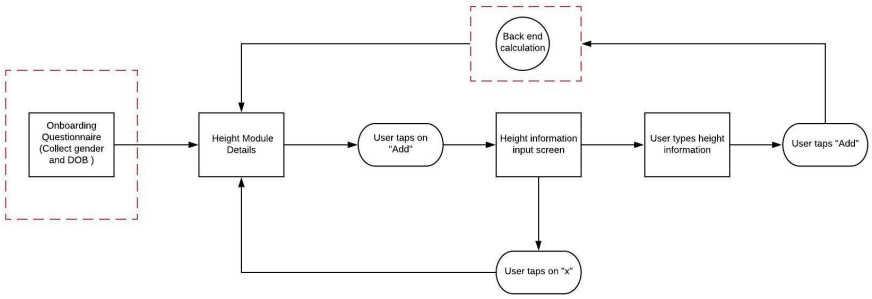
**Height Z-Score

创建者Jiachen Cui (Unlicensed)
最近更新日期六月 05, 2020 • Add Workflow • Analytics

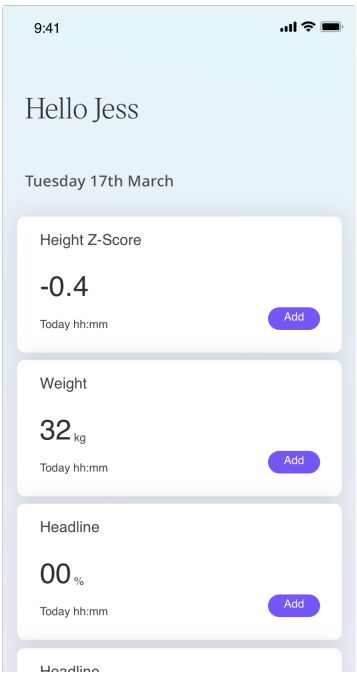
User Flows

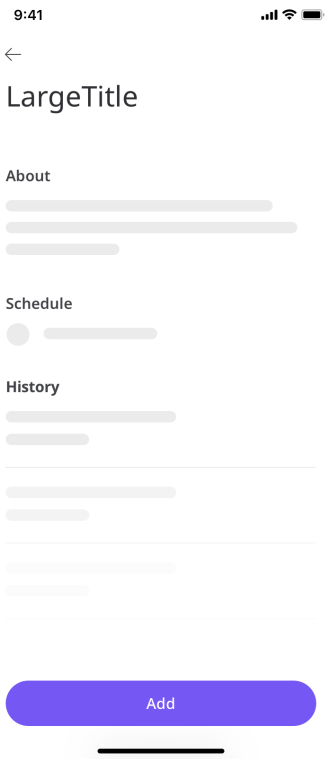
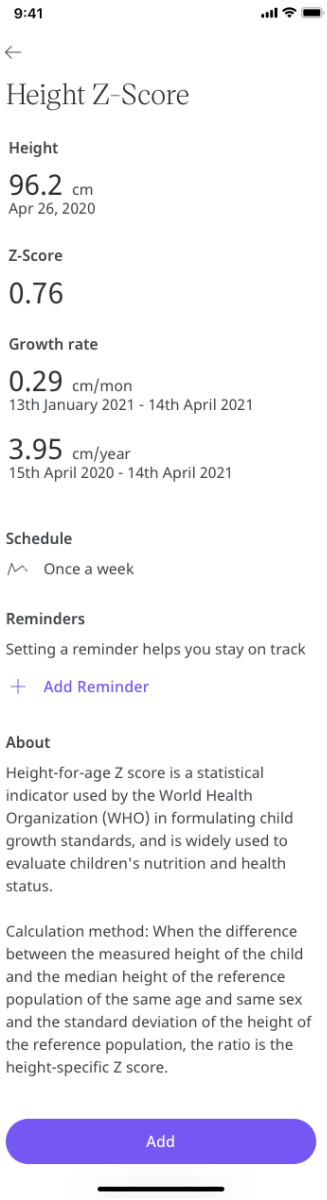


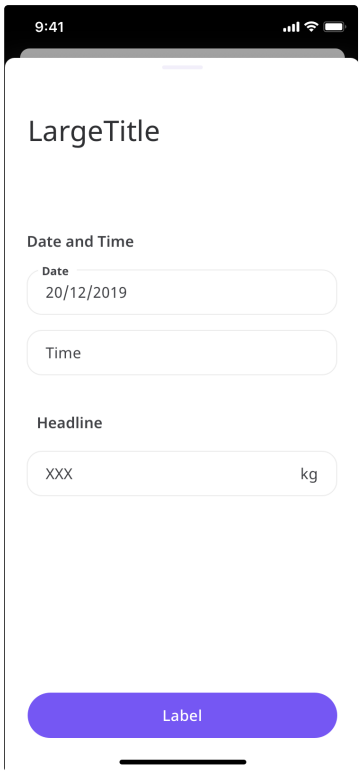
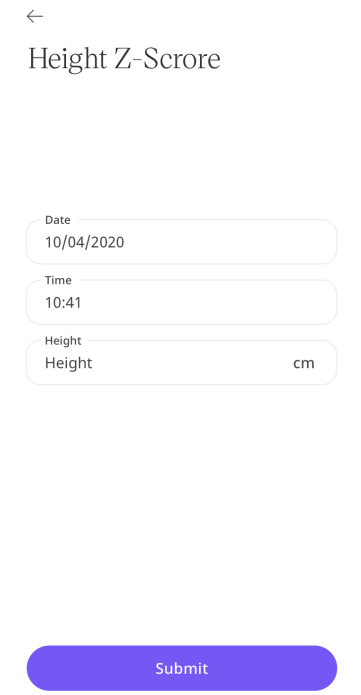
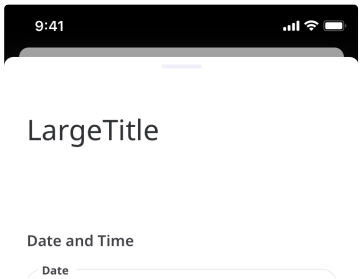
Screens and BDDs

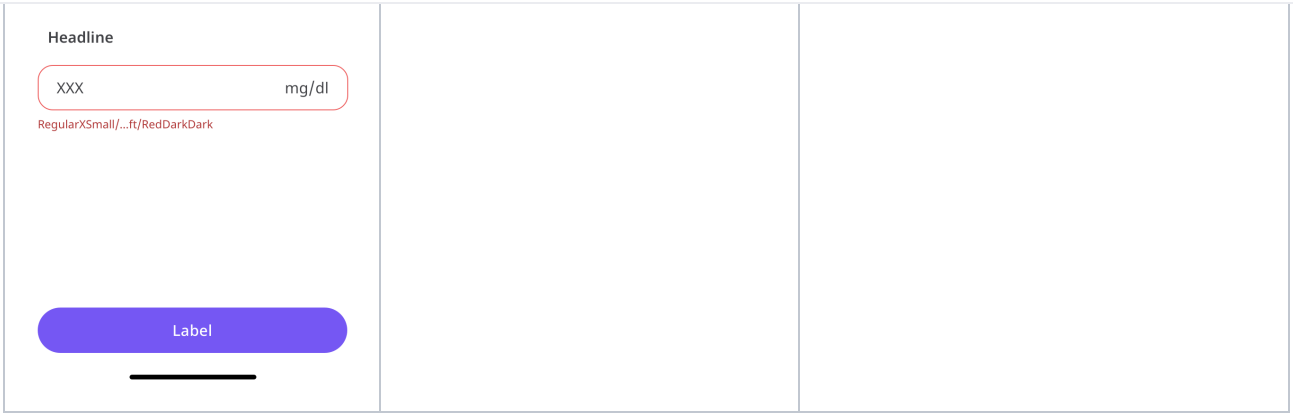
for Android, the only difference is form input field label

Abstract link: https://share.goabstract.com/45444aa6-20f2-45e3-b860-fcea6502e37d

Visual	Behaviour	Copy
General		
	**Given** I signed onto the app **When** I open the app **Then** I will see the Height Z-Score activity **And** I will the height Z-score of last entry	**Headline** > Height Z-Score **Reading (examples)** > 0.2

	**Given** I was shown the care plan page **When** I tap on the Height Z-Score activity **Then** the module details screen will slide in from right to left **And** I am shown a representation of the module details **And** the modules are in an animated skeleton state **And** I see a LargeTitle	**LargeTitle** > Height Z-Score
	**Given** I am on a module details screen **When** the page content has loaded **Then** I will see that the primary button is active **And** the secondary button is active (if device integration is expected) **And** the about section **And** the reminders section **And** the schedule section (for this project : once very two weeks) **Given** I am on a module details screen **When** the page content has loaded **Then** I should see a graph representing historical data provided **And** I should see all the data points in the range **And** I should see the value of latest data provided **And** I should see when the latest data was provided **And** I should see a set of tabs to switch the timeframe of data shown on the graph	**About (machine translated)** > Height-for-age Z-score is a statistical indicator used by the World Health Organization (WHO) in formulating child growth standards, and is widely used to evaluate children's nutrition and health status. > Calculation method: When the difference between the measured height of the child and the median height of the reference population of the same age and same sex and the standard deviation of the height of the reference population, the ratio is the Height-for-age Z-score. > 年龄别身高 Z 评分是世界卫生组织（WHO）制订儿童生长标准时采用的一个统计学指标，并被广泛用于儿童营养与健康状况的评价。 > 计算方法：儿童身高实测值与同年龄、同性别参考人群身高中位数之差和该参考人群身高标准差相比，所得比值就是年龄别身高 Z 评分。 **Primary Button** > Add **Secondary Button** > Collect from device **Value**

Scroll down for formula and cheat sheet Abstract link: https://share.goabstract.com/45444aa6-20f2-45e3-b860-fcea6502e37d		
	**Given** I have navigated to the Height Z-Score module details page **When** I press the primary button **Then** the data entry screen slides in from bottom to top **And** I see a LargeTitle narrative **And** I see a Date/Time narrative **And** I see a Date data entry field with today's date defaulted **And** I see a Time data entry filed with current time defaulted **And** I see a Headline narrative **And** I see a numerical data field **And** the numerical data input field should be automatically selected **And** the soft numeric numpad should be shown	**LargeTitle narrative** > Height Z-Score **Data Entry Field** Date > <native phone setting of date or DD Mon YYY> Time > <native phone setting of time or 24-hour format> Height (example) > 160cm **Headline** > Height
	**Given** I have entered data on the data entry **When** I press the primary button **Then** the primary button should be active	**Primary Button** > Submit
	**Given** I am on the height Input screen **And** I enter a weight value greater than 190cm **When** I attempt to submit my height **Then** I should be informed that it is an invalid input **And** nothing should be uploaded **And** I should remain on the height input screen	Error Messages > Value must be between 10 cm and 190cm inclusive



About (Chinese Copy)
年龄别身高 Z 评分是世界卫生组织（WHO）制订儿童生长标准时采用的一个统计学指标，并被广泛用于儿童营养与健康状况的评价。 计算方法：儿童身高实测值与同年龄、同性别参考人群身高中位数之差和该参考人群身高标准差相比，所得比值就是年龄别身高 Z 评分。

How to calculate Height Z-score?

```
Height Z-Score = Height SDS = (Patient Height - Median.height of the reference age&sex)/1
```

For Standard Deviation (SD) of height different age groups and gender, please find in the cheat sheet below.

Which reference age to use?

Actual Year	Actual Month	Reference Year
N	1-3	N
N	4-9	N+0.5
N	10-12	N+1

e.g.

For a 5-year-3-months-old patient, use reference values of 5-year-old population

For a 4-year-7-month-old patient, use reference values of 4.5-year-old population

For a 9-years-11-month-old patient, use reference value of 10-year-old population

e.g.

A 8 years and 3 months old boy, with height of 104cm, the calculation would be:

Reference age = 8 years

Hence,

Median height=130cm

SD = 5.50

e.g.

A 2-year 8-month old girl, with height of 96.2cm, the calculation would be:

Reference age = 2.5 years

Hence,

Median height=92.1cm

SD = 3.80

Height Z-score = (96.2-92.1)/(3.8) = 1.08

e.g.

A 16-year 11-month old girl, with height of 152.8cm, the calculation would be:

Reference age = 17 years

Hence,

Median height=160.30cm

SD = 5.40

Height Z-score = (152.8-160.3)/(5.4) = -1.46

Cheat Sheet - Median Height and Standard Deviation (SD)

	Male		**Female**	
Reference age	Median Height (cm)	SD	Median Height (cm)	SD
Born	50.40	1.80	49.70	1.70
2 months	58.70	2.30	57.40	2.20
4 months	64.60	2.30	63.10	2.30
6 months	68.40	2.40	66.80	2.30
9 months	72.60	2.60	71.00	2.60
12 months	76.50	2.80	75.00	2.70
15 months	79.80	3.00	78.50	2.90
18 months	82.70	3.10	81.50	3.10
21 months	85.60	3.40	84.40	3.30
2 years	88.50	3.60	87.20	3.50
2.5 years	93.30	3.80	92.10	3.80
3 years	96.80	3.90	95.60	3.80
3.5 years	100.60	3.90	99.40	3.90
4 years	104.10	4.10	103.10	3.90
4.5 years	107.70	4.20	106.70	4.20

6 years	117.70	4.70	116.60	4.60
6.5 years	120.70	4.90	119.40	4.90
7 years	124.00	5.10	122.50	5.10
7.5 years	127.10	5.30	125.60	5.20
8 years	130.00	5.50	128.50	5.40
8.5 years	132.70	5.70	131.30	5.60
9 years	135.40	5.80	134.10	5.80
9.5 years	137.90	6.10	137.00	6.10
10 years	140.20	6.20	140.10	6.30
10.5 years	142.60	6.50	143.30	6.50
11 years	145.30	6.80	146.60	6.70
11.5 years	148.40	7.00	149.70	6.60
12 years	151.90	7.50	152.40	6.40
12.5 years	155.60	7.80	154.60	6.20
13 years	159.50	7.80	156.30	6.00
13.5 year	163.00	7.50	157.60	5.80
14 years	165.90	7.20	158.60	5.70
14.5 years	168.20	6.80	159.40	5.50
15 years	169.80	6.50	159.80	5.50
15.5 years	171.00	6.30	160.10	5.50
16 years	171.60	6.20	160.10	5.40
16.5 years	172.10	6.10	160.20	5.40
17 years	172.30	6.10	160.30	5.40
18 years	172.70	6.00	160.60	5.30

Download Excel file here:

cheat sheet SDS v1.2.xlsx

14 KB

How to calculate Growth Rate

There are 2 numbers need to be calculated, monthly and yearly.

Monthly growth rate updates every 91 days (roughly 3 months) i.e. calculate monthly growth rate on `T+0`, `T+91 days`, `T+182 days`, `T+273 days`, `T+364 days` etc.

Yearly growth rate updates every 364 days i.e. calculate monthly growth rate on `T+0`, `T+364 days`, `T+728 days`, `T+1092 days`, etc.

Monthly Growth Rate

e.g.

Assuming the patient do NOT enter historical data.

Then calculate his next monthly growth rate on **14th October 2020,**

Then calculate his next monthly growth rate on **13th January 2021,**

Then calculate his next monthly growth rate on **14th April 2021; AND** calculate his first YEARLY growth rate on **14th April 2021,**

Then calculate his next monthly growth rate on **14th July 2021,**

...and so on

...

Reference date calculator: https://www.timeanddate.com/date/dateadded.html?d1=15&m1=4&y1=2020&type=add&ay=&am=&aw=&ad=91&re=on&rec=100

e.g.

Assuming the patient do NOT enter historical height.

The patient **initially** entered the height data on 15th April 2020,

Then calculate his first monthly growth rate on **15th July 2020**, no rate will be shown before this date,

Then calculate his next monthly growth rate on **14th October 2020,**

Then calculate his next monthly growth rate on **13th January 2021,**

Then calculate his next monthly growth rate on **14th April 2021; AND** calculate his first YEARLY growth rate on **14th April 2021,**

Then calculate his next monthly growth rate on **14th July 2021,**

...and so on

...

Reference date calculator: https://www.timeanddate.com/date/dateadded.html?d1=15&m1=4&y1=2020&type=add&ay=&am=&aw=&ad=91&re=on&rec=100

e.g.

If the patient enters historical height (i.e. height with a timestamp before current time), the calculation will use height including the previous 91 days.

The patient **initially** entered the height data on 15th April 2020 (current date),

Then entered height data on 1 April, 2020,

Then we calculate growth rate immeadeately between 1 Apr - 15 Apr.

The start date `T+0` is the first time the patient entered height information (which the patient must enter during onboarding questionnaire).

The end date is `T+91 days`.

Monthly growth rate = [(height on `T+91d` - height on `T+0`)/91]*30

$$Monthly\ Growth\ Rate = \frac{(height\ on\ T + 91\ days) - (height\ on\ T + 0)}{91} \times 30$$

Next calculation:

Monthly growth rate = [(height on `T+182d` - height on `T+91d`)/91]*30

$$Monthly\ Growth\ Rate = \frac{(height\ on\ T + 182\ days) - (height\ on\ T + 91\ days)}{91} \times 30$$

We basically divided a year (364 days) into 4 seasons (91 days each). Calculation of Monthly Growth Rate is based on data available in each season.

What if there's no data between `T+91d` and `T+182d` ?

If there's no data in a certain season, we expand our calculation range +1 season forward. If still not, +1 again, until we have data, or reach `T+0 day`.

i.e. find data from date `T+0` to `T+182 days`

⚠ *e.g.*

initial height = 85.6cm

no height has been entered after the initial input, then on `T+91 days`, the calculation will be

Monthly growth rate = [(85.6 - 85.6)/time span in days]*30

where `time span in days` is 0 in this case, and it causes a mathematically error [I don't know how to avoid this]

Growth rate = 0

Then
Monthly growth rate = [(height on `Later date` - height on `Earlier date`)/actual time span in days]*30

$$Monthly\ Growth\ Rate = \frac{(height\ on\ later\ date) - (height\ on\ earlier\ date)}{actual\ time\ span\ in\ days} \times 30$$

Yearly Growth Rate

First calculation wil be:

Monthly growth rate = [(height on `T+0` - height on `T+364d`)/364]*365

Next calculation will be:

Monthly growth rate = [(height on `T+364d` - height on `T+728d`)/364]*365

...and so on

What if there's no data on the `T+364d` or `T+728d` date?

Find the nearest data before these dates, same as calculating monthly growth rate.

Then the calculation will be:

$$Monthly\ Growth\ Rate = \frac{(height\ on\ later\ date) - (height\ on\ earlier\ date)}{actual\ time\ span\ in\ days} \times 365$$

ℹ e.g.

The patient **initially** entered the height data on **15th April 2020 (96.2cm)**

Another input on **2nd July 2020 (96.9cm)**

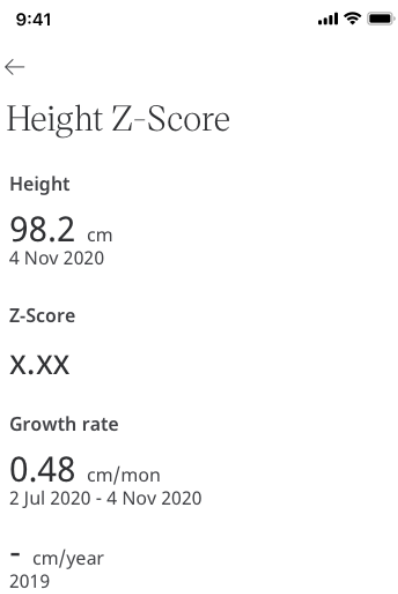
on **15th July 2020**, first monthly growth rate is calculated as:

{ (96.9-96.2)/78 } * 30 = 0.27cm/mon

Another input on 27 September 2020 (97.0cm) and **10 October 2020 (99.2cm)**

{ (99.2-96.9)/100 } * 30 = 0.69cm/mon

e.g.	
The patient **initially** entered the height data on **15th April 2020 (96.2cm)**	
Another input on **2nd July 2020 (96.9cm)** on **15th July 2020**, first monthly growth rate is calculated as: { (96.9-96.2)/78 } * 30 = 0.27cm/mon	
no input ever since on **14 October 2020**, the next monthly growth rate is calculated as: { (96.9-96.9)/0 } * 30 = 0 cm/mon	

Another input on **4 November 2020 (98.2cm)** On **13th January 2021**, the next monthly growth rate is calculated as: { (98.2-96.2)/125 } * 30 = 0.48cm/mon	
Another input on **30 March 2021 (99.5cm)** on **14th April 2021** the next monthly growth rate is calculated as: { (99.5-98.2)/146 } * 30 = 0.27cm/mon **AND** on **14th April 2021** the next yearly growth rate is calculated as: {(99.5-96.2)/349 } * 365 = 3.45cm/year	

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无标签

5条评论

Jiachen Cui (Unlicensed)

@Nicole Xiang @Milano Fili I have cleaned up the Z-score part, and added some more examples. Screens will be added tomorrow.

For Growth rate, I will need to discuss with Echo and the Doctor for some details, but the general framework is done. Screens will also be provided tomorrow.

回复 • 赞 • 五月 07, 2020

Nicole Xiang

@Jiachen Cui (Unlicensed) Thanks for updating all the information. Please correct me if I am wrong, the monthly grow rate calculation here actually calculates the growth rate in the past 3 months period not 1 month.

回复 • 赞 • 五月 11, 2020

Jiachen Cui (Unlicensed)

@Nicole Xiang In terms of frequency YES, it's an average monthly rate over the past 3 months, so calculate every 3 months.
in terms of unit of measurement, NO, the unit is still "cm per month", not "cm per 3 months"

Nicole Xiang

@Nestor Popko FYI on the Height-Z score. We have updated this and figured iOS probably not aware of it.

回复 • 赞 • 五月 20, 2020

Nicole Xiang

@Nestor Popko @daksh bhatt hi both, please note that I have updated the frequency, **once every two weeks**, in **Schedule section**

回复 • 赞 • 五月 20, 2020