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Research Article

Study on Insulin Safety Clinical Audit in a Tertiary Care Teaching Hospital

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Abstract:

Insulin therapy is an integral part of diabetes management in both type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM). In T1DM, insulin therapy is required from the time of diagnosis and continued to be required over the lifetime of an individual. In T2DM, insulin therapy is used either during acute illness associated with hyperglycaemia and hyperglycaemic emergencies, peri-operatively, or during pregnancy and lactation. Long-term insulin therapy in T2DM is indicated following the failure of combination anti-diabetic therapy with oral or non-insulin injectables to maintain optimal glycaemic control.The pattern of anti-diabetic treatment (especially in type 2 diabetes mellitus) tends to change markedly along with the duration of diabetes including the use of Insulin in its treatment. Studies have reported the benefits of insulin in helping to achieve glycaemic control and reduce the risk of long-term diabetes complications. The data was collected and analysed for compliance and the errors were detected. Corrective actions were taken and a re-audit was done to check the compliance. The implementation of a structured documentation form together with training measures for health-care-professionals led to less documentation errors and safe management of glycemic control in hospitalized patients in a short time follow-up.

Keywords: Diabetes Mellitus, Insulin Therapy, Glycaemic control, Sliding Scale, Endocreniology

Introduction:

Insulin remains the cornerstone of therapy in a substantial number of patients with type 2 diabetes mellitus (T2DM). Inadequate knowledge regarding insulin usage is likely to influence its acceptance and adherence, and outcome of therapy, underscoring great need to investigate knowledge, attitude, and practice of insulin usage in patients with T2DM [1]. Insulin therapy is an integral part of diabetes management in both type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM). In T1DM, insulin therapy is required from the time of diagnosis and continued to be required over the lifetime of an individual. In T2DM, insulin therapy is used either during acute illness associated with hyperglycaemia and hyperglycaemic emergencies, peri-operatively, or during pregnancy and lactation. Long-term insulin therapy in T2DM is indicated following the failure of combination anti-diabetic therapy with oral or non-insulin injectables to maintain optimal glycaemic control [2]. Insulin therapy is usually initiated gradually, progressing from once daily insulin regimens to premixed, basal-plus or basal-bolus insulin regimens while the patient is maintained on certain oral anti-diabetic therapies. Two types of insulin are currently in use in Nigeria i.e. human insulin derived by recombinant technology or insulin analogues which are genetically modified human insulin in which the amino acids sequence has been altered to change the pharmacokinetic profile[3].

The pattern of anti-diabetic treatment (especially in type 2 diabetes mellitus) tends to change markedly along with the duration of diabetes including the use of Insulin in its treatment. Studies have reported the benefits of insulin in helping to achieve glycaemic control and reduce the risk of long-term diabetes complications[4]. However, studies have shown concerns and barriers to initiation and adherence to insulin therapy, especially among type 2 diabetics. These include errors or inaccuracies associated with the injections across the lifespan of people with diabetes[5]. The effectiveness of insulin therapy is related to adequate dosing, adherence, preservation of its potency through proper storage and good injection techniques among others[6]. Up to 22-30% of hospitalized patients have diabetes and occurring hyperglycemia and

hypoglycemia can lead to adverse outcomes and even to death,[5] To reduce high blood glucose (BG) values, insulin is often considered to be the first choice in the hospital setting,[6] Despite good treatment effects, insulin is also listed as a high-alert medication by the Institute for Safe Medication Practices,[7] because it can cause serious harm to patients when used incorrectly, Errors in insulin prescription and administration are common[8] and include for example missed or wrongly administered insulin doses, incorrect prescription of insulin name, dose or type, abbreviations in insulin prescription, or illegible handwriting.[9]

Objectives of The Stdy:

Primary objective:

The objective of this study is to report the pattern of insulin use, types, prescription, storage, common regimen used, adherence, sites of insulin injection and whether insulin use interferes with daily routines among other determinants in patients with diabetes.

Secondary objectives:

To study and evaluate the blood glucose level testing and its frequency

Methodology-

This study was conducted in a 300 bedded tertiary care teaching hospital in Kolkata, Eastern India. This hospital provides primary and specialized health care facilities to people in and around Kolkata. The hospital has various departments like Anaesthesia, ENT, General Medicine, Obstetrics and Gynaecology, Ophthalmology, Orthopaedics, Paediatrics, Psychiatry, Radiology, Skin and STD and Surgery. The data was collected using a standardised questionnaire. The data was collected and analysed for compliance and the errors were detected. Corrective actions were taken and a re-audit was done to check the compliance. The audit cycles was carried out to check and compare the

rate of compliance before and after the audit. Statistical tools were used to collect and analyse the data. The primary objective was to compare the number of insulin administration errors (primary endpoint). The following four items were generated according to the definition of insulin errors of NDIA :

- Name of insulin was not written complete/legible/comprehensible,
- unclear dose,
- no initialing when insulin was administered
- time of administration was not clearly documented.

The audit cycles were conducted and the data was analysed to identify the errors. Corrective and preventive actions were taken by the Department of Clinical Pharmacology. The study was conducted over a period of 2 months and the data was analysed and recorded

Inclusion Criteria

All age gender co-morbid patients who were administered with insulin in there therapy in there regimen was included in the study.

Exclusion criteria

Patient visiting Out patient department and patients admitted in Paediatric Wards are excluded from the study.

Results-

Significant changes are observed after conducting the audit cycle and conducting audits and taking corrective and preventive actions lead to a safe handling and usage of insulin.

Insulin error type	First Audit n=100	Second Audit(Cycle) n=100
Insulin administration errors (n=100)	02	0
Name of insulin was not written complete/legible/comprehensible	2	0
Unclear dose	2	1
No initialing when insulin was administered	2	1
Time of administration was not clearly documented		
Insulin prescription errors	22	5
Total no of prescriptions audited	100	100
Name of insulin was not written complete/legible/comprehensible	16	5
Unclear dose	20	5
Unit was written unclear	5	2
Insulin Used	32%	-
Oral Hypoglycaemic Agents Used	8%	-
Insulin + OHA	60%	-

Table- Comparative data of insulin usage before and after the audit

Moreover, 12% absolute improvement in documentation of patient identification (78%

vs. 90%) was achieved by implementing the audit and teaching.

The number of insulin administration errors, the primary endpoint, was significantly

higher for the old audit compared to the new audit results.

Each parameter of insulin administration errors was distinctly higher previously than on new insulin audit. Insulin prescription errors were more frequent on old insulin audit, whereas insulin management errors rarely occurred.

Discussion:

The results of this study indicate that improved inpatient diabetes care was achieved

by implementing a new insulin chart. The UK National Patient Safety Agency reported 3881

incidents with incorrect insulin doses from 2003 to 2009. Most commonly, abbreviations in insulin prescription and errors in using insulin syringes were identified that led to harm and in some cases even to death,(9). In England and Wales, the National Diabetes Inpatient Audit (NDIA) determined that in 31% of inpatients a medication error and in 18% an insulin error occurred during hospital stay. Erroneous documentation of insulin administration was significantly lower in new compared to old insulin audit results[10]. The design of the new chart was found suitable to improve all parameters of insulin administration errors. For example, errors regarding initialing of insulin administration by nurses were distinctly lower on new insulin audit compared to the previously used insulin audit. Our finding (3%) is similar to a rate of 4% not signed as given on audited drug charts at the NDIA. Thus, a comprehensible documentation of mandatory administration data for effective and safe glucose management was guaranteed by implementation of this audit. A Scottish study, which identified evidence-based subcutaneous insulin care clusters to develop a new insulin chart showed similar improvements in the correct documentation of insulin administration after implementing a new insulin chart[11]. Similarly, the Scottish study did not report a significant change in insulin prescription by implementing insulin audit cycles. The authors argued, that this may arise from long standing practice on the wards which is not easily changed[10,11]The same challenge may also apply to our hospital. Frequent audits and teachings needed to be conducted in order to decrease the errors.

Sliding Scale should be mentioned both in treatment sheet as well as medicine chart in order to avoid errors. Practice of mentioning the insulin sliding scale as well as avoiding usage of Error prone abbreviations such as e.g. H.A needs to be avoided[12].

Limitation-

This study is not without limitations. While the outcome of the study remains significant proper usage and handling of insulin needs to be promoted through continuos teaching and awareness and by conducting frequent audits. The usage of insulin was increased due to the surge in Covid complications which associated steroids induced diabetes. Due to these pandemic many of the cycles were not carried out due to the severity or due to the condition of the patient. Audit Cycles were not possible to conduct on patients those who got shifted or discharged against medical advice.

Conclusion-

The implementation of a structured documentation form together with training measures for health-care-professionals led to less documentation errors and safe management of glycemic control in hospitalized patients in a short time follow-up. A roll-out at further medical wards is recommended, and sustainability of the beneficial effects in the long term has to be demonstrated. hospital and hence further training should be offered to health care professionals to improve initialing of prescription. A strength of the study is that improvements in documentation quality were connected with beneficial clinical outcome. Moreover, the project was performed within daily routine work as an essential quality assurance project. Hours spend for implementation were covered out of general employment and, thus, feasibility of a roll out in comparable hospital institutions can be assumed.

Nevertheless, a lesson learnt from the present work was that training of the nursing and medical staff is a real challenge in a typical hospital shift rotation system

List of Abbreviation-

NDIA- National Institue Of Drug Abuse

Conflict of Interest- There is no conflict of interest among the authours.

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