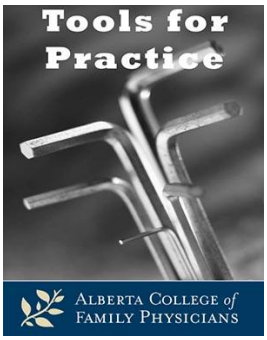
**Tools for Practice** is proudly sponsored by the Alberta College of Family Physicians (ACFP). ACFP is a provincial, professional voluntary organization, representing more than 4,800 family physicians, family medicine residents and medical students in Alberta. Established over sixty years ago, the ACFP strives for excellence in family practice through advocacy, continuing medical education and primary care research. www.acfp.ca

**Reviewed: December 6, 2017**
**Evidence Updates: Added RCT and meta-analysis**
**Bottom Line: No Change**
**First Published: February 16, 2010**




# Strategies for initiating insulin in Type 2 Diabetics

## Clinical Question: What is the optimal regimen for initiating insulin in type 2 diabetes?

## Bottom-line: In type 2 diabetes poorly controlled with oral agents, initiating basal insulin results in similar HbA1c reductions compared to starting with prandial or biphasic insulin and may cause less weight gain and hypoglycemia.

**Evidence:**

- Five reasonably-sized randomized controlled trials compare regimens for initiating insulin in type 2 diabetes with poor glucose control.
  - 4T study[1]: Followed 708 patients for 3 years comparing long-acting basal insulin once daily, biphasic premixed insulin twice daily or prandial insulin with meals.[1]
    - HbA1c levels were not significantly different between the three groups,
      - Significantly more patients in the basal and prandial groups attained HbA1c ≤7.0% (63% and 67% versus 49% biphasic).
    - Basal insulin had statistically significant:
      - Less weight gain (3.6kg) than prandial (6.4kg) or biphasic insulin (5.7kg),
      - Fewer confirmed symptomatic hypoglycemic events/person/yr (1.7 basal versus 3.0 biphasic, versus 5.7 prandial),
      - More patients requiring a second type of insulin (82% basal, 74% prandial and 68% biphasic),
      - Higher total dose of insulin (by weight).
  - The four remaining studies (APOLLO[2], INITIATE[3] JDDM 11[4], and Riddle[5]) followed 160 to 588 patients for 6-14 months and compared basal to prandial,[2] basal to biphasic,[3] biphasic to prandial,[4] and basal(+/-prandial) to biphasic[5] insulin.
    - HbA1c was generally similar except biphasic improved HbA1c more and got more people to a HbA1c ≤7.0% than basal in one study,[3] but less than basal+prandial in another.[5]

        - Basal insulin had significantly less hypoglycemia (than prandial[2] or biphasic[3]) and weight gain (than biphasic[3]), and basal(+/-prandial) had less hypoglycemia and weight gain than biphasic.[5]
    - Meta-analyses found similar.[6,7]

**Context:**

- 4T study[1] is given priority because it is the largest, longest and compares the three options. Fortunately, the remaining studies[2-5] generally support those findings.
- INSIGHT[8] found initiating basal insulin in poorly controlled type 2 diabetes resulted in significantly lower HbA1C than continued oral hypoglycemic agents
    - Mean HbA1c and hypoglycemic rates were not different between patients of family practitioners or diabetes experts.[9]
- There is no evidence that insulin is superior to oral agents in reducing clinical outcomes in patients with type 2 diabetes.[10]
- Specialists are five times more likely to initiate insulin than family practitioners.[11]

**Original Authors:**
Christina Korownyk MD CCFP, Noah Ivers MD CCFP, G Michael Allan MD CCFP

**Updated:**
Ricky D Turgeon BS(Pharm) ACPR PharmD

**Reviewed:**
G. Michael Allan MD CCFP

**References:**

1. Holman RR, Farmer AJ, Davies MJ, et al. N Engl J Med. 2009 Oct 29;361(18):1736-47.
2. Bretzel RG, Nuber U, Landgraf W, *et al*. Lancet. 2008 Mar 29; 371(9618):1073-84.
3. Raskin P, Allen E, Hollander P, *et al*. Diabetes Care. 2005 Feb; 28(2):260-5.
4. Hirao K, Arai K, Yamauchi M, *et al*. Diabetes Res Clin Pract. 2008 Jan; 79(1):171-6.
5. Riddle MC, Rosenstock J, Vlajnic A, Gao L. Diabetes Obes Metab. 2014;16:396-402.
6. Pontrioli AE, Miele L, Morabito A. Diabetes Obes Metab. 2012 May; 14(5):433-46.
7. Wang C, Mamza J, Idris I. Diabet Med. 2015;32:585-594.
8. Gerstein HC, Yale JF, Harris SB, *et al*. Diabet Med. 2006 Jul; 23(7):736-42.
9. Harris S, Yale JF, Dempsey E, *et al*. Can Fam Physician. 2008 Apr; 54(4):550-8.
10. Palmer SC, Mavridis D, Nicolucci A, et al. JAMA. 2016;316(3):313-324.
11. Shah BR, Hux JE, Laupacis A, *et al*. Diabetes Care. 2005 Mar; 28(3):600-6.

**Tools for Practice** is a biweekly article summarizing medical evidence with a focus on topical issues and practice modifying information. It is coordinated by G. Michael Allan, MD, CCFP and the content is written by practising family physicians who are joined occasionally by a health professional from another medical specialty or health discipline. Each article is peer-reviewed, ensuring it maintains a high standard of quality, accuracy, and academic integrity. If you are not a member of the ACFP and would like to receive the TFP emails, please sign up for the distribution list at http://bit.ly/signupfortfps. Archived articles are available on the ACFP website.