Case study on a patient with pulmonary tuberculosis

ASSIGN BUSTER

The case that is about to be discussed here revolves around a patient diagnosed with pulmonary tuberculosis. The patient that was clerked, Mrs A, was a 61 year old woman. She was a Malay housewife. Her Body Mass Index value of 26. 0 kg/m2 based on her height of 1. 58 m and weight of 65 kg indicated that she fell into the overweight range.

The patient was admitted to the Accident & Emergency mode transferred in from another hospital via an ambulance. She presented symptoms such as shortness of breath(SOB) and her respiratory rate was 20 breaths per minute. She appeared pale and weak and her blood glucose levels were low (2. 1 mmol/l) and her blood pressure values indicated she was hypertensive with a value of 152/93 mmHg. Upon physical examination, mild leg swelling was observed.

Based on her past medical history, patient was diagnosed with pulmonary tuberculosis for the past 3 months, hypertension for the past 5 years, diabetes for the past 5 years and advanced renal failure for the past 6 months.

Upon enquiry, she was seen to be a non-smoker and a non alcoholic. Patient lived with her daughter.

Several investigations were performed to evaluate the patient’s condition. A positive sputum smear test indicated that the patients tuberculosis was still active. Upon renal function assessment, creatinine clearance was calculated and a value of 5. 5 ml/min indicated Stage 5 renal failure. Her potassium and urea levels were also above range based on Table 1. Upon haematology assessment, her low blood sugar levels indicated hypoglycaemia and

patient’s haemoglobin count was also low signifying anemia. Chest X ray was conducted on this patient and minor lesions at the apical segments of the upper lobe were seen. This is a typical radiographic representation of patients with tuberculosis.

Table 1: Results of the investigations performed

Laboratory Test

Readings

Normal range

Sputum Smear Test

Positive

—

Renal Function

Creatinine, Cr

Urea

Potassium, K+

912 Î¼mol/l

37. 8 mmol/l

5. 5 mmol/l

44-80 Î¼mol/l

1. 7 – 8. 5 mmol/l

3. 5 – 5. 0 mmol/l

Haematology Assessment

Blood Sugar Level

Haemoglobin

2. 1 mmol/l

9. 8 g/dl

4. 5 – 6. 0 mmol/l

13. 5 – 18 g/dl

Table 2 provides details about patient’s drug history giving information about patient’s drugs and their respective doses. Upon interview, patient informed that she had not been purchasing any over the counter medications. She also has no known drug allergy.

Table 2 : Drug History and their respective doses and their indication

Drug

Dose

Duration

Indication

Rifampicin

300 mg OD

2 months

Anti TB

Isoniazid

200 mg OD

2 months

Anti TB

Pyrazinamide

750 mg OD

2 months

Anti TB

Ethambutol

600 mg OD

2 months

Anti TB

Pyridoxine

20 mg OD

2 months

Treatment of neuropathy

Gliclazide

40 mg OD

5 years

Anti diabetic

Prazosin

2 mg TDS

5 years

Anti Hypertensive

Furosemide

80 mg OD

5 years

Anti Hypertensive

Nifedipine

20 mg TDS

5 years

Anti Hypertensive

Based on the investigations performed, the patient was diagnosed to be suffering from pulmonary tuberculosis and diabetes mellitus.

Patient’s daily condition was monitored and appropriate management was undertaken to control the patient’s condition. Patient’s overall progress is tabulated in the table 3 and the observation is recorded.

Table 3 : Patient’s clinical progress and management

Day

Clinical Progress

Management

1

Hypoglycemia = 2. 1 mmol/L

AFB test positive

Chest X ray performed

SOB

Hyperkalaemia (5. 5 mol/L)

Anemic (9. 8 g/dL)

BP : 152/93 mmHg

Strict fluid intake

IV Dextrose 10%/24 hours

Refer to chest physician

Lesions at upper lobes

NPO2 to resolve SOB

Start on Calcium polystyrene

Start Ferrous (IV) sulphate

Start antihypertensives

Monitor input & output

2

AFB test +ve

Blood Sugar Level = 3. 0 mmol/L

BP : 140/90 mmHg

Start TB regimen (EHRZ)

Continue IV Dextrose 10% & Monitor Blood Glucose

Continue antihypertensives

3

Blood Sugar level = 3. 2 mmol/L

Severe renal impairment (CrCl = 5. 6 ml/min)

Chest X ray done time to time

BP : 130/70 mmHg

Continue dextrose infusion

Send patient for dialysis

Lesions still present

Continue antihypertensives

4

No SOB

Hypoglycaemia resolved = 5. 5 mmol/L

AFB +ve

BP : 130/75 mmHg

Remove nasal prongs

Stop Dextrose. Monitor blood glucose

Continue TB regimen

6

K+ level in normal range (4. 5 mmol/L)

Blood Sugar level = 6. 0 mmol/L

CrCl = 7. 7 ml/min

BP : 130/65 mmHg

Stop Calcium polystyrene.

Monitor blood glucose

Send patient for dialysis

8

Hyperglycemia = 11. 1 mmol/L

BP : 125/75 mmHg

Start on Insulin

DM counselling

13

AFB -ve

DXT = 10. 2 mmol/L

BP : 120/70 mmHg

Transfer out of isolation

Continue insulin. Monitor blood glucose

Based on patient’s presentation and results from investigations performed on day 1, patient was started on dextrose and her blood glucose levels were regularly monitored. Based on patient’s previous history, a sputum smear test was ordered and two consecutive positive results resulted in the patient being referred to the chest physician. A chest X ray was performed and lesions in the apical segment were present. To resolve patient’s SOB, patient was started on Nasal Prongs at 3L/min. To control her hyperkalemia, patient was given calcium polystyrene sulphonate powder. Patient was also started on ferrous sulphate infusion to help her cope with her anaemia. A strict fluid intake was imposed on patient to resolve her leg swelling and this was monitored through an input output chart. Her blood pressure (BP) levels were also elevated and patient was given antihypertensives such as nifedipine, prazosin and furosemide to control her BP.

On day 2, her sputum smear remained positive and patient was commenced on the intial phase therapy for tuberculosis which consists of isoniazid, rifampicin, pyrazinamide and ethambutol. There was not much improvement in her blood glucose levels and patient was remained on the dextrose infusion. Moving on to day 3, not much improvement was observed and due to patient’s deteriorating renal function, patient was sent for peritoneal dialysis.

By day 4, patient could breath normally and no shortness of breath was seen. Nasal prongs were removed. When her blood glucose levels were monitored, the results indicated patient was within the normal range and dextrose was withheld. Blood glucose levels were still monitored to prevent sudden drops and increase in blood glucose. Her potassium levels were within range by day 6 and calcium polystyrene sulphonate was stopped and potassium levels were monitored as well.

Patient suffered from a hyperglycemia episode on day 8 and the patient was given biphasic insulin to treat this condition. By this day, her BP was also in the normal range but the antihypertensives were still continued. On day 13, patient was transferred out of the isolation ward as her sputum smear test produced negative results. Patient’s condition for tuberculosis was still being monitored. Her blood glucose levels were still in the high range and patient was to be continued on insulin.

To summarize this case, patient’s active tuberculosis state should be managed well to ensure patient does not suffer from further complications that might arise in the future. Patient’s history was well noted and this helped in treating the patient in early stages. Adequate investigations were performed to assist the healthcare professional team to diagnose the patient and also to manage the patient. Patient was admitted for a long period but the appropriate management that was undertaken resulted in improvement in patient’s condition. Further care for the patient would improve the patient’s quality of life in the future

Pathophysiology and Incidence

Tuberculosis (TB) is an infectious disease that has plagued many nations across the world. Based on the report by World Health Organization (WHO), almost 9. 4 million cases of TB were reported 3. It is highly common of those with TB to contract the Human Immunodeficiency Virus (HIV) and a prevalence of almost 1. 7 million deaths from TB among HIV-negative people was recorded around the globe 3. In the United Kingdom, an increasing trend in TB incidence has been reported and this is shown in Figure 1. In 2008, a rate of 14 per 100 000 population in the UK were reported to be suffering from TB 4. Malaysia on the other hand has a higher record of TB cases with 103 per 100 000 population being reported in 2007. Table 1 summarizes some of the data obtained from World Health Organization 3.

Figure 1: Number of TB cases reported in the UK from 2000 to 2008 4

Table 1: Statistics displaying number of TB cases in Malaysia in 2007 3

All

In HIV + people

Incidence

All forms of TB (per 100 000 population)

103

17

Mortality

All forms of TB (per 100 000 population)

121

8. 3

Multi-drug Resistant TB (MDR-TB)

MDR-TB among new cases (%)

0. 1

—

Notified relapse cases (per 100 000 pop/yr)

61

—

The bacteria that is responsible for this disease is the acid fast bacilli aerobic bacterium Mycobacterium tuberculosis 1. A key feature that enables this bacterium to survive would be its unique cell wall. Mycolic acids are linked covalently to arabinogalactan that provides a barrier to host defense mechanism. Antigens such as lipoarabinomannan present on the exterior of the cell wall facilitate the survival of the organism within macrophages 1. Tuberculosis is spread usually spread within droplets containing the microorganism that are produced when an infected person coughs, sneezes or even talks 1, 2. Figure 1 gives a schematic impression of the progression of the disease. The inhaled droplets are initially trapped by dendritic cells that act to expel any foreign particles out. Most mycobacteria are able to

surpass this defense mechanism and travels further to the alveoli where it gets ingested by macrophages 1. It then undergoes intracellular replication that might take duration of 4 to 6 weeks. Cytokines are further released during this period and this attracts T lymphocytes that are involved in mediating a cell immune response. The next natural defense system step would be the formation of granuloma that contains the activated T lymphocytes and macrophages. These nodular lesions disable further spread of the disease as the environment within restricts the growth of the bacilli and a latent period occurs 1. For less immunocompetent individuals, the granuloma will not be able to contain the bacilli and the active disease takes form 1.

Figure 1: Image depicting the progress of tuberculosis 2

The diagnostic tests available are summarized in Table 2. TB can be divided to latent and active and to diagnose each different test has been recommended. For latent TB, Mantoux test can be carried out and those with positive results can be considered for QuantiFERON TB test 5. To diagnose active pulmonary TB, a chest X-ray would be taken followed by multiple sputum samples that are sent for smear test 5.

Table 2: Diagnostic tests available for tuberculosis 1

Variable

Purpose

Time required for results

Sputum smear

Detect acid fast bacilli

< 24 hours

Sputum culture

Identify M tuberculosis

3-6 weeks with solid

media, 4-14 days with

high-pressure

liquid chromatography

Tuberculin skin test/ Mantoux

Detect exposure to mycobacteria

48 – 72 hours

QuantiFERON TB-test

Measure immune reactivity to M tuberculosis

12 – 24 hours

Chest radiography

Visualize lobar infiltrates with cavitation

Minutes

The drugs that are commonly used in tuberculosis are isoniazid, rifampicin, pyrazinamide and ethambutol. Rifampicin is a bactericidal agent that inhibits RNA synthesis by binding to the ß subunit of RNA polymerase. It can be given via oral administration and can even be distributed to the central nervous system due to its lipophilicity. Metabolism of this drug occurs in the liver and it is usually excreted in the urine. Isoniazid is a bactericidal pro-drug that inhibits ketoenoylreductase enzyme, InhA, that is responsible in synthesizing mycolic acids. Isoniazid can be administered orally, intramuscularly or intravenously and is acetylated in the liver and subsequently excreted in the urine. Pyridoxine 10 mg is given concurrently to minimize this risk. Pyrazinamide is another prodrug that is activated by nicotinamidase to pyrazinoic acid. This component at low pH carries proton into the cell and collapses the proton motive force present in the mycobacterium which results in cell death. It is only bactericidal against non growing bacilli forms.. Ethambutol works by binding to arabinosyl transferase enzyme and inhibits the polymerization of the cell wall arabinan component. Table 3 gives the details of the dose and side effects reported with the administration of the tuberculosis drugs.

Table 3: Tuberculosis drugs with their respective doses and side effects 6, 7

Drug

Dose

Side effects

Isoniazid

5 -8 mg/kg (max 300 mg)

Peripheral neuropathy, hepatotoxicty

Rifampicin

10 – 15 mg/kg (max 600 mg)

Nausea, vomiting, thrombocytopenia, orange discolouration of urine

Pyrazinamide

20 – 40 mg/kg (max 1. 5 g <50kg, 2g > 50 kg)

Nausea , vomitting, hyperuricemia

Ethambutol

15 – 25 mg/kg

Neuropathy, red green color blindness

Evidence based medication review

Treatment for Tuberculosis

In the past three decades, no new drugs have been discovered in fighting TB. The 4 drugs have been the gold standard in treating TB The chemotherapy regimen available for tuberculosis therapy can be divided to the initial phase and the continuation phase. In the initial phase, drugs such as rifampicin, isoniazid, pyrazinamide and ethambutol are used 6. These drugs act to

decrease the amount of bacteria present and also prevent resistance from emerging from the strains. This regimen is usually for 2 months. The continuation phase would consist of drugs such as isoniazid and rifampicin.

Isoniazid was the first drug to be introduced into combating tuberculosis back in the 1950s. Rifampicin , an antibiotic, was later added to the market and was added to the isoniazid regimen in 1967. This resulted in shortening the duration of treatment from 12 months to a 6 to 9 month treatment 9. Addition of pyrazinamide to the regimen decreased the chemotherapy duration further. Clinical studies have indicated that a pyrazinamide containing short course regimen had a sputum negative conversion rate of 70-95% in the first two months compared to the treatment without pyrazinamide 11. The relapse rates recorded from these studies also were only 4%.

A clinical study conducted in East Africa compared the four 6-month daily regimens that comprised of Streptomycin, Isoniazid and Rifampicin (SHR), Streptomycin, Isoniazid and Pyrazinamide (SHZ); Streptomycin, Isoniazid and thiacetazone (SHZ) and Streptomycin and Isoniazid (SH) 10. The SHZ regimen that was the most effective amongst all the regimens and the SHR regimen had the lowest relapse rate of 2% 30 months post treatment 10. No significant difference results were obtained from the treatment regimen that was carried out for 18 months 10. This study gives an impression of the efficacy of the isoniazid, rifampicin and pyrazinamide regimen when used together

In a Poland study, the efficacy of the 4 different drug regimens containing rifampicin, isoniazid and ethambutol were assessed. During the initial phase, patients were given isoniazid 300 mg, rifampicin 600 mg and ethambutol 25 mg/kg 8. In the continuation phase the regimens given to patients comprised of rifampicin 600 mg, isoniazid 15mg/kg(Regimen A), isoniazid 15 mg/kg rifampicin 600 mg twice a week (Regimen B), Isoniazid 15kg/mg, rifampicin 600 mg ethambutol 50mg/kg once a week (Regimen C) and Isoniazid 15mg/kg, rifampicin 600 mg, ethambutol 50mg/kg twice a week (Regimen D) 8. The result of this study demonstrated that Regimen D had 47% of its patients displaying a significant change in their sputum result to a negative result compared to the other regimens. There were no significant differences in rates between all regimens by the end of the fifth month as all patients had their sputum converted to negative. This study had the limitation of not including pyrazinamide in its regimen but it can be seen that to achieve a quicker rate of sputum negative cultures a regimen containing ethambutol could be used in the continuation phase.

A trial conducted by Jindani et al. assessed the effectiveness of daily dosing of the intial phase drugs compared to the intermittent thrice weekly dosing. The drugs that were assessed were isoniazid, rifampicin, pyrazinamide and ethambutol. The doses that were given to the patients were based on WHO recommendations. The outcome measured after 2 months had 77% of the patients with negative sputum cultures after their 2 month stint (p= 0. 001) 13. A similar study was conducted in Hong Kong with the difference being a 12 month follow up period. By the end of the second month, 94% of patient receiving the daily regimen had improved. 90% of those under the

intermittent regimen also had improved by the second month. Over the long term follow up, more relapse cases were recorded but the values were not significant 14.

Hypoglycemia Treatment

Patient was hypoglycemic upon arrival and dextrose infusion was provided to restore the patient's normal blood glucose range. Two forms of treatment are usually available for hypoglycemic attacks namely glucagon and dextrose infusion. A study compared the efficacy between both the options and it was observed that both were capable of treating hypoglycemia effectively. The only disparity observed was the recovery. Patients on dextrose infusion are capable of regaining consciousness by 4 minutes compared to 6 minutes for patients that were on glucagon (p <0. 001)27. However, glucagon has the advantage of ease of administration and less vascular risk 27. A study by Moore et al. assessed the difference between the administration of 10% dextrose and 50% dextrose. Table 4 clearly displays that the dextrose 10% is the suitable alternative in hypoglycemic patients as the post treatment glucose levels are within the range and is not on the higher end as seen with dextrose 50%.

Table 4 : Results of 51 hypoglycemic patients treated with dextrose 10% and dextrose 50% 27

Dextrose 10%

Dextrose 50%

Median time needed to attain recovery (minutes)

8

8

Median total dose administered

10g (p <0. 001)

25g (p <0. 001)

Median post treatment blood sugar levels

6. 2 mmol/l (p= 0. 003)

9. 4 mmol/l (p= 0. 003)

Diabetes Treatment

Oral antidiabetic agents such as gliclazide in the patient's drug history would not be sufficient for her to have proper control over her glycemic levels. It was reported that tuberculosis affects the hormonal secretion by interfering with endocrinal organs such as pancreas 15. Rifampicin reduces the concentration of gliclazide by inducing liver microsomal enzymes CYP 2C9 that rapidly eliminates gliclazide from circulating in the system 15, 16, 17. In a study by Park et al., patients given with 80 mg gliclazide had the concentration of the drug present in the body reduced by 70% on day 7. The elimination half life of the drug also increased 3 fold 17. All these contribute to the inability of the sulfonyluea to reduce the glucose levels in this patient.

According to the stepwise approach in NICE guidelines, the next step to manage this patient would be to start the insulin regimen18. The type of

insulin that was given was biphasic Mixtard insulin analogue that consists of a short acting analogue and also a long acting analogue. P. V. Rao reported that, due to the insulin resistance present in patients started on anti Tb therapy, the doses of insulin needed to manage these patients increase 15. It is well proven that insulin can achieve better HbA1c levels as a clinical trial by United Kingdom Prospective Diabetes Study (UKPDS) revealed that after 9 years monotherapy with insulin, 28% of patients achieved HbA1c levels below 7% and 42% patients achieved fasting plasma glucose levels below 7. 8 mmol/l 19.

Hypertension Treatment

Patient was suffering from Stage 5 renal disease and the target for blood pressure in this patient would be 125/75 mm Hg 20. First line treatment for this patient would be loop diuretic, furosemide 20. They act by inhibiting the Na+/K+/2Cl- transporter on the ascending limb of loop of Henle which results in natriuresis and hence a fall in blood volume 21. This loop diuretic also performs its vasodilator actions via prostaglandin (PGE2 and prostacyclin) formation. This results in an increased blood flow in the medulla 21. In accordance to SIGN guidelines as well, long acting dihyrdopyridines such as nifedipine and Î± blockers can be added as supplementary therapy 20. Nifedipine, a calcium antagonist acts by causing vasodilatation due to reduction in peripheral resistance. Î± blockers such as prazosin block Î±1 receptors and this results in vasodilation.

A study by Vadasz displayed that Furosemide doses at 40 mg did not display any significant changes in systolic blood pressure. However, when the dose was increased to 60 mg, there was a significant reduction in blood pressure

21, 22. A combined dose of 40 mg and 60 mg were effective in reducing the diastolic blood pressure. Based on this evidence, it is clear that furosemide on its own is not capable of decreasing blood pressure. When nifedipine was combined with diuretics it was observed that a statistically significant lower risk of cardiovascular events was observed compared to the non-statistically significant difference that was noted with nifedipine monotherapy 22. In another study by Psaty et al, nifedipine did not demonstrate an increase of risk in myocardial infarction compared to the other calcium channel blockers 25.

Prazosin’s efficacy in lowering blood pressure was studied and the lowest effective dose that is capable of reducing blood pressure was noted to be 10mg 26. Doses below 10 mg per day did not significantly reduce the blood pressure compared to the placebo arm.

Treatment of Anaemia

Patient had very low haemoglobin levels and this was indicative of anaemia. NICE guidelines have recommended that in order to manage anemia, patients are usually given eryhtropoetin stimulating agents and also iron supplements to help produce haemoglobin 23. There has been no evidence in the use of iron supplements in patients with chronic kidney disease prior to treatment with erythropoietin. But it is recommended that the erythropoietin therapy should not be commenced in conditions of complete iron absence 23. In some conditions, where patients were in Stage 5 renal failure also diagnosed with other co-morbidities, treatment with erythropoietin stimulating agents is decided based on clinical judgment by the professional team if the patient were to benefit from the treatment 23.

Treatment of Hyperkalaemia

Patient was suffering from mild hyperkalemia and it was necessary that this was be treated before it progresses to severe hyperkalemia that might lead to adverse events such as cardiac arrest. A study compared the effectiveness between sodium polystyrene sulfonate and calcium polysterene sulfonate and it is noted that treatement with sodium increases sodium concentration in the body and this escalates the risk of hypertension 24. Treatment with calcium polystyrene sulfonate resulted in 50% decrease in potassium content and an additional advantage of increase in calcium concentration was observed as well 24.

Conclusion

Based on all the evidence provided for the patient’s condition, it is clear that the guidelines were adhered in treating the patient’s individual disease with some minor differences. Tuberculosis treatment for the initial phase was extended for more than 2 months due to the positive result obtained from sputum smear. Patient eventually achieved negative sputum smear and the patient was to be monitored before the patient was commenced on the continuous phase drugs. Effective treatment was undertaken to treat patient’s hypoglycemia condition, and based on the evidence gathered, dextrose 10% is the suitable treatment option for the patient. The antihypertensive regimen that was chosen was due to the patient’s renal failure. Nifedipine, prazosin and furosemide collectively controlled the blood pressure of the patient. Ferrous sulphate was chosen as her treatment compared to erythropoietin and this was based on the doctor’s clinical judgement. Her hyperkalemia which was treated with calcium sulfonate did

benefit the patient as her potassium levels were within the normal range at the end of the treatment.

PATIENT MEDICATION PROFILE

PATIENT DETAILS

Name

Mrs A

Consultant

—

General Practitioner

—

Address

Kuala Lumpur

Gender

Female

Weight

65

Height

158

Community Pharmacist

—

Date of Birth (Age)

61

Known Sensitivities

None

Social History

Non smoker & Non Alcoholic

PATIENT HOSPITAL STAY

Presenting complaint in primary care / reason for admission

Admission date

April

Low Sugar Level : 2. 1 mmol/L

Discharge Date Discharged to

Not Known

Shortness of breath

RELEVANT MEDICAL HISTORY

RELEVANT DRUG HISTORY

Date

Problem Description

Date

Medication

Comments

Feb

Pulmonary Tuberculosis

Feb

Rifampicin

6 months

Advanced Renal Failure

Feb

Isoniazid

5 years

Hypertension

Feb

Pyrazinamide

5 years

Diabetes Mellitus

Feb

Ethambutol

Feb

Pyridoxine

6 months

Prazosin

6 months

Nifedipine

6 months

Furosemide

—

Gliclazide

RELEVANT NON DRUG TREATMENT

Peritoneal Dialysis

Prescribed Medication

Start

Stop

Clinical/Laboratory Tests

Date Result

1

Rifampicin

Day 1

—

Sputum Smear Test

Day 1

Positive

2

Isoniazid

Day 1

—

Creatinine

Day 1

912 µmol

3

Pyrazinamide

Day 1

—

Urea

Day 1

37. 8 mmol/l

4

Ethambutol

Day 1

—

Potassium

Day 1

5. 5 mmol/l

5

Pyridoxine

Day 1

—

Blood Glucose

Day 1

2. 1 mmol/l

6

Prazosin

Day 1

—

Blood Pressure

Day 1

152/93

7

Nifedipine

Day 1

—

Haemoglobin

Day 1

9. 8 g/dl

8

Furosemide

Day 1

—

Chest Xray

Day 1

Lesions in the apical segment

9

Dextrose Solution

Day 1

Day 4

Blood Glucose

Day 8

11. 1 mmol/l

10

Ferrous sulphate

Day 1

—

Sputum Smear

Day 13

Negative

11

Calcium polystyrene sulphate powder

Day 1

Day 6

12

Insulin Mixtard

Day 8

—

CLINCIAL MANAGEMENT

Diagnosis

Pharmaceutical Need

Pulmonary Tuberculosis

Continue patient on intial phase drugs

Hypoglycemia

Start patient on dextrose

Hypertension

Continue antihypertensive treatment

Hyperkalaemia

Start calcium polystyrene sulphonate powder

Anaemia

Start ferrous sulphate

Advanced Renal Failure

Send patient for peritoneal dialysis

PHARMACEUTICAL CARE PLAN

Date

Care Issue/Desired Output

Action

Output

Sub therapeutic doses

For Anti TB drugs

Discussed with the pharmacist and patient’s diabetic condition was the reason for the dose regimen

Doses were not changed

Drug sensitivity testing

was not performed

Patient is diabetic and is more susceptible for MDR-TB

No test was performed

Management of patient’s compliance towards anti tuberculosis drugs

-Patient might be hospitalised for a long period of time due to renal failure

-DOTS scheme to be implemented upon discharge

-Adequate patient education on the importance of completing the regimen is important

Hospitalisation or DOTS scheme

Renal failure

Ethambutol excreted by kidney. Suggest change of medication to 2 Isoniazid + Rifampicin + Pyrazinamide

-If treatment continued, monitoring essential

Continue treatment as before and patient being monitored

AFB test

Another 2 samples should be taken for AFB tests before switching to the continuous phase

Action yet to be taken

Monitor drug toxicity

Lab investigations on full blood count, liver function, serum uric acid, serum bilirubin, should be done to ensure no toxicity

– Eye examination for ethambutol side effects

Scheduled appointments for patient

Education on side effects of drugs

To inform patient about anti Tb drugs side effect and advise patient not to stop the drug and side effects can be controlled (PZA and arthralgia)

Counseling by pharm