician about the usage of a knee cap, but here are a few common scenarios where wearing knee caps can be effective:

• While lifting heavy objects
• While walking or running
• While doing explosive exercises such as squats, weight-lifting, burpees, etc.
• While playing a sport
• While riding a two-wheeled vehicle

Types of knee caps:

- Closed Patellar Support.
- Open Patellar Knee Support.
- Hinged Support.
- Adjustable Stabilizing Knee Support.

Abdominal Belt
An abdominal belt is a wide compression belt that encircles your abdomen. Abdominal binders come in many sizes and widths. Most are made from elastic and have Velcro or hook and loop closures. Some abdominal binders offer secondary lumbar support. Others have straps that hold surgical

Benefits of Abdominal Belt:
It reduces postoperative pain, distress, and hemorrhage after cesarean section [4]. These are also used in patients with spinal cord injury to support the abdomen, to maintain intraabdominal pressure, improve respiratory function and improve overall mobility.

Administration of an abdominal binder:
You may wake up from anesthesia after abdominal surgery wearing an abdominal binder. Depending on the type of surgery you have, an abdominal binder may be worn for up to six weeks or for the full the duration of your recovery. As you heal, your doctor may let you wear the binder less.
You can also purchase abdominal binders at most drugstores or medical supply stores. When choosing an abdominal binder, it's important to get the right size. To determine your size, measure the widest part of your body the binder will cover. For women, the widest part is usually the hips. For men, it's usually the waist. Wrap the abdominal binder around your abdomen, under your clothes, with the closures in the front. Make sure the binder is snug, but not too tight. You should be able to breathe comfortably.

LS belt:

The Lumbosacral (LS) belt is also known by many other several names such as lumbosacral corset, lumbar belt, back pain belt. A LS Belt simply consists of low back support (often fitted with metal strips) with straps to hold it. It is very easy to wear it and can be used inside the garments without revealing it. It is higly recommended in the following low back pain case:

1. Low back severe muscle spasm.
2. Lumbar prolapsed intervertebral disc.
3. Sciatica back pain.
4. Loss of lumbar lordosis

Use:

The most important function of the lumbar corset is to provide protection to the lower back. It acts as a protective shield and prevent undue bending and jerking on the low back during walking, running or travelling.

It also helps in preventing the concentration of body weight over the painful region by even distribution of weight.

The purpose of the LS Belt is to give protection and support to the back. But if the belt does not snugly fit your back it may not severe the purpose of what it is made of. Here we have made a simple step-by-step guide to choose a perfect fit for yourself.

Step-by-step guide:

• Take any inch tape (Tips: inch tapes used by tailors). But, be sure to use the centimeter (cm) side of the inch tape.
• Lower down your garments so as to expose your ASIS bone (Antero Superior Iliac Spine)
• ASIS is the most prominent bony part just beside your naval.
• Now use your inch tape to measure your waist at this ASIS level and take the measurement in centimeters.
• Compare the measurement with the table below to select your size

Observation: We were able to learn about uses, advantages and administration of different orthopedic aids such as LS belt, Knee cap, Abdominal Belt.

Result: Studied about administration and identification of different types of Orthopaedical and Surgical Aids such as knee cap, LS belts, abdominal belt, walker, walking sticks.

EXPERIMENT 5

Aim: Demonstration, administration and identification of different types of Orthopaedical and Surgical Aids such as Sterile Gauze, cotton, crepe bandages, etc.

Reference:
https://www.mountainside-medical.com/blogs/medical-supplies/

Theory:

Gauze

Gauze is a loosely woven, almost translucent fabric that's used to bandage wounds. If you get a bad burn, a doctor might clean it and cover it with gauze.
In medicine, gauze has several uses. Sterile gauze is usually kept in a sealed package, to ensure that it's perfectly clean. It can be used to clean cuts, scrapes, and burns, and also acts as a large bandage. There is also a non-medical fabric called gauze that's used in light, warm-weather clothing.

Application of sterile pad or gauze:

• Wash hands and put on disposable, non-latex gloves before touching a dressing or wound.
• Ensure the pad covers beyond the edge of the wound.
• Hold the pad by the edges and place it directly on top of the wound.
• Never touch the part of the pad that will be in contact with the wound.
• Secure the pad with adhesive tape or a roller bandage.
• Never wrap tape all the way around the injured part as this could reduce the blood flow. If you need to maintain pressure to control bleeding, use a roller bandage.
• If you have no pad or gauze available, you can use a clean, non-fluffy material such as a cloth.

Storage and Disposal: The Sterile Gauze are stored in a dry place where microbial growth could not take place.

The used sterile gauze can dispose of these items by placing them in a closable red Biohazard bag. Hospital-acquired infections are easily picked up in a hospital, nursing home or even in the office of a school nurse when gloves, gauze, and bandages are not properly disposed of.

Sterile cotton

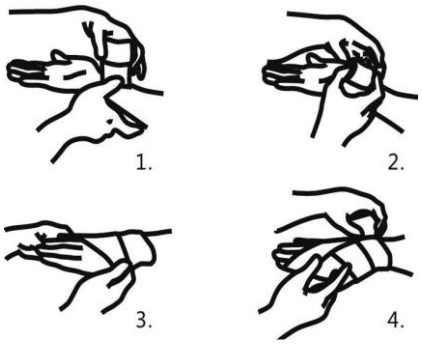
Sterile cotton is fabric devoid of active organic contaminants, such as harmful bacteria. There may be applications for the material in industrial "clean room" processes that require a critically controlled environment, but it was primarily developed for medical purposes. The unique properties of cotton, particularly its hypoallergenic quality, make it ideal for this. Various technologies have been developed to render it sterile.
The individual fibres that are attached to a cotton plant's seed pod are uniformly thin and quite long, averaging 1 inch (2.5 cm). When spun, the fibers tightly twine together into a dense and strong thread relative to its size. The thread can be both knitted and woven. There are many cotton products used in a hospital or medical setting, and most of them need to be sterilized to prevent exposing patients to potentially contagious bacteria, viruses, and other harmful pathogens.

Application of Sterile cotton
Surgical dressings, cosmetic purposes etc. It is also known as Surgical Cotton or Cotton Wool. It is mainly used for medical purposes in hospitals, dispensaries and nursing homes to absorb the body fluids. They are also used for making conventional type of sanitary napkins or pads.

Storage and Disposal:

The Sterile cottons are stored in a dry place where microbial growth could not take place. The used sterile cottons can dispose of these items by placing them in a closable red Biohazard bag.

Crepe bandages
Crepe bandages, commonly made of cotton, are a woven, elasticated bandage. Crepe bandages are ideal to support the healing of sprains and strains, as they provide good compression to injured areas, as per the PRICE method, but as they’re elastic they don’t prevent joints or muscles from flexing. Cotton also allows the skin to breathe, and these bandages are washable and reusable. Crepe bandages can also be used for dressing retention.



Apply elastic bandage on your hand

1. Recommend to use 2", 3" or 4" width elastic bandage
2. Place one end of the bandage below the injured part.
3. Wrap up and around the wrist, overlapping minimum half of the bandage width with each layer.
4. Make sure you wrap it firm and you don't feel too tight
5. The end of the wrap should stop above the injury. And use strap or clips to secure the elastic bandage or ace bandage

Apply elastic bandage on your ankle

1. Recommend to use 3", 4", 6" width elastic bandage
2. Place one end of the bandage on the foot below the injured part.
3. Wrap up and around the ankle, overlapping minimum half of the bandage width with each layer.
4. Make sure you wrap it firm and you don't feel too tight
5. The end of the wrap should stop above the injury. And use strap or clips to secure the elastic bandage or ace bandage.

Result: We were able to study about different surgical aids such as sterile gauze, cotton, crepe bandages, etc.

EXPERIMENT 6

Aim: Demonstration, administration and identification of different types of Orthopaedical and Surgical Aids such as Needles and Syringes.

Reference: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2900101/

Theory:

Syringes

A syringe is a simple reciprocating pump consisting of a plunger (though in modern syringes, it is actually a piston) that fits tightly within a cylindrical tube called a barrel. The plunger can be linearly pulled and pushed along the inside of the tube, allowing the syringe to take in and expel liquid or gas through a discharge orifice at the front (open) end of the tube. The open end of the syringe may be fitted with a hypodermic needle, a nozzle or tubing to direct the flow into and out of the barrel. Syringes are frequently used in clinical medicine to administer injections, infuse intravenous therapy into the bloodstream, apply compounds such as glue or lubricant, and draw/measure liquids.

Types of Syringes

1 Tip designs.

2 Standard U-100 insulin syringes.

3 Multishot needle syringes.

4 Venom extraction syringes.

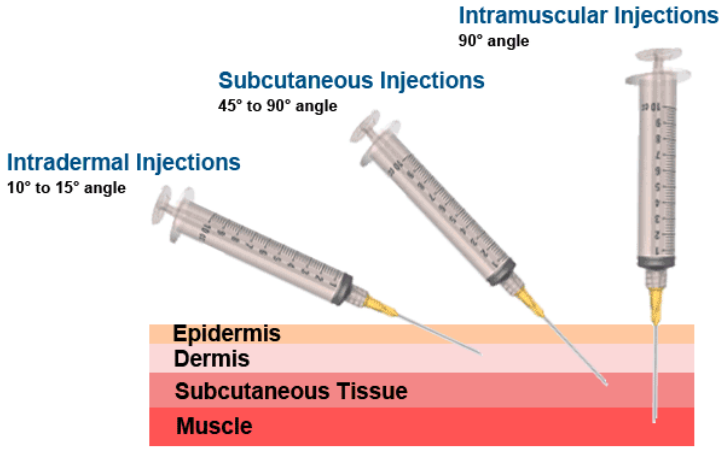
5 Oral.

6 Dental syringes.

7 Dose-sparing syringes.

8 Regulation.

Needle Use



Intramuscular injection angle 90°

Recommended injection sites for intramuscular injections:

- Adults - deltoid muscle of arm, vastus lateralis muscle of thigh.
- Children 18 months (walking) to 18 years - deltoid muscle of arm, vastus lateralis muscle of thigh, or ventrogluteal site.
- Infants less than 18 months - vastus lateralis thigh muscle.

Subcutaneous injection angle 45° to 90°

Recommended injection sites for subcutaneous injections:

- Adults to Infants - anterolateral thigh, upper outer tricep area, upper buttocks, or abdomen (avoid 2" radius around umbillicus).

Intradermal injection angle 10° to 15°

Recommended injection sites for intradermal injections:

- Adults to Infants - anterior aspect of forearm, upper chest, upper back, or back of upper arm.

Catheter

A catheter is a thin, flexible tube that can put fluids into your body or take them out.

If you have trouble peeing or can't control when you pee, a urinary catheter that goes into your bladder can get rid of urine for you. If you need blood or medicine, your doctor might use an intravenous catheter that's connected to one of your veins with a needle. For example, if you had cancer and needed chemotherapy, that's how you'd get it.

(**Urinary Catheters**

Urinating peeing) is a basic function that we all must do several times per day. It helps to remove wastes and fluid from your body. If you're having trouble peeing on your own, you may need a catheter. Catheters are also used to remove the urine from your body before having some types of surgery. The type of catheter and the length of time you will need one depend on your health status.

Types of Urinary Catheters

- **Foley catheter.** This kind stays put. A tiny balloon filled with water keeps one end inside your bladder

- **Intermittent catheters.** You use one of these several times a day, either at scheduled times or whenever your bladder feels full. It usually goes in through your urethra (the tube that takes urine from your bladder out of your body) and drains your bladder.

- **Suprapubic catheter.** Your doctor puts this type into your bladder through a cut in your belly, a little below your belly button. It isn't as likely to give you an infection.

Colostomy Bag

colostomy bag is a plastic bag that collects fecal matter from the digestive tract through an opening in the abdominal wall called a stoma. Doctors attach a bag to the stoma following a colostomy operation.

Types of Colostomy Bag

- **One-piece system:** This fits around your stoma and is attached with a gentle adhesive. When you need a fresh bag, you take the whole thing off and replace it with a new one. Some of these systems use flushable liners.
- **Two-piece system:** A base plate fits tightly around your stoma, and you attach a bag to it. You'll change the bag as needed; the base plate usually is changed every 2 to 3 days.

- **Closed bags:** These are best used with firm stools. You'll change it twice a day. Some have special liners inside that can be flushed down the toilet.
- **Drainable bags:** These are best if your stools are very liquid. You empty them through an opening at the bottom. They need to be changed every 2 or 3 days.
- **Mini pouches:** These are small bags you wear for only a short amount of time.

Useful things to look for when picking a pouching system include:

• odor resistance

• a bag that is easy to put on and take off

• a leakproof seal that lasts for up to 3 days Trusted Source

• a bag that is hard or impossible to see under clothes

• a bag that is gentle on skin around the stoma

I.V INFUSION SET

Intravenous Infusion set (IV set) is the fastest mode to infuse medication or replace fluids throughout the body from sterile glass vacuum IV bags or bottles. It is not used for blood or blood related products.

Types of I.V SET

MAISFUSION SET WITH AIRVENT

Maisfusion set with air-vent is used to transfuse I.V. fluid directly into veins. Maisfusion set with air-vent has small inlet in the tubing allows air to enter into the I.V. bottle to displaces the fluid.

I.V.SET WITH MICRO DRIP (MAISFUSION SET WITH MICRO DRIP)

Micro drip infusion set is used for delivering accurate small amount of infusion to the children less than 10 years.

MAISTROL (IV SET WITH FLOW REGULATOR)

Maistrol is used to regulate the flow of I.V. fluids from the infusion set to the patient's vascular system by insertion of I.V. Catheter under gravity feed.

Administration: -

1. Make sure you have an IV stand. 2. Wash your hands.
3. Double check the doctor's orders again before you begin
4. Determine beforehand what kind of set you will need to use

5. Get the right size of needle, called the needle's gauge.
6. Gather your other supplies.
7. Put all of your supplies on a tray.
8. Prepare the IV bag.
9. Pipe or insert the macroseta or micro set through the IV bag then hang it on the IV stand.
10. Hold the needle end of the tubing over the waste basket.
11. Make sure the line does not touch the floor.
11. Approach the patient.
12. Position the patient.
13. Look for the best place to insert the cannula.
14. Tie the tourniquet directly above where you will be inserting the needle.
15. Clean the spot where you will insert the cannula.
16. Insert the cannula.
17. Connect the IV tubing to the cannula hub.
18. Regulate the drops per minute.
19. Monitor your patient for any signs of an adverse reaction.

Ryle's tube:
A nasogastric tube is a narrow-bore tube passed into the stomach via the nose. It is used for short- or medium-term nutritional support, and also for aspiration of stomach contents - eg, for decompression of intestinal obstruction.

Uses of Ryle's tube:
Nasogastric tube is suitable for enteral feeding for up to six weeks. Polyurethane or silicone feeding tubes are unaffected by gastric acid and can therefore remain in the stomach for a longer period than PVC tubes, which can only be used for up to two weeks. For long-term enteral feeding, the use of percutaneous endoscopic gastrostomy (PEG) is associated with improved survival, better tolerance by the patient and lower incidence of aspiration.

Inserting a nasogastric tube

- Explain the procedure and obtain consent.
- Provide a signal for the patient to stop the procedure
- Sit the patient in a semi-upright position with the head supported with pillows and tilted neither backwards nor forwards.
- Examine the nostrils for deformity or obstructions to determine the best side for insertion.
- Measure the tubing from the bridge of the nose to the earlobe, then to the point halfway between the lower end of the sternum and the navel.
- Mark the measured length with a marker or note the distance.
- Lubricate 2-4 inches of tube with lubricant (eg, 2% Xylocaine®).
- Pass the tube via either nostril, past the pharynx, into the oesophagus and then into the stomach
- Instruct the patient to swallow and advance the tube as the patient swallows (sipping a glass of water helps).
- If resistance is met, rotate the tube slowly while advancing downwards. Do not force.

- Stop immediately and withdraw the tube if the patient becomes distressed, starts gasping or coughing, becomes cyanosed or if the tube coils in the mouth.
- Advance the tube until the mark is reached.
- Check the tube's position (see below).
- Secure the tube with tape.

Oxygen mask

An oxygen mask provides a method to transfer breathing oxygen gas from a storage tank to the lungs. Oxygen masks may cover only the nose and mouth (oral nasal mask) or the entire face (full-face mask). They may be made of plastic, silicone, or rubber. In certain circumstances, oxygen may be delivered via a nasal cannula instead of a mask.

Types of Oxygen Mask:

- Non-Rebreather Masks
- Simple Oxygen Masks
- Partial Rebreather Mask
- Nasal Cannula
- Capnography Mask
- Procedural Oxygen Mask

Administration of Oxygen Mask

1. Review chart for physician's order for oxygen to ensure that it includes method of delivery, flow rate, titration orders; identify client.
2. Wash your hands.
3. Identify client and proceed with 5 rights of medication administration. Explain procedure to client. Explain that oxygen will ease dyspnea or discomfort, and inform client concerning safety precautions associated with oxygen use.

4. Assist client to semi- or high Fowler's position, if tolerated.
5. Insert flowmeter into wall outlet. Attach oxygen tubing to nozzle on flowmeter (Fig. 1). If using a high O2 flow, attach humidifier. Attach oxygen tubing to humidifier.

6. Turn on the oxygen at the prescribed rate (Fig. 2). For a mask with a reservoir, be sure to allow oxygen to fill bag.

7. Place mask on face, applying from the nose and over the chin

8. Adjust the metal rim over the nose and contour the mask to the face.

9. Adjust the metal rim over the nose and contour the mask to the face

10. Assess for proper functioning of equipment and observe client's initial response to therapy.

11. Monitor continuous therapy by assessing for pressure areas on the skin and nares every 2 hours and rechecking flow rate every 4 to 8 hours.

Result : We studied about uses and administration of various surgical aids such as Needles, syringes, catheters, IV set, urine bag, RYLE's tube, urine pots, colostomy bags, oxygen masks.

EXPERIMENT 7

Aim: To study and report the identification of Drug-Drug interaction (Activity increase) in the prescription.

Reference:
https://hivinfo.nih.gov/understanding-hiv/fact-sheets/what-drug-interaction.

Theory

Drug-Drug interaction
A drug interaction is a reaction between two (or more) drugs or between a drug and a food, beverage, or supplement. "The effects of drugs altered by another drug or food that is prior or concurrent administration with it" Then it is termed as Drug-Drug or Drug-food interaction.
The mechanism of drug interaction comprises pharmacokinetic and pharmacodynamics which means what the body does to the drug and drug does to the body respectively. Kinetic includes drug absorption, distribution, metabolism and elimination, whereas pharmacodynamics is the numerous actions of drug on the body systems or their organs.

Common Drug- Drug interactions:

S. No.	Drugs Interaction Combination	Frequency	Outcome
1	Ceftriaxone + Calcium Gluconate	6	Precipitation of ceftriaxone-calcium salt
2	Furosemide + Amikacin	5	Potentiate the risk of oto- and nephrotoxicity
3	Atracurium + Amikacin	3	Severe and/or prolonged respiratory depression
4	Omeprazole + Clopidogril	2	Decreased effectiveness of Clopidogril
5	Aspirin + Clopidogril	2	Increased platelet inhibition effect
6	Nifedipine + Magnesium sulphate	2	Hypotension and neuromuscular blockade
7	Furosemide + Digoxin	2	Predispose patients to digitalis induced arrhythmias
8	Amikacin + Megnesium sulphate	2	Severe and/or prolonged respiratory depression
9	Hydrocartisone + Moxifloxacin	2	Potentiate the risk of tendinitis and tendon rupture
10	Carbamazepine + Nimodipine	1	Decreased plasma concentration of Nimodipine by enzyme induction

Result: Studied about drug- drug interaction of various drugs.

EXPERIMENT 8

Aim: To Perform and report the process of wound dressing.

Reference:
• https://www.ncbi.nlm.nih.gov/

Theory

Wound dressing:

A wound is defined as a discontinuity of the epithelial lining of the skin or mucosa due to physical or thermal damage and they can be present over different anatomical parts of the body. However, the basic principles of choosing a wound dressing remain the same.
The goal is to help the wound heal as soon as possible by using an appropriate dressing material to maintain the right amount of moisture. When the wound bed is dry, use a dressing to increase moisture and if too wet and the surrounding skin is macerated, use material that will absorb excess fluid and protect the surrounding healthy skin. Important criteria to consider before choosing a specific wound dressing are cleaning, absorbing, regulating, and the need to add medication. It is important to choose a dressing guided by the cost, ease of application, and clinician's preference.

Common types of wound dressing:
• The semipermeable dressing allows for moisture to evaporate and also reduces pain. This dressing also acts as a barrier to prevent environmental contamination. The semipermeable dressing does not absorb moisture and requires regular inspection. It also requires a secondary dressing to hold the semipermeable dressing in place.
• Tulle is a non-adherent dressing impregnated with paraffin. It aids healing but does not absorb exudate. It also requires a secondary dressing to hold it in place. It is ideal for burns as one can add topical antibiotics to the dressing. It is known to cause allergies, and this limits its wider use.
• Plastic film dressings are known to absorb exudate and can be used for wounds with a moderate amount of exudate. They should not be used on dry wounds. They often require a secondary dressing to hold the plastic in place.
• Hydrogels are insoluble and hydrophilic materials that are made from synthetic polymers which have a high-water content (70%-90 %) that helps granulation tissues and epithelium in a moist environment. It also decreases the temperature of cutaneous wounds resulting in a soothing and cooling effect. These may be used for dry chronic wounds, pressure ulcers, necrotic wounds and burn wounds. Setbacks involving these dressings are that exudate accumulates and leads to maceration and bacterial proliferation which then produces a foul smell in wounds.
• Fixation sheets can conform to body contour and provide pain relief and also allow exudate to escape. These sheet dressings do need oil application before removal and can be used to manage low-intensity wounds that do not require regular check-ups. They should not be applied to infected wounds.
• Calcium alginate dressings keep the wound moist, reduce pain, and can be used to pack cavities. They also provide hemostasis and can absorb excess exudate. It has been reported that alginates

accelerate the healing process by activating macrophages which in turn produce TNF-α which initiates inflammatory signals. They should not be used in the presence of an infection or on dry wounds. Often another dressing is required to hold the alginate in place.

Wound Types and Appropriate Treatment

1. If too dry, use a hydrogel to hydrate. Dry eschar may also benefit from enzymatic debridement ointments such as collagenase.
2. If the wound has minimal drainage, a hydrocolloid will keep it just right.

3. If there is heavy drainage, absorb excess fluid using material like alginate, hydro-fibres, cellulose, foam, ceramic fibre, or negative pressure wound therapy.
4. If the surrounding skin shows maceration, use zinc oxide, protective films, or a negative pressure wound therapy.
5. If the wound is infected and there is a lot of sloughs, which cannot be mechanically debrided, then a chemical debridement can be done with collagenase-based products.

Clinical Significance:

Wound dressings should provide the most optimum conditions for wound healing while protecting the wound from infection with microorganisms and further trauma. It is important that the dressings be removed a traumatically, to avoid further damage to the wound surface during dressing changes.

Result: We studied about wound dressing and its type and also studied about its use.

EXPERIMENT 9

Aim : Vaccination and injection techniques (IV, IM, SC) using mannequins.

Theory:

Vaccination is the administration of a vaccine to help the immune system develop immunity from a disease. Vaccines contain a microorganism or virus in a weakened, live or killed state, or proteins or toxins from the organism. In stimulating the body's adaptive immunity, they help prevent sickness from an infectious disease.

- **Oral Route (PO):** Oral vaccine is administered through drops to the mouth. Rotavirus vaccine (RV1 [Rotarix], RV5 [RotaTeq]) is the only routinely recommended vaccine administered orally. Rotavirus vaccine should never be injected. CDC videos demonstrating administering each vaccine: Rotarix (RV1) RotaTeq (RV5)

- **Intranasal Route (NAS):** Intranasal vaccine is administered into each nostril using a manufacturer- filled nasal sprayer. Live, attenuated influenza (LAIV [FluMist]) vaccine is the only vaccine administered by the intranasal route.

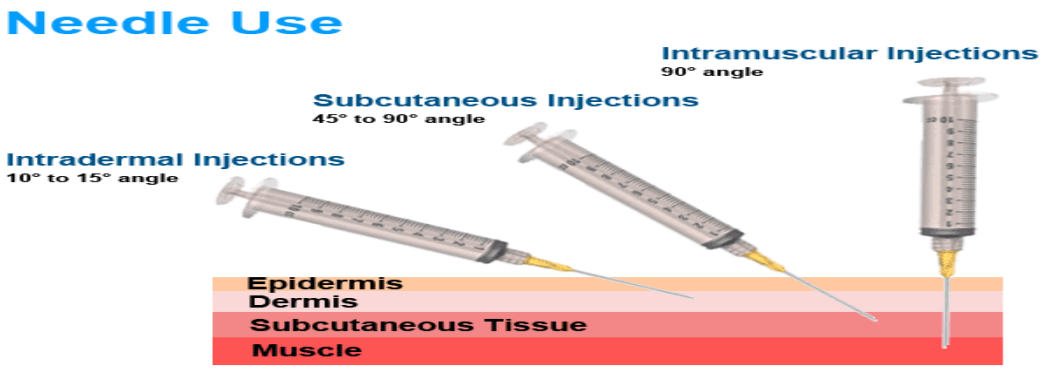
- **Subcutaneous Route (Subcut):** Subcutaneous injections are administered into the fatty tissue found below the dermis and above muscle tissue.

- **Intramuscular Route (IM):** Intramuscular injections are administered into the muscle through the skin and Subcutaneous tissue. The recommended site is based on age.

Administration

- Prepare each injectable vaccine using a separate syringe.
- Label each syringe with the name and the dosage (amount) of the vaccine, lot number, the initials of the preparer, and the exact beyond-use time, if applicable.
- Use combination vaccines (e.g., DTaP-IPV-HepB or DTaP-IPV/Hib) to reduce the number of injections, when appropriate. o Do NOT mix more than one vaccine in the same syringe in an effort to create a “combination vaccine.”

- Separate injection sites by 1 inch or more, if possible.
- Administer vaccines that are known to be painful when injected (e.g., MMR, HPV) last. Because pain can increase with each injection, the order in which vaccines are injected matters. Injecting the most painful vaccine last when multiple injections are needed can decrease the pain associated with the injections.
- Administer vaccines that may be more likely to cause



Storage of vaccines: The vast majority of vaccines should be stored at between 2-8^{0}C in a refrigerator, with a preferred average of 5^{0}C, though some should remain frozen in a range between -15 to -50^{0}C. Additionally, many should be protected from light and are packaged appropriately, as UV-light can damage them.

Result: We were able to study about routes of administration of injection such as IV, IM, SC etc.