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Original Research Article

COST BENEFIT ANALYSIS OF INTRAVENOUS (IV) TO ORAL (PO) SWITCH OF PARACETAMOL IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Intravenous to oral switch of medication in clinically stable patients is a part of appropriate medication reconciliation process, which ensures lower cost and reduced hospital stay. Paracetamol injection use has been very frequent in hospital setting especially during emergency care. At Shaukat Khanum Memorial Cancer Hospital 7 Research Center (SKMCH&RC), an online restriction for paracetamol injection prescribing was introduced in Jun, 2014 to ensure parenteral use only in indicated cases.

Aim: In this retrospective study, it was intended to evaluate the impact of online IV paracetamol restriction on consumption of parenteral paracetamol in the institute.

Method: It was a retrospective cross-sectional study. Paracetamol injection consumption was observed for the year 2014 month-wise using hospital information system (HIS).

Results: The number of paracetamol injections used before implementation of restriction was 11429 from Jan to Jun, 2014. After implementation of restriction, the number was reduced to 8219 in total from Jun, 2014 to Dec, 2014. There was a 28.1% decrease in the use of paracetamol injectable dosage form after implementation of the restriction. Rs. 321,000/- approx. were saved as a result of reduced consumption.

Conclusion: Restriction of intravenous paracetamol prescribing is associated with reduced parenteral paracetamol prescribing and lower cost of therapy.

Key Words: Intravenous, Oral, Paracetamol

INTRODUCTION

Intravenous to oral switch in clinically stable patients is associated with lower costs and reduced duration of hospital stay. For many drugs, bioavailability for intravenous and oral route is comparable. Oral Route is associated with better compliance, lower administration and patient related cost in most of the cases¹. Use of intravenous paracetamol is quite common in tertiary care hospitals across the country. It is primarily used for short term treatment of moderate to severe pain after surgery or in case of fever. However oral paracetamol is as effective as the IV preparation, and is a cost effective choice.²

METHODOLOGY

IV paracetamol provides onset of pain relief in 5-10 minutes. Due to 100% bioavailability, chances of toxicity are higher as well. Oral paracetamol is absorbed completely and achieves peak plasma concentration 30-60 minutes after administration.³

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Indications for the use of IV paracetamol⁴

- Obvious impairment/ inability to absorb orally administered paracetamol
- Significant/ prolonged vomiting (and/or nausea) secondary to e.g. post-operative nausea and vomiting / postoperative ileus/ bowel obstruction/ short bowel syndrome

- Moderate-severe obstructive sleep apnea

- Severe sepsis

Severe Neutropenia (Absolute neutrophil count <500)

Cautions for the use of IV paracetamol⁴

- Hepatocellular insufficiency.

- Severe renal insufficiency (creatinine clearance ≤ 15ml/min).

- Chronic malnutrition (low reserves of hepatic glutathione).

- Dehydration.

- Concomitant use of paracetamol (4 g per day for at least 4 days) with oral anticoagulants may lead to slight variations of INR values. In this case, increased monitoring of INR values should be conducted during the period of concomitant use as well as for 1 week after paracetamol treatment has been discontinued.

MHRA issued an alert in 2010 regarding accidental over-dose of paracetamol and chances of life threatening hepatotoxicity.⁵

Intravenous paracetamol orders are being intervened by pharmacists at SKMCH&RC wherever appropriate for switching to oral route. In this context an online restriction for IV paracetamol orders was implemented in Jun, 2014. Physicians need to identify the reason for choosing intravenous route for paracetamol administration for continuing the order. This restriction, in addition to interventions by the pharmacists, is expected to improve IV to PO switch culture at the institute. In order to evaluate the impact of restriction and online interventions on the trend of injection use, we conducted a retrospective analysis of IV paracetamol orders for the year 2014. Consumption of paracetamol injections month wise as well as quarter wise was compared against guidelines devised for IV paracetamol use.

Methods:

It was a retrospective cross-sectional study. Paracetamol injection use was evaluated for the year 2014. Data was collected using hospital information system (HIS). Data was collected for four respective quarters and compared to identify the trend of paracetamol injection use. Restriction on IV paracetamol use was implemented using HIS restriction form.

RESULTS:

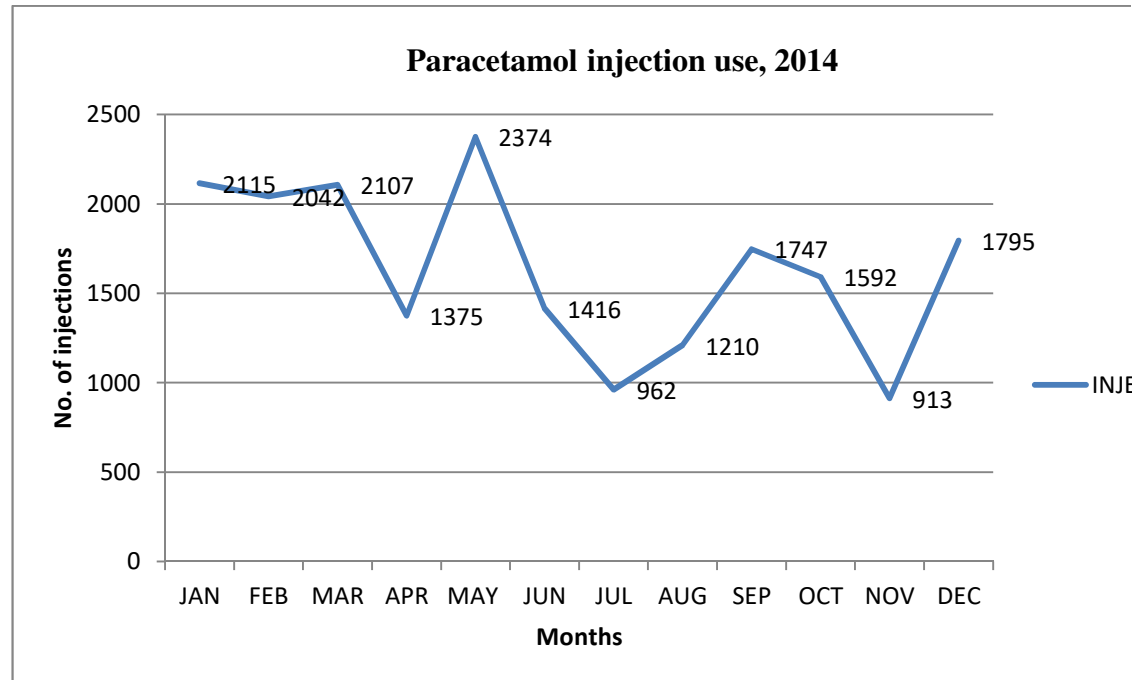
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No of injections consumed	2115	2042	2107	1375	2374	1416	962	1210	1747	1592	913	1795

Table shows the trend of paracetamol injection use from Jan, 2014 through Dec, 2014.

Table 1: Month-wise Paracetamol Injection Consumption, 2014

After implementation of restriction, a downward trend in use of paracetamol injection was observed from Jun, 2014 onwards. However the use has shown a gradual increase later in 2014 again.

Figure 1: Paracetamol injection month-wise, in 2014

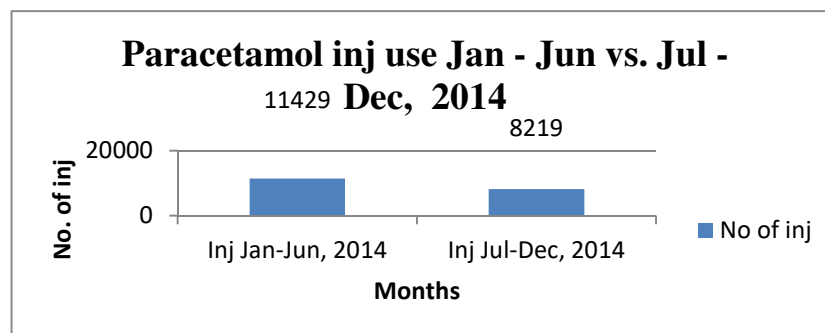


From 2115 injections used in Jan-2014, use decreased to 962 injections in the month of July after implementation of restriction in Jun, 2014.

Table 2: Paracetamol Injection Consumption Jan – Jun 2014 vs. Jul-Dec, 2014

Duration	Inj used
Inj Jan-Jun, 2014	11429
Inj Jul-Dec, 2014	8219

Figure 2: Paracetamol injection use Jan- Jun, 2014 Vs. Jul – Dec, 2014

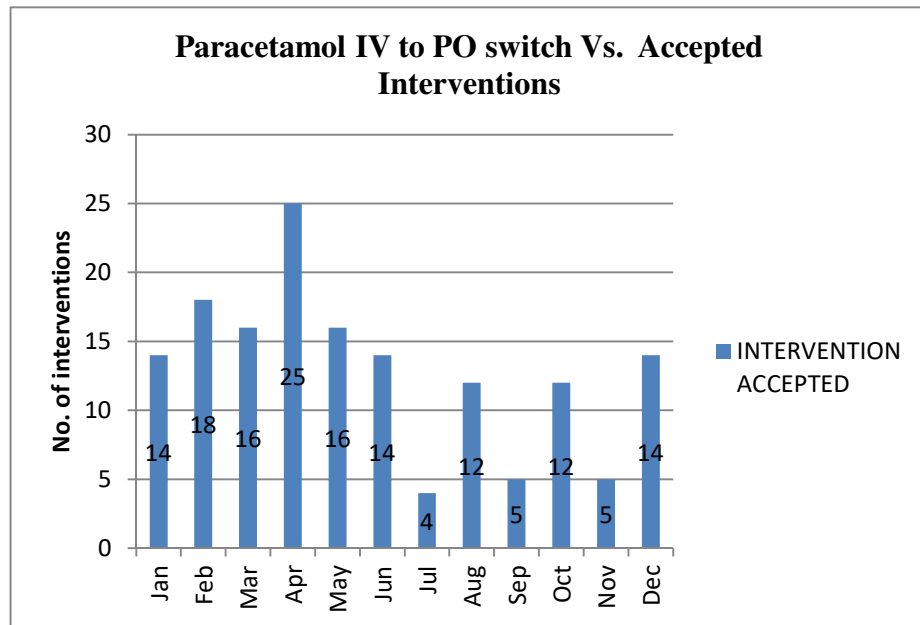


Total number of injections used decreased from 11429 in first half of 2014 (Jan – Jun) to 8219 in second half (Jul – Dec)

Table 3: Paracetamol Injections consumed vs. Accepted clinical interventions on Paracetamol IV to PO switch

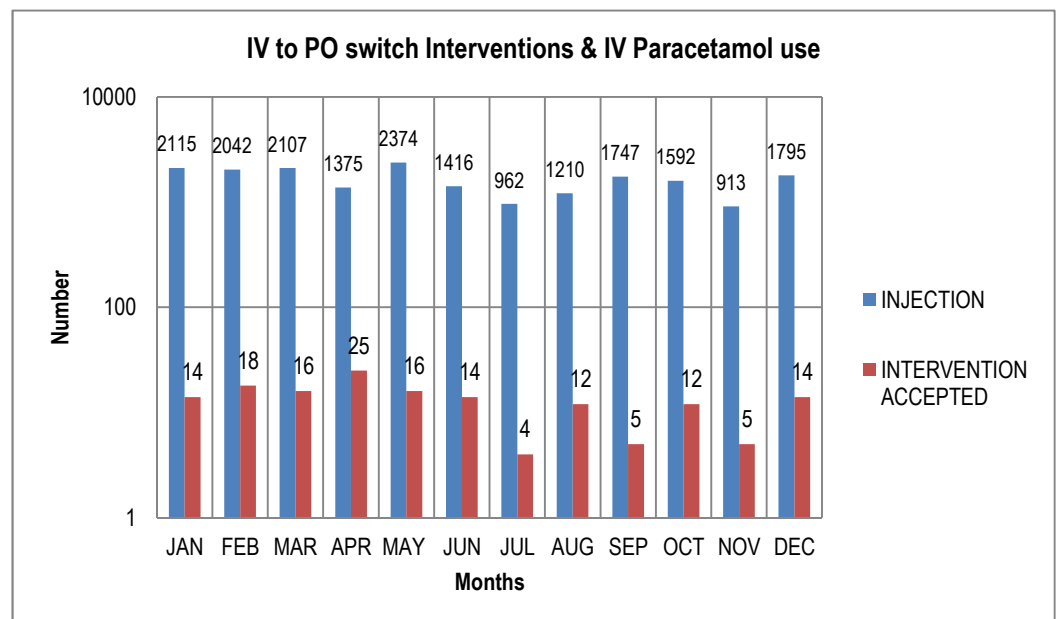
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Injections consumed	211 5	204 2	210 7	137 5	237 4	141 6	96 2	121 0	174 7	159 2	913	179 5
Interventions accepted	14	18	16	25	16	14	4	12	5	12	5	14

Figure 3: Paracetamol IV to PO switch Vs. Accepted clinical intervention for IV to PO switch



Highest number of accepted intervention for paracetamol IV to PO switch was observed in Apr, 2014, while it was comparable in the months of May, Jun, & Dec respectively.

Figure 4: IV to PO switch Interventions & IV Paracetamol use



DISCUSSION:

Intravenous route is generally recommended for patients where oral route is intolerable. However, it is a costly alternative to oral route. The aim of monitoring drug therapy is to minimize the duration of intravenous medication use and switching to the oral dosage form as soon as clinically feasible. This improves compliance and reduces cost for the patient as well as the service facility. Furthermore, intravenous administration is associated with higher risk of infusion reactions and medical management cost.

Institutes develop in-house techniques to improve effective and timely IV to per oral (PO) switch for medications. Proper medication reconciliation is highly recommended for this purpose. SKMCH&RC implemented online IV paracetamol restriction in Jun, 2014 to improve the appropriateness of IV paracetamol use. We carried out a retrospective cross-sectional analysis for evaluating the impact of restriction. It was observed that the number of paracetamol injections used before implementation of restriction was 11429 from Jan to May, 2014. After implementation of restriction, the number reduced to 8219 in total from Jun, 2014 to Dec, 2014. There was 28.1% decrease in the use of paracetamol injectable dosage form after implementation of the restriction. In the month wise break-up of injection consumption, it was observed that 2115 injections were consumed in Jan, 2014, 2042 in Feb, 2107 in Mar, 1375 in Apr, 2374 in May, 1416 in Jun, 962 in Jul, 1210 in Aug, 1747 in Sep, 1592 in Oct, 913 in Nov and 1795 injections in Dec, 2014 respectively. A rapid decline in injection use was seen during the months of Jun & Jul, 2014, right after the implementation of restriction. This may represent the impact of restriction on injection use. Approximately Rs.1, 143,000/- were consumed on IV paracetamol for the first half (Jan – Jun 2014). The cost reduced to Rs. 822,000/- approx. in the second half (Jul – Dec, 2014) with a net benefit of Rs. 321,000/- approx. Pharmacist interventions were evaluated but no correlation could be found between the number of interventions and number of injections used.

CONCLUSION:

IV to PO switch of paracetamol through online restriction is associated with reduced parenteral paracetamol prescribing and lower cost of therapy.

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