

# Injection Technique Practice/Trends in NZ & the Importance of Collaboration

Dr Brandon Orr-Walker & Dr Helen Snell  
Counties Manukau DHB,  
Palmerston North, New Zealand  
20 May 2017



# Outline

- **Diabetes In NZ**
  - Epidemiology
  - Glucose lowering therapy in NZ
  - Management of diabetes in NZ
- **Effective Insulin Therapy**
  - A chain of many links
  - Current practice
- **Emerging Approaches to Diabetes Management in NZ**
  - Opportunities to embed guidance and enhance care
  - Nurse prescribing, nurse practitioners, community pharmacists



*"Insulin is a remedy primarily for the wise  
and not for the foolish,  
whether they be patients or doctors.  
Everyone knows it requires brains to  
live long with diabetes, but to use  
insulin successfully requires more than  
brains."*

**- Elliot Joslin (1923)**

# Diabetes in New Zealand: Epidemiology<sup>1</sup>

- Estimated 260,000 people (VDR Census Dec 2015)
  - Strong age, ethnicity and social deprivation trends

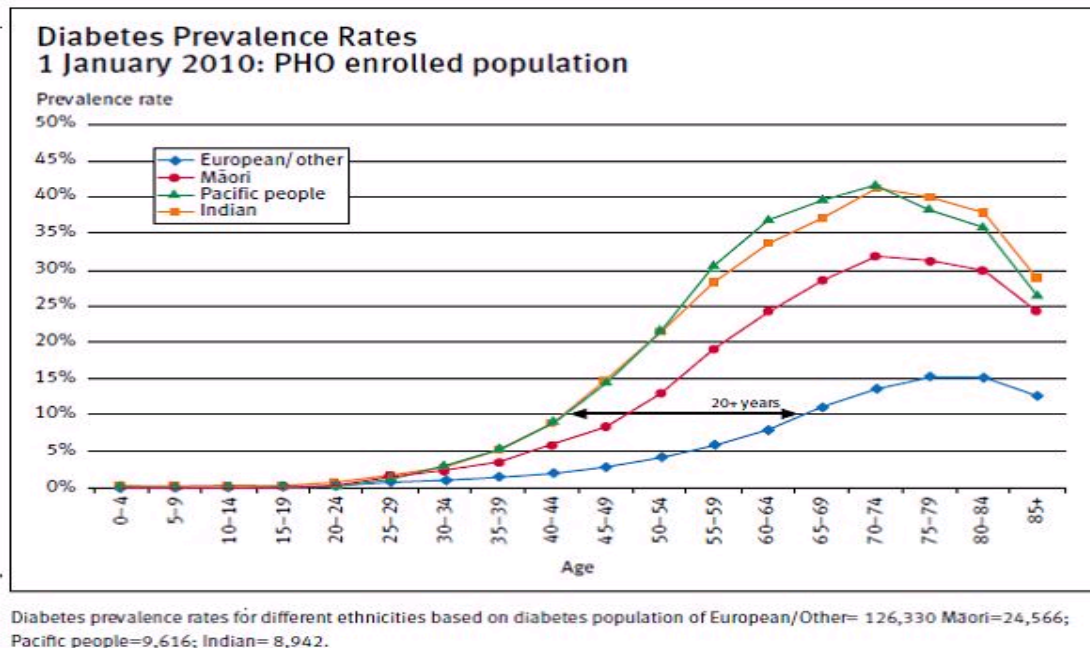


Image sourced:

<https://www.slideshare.net/sunznz/sunz2013-emmanuel-jo> (accessed May 2017)

1. Emmanuel *et al* VDR Consus Jan 2015: 21(1):49-55. Accessed online at [http://www.diabetes.org.nz/resources\\_and\\_publications/new\\_zealand\\_diabetes\\_statistics](http://www.diabetes.org.nz/resources_and_publications/new_zealand_diabetes_statistics)

# Diabetes in New Zealand: Epidemiology<sup>2</sup>

- National Prevalence Survey (NZANS 2008/9):<sup>2</sup>
  - Overall the prevalence of diabetes was 7.0% (95% CI: 6.0, 8.0).
  - Diabetes was more common among men (8.3%; 95% CI: 6.4, 10.1) compared with women (5.8%; 95% CI: 4.7, 7.0).
  - The prevalence of diagnosed diabetes was 6.0% (95% CI: 4.5, 7.5) among men and 4.0% (95% CI: 3.1, 4.8) among women, and the prevalence of undiagnosed diabetes was 2.1% (95% CI: 1.2, 3.0) among men and 1.5% (95% CI: 1.0, 2.0) among women.

# Diabetes in New Zealand: Epidemiology<sup>3</sup>

- No National level breakdown of T1DM vs T2DM
  - Canterbury Diabetes Registry insulin-treated population (est 1984)
    - Growing incidence of T1DM
  - Major increase in prevalence is T2DM
    - Demographic change
    - Secular change
    - Diagnosis

3. Miller, J., Willis, J. A., Pearce, J., Barnett, R. et al (2011) Accessed online at <http://doi.org/10.1016/j.healthplace.2010.10.010>

# Diabetes in New Zealand: Glucose Lowering Therapy

- **Funded**<sup>4</sup>

- Metformin
- Acarbose
- Sulphonylureas
- Pioglitazone
- Insulins

- **Unfunded**

- *Everything else*

New Zealand is particularly reliant on insulin for management of type 2 diabetes

4. PHARMAC.(2017).*Pharmaceutical Schedule*. Accessed online at <http://www.pharmac.govt.nz/2017/04/01/Schedule.pdf>

# Diabetes in New Zealand:

## Management of Diabetes

- **Increasing emphasis on primary care for delivery**, particularly for type 2 diabetes
  - Diabetes Implementation Plan (2000)<sup>5</sup>
  - NZ Guidelines Group 2003, 2009, update 2011 (represented in 2012 in NZ Primary Care handbook 2012)<sup>6</sup>
  - Local Diabetes Teams (Clinical Governance but in reality “monitoring” roles)<sup>7</sup>
  - All vocationally registered practitioners can prescribe equally (no Specialist special authorities).<sup>8</sup>
- **Significant co-funding of primary care**<sup>5</sup>
  - General (population registries)
  - Specific to diabetes (“Get Checked”, DCIP, local initiatives).

5. Health Funding Authority. (2000). *Diabetes 2000*. Accessed on line at [www.moh.govt.nz/notebook/nbbooks.nsf/0/.../\\$file/Diabetes2000.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/.../$file/Diabetes2000.pdf)

6. New Zealand Guidelines Group. (2012). *New Zealand Primary Care Handbook 2012*. (3rd ed.) Wellington: Access on line at <https://www.health.govt.nz/system/files/.../nz-primary-care-handbook-2012.pdf>

7. Ministry of Health (2011). Accessed on line at <https://nsfl.health.govt.nz/system/files/.../specifications/ldtorequivalentservice.doc>

8. New Zealand Legislation. (2017). *Medicines Act 1981*. Accessed online at <http://www.legislation.govt.nz/act/public/1981/0118/latest/DLM53790.html>



# Diabetes in New Zealand: Management of Diabetes

## **Diabetes Implementation Plan (2000) was aspirational:<sup>5</sup>**

*"The proposed changes include the establishment of local diabetes teams and information systems to identify and monitor the needs within the regions.*

*"Services to individuals with diabetes will also be improved with the introduction of free annual reviews, increased education and management, reduced barriers to access, and increased numbers of eye-screening examinations.*

*"These changes focus on the removing the inequity of health outcome for Maori and Pacific Island people, and include specific funding for new initiatives managed by Maori and Pacific Island people.*

*"New Zealand must establish a world-class comprehensive service for people with diabetes. It must include prevention, early detection, and effective treatment at every stage of the development of this disease.*

*"We cannot afford to fail."*

---

5. Health Funding Authority. (2000). *Diabetes 2000*. Accessed on line at [www.moh.govt.nz/notebook/nbbooks.nsf/0/.../\\$file/Diabetes2000.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/.../$file/Diabetes2000.pdf)

# Diabetes in New Zealand: Management of Diabetes

## **But achievement of excellent control has been suboptimal and development of expert workforce suboptimal/imbalanced:**

- Only a minority are referred to specialist services (<20%)
  - Even with very poor diabetic control (HBA1c  $\geq 75$ mmol/mol)<sup>9</sup>
- Up to 24% of the people with diabetes will be admitted to a hospital in a year.<sup>10</sup>
- Only 20% of people currently having retinal laser therapy have been seen by specialist diabetes services in the year prior or subsequent to their laser therapy.<sup>9</sup>

## **For Specialist services:**

- Services including screening and complication management/palliation (eg renal replacement/retinal therapy) are increasing at greater than population growth rates<sup>9</sup>
- Hospitalisation is increasing at greater than population rates.<sup>10</sup>
- Only amputation rates in men are falling, possibly due to reduced smoking<sup>11</sup>
- 20- 25% of hospital inpatients have diabetes.<sup>9</sup>
- Specialist diabetes services are growing at less than population growth, diabetes prevalence growth or are totally stagnant.<sup>9</sup>

9. Counties Manukau DHB figures (unpublished).

10. Jackson *et al* 2009 *NZMJ* 2(1288):13-21.

11. Dr P Drury, *pers comm* 2017.

# Diabetes in New Zealand: Management of Diabetes

- Effective treatment for the large number of people living with diabetes requires increased capacity **and** capability in primary care.
- Literature suggests the effectiveness & quality of insulin initiation & management in primary care varies due to not performing often enough to maintain skills & confidence, or adequate time to cover all aspects of education involved (Chadder, 2013).<sup>12</sup>

# Living With Diabetes Plan 2015-2020<sup>13</sup>

A plan for people at high risk of or living with diabetes.

## **Vision:**

People with diabetes will live well and have access to high quality services that meet their unique needs.

## **Realised through:**

- Implementation of the Quality standards for diabetes care.
- A flexible & responsive workforce, technology & leadership.

# Implementing the Living with Diabetes Plan: Standard 7

When insulin is required it should be initiated by trained health care professionals within a structured programme that, whenever possible, includes education in dose titration by the person with diabetes.<sup>14</sup>

14. Ministry of Health (2014). Quality Standards for diabetes care toolkit. Wellington: *Ministry of Health*.

# Effective insulin therapy: A “chain of many links”

- Access (insulin, delivery, monitoring, review)<sup>15</sup>
- Consistent proactive approaches in initiation and titration<sup>15</sup>
- Patient engagement and empowerment<sup>15</sup>
  - Education, mentoring, problem solving
- Practical knowledge<sup>15</sup>
  - Insulin handling
  - Device use
  - Injection technique
- Psychological resistance to insulin therapy<sup>6</sup>
  - Patient
  - Clinician

6. New Zealand Guidelines Group. (2012). *New Zealand Primary Care Handbook 2012*. (3rd ed.) Wellington: Access on line at <https://www.health.govt.nz/system/files/.../nz-primary-care-handbook-2012.pdf>

15. Frid AH, Kreugel G, Grassi G et al Mayo Clinic Proc. September 2016;91(9): 1231-1255.

# Effective insulin therapy: A “chain of many links”

- Access (insulin, delivery, monitoring, review)
- Consistent proactive approaches in initiation and titration
- Patient engagement and empowerment
  - Education, mentoring, problem solving
- Practical knowledge<sup>15</sup>
  - Insulin handling
  - Device use
  - Injection technique
- Psychological resistance to insulin therapy<sup>6</sup>
  - Patient
  - Clinician

6. New Zealand Guidelines Group. (2012). *New Zealand Primary Care Handbook 2012*. (3rd ed.) Wellington: Access on line at <https://www.health.govt.nz/system/files/.../nz-primary-care-handbook-2012.pdf>

15. Frid AH, Kreugel G, Grassi G et al Mayo Clinic Proc. September 2016;91(9): 1231-1255.

# Factors affecting bioavailability & absorption rate of insulin<sup>16</sup>

**Factors Affecting the Bioavailability and Absorption Rate of Subcutaneously Injected Insulin**

Factor	Effects
Site of injection	Abdominal injection (particularly if above the umbilicus) results in the quickest absorption; arm injection results in quicker absorption than thigh or hip injection.
Depth of injection	Intramuscular injections are absorbed more rapidly than subcutaneous injections.
Insulin concentration	U-40 insulin (40 units per mL) is absorbed more rapid than U-100 insulin (100 units per mL).
Insulin dose	Higher doses have prolonged durations of action compared with lower doses.
Insulin mixing	Regular insulin maintains its potency and time-action profile when it is mixed with NPH insulin; no insulin should be mixed with insulin glargine or insulin detemir
Exercise	Exercising a muscle group before injecting insulin into that area increases the rate of insulin absorption.
Heat application or Massage	Local application of heat or massage after an insulin injection increases the rate of insulin absorption.



# Variability of insulin levels and insulin effect (within subject replicates, T1DM)<sup>17</sup>

Within subject CV  
27%-59% for various  
intermediate and basal  
insulins

17. Heise T *et al. Diabetes* 2004; 53, 1614-20.

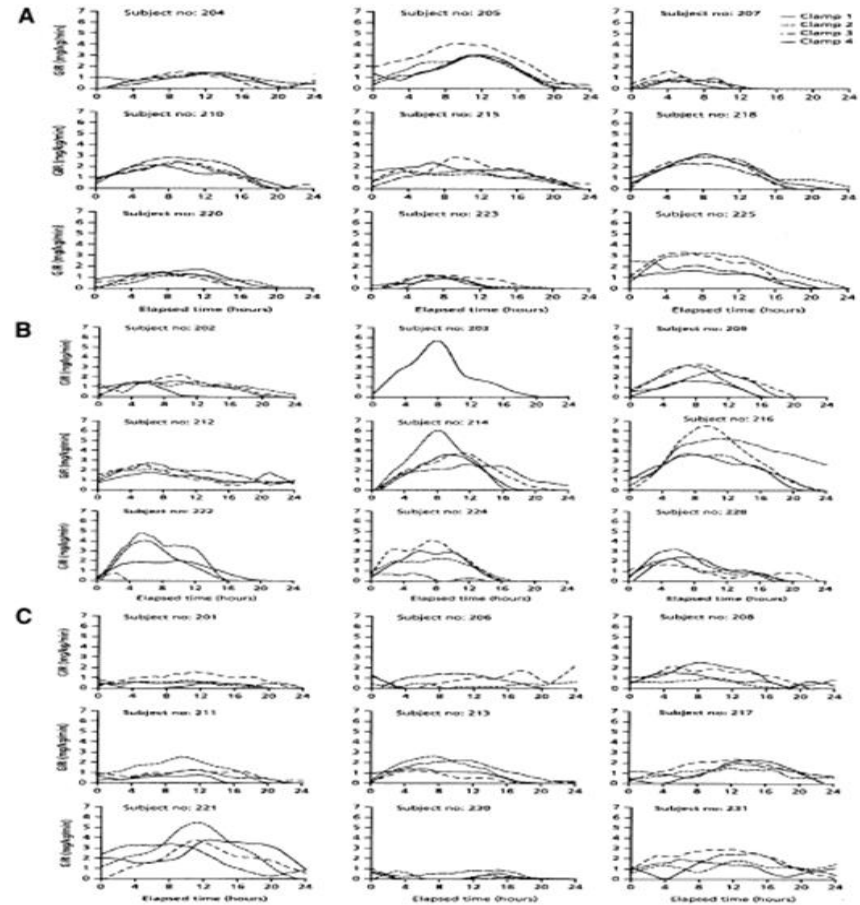


FIG. 1. Individual time-action profiles (glucose infusion rates over time) of the first nine patients randomized to insulin detemir (A), NPH insulin (B), or insulin glargine (C). The four clamps in one subject is summarized in one plot. A low within-subject variability is indicated by the four lines in one plot being close to each other (e.g., subject no. 204), whereas major deviations between the time-action profiles in one subject (e.g., subject no. 224) shows a high within-subject variability.

# Effective Insulin Usage: Current Practice

- Insulin and test strips comprise the majority of all PHARMAC spend on "Diabetes Medication".<sup>18</sup>
- Cost (spend) closely related to script numbers.<sup>18</sup>
- The vast majority of insulin use is sc injections, and the vast majority of that is with pen devices.<sup>19</sup>

Device Units dispensed for 2016

- |  |            |
|--|------------|
| ■ Insulin pen needles                            | 11,147,359 |
| ■ Disposable Insulin syringes, (attached needle) | 61,755     |
| ■ Insulin pump reservoir                         | 15,236     |
- Currently approximately 1,600 insulin pump users (1,100 Adult)

# Emerging approaches to diabetes management in NZ

- Flexible workforce – working to top of scope of practice – collaborative practice<sup>20</sup>  
**‘One team approach - Any door is the right door’<sup>21</sup>**

One example – non-medical prescribing clinicians:

- **Since 2005**  
Nurse Practitioners (242 total, 6 in diabetes care) – authorised prescribers
- **Since 2011**  
Registered Nurses - prescribing in diabetes care – (x 53) – designated prescribers
- **Since 2015**  
Community pharmacists with prescribing rights – (x 12) – designated prescribers

*"The creation & sustainability of highly functioning care teams require essential competencies & skills in their members"<sup>22</sup>*

20. Health workforce NZ (2014). Accessed online: <http://www.health.govt.nz/publication/hwnz-strategic-intent-and-priorities-statement-intent-2014-2018>

21. Minister of Health. 2016. *New Zealand Health Strategy*. Wellington: Ministry of Health.

22. Doherty R, Crowley R et al. *Ann Intern Med*, 2013;159(9): 620-626.

# Collaborative practice

- Collaborative multidisciplinary dynamic clinical care team<sup>23</sup> where all discipline's unique contribution is valued equally is a hallmark of diabetes care in NZ across primary & secondary/tertiary care providers.
- *"A unique strength of multidisciplinary teams is that clinicians from different disciplines bring distinct training, skills, knowledge bases, competencies, and patient care experiences to the team, which can then respond to the needs of each patient and the population it collectively serves in a patient – and family – centred manner".<sup>22</sup>*

22. Doherty R, Crowley R et al. *Ann Intern Med*, 2013;159(9): 620-626.

23. Mitchell, et al., *Institute of Medicine*. 2012: p5.

# Supporting frameworks & leadership

- **Nursing:**

- National Diabetes Nursing Knowledge & Skills Framework (2009)<sup>24</sup>
- Aotearoa College of Diabetes Nurses NZNO – national accreditation process ([www.nzno.org.nz>groups>colleges>accreditation](http://www.nzno.org.nz/groups/colleges/accreditation))

- **National leadership:**

- The New Zealand Society for the Study of Diabetes (NZSSD) Multidisciplinary Membership reflective of diabetes care teams and consumers.

24. Snell, H. & Wood, S. (2009). *National Diabetes Nursing Knowledge and Skills Framework*. Palmerston North: MidCentral Health.

# Reference List

1. Emmanuel *et al* *VDR Consus* Jan 2015: 21(1):49-55. Accessed online at [http://www.diabetes.org.nz/resources\\_and\\_publications/new\\_zealand\\_diabetes\\_statistics](http://www.diabetes.org.nz/resources_and_publications/new_zealand_diabetes_statistics)
2. Kirsten J Coppel *et al.* *NZMJ* March 2013:126 (1370).
3. Miller, J., Willis, J. A., Pearce, J., Barnett, R. *et al* (2011) Accessed online at <http://doi.org/10.1016/j.healthplace.2010.10.010>
4. PHARMAC.(2017).*Pharmaceutical Schedule*. Accessed online at <http://www.pharmac.govt.nz/2017/04/01/Schedule.pdf>
5. Health Funding Authority. (2000). *Diabetes 2000*. Accessed on line at [www.moh.govt.nz/notebook/nbbooks.nsf/0/.../\\$file/Diabetes2000.pdf](http://www.moh.govt.nz/notebook/nbbooks.nsf/0/.../$file/Diabetes2000.pdf)
6. New Zealand Guidelines Group. (2012). *New Zealand Primary Care Handbook 2012*. (3rd ed.) Wellington: Access on line at <https://www.health.govt.nz/system/files/.../nz-primary-care-handbook-2012.pdf>

# Reference List

7. Ministry of Health (2011). Accessed on line at <https://nsfl.health.govt.nz/system/files/.../specifications/ldtorequivalentservice.doc>
8. New Zealand Legislation. (2017). *Medicines Act 1981*. Accessed online at <http://www.legislation.govt.nz/act/public/1981/0118/latest/DLM53790.html>
9. Counties Manukau DHB figures (unpublished).
10. Jackson *et al* 2009 *NZMJ* 2(1288):13-21.
11. Dr P Drury, *pers comm* 2017.
12. Chadder, L. *Journal of Diabetes Nursing*, 2013; 17(4): pp. 141-147.
13. Ministry of Health. (2015). *Living Well with Diabetes*: Wellington.
14. Ministry of Health (2014). Quality Standards for diabetes care toolkit. Wellington: *Ministry of Health*.
15. Frid AH, Kreugel G, Grassi G *et al* *Mayo Clinic Proc.* September 2016;91(9): 1231-1255.

# Reference List

16. Hirsch IB *Am Fam Physician* 1999;60:2343-56.
17. Heise T *et al. Diabetes* 2004: 53, 1614-20.
18. Pharmac, unpublished 2016.
19. Pharmac unpublished 2017.
20. Health workforce NZ (2014). Accessed online:  
<http://www.health.govt.nz/publication/hwnz-strategic-intent-and-priorities-statement-intent-2014-2018>
21. Minister of Health. 2016. *New Zealand Health Strategy*. Wellington: Ministry of Health.
22. Doherty R, Crowley R *et al. Ann Intern Med*, 2013;159(9): 620-626.
23. Mitchell, *et al., Institute of Medicine. 2012: p5.*
24. Snell, H. & Wood, S. (2009). *National Diabetes Nursing Knowledge and Skills Framework*. Palmerston North: MidCentral Health.



**BD Medical - Diabetes Care Australia:** Becton Dickinson Pty Ltd, 4 Research Park Drive, Macquarie University Research Park, North Ryde, NSW. 2113. ABN 82 005 914 796. Toll free telephone: 1800 656 100.

**BD Medical - Diabetes Care New Zealand:** Becton Dickinson Limited, 14b George Bourke Drive, Mt Wellington Auckland 1060, New Zealand, Toll Free: 0800 572 468

© 2017 BD. BD and the BD Logo are the property of Becton, Dickinson and Company. BD-2555

