Title: Identifying Metformin-induced Vitamin B12 Deficiency in Type 2 Diabetics in Primary Care.

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Abstract

**Background:** Diabetes is a complex chronic disease with a significant prevalence. Although metformin is the preferred initial pharmacological choice to treat Type 2 Diabetes, new evidence reveals a link between metformin use and vitamin B12 deficiency. As a result, the American Diabetes Association has made a new recommendation to monitor B12 levels as a standard of care for patients on metformin.

**Purpose:** The purpose of this study was to implement a practice improvement project in an established primary care practice for providers to identify vitamin B12 deficiency in diabetic patients on metformin as outlined in the American Diabetes Association Standards of Care.

**Methods:** This project used a quasi-experimental pre and post-intervention design. Data collected from March 2017 to March 2018 before the checklist intervention for checking serum B12 levels for diabetes patients on metformin was compared to data collected September 2018 to December 2018 when the checklist was revised to include the prompt for monitoring serum B12 levels at least annually.
**Results:** Data was evaluated for whether practice improvement had occurred and led to discovery of low vitamin B12 levels. Prior to checklist implementation, serum B12 levels for patients taking metformin were only being done approximately 5% of the time. After checklist implementation, this improved to 36% (p = <0.0000).

**Conclusions/Implications:** This study found that a checklist is an effective tool for identifying metformin-induced B12 deficiency. Prompting providers to check B12 levels on an annual basis can prevent the complications of peripheral neuropathy, pernicious anemia, and mental status changes that are caused by severe B12 deficiency. Results demonstrate that an improvement in knowledge about new standards of care and the implementation of a checklist increased the number of B12 checks for this patient population.

*Keywords:* diabetes, metformin, vitamin B12, checklist, primary care