

# Introduction

Welcome to RapidCalc, a quick interactive tool to help you calculate Rapid Acting Insulin (RAI) doses, record Basal insulin doses and manage your blood glucose (BG) levels.

Before RapidCalc can calculate your insulin doses and monitor your BG levels it must be customised with your personal settings including your ratios, BG targets and insulin usage profile. Your healthcare professional will be able to assist with these settings and you should only use values agreed with them. The settings are described in the Customising RapidCalc section below. You can access this help at any time via the gears icon in the lower right of the main display.

See the Using RapidCalc section for a description of the controls and operation of the calculator.

Please ensure you read the Safety Information section before using the calculator.

For support and frequently asked questions visit the RapidCalc website

## Important Upgrade Information

**Settings have changed in this version. You must review and update your settings where appropriate before continuing to use the application.**

If you are upgrading or restoring a backup from a previous version of RapidCalc there are significant changes to some settings that you must review, and possibly update, before you can use the calculator. Please read What's new in this version.

## Customising RapidCalc

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The settings needed to customise RapidCalc are divided into sections as described below. This help can also be accessed via the help '?' icon in the top right of each section screen. You can step through the sections using the up/down arrows at the bottom of each screen, or access them directly from the main settings menu. Completed sections will be marked with a tick. RapidCalc will not operate until you have completed all sections.

The values you enter are fundamental to the correct operation of the calculator. You should always discuss your use of the calculator with your healthcare professional and only use values agreed with them.

### Blood Glucose Units

**Blood Glucose Units:** These are the units used to enter and display blood glucose levels. Select either *mmol/L* or *mg/dL* to match the units used by your blood glucose meter. To avoid potential confusion this value can only be set during initial setup. If you need to change your unit of measure you will need to reset the application to factory default. See Clear History/Reset

## 1 - Units and Limits

**Blood Glucose Units:** These are your selected units for measuring blood glucose levels. You select it once when you first setup RapidCalc and it can only be changed after a factory reset.

**Carbohydrate Units:** This is the unit of measure for your carbohydrate intake. You can choose to measure in grams or in portions sizes of 10, 12 or 15 grams. ***If you change the unit of measure you will need to re-enter your Carbohydrate Ratios in step 6.***

**Carb Ratio Measure:** The carb ratio (or carb factor) indicates the amount of insulin needed to cover a given intake of carbohydrate. When carb intake is measured in grams, this ratio is expressed as *`the number of grams of carbohydrate covered by one unit of insulin`* (g/unit). When carb intake is measured in portion sizes, it's expressed as *`the number of units of insulin needed to cover one portion of carbohydrate`* (u/portion).

**HbA1c Units:** These are the units used to display your estimated HbA1c value on the statistics page. You can choose to show HbA1c as a **percentage** or in IFCC units of **mmol/mol**

**Smallest RAI dose size:** This is the smallest RAI dose increment available on your insulin pen or syringe. Insulin pens generally allow you to dose in 0.5 or 1 unit increments. RapidCalc will round your dose to the nearest achievable dose size when you come to save the dose record.

**Limit maximum RAI dose:** This option allows you set an upper limit for the suggested RAI dose. This is a safety feature especially useful when setting up the device for young children. The suggested total RAI dose will never exceed this limit and will be displayed in red if the limit would otherwise be exceeded.

## 2 - BG Thresholds

**Ideal Blood Glucose Range:** These are the lower and upper limits of your ideal BG range. This range will be shaded green on the Blood Glucose Profile Chart.

**Warning Blood Glucose Range:** These are your hypoglycaemia (hypo) and ketones warning BG levels. The regions above and below these levels will be shaded red on the blood glucose profile chart. The chart region between your ideal range and these limits will be shaded orange. A hypo is commonly considered to be indicated by a BG reading less than 4 mmol/L (72 mg/dL). RapidCalc will accept a hypo warning level value in the range 3-10 mmol/L (54-180 mg/dL). A ketone risk is commonly considered to be when BG levels are above 13.9 mmol/L (250 mg/dL) but this level does vary between medical centres and with patient age. The level set here is intended to be the level where your doctor would want you to check for the presence of ketones in your blood or urine. RapidCalc will accept a Ketones warning level value in the range 3-20 mmol/L (54-360 mg/dL). You will be warned when you enter readings in the hypo or ketones ranges.

## 3 - Time Periods

For maximum flexibility RapidCalc allows you to specify different Target Blood Glucose Levels, Correction Factors and Carbohydrate Ratios for different parts of the day. Here you specify the start time for each period which then runs until the start of the next time period.

## 4 - Target Blood Glucose Levels

These are your target blood glucose levels during each period of the day. If your blood glucose level is elevated, RapidCalc will calculate the RAI dose needed to bring it down to the current target value based on your configured correction factor, planned carbohydrate intake and insulin on board. In most cases you would start by using the same value throughout the day and then make individual adjustments as you notice patterns in your 24-hour blood glucose profile. RapidCalc will accept values in the range 3-10 mmol/L (54-180 mg/dL)

## 5 - Correction Factors

Your correction factor is the amount by which one unit of insulin lowers your blood glucose level. In this step you enter your correction factors for each period of the day using your configured blood glucose units. In most cases you would start by using the same value throughout the day and then make individual adjustments when you notice patterns in your 24-hour blood glucose profile. RapidCalc will accept values in the range 0.1-20 mmol/L (0.1-360 mg/dL).

## 6 - Carbohydrate Ratios

Your carbohydrate ratio (or carb factor) reflects the amount of insulin needed to cover a given intake of carbohydrate. When carb intake is measured in grams, the ratio is expressed as *number of grams of carbohydrate covered by one unit of insulin (g/unit)*. When carb intake is measured in portion sizes, the ratio is expressed as *the number of units of insulin needed to cover one portion of carbohydrate (u/portion)*. In this step you enter your carbohydrate ratios for each period of the day. In most cases you would start by using the same ratio throughout the day and then make individual adjustments when you notice patterns in your 24-hour blood glucose profile. **If you change Carbohydrate Units in step 1 you will need to re-enter your Carbohydrate Ratios.** Carb ratios are commonly around 1 to 3 u/portion for a 10g portion size (3.3 to 10 g/unit), but can be as high as 10 u/portion (1 g/unit). If you measure carbs in portion sizes but are given a carb ratio in g/unit, you can convert it to u/portion using this Conversion Chart.

## 7 - Insulin Usage Profile

It takes, on average, 15 minutes from the time you inject Rapid Acting Insulin (RAI) for it to become active in your bloodstream. The rate at which it is then used up depends on several factors including the specific type of insulin, length of needle used, injection site location and your metabolism. Your personal usage profile is captured by entering the percentage of the original RAI dose used in each of up to 6 hours after taking it. The total for all 6 hours must equal 100%. The profile is used to calculate insulin on board (IOB) still active from previous doses. A common profile for RAI usage is: 15%, 30%, 25%, 15%, 10% and 5% for hours 1-6 respectively.

## 8 - Exercise Dose Adjustment

Exercise increases the rate at which your body uses blood glucose and therefore reduces the amount of bolus insulin needed if exercising within 2 hours of dosing. For exercise planned beyond that time, you should dose as normal and take extra carbohydrate instead.

The amount by which you reduce your dose depends on the intensity and duration of the exercise and will vary between individuals, so you will need a period of monitoring and adjustment in order to establish your ideal values.

The values you enter are the percentage by which the suggested bolus dose will be reduced for different durations of LIGHT, MODERATE and INTENSE exercise. The default settings are

shown below:

#### LIGHT Exercise:

- Short duration (15-30 mins): 10%
- Medium duration (30-60 mins): 20%
- Long duration (Over 60 mins): 30%

#### MODERATE Exercise:

- Short duration (15-30 mins): 25%
- Medium duration (30-60 mins): 33%
- Long duration (Over 60 mins): 50%

#### INTENSE Exercise:

- Short duration (15-30 mins): 33%
- Medium duration (30-60 mins): 50%
- Long duration (Over 60 mins): 67%

## 9 - Basal Insulin Dosing

RapidCalc allows for up to three scheduled Basal insulin doses per day. In this step you set the number of doses you take, the dose amounts and the times you take them. Given that the precise timing of Basal doses is not considered critical, RapidCalc will accept a dose at any time within +/- 2 hours of its scheduled time. See step 10 for the option to set dose reminders. When travelling between timezones you must allow for the effect of changes to your iPhone time zone setting on scheduled dose times. See the Travel section for more information.

## 10 - Reminders

RapidCalc supports two types of reminder: Basal dose reminders which will notify you when a scheduled basal dose is due and post-meal reminders which will alert you at a specified time after a meal so you can check your post-meal BG level. In RapidCalc a meal is defined as the first recorded carbohydrate intake of 10 grams or more in one of the breakfast, lunch or dinner meal periods. Meal period times are configured in step 3 - Time Periods. When alerts are enabled you will receive an audible and visual notification at the specified time. If the iPhone is switched to mute it will vibrate instead. **Note that the style and presentation of notifications is set separately for each application in the Notifications section of iPhone settings. If RapidCalc reminders are not working check the iPhone settings to see if they are enabled.**

## 11 - Personal Details

**User Name:** This is the name used to identify the owner of the data in email backups and data exports.

**Main Email:** This is the default primary email address to send your history data. This would normally be your own email address allowing you to archive your history data on your PC. You

can change this address or add additional addresses before the email is finally sent.

**Copy Email:** This is an optional secondary email address that will receive a copy of your history data. This may your diabetes educator or physician for example. You can change this address or add additional addresses before the email is finally sent.

## Clear History/Reset

**Clear History Data:** This will clear all history data. Settings are not affected.

**Factory Reset:** This will clear all history data and restore RapidCalc settings to their factory defaults.

# Using RapidCalc

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RapidCalc is designed to be quick and easy to use with the core functions centered around RAI dose management, but with easy access to Basal dose recording.

The calculator opens on the RAI dose entry screen which comprises a blue display area at the top with user inputs arranged below. Your record history, statistics and charts are accessed via the calendar icon in the lower left corner of the screen. Basal Insulin dosing is accessed via the 'Basal' button in the top right corner of the display.

This section describes the layout of each screen and using RapidCalc for both RAI and Basal dose entry.

## Blue Display Area

The blue display area at the top of the calculator shows the suggested Rapid Acting Insulin (RAI) dose along with a breakdown into its **Meal**, **Correction** and **Insulin On Board (IOB)** components as described below. The suggested dose is shown to the nearest 0.1 units of insulin and then rounded to match the dose increments available with your insulin pen when you come to save the record. If you have set a maximum RAI dose and the calculated dose exceeds that limit then the Suggested RAI dose will be set to the specified maximum value and highlighted in red.

### Meal Component

This is the RAI dose needed to cover your planned Carbohydrate intake based on your Carbohydrate Ratio for the current time of day. Your carbohydrate ratios are set when customising RapidCalc.

### Correction Component

This is the RAI dose needed to lower an elevated BGL to your target level based on your Correction Factor (If your BGL is currently below target then this correction component will be negative). If you have indicated that you have had more than 2 units of alcohol in the last 4

hours, or experienced a hypo in the last 6 hours, then no correction is suggested due to the potential risk of triggering a hypo.

## IOB Component

Insulin on Board, also known as Bolus on Board is an estimate of the amount of rapid acting insulin still in your system and remaining to act. This figure is based on previously recorded RAI doses and your personal insulin usage profile. Note that your usage profile assumes average carbohydrate absorption rates but high fat foods can slow carbohydrate absorption and low GI foods, like pasta, are digested slowly. You must therefore consider the type of food you last ate when interpreting a suggested RAI dose which includes an IOB component. Your personal insulin usage profile is set when customising RapidCalc.

## Messages and Indicators

The lower part of the display area is used to show messages and status indicators. Red warning messages are shown if your measured BGL is outside your preset warning levels. If you still have Insulin on Board then this is shown in the lower left of the display. Status symbols appear in the lower right of display area to indicate your selected dose options.

## Reminders

Each time you activate the calculator you will be shown any remaining Insulin on Board. If it's been over 6 hours since your last recorded reading you will be prompted to enter any RAI doses or hypo events that may have occurred in that time. If you have enabled Basal dose or post-meal check reminders you will receive a notification when they are due.

## User Inputs

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The area below the blue display contains the controls used to enter your primary data. Each of the controls are described below.

### Measured Blood Glucose Level (BGL)

This slider is used to enter your current blood glucose reading from your blood glucose meter. When you activate RapidCalc the slider will be pre-set to your current target BGL. To make small adjustments simply tap on the slider rail near the + or - symbols. If your measured BGL is above your current target, RapidCalc will include a **Correction** component in the suggested RAI dose to return it to your target level. If your measured BGL is lower than your hypo warning level or higher than your ketones warning level then a warning message will be displayed in red. Your target BG levels and choice of units are set when customising RapidCalc.

### Planned Carbohydrate Intake

This slider is used to enter your estimate of the carbohydrate content of your forthcoming meal. The units will be in grams or portions depending on the units you selected when customising RapidCalc. To make small adjustments simply tap on the slider rail near the + or - symbols. RapidCalc will include a **Meal** component in the suggested RAI dose to offset the meal.

## Planned Exercise

This option allows you to specify the intensity and duration of any exercise you are planning within the next 2 hours. Based on your selection, the suggested bolus meal and correction doses will be reduced by the percentage amounts specified in your personal settings. As you make your selection, you will immediately see the effect on the suggested RAI dose in the main display. When exercise is planned an explanatory note is automatically added to the record and a symbol of a running man is shown in the display and in history record.

## BG not measured / Extra Carbs

Select this option if you are dosing for carbohydrates without taking a Blood Glucose reading or where you need to dose for extra, unplanned carbs when you've already dosed for the main meal. When selected, RapidCalc will assume that your Blood Glucose is on-target and will ignore any IOB when calculating the suggested meal dose. The record will be flagged as an estimate ('EST') in the history. RapidCalc Estimated Blood Glucose readings are not included in the BG statistics.

## Over 2 units alcohol in last 4 hours

Select this option if you have consumed more than 2 units of alcohol in the last 4 hours. To help avoid the risk of the alcohol causing a delayed hypo, RapidCalc will set the **Correction** dose component to zero regardless of your measured blood glucose reading. A cross is placed over the correction dose and a glass symbol is shown in the display and history record to indicate the selection. Touch the help icon next to the ticked option box for more detail information.

## Hypo in last 6 hours

Select this option if you have experienced a hypo in the last 6 hours. To help avoid the risk of a re-occurrence of the hypo, RapidCalc will set the **Correction** dose component to zero regardless of your measured blood glucose reading. This option will be pre-selected if your history records show a hypo reading within the last 6 hours. A cross is placed over the correction dose and a 'HYPO' symbol shown in the display and history record to indicate the selection. Touch the help icon next to the ticked option box for more help.

## Calculation and Dosing Routine

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It's easy to get distracted while calculating and taking insulin doses. By following a regular routine, such as the one suggested below, you will minimise the risk of forgetting whether you've dosed or not:-

- Enter your measured Blood Glucose reading.
- Enter your estimated Carb intake.
- Select dose options (exercise, alcohol etc).
- Touch 'Save'.
- Make any final dose adjustments.
- Change the record time or add notes as needed.
- Select the option to take a photograph if needed.
- Take your insulin dose.

- Touch 'Confirm' to save the record.

## Saving the Record

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Touching the **Save** button displays the **Save Record** screen where you confirm the actual dose you plan to take using the 'Actual Dose taken' slider. Initially this will be set to the calculated RAI dose rounded to the nearest dose size achievable with your insulin pen as configured in the settings.

The calculator displays a warning message if the selected dose could lead to a hypo. (Depending on your correction factor, the suggested dose, after rounding, might be just enough to lower your BG below your hypo warning level and so trigger the warning message. In this case you have the choice of either dosing the suggested amount and eating slightly more carbohydrate or rounding the dose down and eating slightly less.)

You can add notes which might aid later interpretation of the data. These notes can be edited later via the history view.

If you are recording a reading made earlier in the day, you can adjust the record time by touching the clock icon in the title bar. See **Recording Missed Doses** below for more information.

If your device has a camera, you can take a labelled photograph of your meal by selecting the 'Take photograph for food diary' option. You will be prompted to take the photograph after you touch 'Confirm' to save the record. The photograph is stored with the history record and can be viewed from the 'Dose Detail' screen. RapidCalc stores your last 100 photographs.

Touch **Confirm** to save the record and optionally take a photograph of your meal. Once the record is saved you are taken to the History view where your newly added record is highlighted. Touch **Cancel** to return to the main screen without saving the record. Your unsaved data will be lost if you exit RapidCalc without saving the record.

RapidCalc stores your records for the last 90 days. If you want to keep your history records for longer than 90 days you must export your history data to your PC as described in **Emailing History Records**.

## Correcting Mistakes

Only the notes field of Dose history records can be edited (see Editing Notes in History Records). RapidCalc does not allow historic records to be changed because dose calculations are based on these earlier records. If you enter a record incorrectly simply go to the History view, delete the record and enter a new one. To preserve references to insulin on board data, only the most recent RAI dose record can be deleted at any time.

## Recording Missed Doses

If you are unable to record an BG reading or RAI dose at the time, you can enter it at any time prior to entering your next reading. Simply enter your data as normal but disregard the suggested RAI dose. When saving the record adjust the 'Actual Dose taken' slider to match the dose taken and touch the clock icon in the title bar to change the actual dose time. The IOB

value stored in the history record will be calculated from the actual dose time and the record will be flagged with a clock symbol. You can back-date a record to any time after the last saved record. There is no restriction on how far you back-date Basal doses.

## Correcting a low BGL

If your measured BGL is below your target level but above the hypoglycaemia level, you can use RapidCalc to determine the amount of carbohydrate needed to restore your BGL to your target including the effect of any insulin that may be remaining to act. This is done as follows:

- Enter your current (low) BGL reading using the 'Measured Blood Glucose' slider.
- Make small incremental adjustments to the 'Planned Carbohydrate Intake' slider until the 'Suggested Dose RAI' value in the display just goes above zero.
- Read off the number of portions indicated on the 'Planned Carbohydrate Intake' slider. This will be the amount of carbohydrate needed to correct the low BGL allowing for any insulin still remaining to act.

Note that this procedure is only for low BGL readings above the hypoglycaemia level. **For all hypoglycaemia events you should take the corrective action recommended by your healthcare professional.**

## Dosing for an unplanned dessert

Sometimes you may calculate an RAI dose at the start of a meal but then, during the meal, decide to have an extra serving or dessert without taking another BG reading. In this situation you should tick the 'Blood Glucose not measured' option and enter the additional carbs as normal using the 'Planned Carbohydrate Intake' slider. RapidCalc will then assume that your Blood Glucose is on-target and will ignore any IOB when calculating a dose for the additional carbs. Always add an explanatory note when saving the record.

## Travel

If you are travelling across timezones you should discuss your plans with your health care professional who will advise you on the best strategy for dealing with the effects of travel and changing timezone. You need to be aware of how and when the time zone setting is updated on the iPhone device running RapidCalc. The following describes how RapidCalc is affected by timezone changes:

- The time periods and basal dose times in RapidCalc are always local to the current time zone. For example, if you set your lunch period start time to 12:00 in London and then travel to Paris (+1 hour) it becomes 12:00 Paris time. Similarly if you have a Basal dose scheduled for 07:00 in London, when you change time zone to Paris you will be reminded at 07:00 Paris time.
- The time between scheduled Basal doses taken in different time zones will be increased or decreased depending on your direction of travel. For example, let's say you have Basal doses scheduled for 07:00 and 12:00 London time. You take your 07:00 dose in London and then hop over to Paris (+1 hour). Your next dose reminder will trigger at 12:00 Paris time but because you lost 1 hour travelling East (it's only 11:00 in London), the time between your morning and midday doses is 1 hour less than it would have been had you stayed in London. Clearly this situation would arise regardless of how you manage your Basal dose schedule and your health care professional will be able to advise on how best to deal with this when travelling across time zones.

- Post-meal BG check reminders are designed to trigger at an elapsed time after a meal dose and are not affected by time zone changes. Using our London to Paris example again, let's say you have post-meal alerts enabled and set for 2 hours after a meal. You dose for breakfast at 08:00 in London and fly to Paris (+1 hour). Your post-meal reminder will trigger at 11:00 Paris time (10:00 London time), 2 hours after the meal.
- The dose times for history records are displayed in local time. So a dose recorded at 8:00 in London will show as 9:00 when the history is viewed in Paris time.
- **When in doubt always follow the advice given by your health care professional.**

## Sick Day Management

Each health care professional has their own particular protocols for sick day management. Always contact them on sick days and follow their advice. When sick, your body becomes more insulin resistant and will therefore need more insulin. However use of RAI to cover mealtime carbohydrate intake should be balanced by your ability to eat and hold down food.

The following are general guidelines:

- Never omit your basal or background insulin.
- Check your BGL more frequently (every 2-4 hours) and take corrective action as necessary.
- Maintain body hydration by adequate fluid intake.
- Check for ketones if diagnosed with Type 1 diabetes.
- Maintain contact with your healthcare professional and follow their advice particularly in any of the following circumstances:
  - The illness continues for longer than 24 hours.
  - Vomiting and diarrhoea lasts for longer than 4 hours.
  - Ketones are present in the blood or urine or you have any of the following symptoms of ketoacidosis: drowsiness, abdominal or chest pain, breathing difficulties, dry cracked lips, mouth or tongue, or your breath has a fruity odour.

## Basal Dose Entry

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RapidCalc allows you to schedule up to 3 basal doses throughout the day. Given that the timing of Basal doses is not considered critical, RapidCalc will accept a dose at any time within +/- 2 hours of its scheduled time.

If you have enabled Basal dose reminders, you will receive a notification at the scheduled time and a red badge will appear against the RapidCalc application icon and is removed when you record the dose. ***Note that notifications are controlled on an application-by-application basis in iPhone settings under 'Notifications'. If dose reminders are not working, check there to see if notifications are enabled for RapidCalc.***

If you are travelling between timezones, you need to be aware of how changes to the iPhone timezone affect scheduled times in RapidCalc. See the Travel section for more information.

If a dose is due when you open RapidCalc you will be taken directly to the Basal Dose Entry page with the scheduled dose preset.

To access the Basal Dose Entry page from the main RapidCalc screen, touch the 'Basal' button in the top right of the display. The button is highlighted red if a dose is due and remains red until

either the dose is recorded, or after 2 hours, at which point the dose is considered missed. There is no record kept of missed doses.

When accessing the Basal Dose Entry page, the prompt message and Dose taken slider will be set as follows:-

- If you are within +/- 2 hours of a scheduled dose but have not yet recorded it, the message ***x.x units due at hh:mm*** will be displayed and the dose slider will be preset to the scheduled dose.
- If you are within +/- 2 hours of a scheduled dose and have already recorded it, the message ***hh:mm dose already taken*** will be displayed and the dose slider will be set to zero.
- If you are not within 2 hours of a scheduled dose, the message ***No scheduled doses due at this time*** will be displayed and the dose slider will be set to zero.
- If you have doses scheduled less than 4 hours apart, then, during the overlapping period, the earliest dose will be presented first.

To record a Basal insulin dose do the following:-

- If necessary, adjust the dose slider to match your actual dose.
- To change the dose time touch the 'Earlier Time' button. To revert to the current time touch the 'Now' button.
- Add an explanatory note for any changes to your normal dose.
- Touch 'Save' to save the record or 'Cancel' to return to the main RapidCalc screen.
- Once the record is saved you are taken to the History view with your newly added record highlighted.
- Basal dose records appear in the Dose History view shaded blue.

## History View

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The History view is accessed via the calendar icon in the lower left corner of the main display. It shows all dose records grouped by day, starting with the most recent. RAI records have a white background, Basal records blue. Each entry shows the record time along with a summary of the dose. Touch the blue arrow on the record to view more detailed dose details.

## Editing Notes in History Records

The notes for any history record can be edited from the Dose Detail view which is accessed by touching the blue arrow on the record in the history list.

## Deleting History Records

Touch the ***Edit*** button at the top right of the History View to change to 'edit' mode where you can delete any Basal dose record but only the most recent RAI dose record. This restriction ensures that Insulin on board is always correctly accounted for. Touch the ***Done*** button to exit edit mode. Alternatively, you can delete a record by swiping your finger across the record from right to left. To delete all your history data, go to the Settings panel and set the ***Clear History Data*** option to 'On'. When you return to the main screen you will be prompted to confirm the deletion.

## Statistics

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### Blood Glucose:

- **Average reading/trend:** The average of all recorded blood glucose readings, excluding estimates. Once you have accumulated more than a weeks worth of data the trend arrow shows how your average for the current week compares to that for the previous week. A change of 5% or more from the previous week will show as an upward or downward trend arrow accordingly.
- **Number of readings:** Total number of readings taken within the last 90 days.
- **Avg No. readings per day:** Average number of readings taken per day, excluding estimates.
- **Ideal readings:** Percentage of readings that were within your ideal range.
- **Ketone warnings:** Percentage of reading that were above your ketone warning level.
- **Hypo warnings:** Percentage of reading that were below your hypo warning level.
- **Estimated HbA1c:** An estimate of your HbA1c level derived from your average blood glucose readings. The value is intended for guidance only and is influenced by the number of readings taken and the time they were taken. For example, if you mainly test when you feel low then the estimate will err on the low side. The estimate is more accurate when testing has taken place over longer time periods. **You should always have your actual HbA1c determined by your physician.**
- Touch on '**more >**' in the section heading to access additional blood glucose statistics including your average (Avg), standard deviation (SD) and co-efficient of variance (SD/Avg) statistics over periods of 7, 30 and 90 days.

### Rapid Acting Insulin:

- **Average daily dose:** Your average daily total dose of Rapid Acting Insulin (RAI).
- **Avg No. doses per day:** Average number of doses taken per day.

### Basal Insulin:

- **Average daily dose:** Your average daily total of basal insulin.

### Carbohydrates:

- **Average daily dose:** Your average daily total carbohydrate intake in grams.
- Touch on '**more >**' in the section heading to access additional Carbohydrate statistics including your average carb intake taken in your Breakfast, Lunch and Dinner periods. Carbs eaten outside of meal periods are not included.

## Charting

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The **Chart** button displays a graph profiling your blood glucose levels over a 24-hour period covering the last 7, 30 or 90 days. Individual readings are shown as dots overlaid with a line of best fit to highlight trends in your readings. Your most recent readings are highlighted as circles so you can see where you are currently. Your ideal BG range is shaded green, your ketone and hypo warning ranges are shaded red and the area between your ideal and warning levels, orange.

The **Pre-Meal Only** option allows you to focus on pre-meal and bedtime blood glucose readings only. Pre-meal readings are the first measured blood glucose readings taken in each meal period where more than 10g of carbohydrate were taken. Pre-bed readings are the last measured reading of the day. Meal times can be customised when you configure RapidCalc.

## Backing up your Data

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The **Backup** button allows you to archive your settings and history data via email for safekeeping. You are strongly advised to backup your data regularly to avoid loss of data if your device is lost or damaged. By default the backup email will be sent to the addresses you entered when customising RapidCalc but you can change these or add additional addresses before sending the email. **The backup should not be restored to an earlier version of RapidCalc.**

## Restoring your Data from a Backup

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You can restore your history or settings data from a backup email as described below.

### Restoring your History data:

- Open the backup email on your iPhone, scroll down and touch on the attachment with a name starting with 'RC\_History...'
- When prompted, select the 'Open in "RapidCalc"' option. RapidCalc will load and display information about the date of the backup and the number of records that are less than 90 days old and available for restoring. (RapidCalc only keeps history records for 90 days and so older backup records are ignored).
- Select 'Restore History' to confirm that you want to restore the history data. **Note that your existing history data will be lost.**

### Restoring your Settings data:

- If you are restoring settings from an version of RapidCalc prior to v2.0 please read What's changed in this release. first.
- Open the backup email on your iPhone, scroll down and touch on the attachment with a name starting with 'RC\_Settings...'
- When prompted, select the 'Open in "RapidCalc"' option. RapidCalc will load and display information about the date of the backup.
- Select 'Restore Settings' to confirm that you want to restore the settings data. **Note that your existing settings will be overwritten.**

## Exporting your Data

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The **Export** button allows you to export your settings and history records via email in industry

standard CSV format suitable for importing into a spreadsheet. You have the choice of exporting all history records or just those added since your last export. Default email addresses are configured in RapidCalc settings but you can change these or add additional addresses when you come to send the email.

## Safety Information

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- Always discuss your use of the calculator with your diabetes educator or physician and only use personal settings agreed with them.
- The calculator is intended as a guide only and is not a substitute for professional medical advice. If you are in any doubt about the recommended insulin dose, you must follow the advice of your health care professional.
- The suggested RAI dose will be invalid if you enter incorrect data, incorrect settings or do not record any RAI doses or hypo events which occurred in the last 6 hours. The authors accept no responsibility for data incorrectly entered.
- The suggested RAI dose is only valid for the person for whom the calculator has been personalised.
- The calculator cannot take account of all the many variables that impact on the life of a person with diabetes and hence on resulting BGLs. No guarantees for improved blood glucose control can therefore be given and the authors assume no responsibility for any adverse health consequences that users may experience whilst using the calculator.

## Calculations used in RapidCalc

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Details of the calculations and formulae underlying the dosing model used in RapidCalc can be found in the resources section of the RapidCalc website

## Insulin:Carb ratio Conversion

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If you measure your carb intake in portion sizes but your physician gives you a carb ratio expressed as grams of carbohydrate covered by 1 unit of insulin (g/unit), you can use the table below to convert this into units of insulin needed to cover 1 portion of carbohydrate (u/portion).

For example, if we are told that 1 unit of insulin covers 12g of carbohydrate and we measure carb units in 10g portions, then scanning down the left hand column to 12g and then across to the 10g portion column gives us a value of 0.833 units RAI needed per 10g portion.

Grams of Carbohydrate covered by 1 unit of RAI	Units of RAI needed to cover 1 portion of carb, for different portion sizes			
	1g	10g	12g	15g
1g	1.000	10.000	12.000	15.000

2g	0.500	5.000	6.000	7.500
3g	0.333	3.333	4.000	5.000
4g	0.250	2.500	3.000	3.750
5g	0.200	2.000	2.400	3.000
6g	0.167	1.667	2.000	2.500
7g	0.143	1.429	1.714	2.143
8g	0.125	1.250	1.500	1.875
9g	0.111	1.111	1.333	1.667
10g	0.100	1.000	1.200	1.500
11g	0.091	0.909	1.091	1.364
12g	0.083	0.833	1.000	1.250
13g	0.077	0.769	0.923	1.154
14g	0.071	0.714	0.857	1.071
15g	0.067	0.667	0.800	1.000
16g	0.063	0.625	0.750	0.938
17g	0.059	0.588	0.706	0.882
18g	0.056	0.556	0.667	0.833
19g	0.053	0.526	0.632	0.789
20g	0.050	0.500	0.600	0.750
21g	0.048	0.476	0.571	0.714
22g	0.045	0.455	0.545	0.682
23g	0.043	0.435	0.522	0.652
24g	0.042	0.417	0.500	0.625
25g	0.040	0.400	0.480	0.600
26g	0.038	0.385	0.462	0.577

27g	0.037	0.370	0.444	0.556
28g	0.036	0.357	0.429	0.536
29g	0.034	0.345	0.414	0.517
30g	0.033	0.333	0.400	0.500
31g	0.032	0.323	0.387	0.484
32g	0.031	0.313	0.375	0.469
33g	0.030	0.303	0.364	0.455
34g	0.029	0.294	0.353	0.441
35g	0.029	0.286	0.343	0.429
36g	0.028	0.278	0.333	0.417
37g	0.027	0.270	0.324	0.405
38g	0.026	0.263	0.316	0.395
39g	0.026	0.256	0.308	0.385
40g	0.025	0.250	0.300	0.375