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Electronic Alerts to Prevent Contrast-Induced Nephropathy Among Hospitalized High Risk Patients

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Contrast-induced nephropathy (CIN) is a common cause of hospital acquired kidney injury and is associated with lengthened hospital stays, increased cost, and increased risk of death. Despite of increasing recognition that extracellular volume expansion effectively reduces the risk for CIN, this preventive strategy remains underused in patients undergoing computed tomography (CT). We hypothesized that the use of a computer-alert program to encourage preventive strategy might increase the frequency of intravenous volume supplements and reduce the incidence of CIN in hospitalized chronic kidney disease (CKD) patients undergoing CT. We developed a computer program in which the responsible physician was alerted to a patient's risk of CIN when the physician ordered contrast enhanced CT in patients with CKD (defined as estimated GFR <60 mL/min per 1.73m^2). The physician was required to acknowledge the alert and order preventive strategy, including hydration with 0.9% saline or sodium bicarbonate, N-acetylcysteine administration, and follow-up serum creatinine level within 24-72 hours. This electronic alert program was applied to all hospitalized patients from March, 2010. We conducted a prospective observational study of 435 inpatients (>18 years old) with stable chronic kidney disease who underwent contrast-enhanced CT from January, 2010 to May, 2010. CIN was defined as an increase in the serum creatinine level after contrast administration of ≥25% or ≥0.5 mg/dL from the baseline level. 242 patients were eligible in the study: 110 patients in the intervention group (after application of alert system) and 132 patients in the control group (before application of alert system). Preventive strategy were ordered for 56 patients in the intervention group (51%) and 34 patients in the control group (26%, p<0.001). The intervention group had higher rate of use of both intravenous hydration (56% vs. 30%, p<0.001) and N-acetylcysteine (62% vs 36%, p<0.001). Serum creatinine values were obtained within 72 hours from 67 patients in each group (61% vs. 51% p=0.114). CIN occurred in 1 patient in the intervention group while 4 patients in the control group (2% vs. 6%, p=0.172). The institution of a computer-alert program increased physicians' use of prophylaxis. Electronic alerts may reduce the incidence of CIN among hospitalized patients at risk. We collected and are analyzing data of more than 100 patients.

Key Words: CIN, Prophylaxis, Alerts