

# Nutrition Guideline Healthy Infants and Young Children Weight Velocity

*For Professional Reference Only*

Applicable to: Nurses, Physicians and Health Professionals

## Recommendations

- Growth charts should be used as the standard tool for monitoring growth.
- Weight velocity (weight change over a specific time period) is one part of childhood growth monitoring that may be useful when investigating growth concerns in infants from birth to six months of age.
- Weight velocity should only be used when investigating growth concerns identified by other assessment factors (e.g. feeding, outputs). It should only be used along with growth charts and should be interpreted with caution.
- Repeated or successive measures below the approximate weekly weight gain values provided in this guideline can signal a growth concern, in which case further assessment should occur.
- There currently is not enough evidence for a specific upper weight velocity threshold signalling excessive or rapid weight gain.

## Background

This guideline will provide information on and considerations for using weight velocity as part of childhood growth monitoring. Health professional judgment is important when applying this information to an individual child.

Serial growth measurements (e.g. weight, length, and head circumference), and interpretation of these measurements when plotted on a growth chart, help to assess a child's growth and development.<sup>1</sup> Weight velocity may be useful when assessing potential infant growth concerns over short periods of time. Weight velocity may help to identify growth problems earlier when changes on growth charts may be difficult to detect.<sup>1,2</sup> Weight velocity is not a standard assessment tool; its use should be limited to the investigation of growth concerns and should always be considered along with the child's placement on the growth chart.<sup>3</sup>

When assessing infant growth it is important to consider all factors that impact growth including:

- the infant's overall health, including any recent illnesses or medical conditions
- nutrition (e.g. breastfeeding, formula preparation)
- output (voiding and stooling)
- feeding relationship (e.g. parent recognition of an infant's ability to show feeding cues)
- family's availability of or access to healthy foods
- infant's general behaviour, including sleep patterns

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This guideline was designed for use with healthy term infants and does not specifically address preterm infants or infants with intellectual, developmental, genetic, or other conditions (e.g. cerebral palsy, Down syndrome, etc.). Growth charts should be the standard tool for monitoring the growth of all infants.

For more information and resources on growth, visit the [Childhood Growth Monitoring](https://www.albertahealthservices.ca/info/cgm.aspx) page on the AHS website: <https://www.albertahealthservices.ca/info/cgm.aspx>

#### Key Questions

##### What is weight velocity and how can it be used in growth assessment?

Weight velocity refers to weight change over a specific time period.<sup>1</sup> Compared to size-for-age measures on growth charts, weight velocity reflects weight changes over shorter periods of time, such as one week.<sup>3</sup> Therefore, weight velocity has the potential for earlier identification of growth problems that may not be as easily seen on a growth chart.<sup>1,2</sup>

A child's weight velocity can be influenced by many factors and can fluctuate.<sup>3</sup> For example, a low weight velocity may be expected if a child was growing at a higher percentile and the rate of weight gain then slows as the child settles into their unique pattern of growth.<sup>2</sup> A higher weight velocity may reflect recovery after an illness.<sup>2</sup> Since there are a number of reasons why a child's weight velocity may be increasing or slowing, it is imperative that weight velocity is interpreted along with the child's placement on the growth chart and recent medical history.<sup>2</sup>

##### How often should an infant's weight be measured?

Serial measurements (e.g. weight, length, and head circumference) over time are needed in order to understand a child's growth *pattern*. The Canadian collaborative statement by Dietitians of Canada, Canadian Paediatric Society, the College of Family Physicians of Canada, and Community Health Nurses of Canada recommends that growth monitoring occur at birth, 1 to 2 weeks after birth, at 2, 4, 6, 9, 12, 18, and 24 months, and then yearly after age 2.<sup>1</sup>

An infant's weight is typically measured by two weeks of age to determine if the infant has returned to birth weight. In public health, growth monitoring should occur at all routine well-child visits.<sup>1</sup> Growth monitoring may also be conducted at routine and acute physician visits.<sup>1</sup>

Health professionals may monitor children more frequently than the recommended or scheduled monitoring intervals if potential growth concerns are identified. In such cases, weight should not typically be monitored more frequently than weekly. Day-to-day variability in the frequency and amount of newborn feeds, normal fluid loss from skin and respiration, and outputs will result in greater fluctuations in daily weights than would be reflected by weekly increments. Weighing infants by trained individuals, using standardized protocols and equipment in order to achieve accurate weights, is more achievable and practical with weekly measurements versus daily.

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Recommended frequency of measurements taken in clinical settings depends on age, illness, and degree of nutritional intervention. Minimum guidelines are outlined within the [Childhood Growth Measurement Protocol - Public Health and Clinical Settings](#) available on the AHS website:

<https://www.albertahealthservices.ca/assets/info/hp/cgm/if-hp-cgm-measurement-protocol.pdf>

For more information and resources on growth measurement, visit the [Childhood Growth Measurement](#) page on the AHS website: <https://www.albertahealthservices.ca/info/cgm.aspx>

#### What are the challenges with using growth charts in early infancy?

The World Health Organization (WHO) Growth Charts for Canada Set 2 (WHO Set 2) or the Canadian Pediatric Endocrine Group (CPEG) growth charts should be used as the [standard tools](#) for monitoring growth; however:

- Using growth charts can be challenging during the first two weeks after birth since growth charts don't reflect normal neonatal weight loss.<sup>4,5</sup>
- If an infant is being followed for a potential growth concern and is being weighed multiple times, plotting challenges can occur due to the space of the two-week increments on the growth charts. In such cases, the infant's measurements should still be plotted on the growth chart. Weight velocity may also assist with the growth assessment.

#### What is normal weight loss in early infancy?

It is normal for term infants to lose weight during the first two to three days after birth.<sup>6,7</sup> It is also normal to take two weeks to return to their birth weight, with some infants taking three weeks or longer.<sup>8</sup> Losses up to 10% of birth weight are considered normal.<sup>9</sup> Variations in weight loss and regain patterns in the first month of life are influenced by a variety of factors including the infant's birth weight, gestational age at birth, and successful initiation of lactation.<sup>6</sup> Higher percentage weight loss may be due to surplus fluid loss (acquired by the infant from the mother during labour and birth) and evaporative and meconium losses.<sup>5</sup> After returning to birth weight, healthy term infants should continue to gain weight.<sup>10</sup>

#### What is a typical weekly weight gain in infancy?

Table 1 provides approximate weekly weight gains for healthy term infants, birth to six months of age. It was designed for use in **public health** settings to help guide health care providers when investigating potential growth concerns. Health professional judgment is important when applying this information to an individual child.

Weekly weight gain becomes less relevant as a growth monitoring tool after six months of age when a child's growth typically slows. At this time, the lower end of the approximate weekly weight gain ranges may be too low to be a sensitive indicator for potential growth concerns. Longer time intervals may be needed to identify changes in growth patterns after six months of age; therefore, growth charts are the preferred tool.

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The purpose of Table 1 is to provide a reference for the typical growth of healthy term infants and indications for further assessment. These indications may or may not end up suggesting a concern after further assessment. Table 1 should be interpreted with caution and only used along with growth charts.<sup>3</sup> The table is for health professional reference only and should not be distributed to patients.

**Table 1. Approximate Weekly Weight Gain for Healthy Term Infants (Birth – 6 Months)**

	Approximate weekly weight gain (grams)* <sup>10</sup>		Typical growth	Indications for further assessment	Further assessment & support may include:
	Girls	Boys			
<b>Birth – 14 days</b>	Because of normal weight loss after birth and weight fluctuations, weekly weight gain values cannot be provided.		It is normal for infants to lose weight after birth and to take 2 weeks or longer to return to birthweight. <sup>8</sup>	If an infant has <u>not returned</u> to birth weight by 2 weeks of age, further assessment should occur. <sup>9</sup>	<ul style="list-style-type: none"> <li>Further exploration of all factors impacting growth</li> <li>Breastfeeding support and/or referral to another health professional (PHN or Lactation Consultant [IBCLC or CLC])</li> </ul>
<b>15 – 28 days</b>	Weekly weight gain is generally 150 g <u>or more</u> .	Weekly weight gain is generally 175 g <u>or more</u> .	After returning to birth weight, infants should continue to gain weight. <sup>10</sup>	Weight gain <u>lower than</u> the values to the left may signal a growth concern; further assessment should occur. <sup>3,11</sup>	<ul style="list-style-type: none"> <li>Information on appropriate infant formula and preparation as appropriate</li> </ul>
<b>1 – 2 months</b>	130 – 360 g	165 – 420 g	The values to the left represent approximate weekly weight gain for healthy, term infants. In a given week, infants may gain above or below these values and be experiencing normal, healthy growth.	Repeated or successive measures <u>below the lower end</u> of the ranges to the left may signal a growth concern; <sup>3,11</sup> further assessment should occur.	<ul style="list-style-type: none"> <li>Follow-up weight checks</li> </ul>
<b>2 – 4 months</b>	90 – 235 g	100 – 250 g			<ul style="list-style-type: none"> <li>Referral to a physician to investigate any potential medical causes such as cardiac, respiratory, neurological or endocrine disorders; tongue-tie (ankyloglossia); digestive issues; allergies; infections; or other diseases</li> </ul>
<b>4 – 6 months</b>	50 – 170 g	50 – 180 g			<ul style="list-style-type: none"> <li>Referral to a Registered Dietitian</li> </ul>

\*Conversion – To convert grams to ounces divide by 28.

**Adapted from:** WHO Growth Velocity Standards<sup>10</sup>

Data for 15 to 28 days: Weight velocity (g/d) by birth-weight groups girls and boys

Data for 1 to 2 months: 1-month weight increments (g) girls and boys birth to 12 months (percentiles)

Data for 2 to 6 months: 2-month weight increments (g) girls and boys birth to 24 months (percentiles)

**Note:** The values for 15 to 28 days have been presented as minimums rather than expected ranges as there is not enough evidence to identify upper cutoffs.

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#### What data was used to develop the approximate weekly weight gain values presented in Table 1?

The values provided in **Table 1** were calculated from the World Health Organization's child growth velocity standards.<sup>10</sup>

The values for 15 to 28 days are based on weight velocity rates for "all" babies with birth weights 2000 – 4000+ grams with weight velocity at the 5<sup>th</sup> percentile. The term "all" refers to average weight velocity of all infants from different birth categories: 2000 – 2500 grams, 2500 – 3000 grams, 3000 – 3500 grams, 3500 – 4000 grams, and 4000+ grams.<sup>10</sup> The values have been presented as minimums rather than expected ranges as there is not enough evidence to identify upper cutoffs.

The lower and higher ends of the approximate weight gain range for one to six months of age are based on growth at the 5<sup>th</sup> – 97<sup>th</sup> percentile for weight velocity, respectively. These values have been chosen to represent a range for weight velocity unlikely to signal a growth concern.

It should be noted that a child's percentile for weight velocity is not necessarily the same as their percentile on the growth charts. For example, if a child is growing at the 5<sup>th</sup> percentile for weight velocity, it does not mean that they are growing along the 5<sup>th</sup> percentile on the growth chart. This is because growth charts represent *attained* weight and weight velocity represents the *rate* of weight gain.

#### What are the implications of rapid weight gain?

Rapid weight gain can be associated with overfeeding.<sup>12</sup> Rapid postnatal weight gain has been linked to long-term effects, such as increased risk for hypertension, cardiovascular disease, type 2 diabetes, osteoporosis, and obesity, particularly for preterm and/or low-birth-weight infants experiencing catch-up growth.<sup>13-15</sup> However, there is not enough evidence for a specific weight velocity threshold for "rapid" growth or to interpret measures above the upper end of the ranges in **Table 1** as a growth concern. In these situations, if the child's weight is also inclining on the growth chart from the previous growth pattern, further assessment may be needed. Future research is needed to determine what patterns of successive measurements, over what velocity thresholds, and over which time intervals have the best diagnostic and prognostic validity for specific diseases.<sup>3</sup>

#### Are there any handouts on healthy growth for infants and young children that I can use with my patients?

For nutrition resources visit Nutrition Education Materials at <http://www.albertahealthservices.ca/nutrition/Page11115.aspx> and click on **Children/Adolescents**.

For more information related to healthy infants and children see [Healthy Parents Healthy Children](#)

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