Oral Hygiene

- **Reasons for Wearing Retainers After Treatment**
  Reasons for Wearing Retainers After Treatment Differences Between Removable and Fixed Retention Establishing a Routine to Prevent Tooth Shifting Oral Hygiene Tips for Retainer Care Monitoring Changes After Active Orthodontic Phase Factors That Influence Retention Duration Communicating the Value of Long Term Follow Ups How Retainers Support Jaw Positioning Over Time Signs That Signal the Need for Retainer Adjustments Materials Used in Crafting Effective Retainers Incorporating Retainer Wear Into Daily Habits Assessing Compliance and Its Impact on Stability
- **Basics of Brushing With Braces or Aligners**
  Basics of Brushing With Braces or Aligners Practical Tips for Flossing Around Orthodontic Wires Understanding the Role of Mouthwash in Oral Care Techniques to Prevent White Spots on Enamel Avoiding Common Foods That Damage Orthodontic Appliances Solutions for Managing Gum Irritation and Inflammation Tools That Simplify Cleaning With Orthodontic Hardware Importance of Regular Dental Checkups During Treatment Risk Factors for Plaque Buildup With Braces Adapting Hygiene Routines for Clear Aligner Users Balancing Oral Care With Busy Lifestyles Early Intervention for Minor Issues That Escalate
- **About Us**

Okay, so let's talk about why poor brushing and flossing are a major problem when you have braces. Orthodontic expanders can create more space in the mouth for teeth **Orthodontics for young children** dentistry. It's pretty straightforward, really. Think about it: braces create all sorts of nooks and crannies in your mouth – around the brackets, under the wires, and along the gum line. These are perfect hiding spots for food particles and bacteria.

Now, if you're not brushing and flossing thoroughly, those food particles and bacteria are going to hang around. And what happens when they hang around? They form plaque. Plaque is that sticky, colorless film that's constantly forming on your teeth. It's full of bacteria that love to munch on sugar and carbs, and as they do, they produce acids.

These acids are the real villains because they attack your tooth enamel, leading to cavities and decalcification, which can leave permanent white spots on your teeth. And because plaque loves to accumulate around the braces, those areas become especially vulnerable.

Basically, when you've got braces, good oral hygiene isn't just a suggestion; it's an absolute necessity. Inadequate brushing and flossing are like inviting plaque to a party on your teeth, and the consequences can be pretty unpleasant. So, keep up with the brushing and flossing – your teeth will thank you for it!

* Preventing teeth from shifting back to their original positions as the jawbone settles. —

- *** Maintaining the corrected tooth alignment achieved during braces.**
- *** Preventing teeth from shifting back to their original positions as the jawbone settles.**
- *** Protecting the investment made in orthodontic treatment.**
- *** Ensuring the long-term stability of the bite and smile.**
- *** Supporting proper jaw growth and development in younger children.**

- *** Avoiding the need for future, potentially more extensive, orthodontic intervention.**
- *** Contributing to overall oral health by preventing crowding and misalignment.**

Risk Factors for Plaque Buildup With Braces

Braces, while fantastic for straightening teeth, can unfortunately turn your mouth into a plaque-magnet. It's like setting up a tiny obstacle course where bacteria can thrive. Several things can contribute to this increased risk, and knowing them is half the battle.

One major culprit is, unsurprisingly, what we eat. Dietary Factors play a huge role. Think about it: sugary and starchy foods are like a feast for the bacteria in your mouth. These little guys love to munch on the sugars and starches left behind after you eat. As they digest these goodies, they produce acids. These acids are what attack your tooth enamel, leading to plaque formation and, eventually, cavities.

Sugary drinks like soda and juice are particularly problematic because they coat your teeth and braces in a sugary film that lingers for a long time. Starchy foods, like bread and pasta, can also get trapped easily in and around your braces, providing another source of fuel for those plaque-producing bacteria. Imagine little bits of bread stuck around your brackets, slowly dissolving into sugar right on your teeth. Not a pretty picture, right?

So, while you're rocking those braces, being extra mindful of your diet is crucial. Reducing sugary and starchy snacks and drinks, and making sure to brush thoroughly after meals, especially those containing these types of foods, can significantly reduce your risk of plaque buildup and keep your smile healthy throughout your orthodontic journey.

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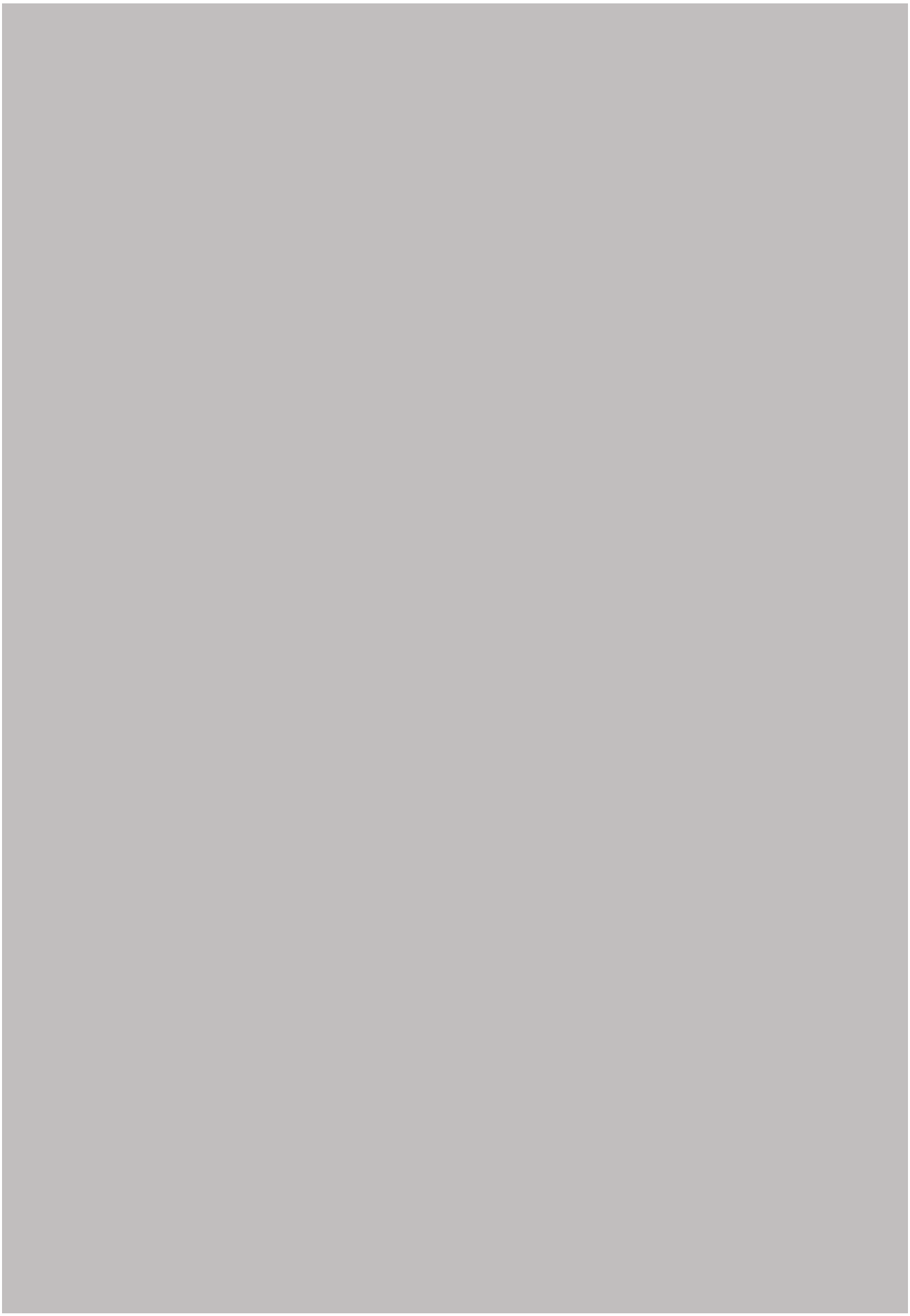

* Protecting the investment made in orthodontic treatment.

Okay, so we're talking about braces, and specifically, how some designs and placements can be a real pain when it comes to keeping your teeth clean. Let's face it, braces already make brushing and flossing a challenge. But certain features can crank that challenge up to eleven.

Imagine those tiny, elaborate brace brackets. The more nooks and crannies they have, the more hiding spots there are for plaque and food debris. It's like giving bacteria a five-star hotel right on your teeth! Some older brace designs, or even just brackets with particularly intricate detailing, can be significantly harder to navigate with your toothbrush.

And it's not just the design of the brackets themselves, but also where they're placed. If a bracket sits really close to the gumline, it can be tough to get your brush bristles in there effectively. This area is already prone to plaque accumulation, and the bracket just makes it worse. Similarly, if a bracket is positioned in a hard-to-reach spot, like way in the back molars, even the most dedicated brusher might struggle to get it sparkling clean.

Then there are things like elastic ligatures (the little rubber bands that hold the wire to the bracket). While they come in fun colors, they're also notorious for trapping food and staining easily. It's like they're specifically designed to attract and hold onto everything you eat!

Essentially, anything that creates more surfaces, more angles, or more difficult access points around your braces is going to increase the risk of plaque buildup. And plaque buildup, as we all know, leads to cavities, gum disease, and no one wants that on top of already having braces! So, while you might not be able to choose the exact design or placement of your braces, being aware of these potential challenges can help you focus your cleaning efforts and make sure you're giving those tricky spots extra attention. It's all about being proactive in the fight against plaque!

* Ensuring the long-term stability of the bite and smile.

Okay, let's talk about the little ones and their braces. It's adorable when kids get braces, a sign they're on their way to a great smile. But let's be real, for younger children, especially, keeping their teeth clean with all that metal and wire in the way can be a real struggle. We're talking about kids who are still mastering tying their shoelaces, now we're asking them to navigate tiny brushes and floss threaders around brackets?

A big part of the problem is dexterity. Little hands just aren't as coordinated. Flossing, which is already a bit tricky even without braces, becomes a monumental task. They might not have the fine motor skills to get the floss in the right places, or the patience to do it thoroughly. Brushing is similar – reaching all the nooks and crannies around the braces requires a level of precision that younger kids might not possess yet.

Then there's the age factor itself. Younger children might not fully grasp the importance of oral hygiene. They might not understand why it's so crucial to keep their teeth clean, even when it's a bit of a hassle. This lack of understanding can lead to inconsistent brushing and flossing, even if they're trying their best. Plus, let's be honest, kids are easily distracted. A quick brush might turn into a two-second swipe followed by a return to playtime.

So, what does this mean for plaque buildup? Well, all those extra surfaces created by the braces, combined with less-than-perfect cleaning, creates the perfect storm for plaque to thrive. Food particles get trapped easily, and if they're not removed regularly, they turn into plaque, which can lead to cavities, gum disease, and decalcification (those white spots on the teeth after the braces come off). It's not a pretty picture.

That's why, with younger children, parental involvement is absolutely key. Parents need to help with brushing and flossing, or at least supervise and encourage them until they develop the necessary skills and understanding. Making it a fun, engaging routine can also help. Think colorful toothbrushes, flavored toothpaste, and maybe even a reward chart for consistent effort. It's all about setting them up for success and protecting that developing smile.

* Supporting proper jaw growth and development in younger children.

Okay, so we're talking about plaque buildup with braces, right? It's a tricky situation, and there are a bunch of things that can make it worse. But one thing that often gets overlooked, and it's a big one, is

simply a lack of parental supervision, especially when it comes to younger kids and teens rocking those metal smiles.

Think about it. Braces are complicated. They create all sorts of nooks and crannies where food can hide and plaque can thrive. Kids, bless their hearts, aren't always the most diligent brushers even without braces. Add in the complexity of wires and brackets, and suddenly oral hygiene becomes a real challenge. That's where parents come in.

It's not about nagging, though. It's about involvement. It's about making oral hygiene a family affair, at least for a while. Parents can help by actually watching their kids brush, especially in the beginning. Are they getting into all those hard-to-reach spots? Are they using the right tools, like interdental brushes or floss threaders? Are they spending enough time on it? A quick once-over just isn't going to cut it when you've got braces.

Beyond just watching, parents can also educate. Explain *why* it's so important to keep plaque at bay. Show them pictures of what gum disease and cavities can look like. Make it real for them. Talk to the orthodontist together, ask questions, and make sure everyone understands the recommended cleaning techniques.

And let's be honest, sometimes kids just need a little encouragement. Maybe a reward system for consistently good brushing, or even just a word of praise can go a long way. It's about making the process less of a chore and more of a habit.

Ultimately, while the orthodontist provides the hardware and the professional guidance, parents play a crucial role in ensuring the success of the treatment. By being actively involved in their child's oral hygiene routine, they can significantly reduce the risk of plaque buildup, protect their child's teeth and gums, and help them achieve a healthy and beautiful smile. It's an investment that pays off big time in the long run.

*** Avoiding the need for future, potentially more extensive, orthodontic intervention.**

Okay, so let's talk about how your mouth's existing state can make you more prone to plaque buildup when you get braces. Think of it like this: braces are already an extra obstacle course for your toothbrush. Now, imagine you're starting that obstacle course with a bit of a disadvantage, like, say, a sprained ankle. That's kind of what pre-existing oral health conditions are like.

Gingivitis, which is basically inflammation of the gums, is a really common example. When your gums are already inflamed, they tend to bleed more easily. This bleeding creates a perfect little breeding ground for bacteria. Plaque is basically just a sticky film of bacteria, right? So, more bacteria, plus a sticky environment, equals more plaque. It's a pretty straightforward equation.

Also, when your gums are swollen from gingivitis, it can create little nooks and crannies around your teeth. These are exactly the kinds of places your toothbrush might miss, even without braces. Now add brackets and wires into the mix, and those nooks become even harder to reach. The bacteria just happily settle in, feast on leftover food particles, and multiply, leading to even *more* plaque.

So, you see, pre-existing conditions like gingivitis don't just magically disappear when you get braces. They can actually amplify the risk of plaque buildup because they create a more hospitable environment for the bacteria that cause it. That's why it's so important to get any existing gum issues under control *before* you even think about getting braces. A healthy mouth is the best foundation for a successful braces journey!

* Contributing to overall oral health by preventing crowding and misalignment.

Okay, so you've got braces. Rock on! But let's be real, those brackets and wires are like little magnets for plaque. And plaque, my friends, is the enemy. One of the biggest risk factors for plaque buildup with braces is simply not getting your teeth professionally cleaned often enough. Think about it: your toothbrush can only do so much when it's navigating around all that metal. Bits of food get trapped, bacteria throws a party, and before you know it, you're staring down the barrel of cavities, gum disease, and even decalcification (those nasty white spots).

That's where regular dental checkups and professional cleanings come in as your saving grace. Your orthodontist and dental hygienist are your partners in keeping your mouth healthy during this process. They're not just there to tighten wires; they're also there to give your teeth a super-deep clean that you just can't achieve at home, no matter how diligent you are with your brushing and flossing. They use specialized tools to remove plaque and tartar from those hard-to-reach areas around your brackets. Plus, they can give you personalized advice on your oral hygiene routine, showing you the best techniques and tools to use to keep plaque at bay. They can also spot potential problems early on, before they turn into bigger, more expensive, and more painful issues. Think of it like taking your car in for regular maintenance. You wouldn't skip oil changes, right? Same deal with your teeth! Regular checkups and cleanings are essential to keeping your smile healthy and bright while you're straightening it.

About malocclusion

"Deep bite" and "Buck teeth" redirect here. For the village, see Deep Bight, Newfoundland and Labrador.

Malocclusion

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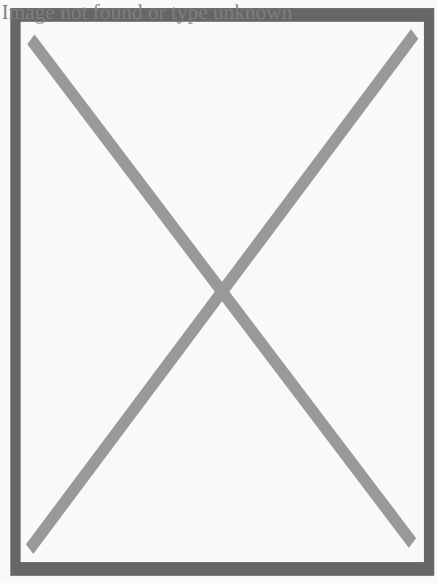

Malocclusion in 10-year-old girl

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Look up ***bucktooth*** in Wiktionary, the free dictionary.

In orthodontics, a **malocclusion** is a misalignment or incorrect relation between the teeth of the upper and lower dental arches when they approach each other as the jaws close. The English-language term dates from 1864;[1] Edward Angle (1855–1930), the "father of modern orthodontics",[2][3][*need quotation to verify*] popularised it. The word derives from *mal-* 'incorrect' and *occlusion* 'the manner in which opposing teeth meet'.

The malocclusion classification is based on the relationship of the mesiobuccal cusp of the maxillary first molar and the buccal groove of the mandibular first molar. If this molar relationship exists, then the teeth can align into normal occlusion. According to Angle, malocclusion is any deviation of the occlusion from the ideal.[4] However, assessment for malocclusion should also take into account aesthetics and the impact on functionality. If these aspects are acceptable to the patient despite meeting the formal definition of malocclusion, then treatment may not be necessary. It is estimated that nearly 30% of the population have malocclusions that are categorised as severe and definitely benefit from orthodontic treatment.[5]

Causes

[edit]

The aetiology of malocclusion is somewhat contentious, however, simply put it is multifactorial, with influences being both genetic[6][*unreliable source?*] and environmental.[7] Malocclusion is already present in one of the Skhul and Qafzeh hominin fossils and other prehistoric human skulls.[8][9] There are three generally accepted causative factors of malocclusion:

- Skeletal factors – the size, shape and relative positions of the upper and lower jaws. Variations can be caused by environmental or behavioral factors such as muscles of mastication, nocturnal mouth breathing, and cleft lip and cleft palate.
- Muscle factors – the form and function of the muscles that surround the teeth. This could be impacted by habits such as finger sucking, nail biting, pacifier and tongue thrusting.[10]
- Dental factors – size of the teeth in relation to the jaw, early loss of teeth could result in spacing or mesial migration causing crowding, abnormal eruption path or timings, extra teeth (supernumeraries), or too few teeth (hypodontia)

There is not one single cause of malocclusion, and when planning orthodontic treatment it is often helpful to consider the above factors and the impact they have played on malocclusion. These can also be influenced by oral habits and pressure resulting in malocclusion.[11][12]

Behavioral and dental factors

[edit]

In the active skeletal growth,[13] mouthbreathing, finger sucking, thumb sucking, pacifier sucking, onychophagia (nail biting), dermatophagia, pen biting, pencil biting, abnormal posture, deglutition disorders and other habits greatly influence the development of the face and dental arches.[14][15][16][17][18] Pacifier sucking habits are also correlated with otitis media.[19][20] Dental caries, periapical inflammation and tooth loss in the deciduous teeth can alter the correct permanent teeth eruptions.

Primary vs. secondary dentition

[edit]

Malocclusion can occur in primary and secondary dentition.

In primary dentition malocclusion is caused by:

- Underdevelopment of the dentoalvelor tissue.
- Over development of bones around the mouth.
- Cleft lip and palate.
- Overcrowding of teeth.
- Abnormal development and growth of teeth.

In secondary dentition malocclusion is caused by:

- Periodontal disease.
- Overeruption of teeth.[21]
- Premature and congenital loss of missing teeth.

Signs and symptoms

[edit]

Malocclusion is a common finding,[22][23] although it is not usually serious enough to require treatment. Those who have more severe malocclusions, which present as a part of craniofacial anomalies, may require orthodontic and sometimes surgical treatment (orthognathic surgery) to correct the problem.

The ultimate goal of orthodontic treatment is to achieve a stable, functional and aesthetic alignment of teeth which serves to better the patient's dental and total health.[24] The symptoms which arise as a result of malocclusion derive from a deficiency in one or more of these categories.[25]

The symptoms are as follows:

- Tooth decay (caries): misaligned teeth will make it more difficult to maintain oral hygiene. Children with poor oral hygiene and diet will be at an increased risk.
- Periodontal disease: irregular teeth would hinder the ability to clean teeth meaning poor plaque control. Additionally, if teeth are crowded, some may be more buccally or lingually placed, there will be reduced bone and periodontal support. Furthermore, in Class III malocclusions, mandibular anterior teeth are pushed labially which contributes to gingival recession and weakens periodontal support.
- Trauma to anterior teeth: Those with an increased overjet are at an increased risk of trauma. A systematic review found that an overjet of greater than 3mm will double the risk of trauma.
- Masticatory function: people with anterior open bites, large increased & reverse overjet and hypodontia will find it more difficult to chew food.
- Speech impairment: a lisp is when the incisors cannot make contact, orthodontics can treat this. However, other forms of misaligned teeth will have little impact on speech and orthodontic treatment has little effect on fixing any problems.
- Tooth impaction: these can cause resorption of adjacent teeth and other pathologies for example a dentigerous cyst formation.
- Psychosocial wellbeing: malocclusions of teeth with poor aesthetics can have a significant effect on self-esteem.

Malocclusions may be coupled with skeletal disharmony of the face, where the relations between the upper and lower jaws are not appropriate. Such skeletal disharmonies often distort sufferer's face shape, severely affect aesthetics of the face, and may be coupled with mastication or speech problems. Most skeletal malocclusions can only be treated by orthognathic surgery.[*citation needed*]

Classification

[edit]

Depending on the sagittal relations of teeth and jaws, malocclusions can be divided mainly into three types according to Angle's classification system published 1899. However, there are also other conditions, e.g. *crowding of teeth*, not directly fitting into this classification.

Many authors have tried to modify or replace Angle's classification. This has resulted in many subtypes and new systems (see section below: *Review of Angle's system of classes*).

A deep bite (also known as a Type II Malocclusion) is a condition in which the upper teeth overlap the lower teeth, which can result in hard and soft tissue trauma, in addition to an effect on appearance.[26] It has been found to occur in 15–20% of the US population.[27]

An open bite is a condition characterised by a complete lack of overlap and occlusion between the upper and lower incisors.[28] In children, open bite can be caused by prolonged thumb

sucking.[29] Patients often present with impaired speech and mastication.[30]

Overbites

[edit]

This is a vertical measurement of the degree of overlap between the maxillary incisors and the mandibular incisors. There are three features that are analysed in the classification of an overbite:

- Degree of overlap: edge to edge, reduced, average, increased
- Complete or incomplete: whether there is contact between the lower teeth and the opposing teeth/tissue (hard palate or gingivae) or not.
- Whether contact is traumatic or atraumatic

An average overbite is when the upper anterior teeth cover a third of the lower teeth. Covering less than this is described as ‘reduced’ and more than this is an ‘increased’ overbite. No overlap or contact is considered an ‘anterior open bite’.[25][31][32]

Angle's classification method

[edit]

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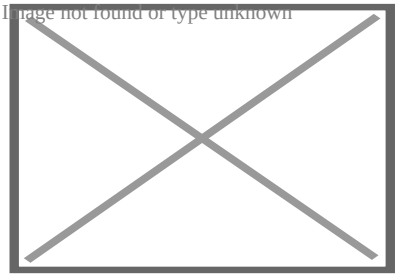

Class I with severe crowding and labially erupted canines

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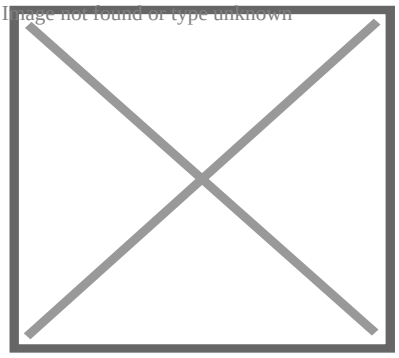


Class II molar relationship

Edward Angle, who is considered the father of modern orthodontics, was the first to classify malocclusion. He based his classifications on the relative position of the maxillary first molar.[33] According to Angle, the mesiobuccal cusp of the upper first molar should align with the buccal groove of the mandibular first molar. The teeth should all fit on a line of occlusion which, in the upper arch, is a smooth curve through the central fossae of the posterior teeth and cingulum of the canines and incisors, and in the lower arch, is a smooth curve through the buccal cusps of the posterior teeth and incisal edges of the anterior teeth. Any variations from this resulted in malocclusion types. It is also possible to have different classes of malocclusion on left and right sides.

- **Class I** (Neutrocclusion): Here the molar relationship of the occlusion is normal but the incorrect line of occlusion or as described for the maxillary first molar, but the other teeth have problems like spacing, crowding, over or under eruption, etc.
- **Class II** (Distocclusion (retrognathism, overjet, overbite)): In this situation, the mesiobuccal cusp of the upper first molar is not aligned with the mesiobuccal groove of the lower first molar. Instead it is anterior to it. Usually the mesiobuccal cusp rests in between the first mandibular molars and second premolars. There are two subtypes:
  - Class II Division 1: The molar relationships are like that of Class II and the anterior teeth are protruded.
  - Class II Division 2: The molar relationships are Class II but the central are retroclined and the lateral teeth are seen overlapping the centrals.
- **Class III**: (Mesiocclusion (prognathism, anterior crossbite, negative overjet, underbite)) In this case the upper molars are placed not in the mesiobuccal groove but posteriorly to it. The mesiobuccal cusp of the maxillary first molar lies posteriorly to the mesiobuccal groove of the mandibular first molar. Usually seen as when the lower front teeth are more prominent than the upper front teeth. In this case the patient very often has a large mandible or a short maxillary bone.

Review of Angle's system of classes and alternative systems

[edit]

A major disadvantage of Angle's system of classifying malocclusions is that it only considers two dimensions along a spatial axis in the sagittal plane in the terminal occlusion, but occlusion problems can be three-dimensional. It does not recognise deviations in other spatial axes, asymmetric deviations, functional faults and other therapy-related features.

Angle's classification system also lacks a theoretical basis; it is purely descriptive. Its much-discussed weaknesses include that it only considers static occlusion, it does not account for the development and causes (aetiology) of occlusion problems, and it disregards the proportions (or relationships in general) of teeth and face.[34] Thus, many attempts have been made to modify the Angle system or to replace it completely with a more efficient one,[35] but Angle's classification continues be popular mainly because of its simplicity and clarity.[*citation needed*]

Well-known modifications to Angle's classification date back to Martin Dewey (1915) and Benno Lischer (1912, 1933). Alternative systems have been suggested by, among others, Simon (1930, the first three-dimensional classification system), Jacob A. Salzmann (1950, with a classification system based on skeletal structures) and James L. Ackerman and William R. Proffit (1969).[36]

Incisor classification

[edit]

Besides the molar relationship, the British Standards Institute Classification also classifies malocclusion into incisor relationship and canine relationship.

- Class I: The lower incisor edges occlude with or lie immediately below the cingulum plateau of the upper central incisors
- Class II: The lower incisor edges lie posterior to the cingulum plateau of the upper incisors
  - Division 1 – the upper central incisors are proclined or of average inclination and there is an increase in overjet
  - Division 2 – The upper central incisors are retroclined. The overjet is usually minimal or may be increased.
- Class III: The lower incisor edges lie anterior to the cingulum plateau of the upper incisors. The overjet is reduced or reversed.

Canine relationship by Ricketts

[edit]

- Class I: Mesial slope of upper canine coincides with distal slope of lower canine
- Class II: Mesial slope of upper canine is ahead of distal slope of lower canine
- Class III: Mesial slope of upper canine is behind to distal slope of lower canine

Crowding of teeth

[edit]

Dental crowding is defined by the amount of space that would be required for the teeth to be in correct alignment. It is obtained in two ways: 1) by measuring the amount of space required and reducing this from calculating the space available via the width of the teeth, or 2) by measuring the degree of overlap of the teeth.

The following criterion is used:[25]

- 0-4mm = Mild crowding
- 4-8mm = Moderate crowding
- >8mm = Severe crowding

Causes

[edit]

Genetic (inheritance) factors, extra teeth, lost teeth, impacted teeth, or abnormally shaped teeth have been cited as causes of crowding. Ill-fitting dental fillings, crowns, appliances, retainers, or braces as well as misalignment of jaw fractures after a severe injury are also known to cause crowding.[26] Tumors of the mouth and jaw, thumb sucking, tongue thrusting, pacifier use beyond age three, and prolonged use of a bottle have also been identified.[26]

Lack of masticatory stress during development can cause tooth overcrowding.[37][38] Children who chewed a hard resinous gum for two hours a day showed increased facial growth.[37] Experiments in animals have shown similar results. In an experiment on two groups of rock hyraxes fed hardened or softened versions of the same foods, the animals fed softer food had significantly narrower and shorter faces and thinner and shorter mandibles than animals fed hard food.[37][39][*failed verification*]

A 2016 review found that breastfeeding lowers the incidence of malocclusions developing later on in developing infants.[40]

During the transition to agriculture, the shape of the human mandible went through a series of changes. The mandible underwent a complex shape changes not matched by the teeth, leading to incongruity between the dental and mandibular form. These changes in human skulls may have been "driven by the decreasing bite forces required to chew the processed foods eaten

once humans switched to growing different types of cereals, milking and herding animals about 10,000 years ago."[38][41]

Treatment

[edit]

Orthodontic management of the condition includes dental braces, lingual braces, clear aligners or palatal expanders.[42] Other treatments include the removal of one or more teeth and the repair of injured teeth. In some cases, surgery may be necessary.[43]

Treatment

[edit]

Malocclusion is often treated with orthodontics,[42] such as tooth extraction, clear aligners, or dental braces,[44] followed by growth modification in children or jaw surgery (orthognathic surgery) in adults. Surgical intervention is used only in rare occasions. This may include surgical reshaping to lengthen or shorten the jaw. Wires, plates, or screws may be used to secure the jaw bone, in a manner like the surgical stabilization of jaw fractures. Very few people have "perfect" alignment of their teeth with most problems being minor that do not require treatment.[37]

Crowding

[edit]

Crowding of the teeth is treated with orthodontics, often with tooth extraction, clear aligners, or dental braces, followed by growth modification in children or jaw surgery (orthognathic surgery) in adults. Surgery may be required on rare occasions. This may include surgical reshaping to lengthen or shorten the jaw (orthognathic surgery). Wires, plates, or screws may be used to secure the jaw bone, in a manner similar to the surgical stabilization of jaw fractures. Very few people have "perfect" alignment of their teeth. However, most problems are very minor and do not require treatment.[39]

Class I

[edit]

While treatment is not crucial in class I malocclusions, in severe cases of crowding can be an indication for intervention. Studies indicate that tooth extraction can have benefits to correcting malocclusion in individuals.[45][46] Further research is needed as reoccurring crowding has been examined in other clinical trials.[45][47]

Class II

[edit]

A few treatment options for class II malocclusions include:

1. Functional appliance which maintains the mandible in a postured position to influence both the orofacial musculature and dentoalveolar development prior to fixed appliance therapy. This is ideally done through pubertal growth in pre-adolescent children and the fixed appliance during permanent dentition .[48] Different types of removable appliances include Activator, Bionatar, Medium opening activator, Herbst, Frankel and twin block appliance with the twin block being the most widely used one.[49]
2. Growth modification through headgear to redirect maxillary growth
3. Orthodontic camouflage so that jaw discrepancy no longer apparent
4. Orthognathic surgery – sagittal split osteotomy mandibular advancement carried out when growth is complete where skeletal discrepancy is severe in anterior-posterior relationship or in vertical direction. Fixed appliance is required before, during and after surgery.
5. Upper Removable Appliance – limited role in contemporary treatment of increased overjets. Mostly used for very mild Class II, overjet due to incisor proclination, favourable overbite.

Class II Division 1

[edit]

Low- to moderate- quality evidence suggests that providing early orthodontic treatment for children with prominent upper front teeth (class II division 1) is more effective for reducing the incidence of incisal trauma than providing one course of orthodontic treatment in adolescence.[50] There do not appear to be any other advantages of providing early treatment when compared to late treatment.[50] Low-quality evidence suggests that, compared to no treatment, late treatment in adolescence with functional appliances is effective for reducing the prominence of upper front teeth.[50]

Class II Division 2

[edit]

Treatment can be undertaken using orthodontic treatments using dental braces.[51] While treatment is carried out, there is no evidence from clinical trials to recommend or discourage any type of orthodontic treatment in children.[51] A 2018 Cochrane systematic review anticipated that the evidence base supporting treatment approaches is not likely to improve occlusion due to the low prevalence of the condition and the ethical difficulties in recruiting people to participate in a randomized controlled trials for treating this condition.[51]

Class III

[edit]

The British Standard Institute (BSI) classify class III incisor relationship as the lower incisor edge lies anterior to the cingulum plateau of the upper incisors, with reduced or reversed over jet.[52] The skeletal facial deformity is characterized by mandibular prognathism, maxillary retrognathism or a combination of the two. This effects 3-8% of UK population with a higher incidence seen in Asia.[53]

One of the main reasons for correcting Class III malocclusion is aesthetics and function. This can have a psychological impact on the person with malocclusion resulting in speech and mastication problems as well. In mild class III cases, the patient is quite accepting of the aesthetics and the situation is monitored to observe the progression of skeletal growth.[54]

Maxillary and mandibular skeletal changes during prepubertal, pubertal and post pubertal stages show that class III malocclusion is established before the prepubertal stage.[55] One treatment option is the use of growth modification appliances such as the Chin Cap which has greatly improved the skeletal framework in the initial stages. However, majority of cases are shown to relapse into inherited class III malocclusion during the pubertal growth stage and when the appliance is removed after treatment.[55]

Another approach is to carry out orthognathic surgery, such as a bilateral sagittal split osteotomy (BSSO) which is indicated by horizontal mandibular excess. This involves surgically cutting through the mandible and moving the fragment forward or backwards for desired function and is supplemented with pre and post surgical orthodontics to ensure correct tooth relationship. Although the most common surgery of the mandible, it comes with several complications including: bleeding from inferior alveolar artery, unfavorable splits, condylar resorption, avascular necrosis and worsening of temporomandibular joint.[56]

Orthodontic camouflage can also be used in patients with mild skeletal discrepancies. This is a less invasive approach that uses orthodontic brackets to correct malocclusion and try to hide the skeletal discrepancy. Due to limitations of orthodontics, this option is more viable for patients who are not as concerned about the aesthetics of their facial appearance and are happy to address the malocclusion only, as well as avoiding the risks which come with orthognathic surgery. Cephalometric data can aid in the differentiation between the cases that benefit from ortho-surgical or orthodontic treatment only (camouflage); for instance, examining a large group of orthognathic patient with Class III malocclusions they had average ANB angle of -3.57° (95% CI, -3.92° to -3.21°). [57]

Deep bite

[edit]

The most common corrective treatments available are fixed or removal appliances (such as dental braces), which may or may not require surgical intervention. At this time there is no robust evidence that treatment will be successful.[51]

Open bite

[edit]

An open bite malocclusion is when the upper teeth don't overlap the lower teeth. When this malocclusion occurs at the front teeth it is known as anterior open bite. An open bite is difficult to treat due to multifactorial causes, with relapse being a major concern. This is particularly so for an anterior open bite.[58] Therefore, it is important to carry out a thorough initial assessment in order to obtain a diagnosis to tailor a suitable treatment plan.[58] It is important to take into consideration any habitual risk factors, as this is crucial for a successful outcome without relapse. Treatment approach includes behavior changes, appliances and surgery. Treatment for adults include a combination of extractions, fixed appliances, intermaxillary elastics and orthognathic surgery.[30] For children, orthodontics is usually used to compensate for continued growth. With children with mixed dentition, the malocclusion may resolve on its own as the permanent teeth erupt. Furthermore, should the malocclusion be caused by childhood habits such as digit, thumb or pacifier sucking, it may result in resolution as the habit is stopped. Habit deterrent appliances may be used to help in breaking digit and thumb sucking habits. Other treatment options for patients who are still growing include functional appliances and headgear appliances.

Tooth size discrepancy

[edit]

Identifying the presence of tooth size discrepancies between the maxillary and mandibular arches is an important component of correct orthodontic diagnosis and treatment planning.

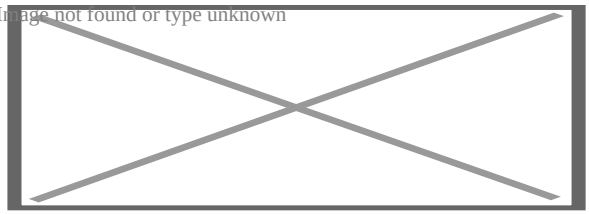
To establish appropriate alignment and occlusion, the size of upper and lower front teeth, or upper and lower teeth in general, needs to be proportional. Inter-arch tooth size discrepancy (ITSD) is defined as a disproportion in the mesio-distal dimensions of teeth of opposing dental arches. The prevalence is clinically significant among orthodontic patients and has been reported to range from 17% to 30%.[59]

Identifying inter-arch tooth size discrepancy (ITSD) before treatment begins allows the practitioner to develop the treatment plan in a way that will take ITSD into account. ITSD corrective treatment may entail demanding reduction (interproximal wear), increase (crowns and resins), or elimination (extractions) of dental mass prior to treatment finalization.[60]

Several methods have been used to determine ITSD. Of these methods the one most commonly used is the Bolton analysis. Bolton developed a method to calculate the ratio between the mesiodistal width of maxillary and mandibular teeth and stated that a correct and harmonious occlusion is possible only with adequate proportionality of tooth sizes.[60] Bolton's formula concludes that if in the anterior portion the ratio is less than 77.2% the lower teeth are too narrow, the upper teeth are too wide or there is a combination of both. If the ratio is higher than 77.2% either the lower teeth are too wide, the upper teeth are too narrow or there is a combination of both.[59]

Other conditions

[edit]
Further information: Open bite malocclusion



Open bite treatment after eight months of braces.

Other kinds of malocclusions can be due to or horizontal, vertical, or transverse skeletal discrepancies, including skeletal asymmetries.

Increased vertical growth causes a long facial profile and commonly leads to an open bite malocclusion, while decreased vertical facial growth causes a short facial profile and is commonly associated with a deep bite malocclusion. However, there are many other more

common causes for open bites (such as tongue thrusting and thumb sucking) and likewise for deep bites.[61][62][63]

The upper or lower jaw can be overgrown (macrognathia) or undergrown (micrognathia).[62][61][63] It has been reported that patients with micrognathia are also affected by retrognathia (abnormal posterior positioning of the mandible or maxilla relative to the facial structure).[62] These patients are majorly predisposed to a class II malocclusion. Mandibular macrognathia results in prognathism and predisposes patients to a class III malocclusion.[64]

Most malocclusion studies to date have focused on Class III malocclusions. Genetic studies for Class II and Class I malocclusion are more rare. An example of hereditary mandibular prognathism can be seen amongst the Hapsburg Royal family where one third of the affected individuals with severe class III malocclusion had one parent with a similar phenotype.[65]

The frequent presentation of dental malocclusions in patients with craniofacial birth defects also supports a strong genetic aetiology. About 150 genes are associated with craniofacial conditions presenting with malocclusions.[66] Micrognathia is a commonly recurring craniofacial birth defect appearing among multiple syndromes.

For patients with severe malocclusions, corrective jaw surgery or orthognathic surgery may be carried out as a part of overall treatment, which can be seen in about 5% of the general population.[62][61][63]

See also

[edit]

- Crossbite
- Elastics
- Facemask (orthodontics)
- Maximum intercuspation
- Mouth breathing
- Occlusion (dentistry)

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Further reading

[edit]

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External links

[edit]

Classification	D • **ICD-10**: K07.3, K07.4, K07.5, K07.6 • **ICD-9-CM**: 524.4 • **MeSH**: D008310

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Orthodontics

Diagnosis

- Bolton analysis
- Cephalometric analysis
- Cephalometry
- Dentition analysis
- Failure of eruption of teeth
- Little's Irregularity Index
- Malocclusion
- Scissor bite
- Standard anatomical position
- Tooth ankylosis
- Tongue thrust

Conditions

- Overbite
- Overjet
- Open bite
- Crossbite
- Dental crowding
- Dental spacing
- Bimaxillary Protrusion
- Prognathism
- Retrognathism
- Maxillary hypoplasia
- Condylar hyperplasia
- Overeruption
- Mouth breathing
- Temperomandibular dysfunction

Appliances

- ACCO appliance
- Archwire
- Activator appliance
- Braces
- Damon system
- Elastics
- Frankel appliance
- Invisalign
- Lingual arch
- Lip bumper
- Herbst Appliance
- List of orthodontic functional appliances
- List of palatal expanders
- Lingual braces
- Headgear
- Orthodontic technology
- Orthodontic spacer
- Palatal lift prosthesis
- Palatal expander
- Quad helix
- Retainer
- SureSmile
- Self-ligating braces
- Splint activator
- Twin Block Appliance

Procedures

- Anchorage (orthodontics)
- Cantilever mechanics
- Fiberotomy
- Interproximal reduction
- Intrusion (orthodontics)
- Molar distalization
- SARPE
- Serial extraction

Materials	○ Beta-titanium ○ Nickel titanium ○ Stainless steel ○ TiMolium ○ Elgiloy ○ Ceramic ○ Composite ○ Dental elastics

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Journals	○ American Journal of Orthodontics and Dentofacial Orthopedics ○ The Angle Orthodontist ○ Journal of Orthodontics
Institution	○ Angle School of Orthodontia

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Dental disease involving the jaw

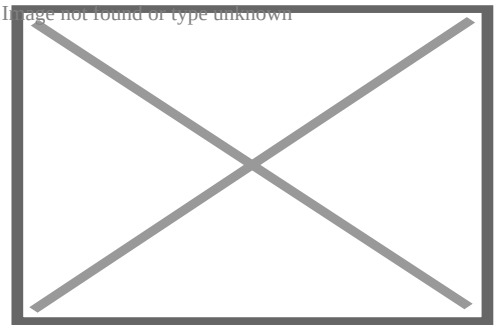
General	○ Jaw abnormality ○ malocclusion ○ Orthodontics ○ Gnathitis
Size	○ Micrognathism ○ Maxillary hypoplasia
Maxilla and Mandible	○ Cherubism ○ Congenital epulis ○ Torus mandibularis ○ Torus palatinus

Other	○ Jaw and base of cranium
	  ○ Prognathism
	  ○ Retrognathism
	○ Dental arch
	  ○ Crossbite
	  ○ Overbite
	○ Temporomandibular joint disorder

About pediatrics

This article is about the branch of medicine. For the journal, see Pediatrics (journal). For the branch of dentistry, see Pedodontics.

Pediatrics



A pediatrician examines a neonate.

Focus	**Infants, Children, Adolescents, and Young Adults**
Subdivisions	*Paediatric cardiology, neonatology, critical care, pediatric oncology, hospital medicine, primary care, others (see below)*
Significant diseases	Congenital diseases, Infectious diseases, Childhood cancer, Mental disorders
Significant tests	World Health Organization Child Growth Standards
Specialist	**Pediatrician**
Glossary	Glossary of medicine

Pediatrics (American English) also spelled **paediatrics** (British English), is the branch of medicine that involves the medical care of infants, children, adolescents, and young adults. In the United Kingdom, pediatrics covers many of their youth until the age of 18.[1] The American Academy of Pediatrics recommends people seek pediatric care through the age of 21, but some

pediatric subspecialists continue to care for adults up to 25.[2][3] Worldwide age limits of pediatrics have been trending upward year after year.[4] A medical doctor who specializes in this area is known as a **pediatrician**, or **paediatrician**. The word *pediatrics* and its cognates mean "healer of children", derived from the two Greek words: ??Ã¡Â¿â€“? (*pais* "child") and Ã¡Â¼Â°???Ã•Å’?(*iatros* "doctor, healer"). Pediatricians work in clinics, research centers, universities, general hospitals and children's hospitals, including those who practice pediatric subspecialties (e.g. neonatology requires resources available in a NICU).

History

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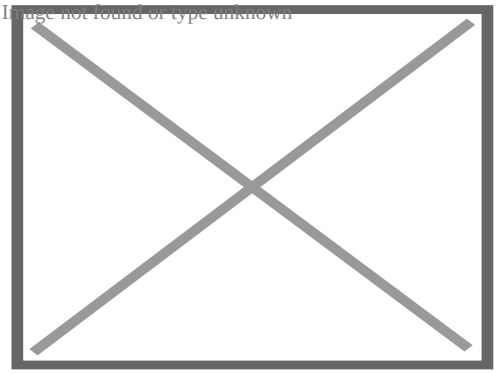

Part of Great Ormond Street Hospital in London, United Kingdom, which was the first pediatric hospital in the English-speaking world.

The earliest mentions of child-specific medical problems appear in the *Hippocratic Corpus*, published in the fifth century B.C., and the famous *Sacred Disease*. These publications discussed topics such as childhood epilepsy and premature births. From the first to fourth centuries A.D., Greek philosophers and physicians Celsus, Soranus of Ephesus, Aretaeus, Galen, and Oribasius, also discussed specific illnesses affecting children in their works, such as rashes, epilepsy, and meningitis.[5] Already Hippocrates, Aristotle, Celsus, Soranus, and Galen[6] understood the differences in growing and maturing organisms that necessitated different treatment: *Ex toto non sic pueri ut viri curari debent* ("In general, boys should not be treated in the same way as men").[7] Some of the oldest traces of pediatrics can be discovered in Ancient India where children's doctors were called *kumara bhrtya*.[6]

Even though some pediatric works existed during this time, they were scarce and rarely published due to a lack of knowledge in pediatric medicine. *Sushruta Samhita*, an ayurvedic text composed during the sixth century BCE, contains the text about pediatrics.[8] Another ayurvedic text from this period is *Kashyapa Samhita*.[9][10] A second century AD manuscript by the Greek physician and gynecologist Soranus of Ephesus dealt with neonatal pediatrics.[11] Byzantine physicians Oribasius, Aëtius of Amida, Alexander Trallianus, and Paulus Aegineta contributed to the field.[6] The Byzantines also built *brephotrophia* (crêches).[6] Islamic Golden Age writers served as a bridge for Greco-Roman and Byzantine medicine and added ideas of their own, especially Haly Abbas, Yahya Serapion, Abulcasis, Avicenna, and Averroes. The Persian philosopher and physician al-Razi (865–925), sometimes called the father of pediatrics,

published a monograph on pediatrics titled *Diseases in Children*.[12][13] Also among the first books about pediatrics was *Libellus [Opusculum] de aegritudinibus et remediis infantium* 1472 ("Little Book on Children Diseases and Treatment"), by the Italian pediatrician Paolo Bagellardo.[14][5] In sequence came Bartholomäus Metlinger's *Ein Regiment der Jungerkinder* 1473, Cornelius Roelans (1450–1525) no title Buchlein, or Latin compendium, 1483, and Heinrich von Louffenburg (1391–1460) *Versehung des Leibs* written in 1429 (published 1491), together form the *Pediatric Incunabula*, four great medical treatises on children's physiology and pathology.[6]

While more information about childhood diseases became available, there was little evidence that children received the same kind of medical care that adults did.[15] It was during the seventeenth and eighteenth centuries that medical experts started offering specialized care for children.[5] The Swedish physician Nils Rosén von Rosenstein (1706–1773) is considered to be the founder of modern pediatrics as a medical specialty,[16][17] while his work *The diseases of children, and their remedies* (1764) is considered to be "the first modern textbook on the subject".[18] However, it was not until the nineteenth century that medical professionals acknowledged pediatrics as a separate field of medicine. The first pediatric-specific publications appeared between the 1790s and the 1920s.[19]

Etymology

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The term pediatrics was first introduced in English in 1859 by Abraham Jacobi. In 1860, he became "the first dedicated professor of pediatrics in the world."[20] Jacobi is known as the *father of American pediatrics* because of his many contributions to the field.[21][22] He received his medical training in Germany and later practiced in New York City.[23]

The first generally accepted pediatric hospital is the *Hôpital des Enfants Malades* (French: *Hospital for Sick Children*), which opened in Paris in June 1802 on the site of a previous orphanage.[24] From its beginning, this famous hospital accepted patients up to the age of fifteen years,[25] and it continues to this day as the pediatric division of the Necker-Enfants Malades Hospital, created in 1920 by merging with the nearby *Necker Hospital*, founded in 1778.[26]

In other European countries, the Charité (a hospital founded in 1710) in Berlin established a separate Pediatric Pavilion in 1830, followed by similar institutions at Saint Petersburg in 1834, and at Vienna and Breslau (now WrocÃ…â€šaw), both in 1837. In 1852 Britain's first pediatric hospital, the Hospital for Sick Children, Great Ormond Street was founded by Charles West.[24] The first Children's hospital in Scotland opened in 1860 in Edinburgh.[27] In the US, the first similar institutions were the Children's Hospital of Philadelphia, which opened in 1855, and then Boston Children's Hospital (1869).[28] Subspecialties in pediatrics were created at the Harriet Lane Home at Johns Hopkins by Edwards A. Park.[29]

Differences between adult and pediatric medicine

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The body size differences are paralleled by maturation changes. The smaller body of an infant or neonate is substantially different physiologically from that of an adult. Congenital defects, genetic variance, and developmental issues are of greater concern to pediatricians than they often are to adult physicians. A common adage is that children are not simply "little adults". The clinician must take into account the immature physiology of the infant or child when considering symptoms, prescribing medications, and diagnosing illnesses.[30]

Pediatric physiology directly impacts the pharmacokinetic properties of drugs that enter the body. The absorption, distribution, metabolism, and elimination of medications differ between developing children and grown adults.[30][31][32] Despite completed studies and reviews, continual research is needed to better understand how these factors should affect the decisions of healthcare providers when prescribing and administering medications to the pediatric population.[30]

Absorption

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Many drug absorption differences between pediatric and adult populations revolve around the stomach. Neonates and young infants have increased stomach pH due to decreased acid secretion, thereby creating a more basic environment for drugs that are taken by mouth.[31][30][32] Acid is essential to degrading certain oral drugs before systemic absorption. Therefore, the absorption of these drugs in children is greater than in adults due to decreased breakdown and increased preservation in a less acidic gastric space.[31]

Children also have an extended rate of gastric emptying, which slows the rate of drug absorption.[31][32]

Drug absorption also depends on specific enzymes that come in contact with the oral drug as it travels through the body. Supply of these enzymes increase as children continue to develop their gastrointestinal tract.[31][32] Pediatric patients have underdeveloped proteins, which leads to decreased metabolism and increased serum concentrations of specific drugs. However, prodrugs experience the opposite effect because enzymes are necessary for allowing their active form to enter systemic circulation.[31]

Distribution

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Percentage of total body water and extracellular fluid volume both decrease as children grow and develop with time. Pediatric patients thus have a larger volume of distribution than adults, which directly affects the dosing of hydrophilic drugs such as beta-lactam antibiotics like ampicillin.[31] Thus, these drugs are administered at greater weight-based doses or with adjusted dosing intervals in children to account for this key difference in body composition.[31][30]

Infants and neonates also have fewer plasma proteins. Thus, highly protein-bound drugs have fewer opportunities for protein binding, leading to increased distribution.[30]

Metabolism

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Drug metabolism primarily occurs via enzymes in the liver and can vary according to which specific enzymes are affected in a specific stage of development.[31] Phase I and Phase II enzymes have different rates of maturation and development, depending on their specific mechanism of action (i.e. oxidation, hydrolysis, acetylation, methylation, etc.). Enzyme capacity, clearance, and half-life are all factors that contribute to metabolism differences between children and adults.[31][32] Drug metabolism can even differ within the pediatric population, separating neonates and infants from young children.[30]

Elimination

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Drug elimination is primarily facilitated via the liver and kidneys.[31] In infants and young children, the larger relative size of their kidneys leads to increased renal clearance of medications that are eliminated through urine.[32] In preterm neonates and infants, their kidneys are slower to mature and thus are unable to clear as much drug as fully developed kidneys. This can cause unwanted drug build-up, which is why it is important to consider lower doses and greater dosing intervals for this population.[30][31] Diseases that negatively affect kidney function can also have the same effect and thus warrant similar considerations.[31]

Pediatric autonomy in healthcare

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A major difference between the practice of pediatric and adult medicine is that children, in most jurisdictions and with certain exceptions, cannot make decisions for themselves. The issues of guardianship, privacy, legal responsibility, and informed consent must always be considered in every pediatric procedure. Pediatricians often have to treat the parents and sometimes, the family, rather than just the child. Adolescents are in their own legal class, having rights to their own health care decisions in certain circumstances. The concept of legal consent combined with the non-legal consent (assent) of the child when considering treatment options, especially in the face of conditions with poor prognosis or complicated and painful procedures/surgeries, means the pediatrician must take into account the desires of many people, in addition to those of the patient.[*citation needed*]

History of pediatric autonomy

[edit]

The term autonomy is traceable to ethical theory and law, where it states that autonomous individuals can make decisions based on their own logic.[33] Hippocrates was the first to use the term in a medical setting. He created a code of ethics for doctors called the *Hippocratic Oath* that highlighted the importance of putting patients' interests first, making autonomy for patients a top priority in health care.[34]

In ancient times, society did not view pediatric medicine as essential or scientific.[35] Experts considered professional medicine unsuitable for treating children. Children also had no rights. Fathers regarded their children as property, so their children's health decisions were entrusted to them.[5] As a result, mothers, midwives, "wise women", and general practitioners treated the children instead of doctors.[35] Since mothers could not rely on professional medicine to take care of their children, they developed their own methods, such as using alkaline soda ash to remove the vernix at birth and treating teething pain with opium or wine. The absence of proper pediatric care, rights, and laws in health care to prioritize children's health led to many of their deaths. Ancient Greeks and Romans sometimes even killed healthy female babies and infants with deformities since they had no adequate medical treatment and no laws prohibiting infanticide.[5]

In the twentieth century, medical experts began to put more emphasis on children's rights. In 1989, in the United Nations Rights of the Child Convention, medical experts developed the Best Interest Standard of Child to prioritize children's rights and best interests. This event marked the onset of pediatric autonomy. In 1995, the American Academy of Pediatrics (AAP) finally acknowledged the Best Interest Standard of a Child as an ethical principle for pediatric decision-

making, and it is still being used today.[34]

Parental authority and current medical issues

[edit]

The majority of the time, parents have the authority to decide what happens to their child. Philosopher John Locke argued that it is the responsibility of parents to raise their children and that God gave them this authority. In modern society, Jeffrey Blustein, modern philosopher and author of the book *Parents and Children: The Ethics of Family*, argues that parental authority is granted because the child requires parents to satisfy their needs. He believes that parental autonomy is more about parents providing good care for their children and treating them with respect than parents having rights.[36] The researcher Kyriakos Martakis, MD, MSc, explains that research shows parental influence negatively affects children's ability to form autonomy. However, involving children in the decision-making process allows children to develop their cognitive skills and create their own opinions and, thus, decisions about their health. Parental authority affects the degree of autonomy the child patient has. As a result, in Argentina, the new National Civil and Commercial Code has enacted various changes to the healthcare system to encourage children and adolescents to develop autonomy. It has become more crucial to let children take accountability for their own health decisions.[37]

In most cases, the pediatrician, parent, and child work as a team to make the best possible medical decision. The pediatrician has the right to intervene for the child's welfare and seek advice from an ethics committee. However, in recent studies, authors have denied that complete autonomy is present in pediatric healthcare. The same moral standards should apply to children as they do to adults. In support of this idea is the concept of paternalism, which negates autonomy when it is in the patient's interests. This concept aims to keep the child's best interests in mind regarding autonomy. Pediatricians can interact with patients and help them make decisions that will benefit them, thus enhancing their autonomy. However, radical theories that question a child's moral worth continue to be debated today.[37] Authors often question whether the treatment and equality of a child and an adult should be the same. Author Tamar Schapiro notes that children need nurturing and cannot exercise the same level of authority as adults.[38] Hence, continuing the discussion on whether children are capable of making important health decisions until this day.

Modern advancements

[edit]

According to the Subcommittee of Clinical Ethics of the Argentinean Pediatric Society (SAP), children can understand moral feelings at all ages and can make reasonable decisions based on those feelings. Therefore, children and teens are deemed capable of making their own health decisions when they reach the age of 13. Recently, studies made on the decision-making of children have challenged that age to be 12.[37]

Technology has made several modern advancements that contribute to the future development of child autonomy, for example, unsolicited findings (U.F.s) of pediatric exome sequencing. They are findings based on pediatric exome sequencing that explain in greater detail the intellectual disability of a child and predict to what extent it will affect the child in the future. Genetic and intellectual disorders in children make them incapable of making moral decisions, so people look down upon this kind of testing because the child's future autonomy is at risk. It is still in question whether parents should request these types of testing for their children. Medical experts argue that it could endanger the autonomous rights the child will possess in the future. However, the parents contend that genetic testing would benefit the welfare of their children since it would allow them to make better health care decisions.[39] Exome sequencing for children and the decision to grant parents the right to request them is a medically ethical issue that many still debate today.

Education requirements

[edit]

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The examples and perspective in this section **deal primarily with United States and do not represent a worldwide view of the subject**. You may improve this section, discuss the issue on the talk page, or create a new section, as appropriate. *(September 2019) (Learn how and when to remove this message)*

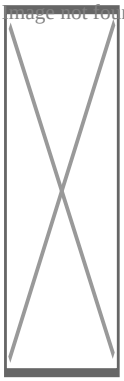
Aspiring medical students will need 4 years of undergraduate courses at a college or university, which will get them a BS, BA or other bachelor's degree. After completing college, future pediatricians will need to attend 4 years of medical school (MD/DO/MBBS) and later do 3 more years of residency training, the first year of which is called "internship." After completing the 3 years of residency, physicians are eligible to become certified in pediatrics by passing a rigorous test that deals with medical conditions related to young children.[*citation needed*]

In high school, future pediatricians are required to take basic science classes such as biology, chemistry, physics, algebra, geometry, and calculus. It is also advisable to learn a foreign language (preferably Spanish in the United States) and be involved in high school organizations and extracurricular activities. After high school, college students simply need to fulfill the basic science course requirements that most medical schools recommend and will need to prepare to take the MCAT (Medical College Admission Test) in their junior or early senior year in college. Once attending medical school, student courses will focus on basic medical sciences like human anatomy, physiology, chemistry, etc., for the first three years, the second year of which is when medical students start to get hands-on experience with actual patients.[40]

Training of pediatricians

[edit]

Pediatrics



Occupation

Names	○ Pediatrician ○ Paediatrician
Occupation type	Specialty
Activity sectors	Medicine

Description

Education required	○ Doctor of Medicine ○ Doctor of Osteopathic Medicine ○ Bachelor of Medicine, Bachelor of Surgery (MBBS/MBChB)
Fields of employment	Hospitals, Clinics

The training of pediatricians varies considerably across the world. Depending on jurisdiction and university, a medical degree course may be either undergraduate-entry or graduate-entry. The former commonly takes five or six years and has been usual in the Commonwealth. Entrants to graduate-entry courses (as in the US), usually lasting four or five years, have previously completed a three- or four-year university degree, commonly but by no means always in sciences. Medical graduates hold a degree specific to the country and university in and from which they graduated. This degree qualifies that medical practitioner to become licensed or registered under the laws of that particular country, and sometimes of several countries, subject to requirements for "internship" or "conditional registration".

Pediatricians must undertake further training in their chosen field. This may take from four to eleven or more years depending on jurisdiction and the degree of specialization.

In the United States, a medical school graduate wishing to specialize in pediatrics must undergo a three-year residency composed of outpatient, inpatient, and critical care rotations. Subspecialties within pediatrics require further training in the form of 3-year fellowships. Subspecialties include critical care, gastroenterology, neurology, infectious disease, hematology/oncology, rheumatology, pulmonology, child abuse, emergency medicine, endocrinology, neonatology, and others.[41]

In most jurisdictions, entry-level degrees are common to all branches of the medical profession, but in some jurisdictions, specialization in pediatrics may begin before completion of this degree. In some jurisdictions, pediatric training is begun immediately following the completion of entry-level training. In other jurisdictions, junior medical doctors must undertake generalist (unstreamed) training for a number of years before commencing pediatric (or any other) specialization. Specialist training is often largely under the control of *'pediatric organizations* (see below) rather than universities and depends on the jurisdiction.

Subspecialties

[edit]

Subspecialties of pediatrics include:

(*not an exhaustive list*)

- Addiction medicine (multidisciplinary)
- Adolescent medicine
- Child abuse pediatrics
- Clinical genetics
- Clinical informatics
- Developmental-behavioral pediatrics
- Headache medicine
- Hospital medicine
- Medical toxicology
- Metabolic medicine
- Neonatology/Perinatology
- Pain medicine (multidisciplinary)
- Palliative care (multidisciplinary)
- Pediatric allergy and immunology
- Pediatric cardiology
    - Pediatric cardiac critical care
- Pediatric critical care
    - Neurocritical care
    - Pediatric cardiac critical care
- Pediatric emergency medicine
- Pediatric endocrinology
- Pediatric gastroenterology

    - Transplant hepatology
- Pediatric hematology
- Pediatric infectious disease
- Pediatric nephrology
- Pediatric oncology
    - Pediatric neuro-oncology
- Pediatric pulmonology
- Primary care
- Pediatric rheumatology
- Sleep medicine (multidisciplinary)
- Social pediatrics
- Sports medicine

Other specialties that care for children

[edit]

(*not an exhaustive list*)

- Child neurology
    - Addiction medicine (multidisciplinary)
    - Brain injury medicine
    - Clinical neurophysiology
    - Epilepsy
    - Headache medicine
    - Neurocritical care
    - Neuroimmunology
    - Neuromuscular medicine
    - Pain medicine (multidisciplinary)
    - Palliative care (multidisciplinary)
    - Pediatric neuro-oncology
    - Sleep medicine (multidisciplinary)
- Child and adolescent psychiatry, subspecialty of psychiatry
- Neurodevelopmental disabilities
- Pediatric anesthesiology, subspecialty of anesthesiology
- Pediatric dentistry, subspecialty of dentistry
- Pediatric dermatology, subspecialty of dermatology
- Pediatric gynecology
- Pediatric neurosurgery, subspecialty of neurosurgery
- Pediatric ophthalmology, subspecialty of ophthalmology
- Pediatric orthopedic surgery, subspecialty of orthopedic surgery
- Pediatric otolaryngology, subspecialty of otolaryngology
- Pediatric plastic surgery, subspecialty of plastic surgery
- Pediatric radiology, subspecialty of radiology
- Pediatric rehabilitation medicine, subspecialty of physical medicine and rehabilitation

- Pediatric surgery, subspecialty of general surgery
- Pediatric urology, subspecialty of urology

See also

[edit]

- American Academy of Pediatrics
- American Osteopathic Board of Pediatrics
- Center on Media and Child Health (CMCH)
- Children's hospital
- List of pediatric organizations
- List of pediatrics journals
- Medical specialty
- Pediatric Oncall
- Pain in babies
- Royal College of Paediatrics and Child Health
- Pediatric environmental health

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39. **^** *Dondorp, W.; Bolt, I.; Tibben, A.; De Wert, G.; Van Summeren, M. (1 September 2021). '"We Should View Him as an Individual': The Role of the Child's Future Autonomy in Shared Decision-Making About Unsolicited Findings in Pediatric Exome Sequencing". Health Care Analysis.* ***29*** *(3): 249–261. doi:10.1007/s10728-020-00425-7. ISSN 1573-3394. PMID 33389383. S2CID 230112761.*
40. **^** *"What Education Is Required to Be a Pediatrician?". Archived from the original on 7 June 2017. Retrieved 14 June 2017.*

41. ^ *"CoPS". www.pedsubs.org. Archived from the original on 18 September 2013. Retrieved 14 August 2015.*

Further reading

[edit]

- *BMC Pediatrics* - open access
- *Clinical Pediatrics*
- *Developmental Review* - partial open access
- *JAMA Pediatrics*
- *The Journal of Pediatrics* - partial open access

External links

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- Pediatrics Directory at Curlie
- Pediatric Health Directory at OpenMD

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Medicine

Surgery	○ Cardiac surgery
	○ Cardiothoracic surgery
	○ Endocrine surgery
	○ Eye surgery
	○ General surgery
	  ○ Colorectal surgery
	  ○ Digestive system surgery
	○ Neurosurgery
	○ Oral and maxillofacial surgery
	○ Orthopedic surgery
	○ Hand surgery
	○ Otolaryngology
	  ○ ENT
	○ Pediatric surgery
	○ Plastic surgery
	○ Reproductive surgery
	○ Surgical oncology
	○ Transplant surgery
	○ Trauma surgery
	○ Urology
	  ○ Andrology
	○ Vascular surgery

Internal medicine	○ Allergy / Immunology ○ Angiology ○ Cardiology ○ Endocrinology ○ Gastroenterology ○ Hepatology ○ Geriatrics ○ Hematology ○ Hospital medicine ○ Infectious diseases ○ Nephrology ○ Oncology ○ Pulmonology ○ Rheumatology
Obstetrics and gynaecology	○ Gynaecology ○ Gynecologic oncology ○ Maternal–fetal medicine ○ Obstetrics ○ Reproductive endocrinology and infertility ○ Urogynecology

Medical education	○ Medical school ○ Bachelor of Medicine, Bachelor of Surgery ○ Bachelor of Medical Sciences ○ Master of Medicine ○ Master of Surgery ○ Doctor of Medicine ○ Doctor of Osteopathic Medicine ○ MD–PhD ○ Medical Scientist Training Program
Related topics	○ Alternative medicine ○ Allied health ○ Molecular oncology ○ Nanomedicine ○ Personalized medicine ○ Public health ○ Rural health ○ Therapy ○ Traditional medicine ○ Veterinary medicine ○ Physician ○ Chief physician ○ History of medicine

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Infants and their care

Health (Pediatrics)	○ Baby food ○ Birth weight ○ Breast pump ○ Breastfeeding ○ Breastfeeding and medications ○ Breastfeeding and mental health ○ Bottle feeding ○ Colic ○ Cradle cap ○ Esotropia ○ Failure to thrive ○ Immunization ○ Infant and toddler safety ○ Infant bathing ○ Infant feeding ○ Infant food safety ○ Infant formula ○ Infant massage ○ Infant respiratory distress syndrome ○ Infant sleep training ○ Neonatal intensive care unit ○ Newborn care and safety ○ Oral rehydration therapy ○ Pedialyte ○ Preterm birth ○ Shaken baby syndrome ○ Soy formula ○ SIDS

Development

- Attachment parenting
- Baby-led weaning
- Baby talk
- Babbling
- Birth defect
- Childbirth
- Crawling
- Gestational age
- Infant visual development
- Irritant diaper dermatitis
- Infant cognitive development
- Infant crying
- Kangaroo care
- Mother
- Nursery rhyme
- Object permanence
- Parent
- Parenting
- Peekaboo
- Play
- Prenatal development
- Prenatal development table
- Teething
- Walking
- Weaning

Socialization and Culture

- Attachment
- Babysitting
- Child abuse
- Child care
- Child custody
- Children's rights
  - UN Child rights
- Circumcision
- Foster care
- Grandparent visitation
- Infant swimming
- Milk bank
- Nanny
- Wet nurse

Infant care and equipment	○ Baby bouncer ○ Baby gate ○ Baby monitor/Hidden camera ○ Baby powder ○ Baby shampoo ○ Baby toy ○ Baby walker ○ Bib ○ Baby swing ○ Baby transport ○ Bassinet ○ Car seat safety ○ Cloth diaper ○ Cradle board ○ Diaper ○ Diaper bag ○ Baby wipes ○ Haberman Feeder ○ High chair ○ Infant bed *(American 'crib' and 'cradle', British 'cot')* ○ Infant carrier ○ Infant clothing ○ Pacifier ○ Playpen ○ Stroller ○ Supplemental nursing system ○ Swaddling ○ Swim diaper ○ Teether ○ Travel cot

Other topics	○ Baby shower ○ Babywearing ○ Child neglect ○ Closed adoption ○ Cry room ○ Infant ear piercing ○ Open adoption ○ Prenatal cocaine exposure ○ Neonatal withdrawal syndrome ○ Parental child abduction ○ Parental responsibility ○ Parenting plan ○ Paternity ○ Paternity fraud

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National	○ Germany ○ Japan ○ Czech Republic ○ Latvia ○ Israel
Other	○ NARA

About health professional

A **health professional**, **healthcare professional**, or **healthcare worker** (sometimes abbreviated **HCW**)[1] is a provider of health care treatment and advice based on formal training and experience. The field includes those who work as a nurse, physician (such as family physician, internist, obstetrician, psychiatrist, radiologist, surgeon etc.), physician assistant, registered dietitian, veterinarian, veterinary technician, optometrist, pharmacist, pharmacy technician, medical assistant, physical therapist, occupational therapist, dentist, midwife, psychologist, audiologist, or healthcare scientist, or who perform services in allied health professions. Experts in public health and community health are also health professionals.

Fields

[edit]

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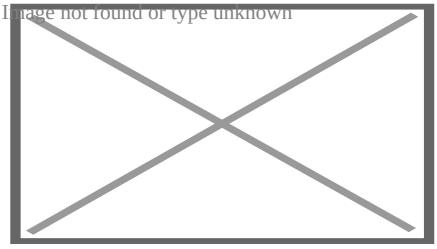

NY College of Health Professions massage therapy class

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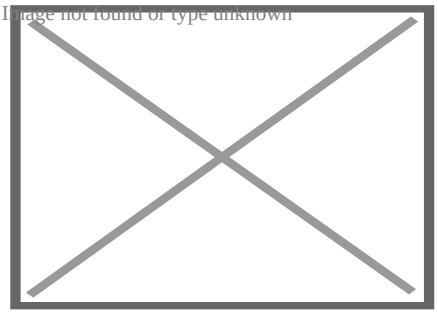

US Navy doctors deliver a healthy baby

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Health practitioners and professionals

- Athletic trainer
- Audiologist
- Chiropractor
- Clinical coder
- Clinical nurse specialist
- Clinical officer
- Community health worker
- Dentist
- Dietitian and nutritionist
- Emergency medical technician
- Feldsher
- Health administrator
- Medical assistant
- Medical laboratory scientist
- Medical transcriptionist
- Nurse anesthetist
- Nurse practitioner
- Nurse midwife
- Nurse
- Occupational Therapist
- Optometrist
- Paramedic
- Pharmacist
- Pharmaconomist
- Pharmacy technician
- Phlebotomist
- Physician
- Physician assistant
- Podiatrist
- Psychologist
- Psychotherapist
- Physical therapist
- Radiographer
- Radiotherapist
- Respiratory therapist
- Speech-language pathologist
- Social Work
- Surgeon
- Surgeon's assistant
- Surgical technologist

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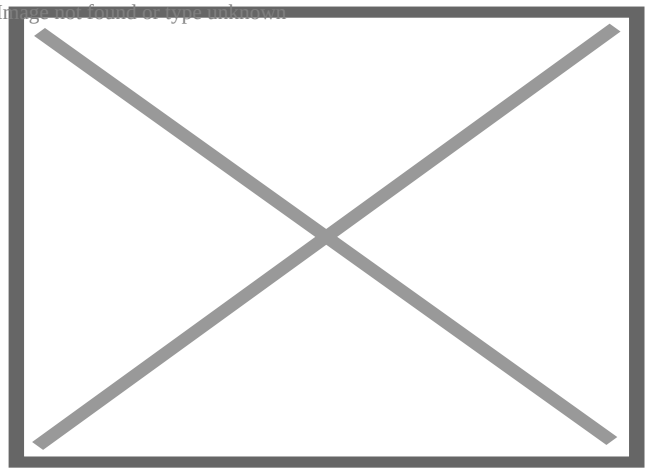


70% of global health and social care workers are women, 30% of leaders in the global health sector are women

The healthcare workforce comprises a wide variety of professions and occupations who provide some type of healthcare service, including such direct care practitioners as physicians, nurse practitioners, physician assistants, nurses, respiratory therapists, dentists, pharmacists, speech-language pathologist, physical therapists, occupational therapists, physical and behavior therapists, as well as allied health professionals such as phlebotomists, medical laboratory scientists, dieticians, and social workers. They often work in hospitals, healthcare centers and other service delivery points, but also in academic training, research, and administration. Some provide care and treatment services for patients in private homes. Many countries have a large number of community health workers who work outside formal healthcare institutions. Managers of healthcare services, health information technicians, and other assistive personnel and support workers are also considered a vital part of health care teams.[2]

Healthcare practitioners are commonly grouped into health professions. Within each field of expertise, practitioners are often classified according to skill level and skill specialization. "Health professionals" are highly skilled workers, in professions that usually require extensive knowledge including university-level study leading to the award of a first degree or higher qualification.[3] This category includes physicians, physician assistants, registered nurses, veterinarians, veterinary technicians, veterinary assistants, dentists, midwives, radiographers, pharmacists, physiotherapists, optometrists, operating department practitioners and others. Allied health professionals, also referred to as "health associate professionals" in the International Standard Classification of Occupations, support implementation of health care, treatment and referral plans usually established by medical, nursing, respiratory care, and other health professionals, and usually require formal qualifications to practice their profession. In addition, unlicensed assistive personnel assist with providing health care services as permitted.[*citation*

Another way to categorize healthcare practitioners is according to the sub-field in which they practice, such as mental health care, pregnancy and childbirth care, surgical care, rehabilitation care, or public health.[*citation needed*]

Mental health

[edit]
Main article: Mental health professional

A mental health professional is a health worker who offers services to improve the mental health of individuals or treat mental illness. These include psychiatrists, psychiatry physician assistants, clinical, counseling, and school psychologists, occupational therapists, clinical social workers, psychiatric-mental health nurse practitioners, marriage and family therapists, mental health counselors, as well as other health professionals and allied health professions. These health care providers often deal with the same illnesses, disorders, conditions, and issues; however, their scope of practice often differs. The most significant difference across categories of mental health practitioners is education and training.[4] There are many damaging effects to the health care workers. Many have had diverse negative psychological symptoms ranging from emotional trauma to very severe anxiety. Health care workers have not been treated right and because of that their mental, physical, and emotional health has been affected by it. The SAGE author's said that there were 94% of nurses that had experienced at least one PTSD after the traumatic experience. Others have experienced nightmares, flashbacks, and short and long term emotional reactions.[5] The abuse is causing detrimental effects on these health care workers. Violence is causing health care workers to have a negative attitude toward work tasks and patients, and because of that they are "feeling pressured to accept the order, dispense a product, or administer a medication".[6] Sometimes it can range from verbal to sexual to physical harassment, whether the abuser is a patient, patient's families, physician, supervisors, or nurses.[*citation needed*]

Obstetrics

[edit]
Main articles: Obstetrics, Midwifery, and Birth attendant

A maternal and newborn health practitioner is a health care expert who deals with the care of women and their children before, during and after pregnancy and childbirth. Such health practitioners include obstetricians, physician assistants, midwives, obstetrical nurses and many others. One of the main differences between these professions is in the training and authority to provide surgical services and other life-saving interventions.[7] In some developing countries, traditional birth attendants, or traditional midwives, are the primary source of pregnancy and childbirth care for many women and families, although they are not certified or licensed. According to research, rates for unhappiness among obstetrician-gynecologists (Ob-Gyns) range somewhere between 40 and 75 percent.[8]

Geriatrics

[edit]
Main articles: Geriatrics and Geriatric care management

A geriatric care practitioner plans and coordinates the care of the elderly and/or disabled to promote their health, improve their quality of life, and maintain their independence for as long as possible.[9] They include geriatricians, occupational therapists, physician assistants, adult-gerontology nurse practitioners, clinical nurse specialists, geriatric clinical pharmacists, geriatric nurses, geriatric care managers, geriatric aides, nursing aides, caregivers and others who focus on the health and psychological care needs of older adults.[*citation needed*]

Surgery

[edit]

A surgical practitioner is a healthcare professional and expert who specializes in the planning and delivery of a patient's perioperative care, including during the anaesthetic, surgical and recovery stages. They may include general and specialist surgeons, physician assistants, assistant surgeons, surgical assistants, veterinary surgeons, veterinary technicians. anesthesiologists, anesthesiologist assistants, nurse anesthetists, surgical nurses, clinical officers, operating department practitioners, anaesthetic technicians, perioperative nurses, surgical technologists, and others.[*citation needed*]

Rehabilitation

[edit]

A rehabilitation care practitioner is a health worker who provides care and treatment which aims to enhance and restore functional ability and quality of life to those with physical impairments or disabilities. These include physiatrists, physician assistants, rehabilitation nurses, clinical nurse specialists, nurse practitioners, physiotherapists, chiropractors, orthotists, prosthetists, occupational therapists, recreational therapists, audiologists, speech and language pathologists, respiratory therapists, rehabilitation counsellors, physical rehabilitation therapists, athletic trainers, physiotherapy technicians, orthotic technicians, prosthetic technicians, personal care assistants, and others.[10]

Optometry

[edit]
Main article: Optometry

Optometry is a field traditionally associated with the correction of refractive errors using glasses or contact lenses, and treating eye diseases. Optometrists also provide general eye care, including screening exams for glaucoma and diabetic retinopathy and management of routine or eye conditions. Optometrists may also undergo further training in order to specialize in various fields, including glaucoma, medical retina, low vision, or paediatrics. In some countries, such as the United Kingdom, United States, and Canada, Optometrists may also undergo further training in order to be able to perform some surgical procedures.

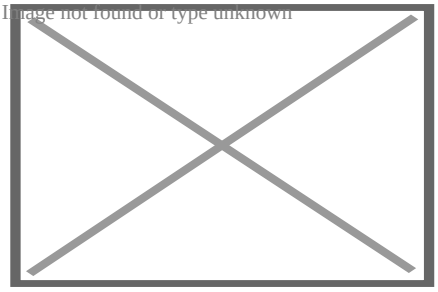
Diagnostics

[edit]
Main article: Medical diagnosis

Medical diagnosis providers are health workers responsible for the process of determining which disease or condition explains a person's symptoms and signs. It is most often referred to as diagnosis with the medical context being implicit. This usually involves a team of healthcare providers in various diagnostic units. These include radiographers, radiologists, Sonographers, medical laboratory scientists, pathologists, and related professionals.[*citation needed*]

Dentistry

[edit]



Dental assistant on the right supporting a dental operator on the left, during a procedure.

Main article: Dentistry

A dental care practitioner is a health worker and expert who provides care and treatment to promote and restore oral health. These include dentists and dental surgeons, dental assistants, dental auxiliaries, dental hygienists, dental nurses, dental technicians, dental therapists or oral health therapists, and related professionals.

Podiatry

[edit]

Care and treatment for the foot, ankle, and lower leg may be delivered by podiatrists, chiropodists, pedorthists, foot health practitioners, podiatric medical assistants, podiatric nurse and others.

Public health

[edit]

A public health practitioner focuses on improving health among individuals, families and communities through the prevention and treatment of diseases and injuries, surveillance of cases, and promotion of healthy behaviors. This category includes community and preventive medicine specialists, physician assistants, public health nurses, pharmacist, clinical nurse specialists, dietitians, environmental health officers (public health inspectors), paramedics, epidemiologists, public health dentists, and others.[*citation needed*]

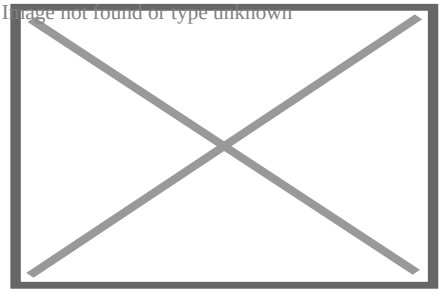
Alternative medicine

[edit]

In many societies, practitioners of alternative medicine have contact with a significant number of people, either as integrated within or remaining outside the formal health care system. These include practitioners in acupuncture, Ayurveda, herbalism, homeopathy, naturopathy, Reiki, Shamballa Reiki energy healing Archived 2021-01-25 at the Wayback Machine, Siddha medicine, traditional Chinese medicine, traditional Korean medicine, Unani, and Yoga. In some countries such as Canada, chiropractors and osteopaths (not to be confused with doctors of osteopathic medicine in the United States) are considered alternative medicine practitioners.

Occupational hazards

[edit]
See also: Occupational hazards in dentistry and Nursing § Occupational hazards



A healthcare professional wears an air sampling device to investigate exposure to airborne influenza

A video describing the Occupational Health and Safety Network, a tool for monitoring occupational hazards to health care workers

The healthcare workforce faces unique health and safety challenges and is recognized by the National Institute for Occupational Safety and Health (NIOSH) as a priority industry sector in the National Occupational Research Agenda (NORA) to identify and provide intervention strategies regarding occupational health and safety issues.[11]

Biological hazards

[edit]

Exposure to respiratory infectious diseases like tuberculosis (caused by *Mycobacterium tuberculosis*) and influenza can be reduced with the use of respirators; this exposure is a significant occupational hazard for health care professionals.[12] Healthcare workers are also at risk for diseases that are contracted through extended contact with a patient, including scabies.[13] Health professionals are also at risk for contracting blood-borne diseases like hepatitis B, hepatitis C, and HIV/AIDS through needlestick injuries or contact with bodily fluids.[14][15] This risk can be mitigated with vaccination when there is a vaccine available, like with hepatitis B.[15] In epidemic situations, such as the 2014-2016 West African Ebola virus epidemic or the 2003 SARS outbreak, healthcare workers are at even greater risk, and were disproportionately affected in both the Ebola and SARS outbreaks.[16]

In general, appropriate personal protective equipment (PPE) is the first-line mode of protection for healthcare workers from infectious diseases. For it to be effective against highly contagious diseases, personal protective equipment must be watertight and prevent the skin and mucous membranes from contacting infectious material. Different levels of personal protective

equipment created to unique standards are used in situations where the risk of infection is different. Practices such as triple gloving and multiple respirators do not provide a higher level of protection and present a burden to the worker, who is additionally at increased risk of exposure when removing the PPE. Compliance with appropriate personal protective equipment rules may be difficult in certain situations, such as tropical environments or low-resource settings. A 2020 Cochrane systematic review found low-quality evidence that using more breathable fabric in PPE, double gloving, and active training reduce the risk of contamination but that more randomized controlled trials are needed for how best to train healthcare workers in proper PPE use.[16]

Tuberculosis screening, testing, and education

[edit]

Based on recommendations from The United States Center for Disease Control and Prevention (CDC) for TB screening and testing the following best practices should be followed when hiring and employing Health Care Personnel.[17]

When hiring Health Care Personnel, the applicant should complete the following:[18] a TB risk assessment,[19] a TB symptom evaluation for at least those listed on the Signs & Symptoms page,[20] a TB test in accordance with the guidelines for Testing for TB Infection,[21] and additional evaluation for TB disease as needed (e.g. chest x-ray for HCP with a positive TB test) [18] The CDC recommends either a blood test, also known as an interferon-gamma release assay (IGRA), or a skin test, also known as a Mantoux tuberculin skin test (TST).[21] A TB blood test for baseline testing does not require two-step testing. If the skin test method is used to test HCP upon hire, then two-step testing should be used. A one-step test is not recommended.[18]

The CDC has outlined further specifics on recommended testing for several scenarios.[22] In summary:

1. Previous documented positive skin test (TST) then a further TST is not recommended
2. Previous documented negative TST within 12 months before employment OR at least two documented negative TSTs ever then a single TST is recommended
3. All other scenarios, with the exception of programs using blood tests, the recommended testing is a two-step TST

According to these recommended testing guidelines any two negative TST results within 12 months of each other constitute a two-step TST.

For annual screening, testing, and education, the only recurring requirement for all HCP is to receive TB education annually.[18] While the CDC offers education materials, there is not a well defined requirement as to what constitutes a satisfactory annual education. Annual TB testing is no longer recommended unless there is a known exposure or ongoing transmission at a healthcare facility. Should an HCP be considered at increased occupational risk for TB annual

screening may be considered. For HCP with a documented history of a positive TB test result do not need to be re-tested but should instead complete a TB symptom evaluation. It is assumed that any HCP who has undergone a chest x-ray test has had a previous positive test result. When considering mental health you may see your doctor to be evaluated at your digression. It is recommended to see someone at least once a year in order to make sure that there has not been any sudden changes.[23]

Psychosocial hazards

[edit]

Occupational stress and occupational burnout are highly prevalent among health professionals.[24] Some studies suggest that workplace stress is pervasive in the health care industry because of inadequate staffing levels, long work hours, exposure to infectious diseases and hazardous substances leading to illness or death, and in some countries threat of malpractice litigation. Other stressors include the emotional labor of caring for ill people and high patient loads. The consequences of this stress can include substance abuse, suicide, major depressive disorder, and anxiety, all of which occur at higher rates in health professionals than the general working population. Elevated levels of stress are also linked to high rates of burnout, absenteeism and diagnostic errors, and reduced rates of patient satisfaction.[25] In Canada, a national report (*Canada's Health Care Providers*) also indicated higher rates of absenteeism due to illness or disability among health care workers compared to the rest of the working population, although those working in health care reported similar levels of good health and fewer reports of being injured at work.[26]

There is some evidence that cognitive-behavioral therapy, relaxation training and therapy (including meditation and massage), and modifying schedules can reduce stress and burnout among multiple sectors of health care providers. Research is ongoing in this area, especially with regards to physicians, whose occupational stress and burnout is less researched compared to other health professions.[27]

Healthcare workers are at higher risk of on-the-job injury due to violence. Drunk, confused, and hostile patients and visitors are a continual threat to providers attempting to treat patients. Frequently, assault and violence in a healthcare setting goes unreported and is wrongly assumed to be part of the job.[28] Violent incidents typically occur during one-on-one care; being alone with patients increases healthcare workers' risk of assault.[29] In the United States, healthcare workers experience 2?3 of nonfatal workplace violence incidents.[28] Psychiatric units represent the highest proportion of violent incidents, at 40%; they are followed by geriatric units (20%) and the emergency department (10%). Workplace violence can also cause psychological trauma.[29]

Health care professionals are also likely to experience sleep deprivation due to their jobs. Many health care professionals are on a shift work schedule, and therefore experience misalignment

of their work schedule and their circadian rhythm. In 2007, 32% of healthcare workers were found to get fewer than 6 hours of sleep a night. Sleep deprivation also predisposes healthcare professionals to make mistakes that may potentially endanger a patient.[30]

COVID pandemic

[edit]

Especially in times like the present (2020), the hazards of health professional stem into the mental health. Research from the last few months highlights that COVID-19 has contributed greatly to the degradation of mental health in healthcare providers. This includes, but is not limited to, anxiety, depression/burnout, and insomnia.[*citation needed*]

A study done by Di Mattei et al. (2020) revealed that 12.63% of COVID nurses and 16.28% of other COVID healthcare workers reported extremely severe anxiety symptoms at the peak of the pandemic.[31] In addition, another study was conducted on 1,448 full time employees in Japan. The participants were surveyed at baseline in March 2020 and then again in May 2020. The result of the study showed that psychological distress and anxiety had increased more among healthcare workers during the COVID-19 outbreak.[32]

Similarly, studies have also shown that following the pandemic, at least one in five healthcare professionals report symptoms of anxiety.[33] Specifically, the aspect of "anxiety was assessed in 12 studies, with a pooled prevalence of 23.2%" following COVID.[33] When considering all 1,448 participants that percentage makes up about 335 people.

Abuse by patients

[edit]

- The patients are selecting victims who are more vulnerable. For example, Cho said that these would be the nurses that are lacking experience or trying to get used to their new roles at work.[34]
- Others authors that agree with this are Vento, Cainelli, & Vallone and they said that, the reason patients have caused danger to health care workers is because of insufficient communication between them, long waiting lines, and overcrowding in waiting areas.[35] When patients are intrusive and/or violent toward the faculty, this makes the staff question what they should do about taking care of a patient.
- There have been many incidents from patients that have really caused some health care workers to be traumatized and have so much self doubt. Goldblatt and other authors said that there was a lady who was giving birth, her husband said, "Who is in charge around here"? "Who are these sluts you employ here".[5] This was very avoidable to have been said to the people who are taking care of your wife and child.

Physical and chemical hazards

[edit]

Slips, trips, and falls are the second-most common cause of worker's compensation claims in the US and cause 21% of work absences due to injury. These injuries most commonly result in strains and sprains; women, those older than 45, and those who have been working less than a year in a healthcare setting are at the highest risk.[36]

An epidemiological study published in 2018 examined the hearing status of noise-exposed health care and social assistance (HSA) workers sector to estimate and compare the prevalence of hearing loss by subsector within the sector. Most of the HSA subsector prevalence estimates ranged from 14% to 18%, but the Medical and Diagnostic Laboratories subsector had 31% prevalence and the Offices of All Other Miscellaneous Health Practitioners had a 24% prevalence. The Child Day Care Services subsector also had a 52% higher risk than the reference industry.[37]

Exposure to hazardous drugs, including those for chemotherapy, is another potential occupational risk. These drugs can cause cancer and other health conditions.[38]

Gender factors

[edit]

Female health care workers may face specific types of workplace-related health conditions and stress. According to the World Health Organization, women predominate in the formal health workforce in many countries and are prone to musculoskeletal injury (caused by physically demanding job tasks such as lifting and moving patients) and burnout. Female health workers are exposed to hazardous drugs and chemicals in the workplace which may cause adverse reproductive outcomes such as spontaneous abortion and congenital malformations. In some contexts, female health workers are also subject to gender-based violence from coworkers and patients.[39][40]

Workforce shortages

[edit]
See also: Health workforce, Doctor shortage, and Nursing shortage

Many jurisdictions report shortfalls in the number of trained health human resources to meet population health needs and/or service delivery targets, especially in medically underserved areas. For example, in the United States, the 2010 federal budget invested $330 million to increase the number of physicians, physician assistants, nurse practitioners, nurses, and dentists practicing in areas of the country experiencing shortages of trained health professionals. The Budget expands loan repayment programs for physicians, nurses, and dentists who agree to practice in medically underserved areas. This funding will enhance the capacity of nursing schools to increase the number of nurses. It will also allow states to increase access to oral health care through dental workforce development grants. The Budget's new resources will sustain the expansion of the health care workforce funded in the Recovery Act.[41] There were 15.7 million health care professionals in the US as of 2011.[36]

In Canada, the 2011 federal budget announced a Canada Student Loan forgiveness program to encourage and support new family physicians, physician assistants, nurse practitioners and nurses to practice in underserved rural or remote communities of the country, including communities that provide health services to First Nations and Inuit populations.[42]

In Uganda, the Ministry of Health reports that as many as 50% of staffing positions for health workers in rural and underserved areas remain vacant. As of early 2011, the Ministry was conducting research and costing analyses to determine the most appropriate attraction and retention packages for medical officers, nursing officers, pharmacists, and laboratory technicians in the country's rural areas.[43]

At the international level, the World Health Organization estimates a shortage of almost 4.3 million doctors, midwives, nurses, and support workers worldwide to meet target coverage levels of essential primary health care interventions.[44] The shortage is reported most severe in 57 of the poorest countries, especially in sub-Saharan Africa.

Nurses are the most common type of medical field worker to face shortages around the world. There are numerous reasons that the nursing shortage occurs globally. Some include: inadequate pay, a large percentage of working nurses are over the age of 45 and are nearing retirement age, burnout, and lack of recognition.[45]

Incentive programs have been put in place to aid in the deficit of pharmacists and pharmacy students. The reason for the shortage of pharmacy students is unknown but one can infer that it is due to the level of difficulty in the program.[46]

Results of nursing staff shortages can cause unsafe staffing levels that lead to poor patient care. Five or more incidents that occur per day in a hospital setting as a result of nurses who do not receive adequate rest or meal breaks is a common issue.[47]

Regulation and registration

[edit]
Main article: Health professional requisites

Practicing without a license that is valid and current is typically illegal. In most jurisdictions, the provision of health care services is regulated by the government. Individuals found to be providing medical, nursing or other professional services without the appropriate certification or license may face sanctions and criminal charges leading to a prison term. The number of professions subject to regulation, requisites for individuals to receive professional licensure, and nature of sanctions that can be imposed for failure to comply vary across jurisdictions.

In the United States, under Michigan state laws, an individual is guilty of a felony if identified as practicing in the health profession without a valid personal license or registration. Health professionals can also be imprisoned if found guilty of practicing beyond the limits allowed by their licenses and registration. The state laws define the scope of practice for medicine, nursing, and a number of allied health professions.[48][*unreliable source?*] In Florida, practicing medicine without the appropriate license is a crime classified as a third degree felony,[49] which may give imprisonment up to five years. Practicing a health care profession without a license which results in serious bodily injury classifies as a second degree felony,[49] providing up to 15 years' imprisonment.

In the United Kingdom, healthcare professionals are regulated by the state; the UK Health and Care Professions Council (HCPC) protects the 'title' of each profession it regulates. For example, it is illegal for someone to call himself an Occupational Therapist or Radiographer if they are not on the register held by the HCPC.

See also

[edit]

- List of healthcare occupations
- Community health center
- Chronic care management
- Electronic superbill
- Geriatric care management
- Health human resources
- Uniform Emergency Volunteer Health Practitioners Act

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Care	○ Acute ○ Chronic ○ End-of-life ○ Hospice ○ Overutilization ○ Palliative ○ Primary ○ Self ○ Total

Skills / training	○ Bedside manner ○ Cultural competence ○ Diagnosis ○ Education ○ Universal precautions
Technology	○ 3D bioprinting ○ Artificial intelligence ○ Connected health ○ Digital health ○ Electronic health records ○ mHealth ○ Nanomedicine ○ Telemedicine
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