

Optimizing Clinical Productivity

Using speech recognition with medical features
vs. a general-purpose solution

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Highly-accurate medical speech recognition for busy clinicians, provides better care with lower cost, greater revenue

Maximizing speech recognition accuracy is the single most important determinant in maximizing clinician productivity, practice revenue, and satisfaction. A low accuracy reduces clinicians' confidence and will require that they spend extra minutes on each note reviewing and correcting transcribed text. The economic impact on a practice and on clinician satisfaction can be significant—far outweighing any initial cost savings accrued by purchasing lower-cost, general-purpose, non-medical speech recognition products.

The Dragon® Medical speech recognition software solution is designed for clinicians based on robust linguistic and acoustic research and the analysis of millions of medical records, combined with advanced software engineering for ease of use.

While Nuance markets non-medical versions of Dragon, Nuance strongly recommends that healthcare providers rely on Dragon Medical for use in clinical settings as the only speech recognition solution which will fully meet the needs of practicing clinicians. Dragon Medical combines the highest recognition accuracy with a feature set shaped for use in an electronic health record (EHR) environment.

This white paper describes the significant advantages Dragon Medical provides compared with non-medical speech recognition products in clinical settings. After reading this document, we hope you'll agree that only Dragon Medical should be a required part of your speech recognition clinical documentation strategy.

Specialty-specific vocabularies: high 'out-of the box' accuracy

As a clinician, you know that medical terminology and phraseology differs greatly from everyday English. Specialization has not only affected the practice of medicine, but also communication and documentation. You wouldn't expect non-clinicians to understand fully the communication between you and your colleagues in a hospital or practice.

Dragon Medical includes specialty-specific vocabularies based on the analysis of millions of real-world medical reports from the full range of medical specialties. These vocabularies include detailed information on the proper spellings and pronunciations of words, as well as sophisticated statistical models describing how these words fit together to form sentences, paragraphs, and documents.

The Dragon® Medical speech recognition software solution is designed for clinicians based on robust linguistic and acoustic research and the analysis of millions of medical records, combined with advanced software engineering for ease of use.

Dragon Medical includes the following vocabularies (and many more):

- Cardiology
- General Medicine
- Mental Health
- Orthopedics
- Pediatrics
- Radiology
- Emergency Medicine
- Internal Medicine
- Oncology
- Pathology
- Primary Care
- Speech Therapy

Each of these vocabularies represents a family of medical specialties with related language properties. For example, the cardiology specialty vocabulary covers General Cardiology, Cardiopulmonary Cardiology, and Cardiothoracic and Vascular Surgery. All told, Dragon Medical includes vocabularies for nearly 60 medical specialties and subspecialties.

Based on extensive tests with real-world recordings of physician dictations in our speech recognition laboratories, Nuance calculates that a clinician using specialty versions of Dragon Medical will generate, on average, 33% fewer errors compared with the Dragon NaturallySpeaking base vocabularies.

Dragon Medical: over 33% more accurate than Dragon NaturallySpeaking in clinical settings

How much more accurate is Dragon Medical than Dragon NaturallySpeaking® in clinical settings?

Significantly more accurate.

Based on extensive tests with real-world recordings of physician dictations in our speech recognition laboratories, Nuance calculates that a clinician using specialty versions of Dragon Medical will generate, on average, 33% fewer errors compared with the Dragon NaturallySpeaking base vocabularies—even if a clinician were to have purchased Dragon NaturallySpeaking and added large lists of words not originally provided in Dragon NaturallySpeaking.

The Dragon speech recognizer has four large components:

- **A lexicon**—contains the full list of words that can be recognized.
- **A language model**—the statistical model that tells the recognizer how words fit together, analyzing the usage frequency of words and word combinations.
- **An acoustic model**—contains knowledge of the sounds of a language, including speech inflections.
- **The speech recognition engine**—software which draws on the lexicon, specialty-specific language model, and acoustic model to generate text from your spoken dictation.

Dragon Medical's specialty language models have been built by capturing tens of thousands of unique words from tens of millions of actual medical reports. The model building program calculates the frequency of each word and models the context of several words before and after each word occurrence. These processes are performed for each medical specialty. This process enables Dragon Medical to provide a suite of language models—each optimized for specific medical disciplines—which yields the highest possible accuracy in each setting.

A clinician's time is priceless. Reducing the amount of time away from care for documentation is essential. The Dragon Medical library of specialty-specific language models does just that.

How medical specialty vocabularies provide a better experience

The greatest determinant of speech recognition accuracy is the appropriateness of the vocabulary and language model. To demonstrate the difference between Dragon Medical and Dragon NaturallySpeaking, we've provided an analysis of how the two vocabularies handle the word 'embolism.'

Term	Dragon Naturally Speaking	Likely Recognition	Dragon Medical	Likely Recognition
Embolism	Not in vocabulary	'Symbolism...'	Already in vocabulary	'Embolism...'
Cerebral embolism	Not in vocabulary	'Cerebral symbolism...'	Already in vocabulary	'Cerebral embolism ...'

Dragon NaturallySpeaking is far more likely to translate 'embolism' as the word 'symbolism,' because 'symbolism' rates higher than 'embolism'—it's far more commonly used by business professionals. In contrast, Dragon Medical translates the word as 'embolism' because its usage is statistically rated much higher in medical dictation than it would be in general business settings.

Nuance speech scientists have spent considerable time studying the exact difference between Dragon Medical and Dragon NaturallySpeaking and have performed tests to determine the relative improvements from adding medical words to a general vocabulary versus using Dragon Medical 'out-of-the-box.' Their research found an accuracy rate of 33% between Dragon Medical and Dragon NaturallySpeaking in clinical settings.

Impact on physician productivity is noticeable

What is the practical impact of this 33% difference in Word Error Rate Reduction for physicians dictating with Dragon non-medical versus Dragon Medical?

For a clinician with 98% accuracy dictating 10,000 words per day (40 reports each containing 250 words—20 lines per report), a 40% increase means that there will be 80 more errors dictating with a non-medical version compared with a medical version.

If each error takes an additional 15 seconds for a physician to review and correct, a clinician will have added 20 minutes—or have lost time with two patients—each day.

Adding medical terms to non-medical recognizers won't bridge the accuracy gap

Simply having clinicians train and add hundreds of medical terms to Dragon NaturallySpeaking will not adequately raise its accuracy for use in medical settings. Without the additional benefit of Dragon Medical's language model, which carries the knowledge of the relative frequency of use for both individual words and phrases, a non-medical speech recognizer will not have the added benefit of recognizing the context of the words which provides that additional boost in accuracy.

Were 'cerebral embolism' and not just 'embolism' spoken by a clinician, Dragon Medical would be far more likely to recognize the phrase than Dragon NaturallySpeaking because it would recognize the context in which 'embolism' was spoken. *Because the language models take into account not only the frequency of words but the frequency of multi-word phrases, Dragon Medical is significantly more accurate for medical dictation.*

In fact, there are thousands of similar-sounding medical and non-medical single words and multi-word phrases which Dragon NaturallySpeaking is likely to misunderstand—resulting in precious, unnecessary time needed to review and correct dictation. Other examples of phrases having far better recognition by Dragon Medical are below.

Phrases which Dragon Medical normally recognizes...	...may be heard differently by Dragon NaturallySpeaking
Neck is supple with no adenopathy.	Neck as supple with no odyssey.
Heart: Regular rate and rhythm without murmur, rub, or gallop.	Hart: regular rate rhythm without murmur, Robert Gala.
Patient is a 42-year-old female, gravida 2, para 1.	Patient is a 42-year-old female, granted in two, Parra won.
Patient states he has had dull substernal chest pain associated with diaphoresis.	Patient stays his head sub startle chest pain associated with dire phrases.
Medications include dicloxacillin and Bactrim.	Medications include a caucus alone back from.
Medications: Cardizem CM 120 mg one p.o. q. day.	Medications: cars and Sam 120 mg once PO QT.
BUN and creatinine were normal.	The UN and creatinine were normal.
He has had no edema, orthopnea, or PND.	He's had no edema, or stopping, or PNG.

The impact of higher accuracy on medical practice

See more patients per day, generate higher practice revenue

Clinicians using higher-accuracy speech recognition will experience the same efficiencies as gaining the services of a more accurate transcriptionist—more time on patient care, less time on documentation.

For a clinician seeing 40 patients a day, one additional speech recognition error per patient can cost another 30 to 45 seconds of review and correction time—meaning a doctor will see at least one to two fewer patients per day, which has a significant impact on practice workflow and revenue.

The economic impact of seeing two fewer patients a day is significant—thousands of dollars a year in a private practice setting, depending upon reimbursement rates, specialty, and acuity levels.

Clearly, it's penny-wise and pound-foolish to try saving a few hundred dollars purchasing Dragon NaturallySpeaking—the potential negative impact on a medical practice is 20 times any up-front savings gained at purchase in the first year of use alone.

Built for physicians

Dragon Medical offers a series of capabilities specially designed for the healthcare environment. The software offers productivity and quality enhancements which are not found in non-medical versions of Dragon NaturallySpeaking. Therefore, purchasing Dragon NaturallySpeaking and adding a third-party medical vocabulary will not provide the same user experience, support for compliance-related regulations, or be backed by the knowledge that it's used by thousands of other clinicians across a broad range of specialties and provider settings.

	Dragon Medical	Dragon NaturallySpeaking
Support dictation in EMRs/EHRs	•	
Dictate in almost any Windows® application	•	•
Hidden mode	•	
Control menus by voice	•	•
Say web and browser links by voice	•	•
Medical Templates and Normals	•	
PowerMic II® support	•	
Medical Specialty Vocabulary	•	

Higher clinician satisfaction via time-saving medical-specific features

Productivity gains realized by using Dragon Medical are even higher when one accounts for the added time and resources required to add words to a vocabulary as opposed to using the medical vocabulary ‘out-of-the-box.’ Dragon Medical also comes with:

- **Support for English as a second language.** Dragon Medical contains an acoustic model for English speakers with Asian-Pacific, Asian-Indian, Australian, British, Hispanic, and Pakistani accents. Dragon Medical also provides support for U.S. accents, such as Deep South and Northern Inland.
- **Formatting rules.** Only Dragon Medical contains a large set of formatting rules for measurements, dimensions, medication dosages, and blood pressure. Medical abbreviations are recognized and presented in standard medical formats. This capability is not available in Dragon NaturallySpeaking.

Conclusion

This paper has made the case for medical providers choosing Dragon Medical as the appropriate speech recognition software best suited for clinicians, for the reasons below.

Dragon Medical:

- Is nearly 33% more accurate ‘out of the box’ for medical dictation than general-purpose English speech recognition products such as Dragon NaturallySpeaking.
- Provides specialty-specific vocabularies—covering nearly 60 medical specialties and subspecialties—which understand the nuances and terminology of each form of care, meaning that clinicians will spend less time on documentation and more time with their patients than using general-English recognizers, even those provided by Nuance.
- Saves clinicians hours of time correcting mistakes that would have occurred were they using Dragon NaturallySpeaking, enabling them to see more patients per day and maximize practice revenue, protecting thousands of dollars per year based on practice setting.

Dragon Medical offers the broadest and deepest set of specialty-specific vocabularies of any commercial speech recognition product, meaning that provider organizations get the best of both worlds—a single speech solution that an enterprise or practice can standardize on, while allowing each physician to use the specialty vocabulary which fits their own practice’s needs.

For product information please visit Nuance Healthcare at www.nuance.com/healthcare.

33%

more accurate ‘out of the box’ for medical dictation than general-purpose English speech recognition products such as Dragon NaturallySpeaking.

About Nuance Communications, Inc.

Nuance Communications, Inc. is a leading provider of voice and language solutions for businesses and consumers around the world. Its technologies, applications and services make the user experience more compelling by transforming the way people interact with devices and systems. Every day, millions of users and thousands of businesses experience Nuance’s proven applications. For more information, please visit: www.nuance.com/healthcare. Connect with Nuance on social media through the healthcare blog, [What’s next](#), as well as [Twitter](#) and [LinkedIn](#).