

Basics Of Good Medical Writing

Sentence Control ; Writing Flow
And Cohesiveness; Computer
Skills



Topic 2

Medical Writing

- An ideal medical document/presentation is prepared with the audience in mind. The audience might be:
 - A clinical/scientific team
 - A government agency (FDA, EMA, PMDA)
 - An objective 3rd party reviewer/expert in the field
 - A product consumer/public



A well-written document will accurately present the information and successfully communicate the outcome in the most concise manner possible



Medical Writing (contd)

Questions medical writers ask about the documents they are writing:

- What is its purpose?
- Who is the target audience?
- What type of publication is it?
- Does a template exist?



Medical Writing (contd)

- Are there previous similar documents that can be used as a guide?
- What are the proposed start and finish dates?
- Is there a specific style guideline/format that should be followed?
- Who will sign off on the document and at what stages?



Behave ethically

- Research ethics – declaration of Helsinki, ICH
- Publication ethics
 - avoid misconduct
 - protect patients' identities
 - report clearly:
 - » informed consent
 - » any deviation from usual practice
 - » full burden imposed on participants
 - » total risks posed to participants or others
 - » benefits to participants, patients, society



It's not always enough to state that the study was approved by an ethics committee or IRB

Protect patients' confidentiality

Beware of personal identifiers:

- age,
- sex,
- location,
- clinical details,
- test results
- unusual personal story or
- context
- photo
(even if of a body part or clinical image)



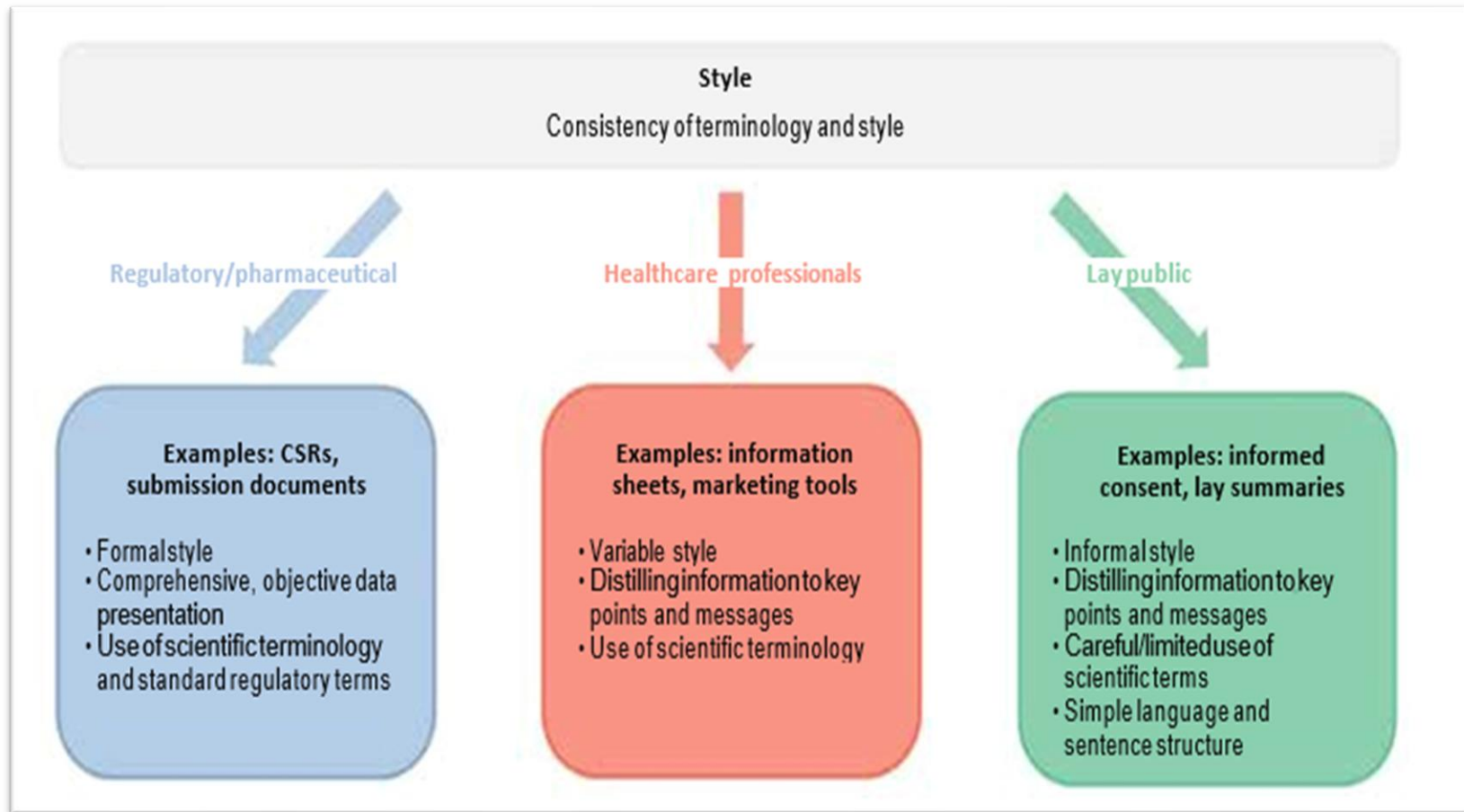
Misconduct

Fabrication: making up data or results and recording or reporting them

Falsification: manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record

Plagiarism: the appropriation of another person's ideas, processes, results, or words without giving appropriate credit





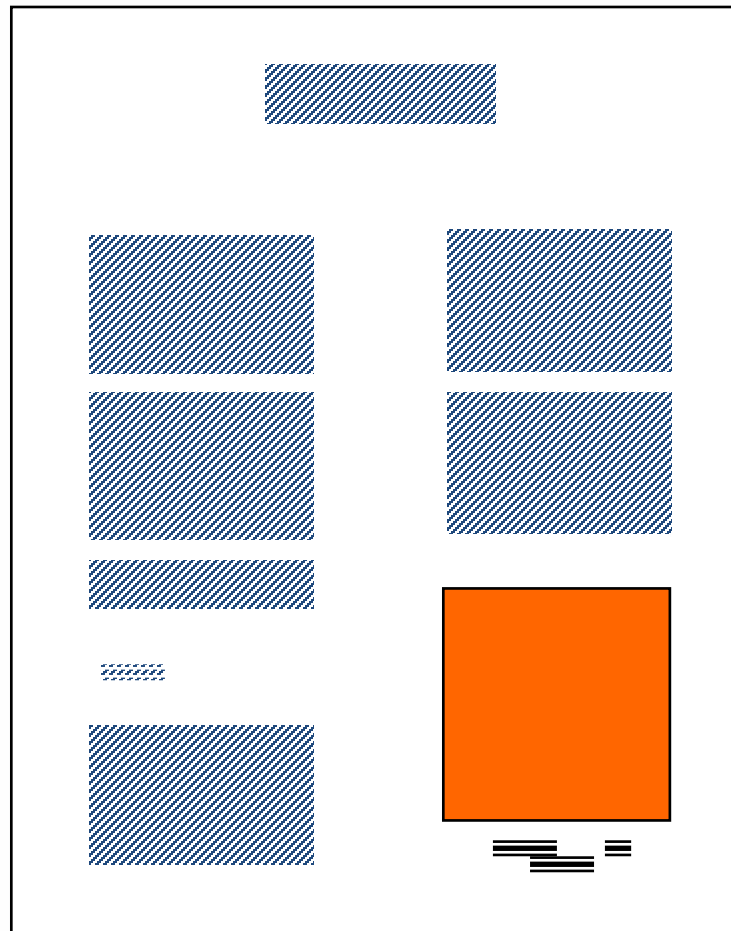
Key components of good writing – Format and Mechanics

format

**typography
Structure
layout
template**

mechanics

**grammar
usage
punctuation
spelling**

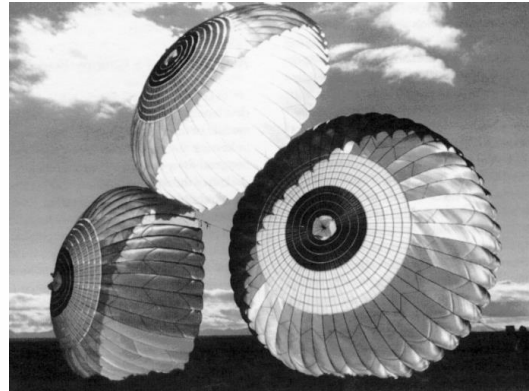


Mechanics



Writing Styles & Grammar
Nuances of Good writing

Style is the way you communicate the content to the audience

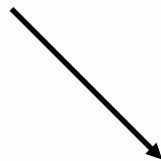


[Peterson, 1987]

Illustration

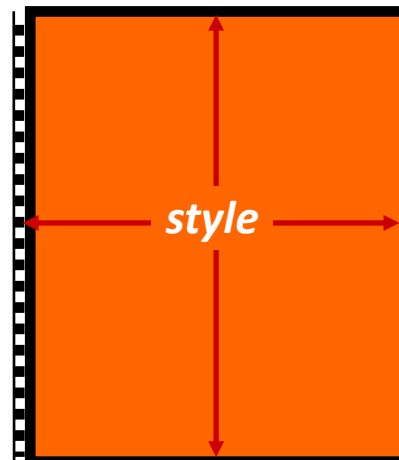
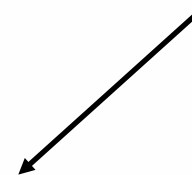


Structure



words
wordswords
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Language



Clear writing

Keep it simple: use short, familiar words

Avoid jargon and acronyms

Be specific

Be concrete, not abstract

Say what you mean and mean what you say



The common touch

- As a general principle, the greater the percentage of common words an article contains, the easier it is to comprehend
- Euphemistic words and phrases normally should not be used in the scientific writing. (Animals are not “sacrificed” but “killed”, Some peoples “suffered mortal sequences from” the lead in the flour. Replace it with “Some peoples died of ...”
- Singulars and plurals: 10 g was added or 10 g were added



Avoid stilted language

Chest pain is often a harbinger of disease that can threaten the life of the organism. So, when a patient presents with significant chest pain, the prudent examiner is at once poised to exclude dangerous disease.



Wordiness: Long sentences

One of the problems I have with writing is that I have a lot of ideas that are interconnected so I try to put them into one sentence, which tires the reader because they have to read a long stretch of ideas without a break and which also tends to mire meaning when the different ideas intermingles in one long, run-on sentence.

Let your reader breathe. If you need to take a breath while reading your sentence, it should probably be split into two or three sentences



Wordiness: Long sentences

One of the problems I have with writing is that I try to put a lot of interconnected ideas into one sentence.

This practice tires the reader, who has to read a long stretch of ideas without a break.

It also tends to mire meaning.

The different ideas intermingle in one long, run-on sentence.



Wordiness: One run-on sentence...

Because the differential diagnosis of abdominal pain is extensive and includes multiple disease entities that can be placed into the broad categories of abdominal and extra-abdominal disorders and sub-divided as follows: abdominal disorders include four categories of intraperitoneal conditions (inflammatory, mechanical, malignancy, and vascular disorders) and a limited list of extraperitoneal conditions.



Exercise – divide into two or three separate sentences

...edited into three sentences

Because the differential diagnosis of abdominal pain is extensive, it is helpful to organize it anatomically into abdominal and extra-abdominal disorders.

First, recognize that abdominal disorders can be intraperitoneal or extraperitoneal.

Intraperitoneal disorders can be further divided into four categories (inflammatory, mechanical, malignancy, and vascular disorders), each of which is further subdivided by whether they affect hollow, solid, or pelvic viscera or the mesentery



Examples of good and bad style

- Really bad (wordy, stilted, passive voice):
 - “It has been proposed that chest radiography should be considered...”
- Bad (passive voice, weasel words):
 - “Chest radiography should be considered...”
- Good:
 - “Order a chest radiograph if...”

Parentheses fever!

- Bad: “Admission was less likely in patients taking the cephalosporin (43%) than in those taking placebo (32%), a difference that was statistically significant ($p = 0.03$).”
- Good: “Admission was significantly less likely in patients taking the cephalosporin than in those taking the placebo (42% vs 32%, $p = 0.03$).”



Non-standard capitalization

Chest Pain can be defined as an unpleasant sensation perceived in or on the anterior trunk (costal margin to clavicles) resulting from actual or potential tissue damage that may be unrelenting, causing the patient to seek the advise of a Physician.



Capitalization rules

- Medical writing is no different from any other!
- Diagnoses, tests, and generic drugs are NOT capitalized.
 - Correct: “Order a complete blood count (CBC) in patients with diabetes mellitus (DM), then prescribe amoxicillin.”
 - Incorrect: “Order a Complete Blood Count (CBC) in patients with Diabetes Mellitus (DM), then prescribe Amoxicillin.”
- Proper names (i.e. “Addison’s disease”) and trade names ARE capitalized



Don't state the obvious

- **Before:** The clinically relevant pathophysiology of significant abdominal pain is based on whether pain is parietal or visceral in nature.
- **After:** The pathophysiology of significant abdominal pain is based on whether pain is parietal or visceral.
- If it wasn't "clinically relevant" why would you be talking about it in a clinical article? Also, "in nature" adds nothing.



Vague statements that reflect traditional wisdom...

- Patients on beta-blockers sometimes complain of fatigue and difficulty concentrating...
- Patients with depression or sleep disorders may be adversely affected by all adrenergic blocking agents, including clonidine, beta-blockers, methyldopa, and reserpine...
- Sexual dysfunction has been ascribed to all of the antihypertensive medications, particularly beta-blockers.



Replaced with evidence...

- It is important to note that beta-blockers have a much better tolerability profile than previously thought. A meta-analysis of 15 trials involving 35,000 patients found no significant increase in the risk of depression and only small increases in the risk of sexual dysfunction (NNH = 200 per year) and fatigue (NNH = 57 per year).(78)



Avoid weasel words

- It has been suggested that...
- Some might consider...
- There is growing evidence that...
- Preliminary evidence suggests that...



Medical Writing Style: The Importance of Being Clear and Concise (contd)

- **Avoid Repetition**

- It is often advisable to change the word order in a sentence in order to avoid repetition
- Example: Group A had a mean systolic blood pressure of 13.3mm Hg on Day 1 and Group B had a mean systolic blood pressure of 15.6mm Hg on Day 1
- Improved version: The mean systolic blood pressure on Day 1 was 13.3mm Hg in Group A and 15.6mm Hg in Group B
- Use 'respectively' for studies with three or more groups. It requires a little more mental gymnastics to understand



Medical Writing Style: The Importance of Being Clear and Concise (contd)

- **Put the Most Important Information at the Beginning of the Sentence**
 - Example: During the 13-week treatment period, 3.6% of subjects in the Drug A group and 2.3% of subjects in the placebo group reported headaches
- The sentence is about headaches, so it needs to be mentioned first. That way, anyone who is not interested in headaches does not have to read it.



Avoid Passive Constructions

- It may change verb into noun
- Swelling the sentence
- Less direct
- Poorly understood
- The active voice is usually more precise and less wordy than the passive voice. Example: “It was found that” to “I found”
- Do not be afraid to name the agent of the action in a sentence, even when it is “I” or “We”



Passive vs active voice

Passive


The boy *was bitten* by the dog.

Active


The dog *bit* the boy.

Passive


Experiments *have been conducted* to test the hypothesis. by ?

Active


Scientists *have conducted* experiments to test the hypothesis.



Passive vs active voice

- Program evaluation **will be performed** through objective measures.
 - *We **will use** objective measures for program evaluation.*
- The total number of participants that initiate and complete the program **will be analyzed**.
 - *The researchers **will analyze** the total number of participants that initiate and complete the program.*
- Compliance **will also be measured** through program attendance.
 - *We **will measure** compliance through program attendance.*



Concise, clear, active voice

Before

It has been shown that rye, wheat, and barley, as well as multiple processed products containing gluten, may in some cases elicit this immune response.

After

Rye, wheat, and barley, and many processed foods contain gluten and may elicit this immune response.



Correctly Structure Paragraph

- A paragraph should begin with a topic sentence that clearly sets the stage for what will follow – make topic sentences short and direct
- Build the paragraph from the ideas introduced in your topic sentence
- Make the flow of individual sentences follow a logical sequence
- Try to finish each paragraph with a sentence that forms a bridge to the next paragraph



Format

Structure And Formatting



Computer skills in Medical
writing

Document Structure and Formatting

- A well-structured and well-formatted document should be pleasing to the eye and should help the reader navigate through its numerous chapters
- The simplest way to get your formatting right in Word is to attach a template with pre-set styles. Many companies also have customised tool bars to facilitate the use of styles and standardise certain repetitive tasks such as inserting references and tables
- Never copy and paste formatting from another document unless it has identical Word styles. If in doubt, always use 'paste special' or the 'keep text only' paste option to avoid copying formatting



Document Structure and Formatting (contd)

- Page headers and footers are important as they define the identity of the document, e.g. date, version number, study number etc.
- Do not forget to update these for each draft and in all sections of the document
- Chapter numbers should never be typed manually. Create automatic chapter numbers using Word styles (Heading 1, Heading 2 etc.) and insert an automatic table of contents (References tab)
- Check consistency of the use of capitals in chapter headings



Document Structure and Formatting (contd)

- Use non-breaking hyphens (CTRL+Alt+Hyphen) to avoid hyphenated words splitting across lines and non-breaking spaces (CTRL+Alt+Space) between numbers and their units to avoid ending a line with a number
- ‘Refresh’ your document regularly (CTRL+A then F9) to ensure that all automatic numbers are correct. Avoid use of page breaks or adding carriage returns to position text on a new page. It is better to use ‘keep with next’ (Layout tab, paragraphs, line and page breaks) to ensure that chapter headings stay with text, and that tables stay with their captions and footers



Document Structure and Formatting (contd)

- Double space!
- Adequate margins, i.e. 1 to 1.5”
- Insert hard page breaks after title page, abstract, body of paper, and each table
 - Ctrl-Enter
- Do not use hard line breaks (i.e. “Enter”) except for a new paragraph



Document Structure and Formatting (contd)

- Use appropriate subheadings
 - <H1>Main heading
 - <H2>Subheading
 - <H2>Subheading
 - <H1>Next main heading
- Use a nice font (not Courier!)
 - Arial
 - Times New Roman
 - Courier



Numbers, parens, and percentages

- Correct
 - 10 mg/dl
 - 10 percent
 - 10%
 - 10 to 20 pounds
 - 10 years old
 - ...drug (unless contraindicate d) it
- Incorrect
 - ❑ 10mg/dl
 - ❑ 10 Percent
 - ❑ 10 %
 - ❑ 10lbs to 20lbs
 - ❑ 10 yrs
 - ❑ ...drug(unless contraindicated) it



Harmonisation

- It is essential to decide what terms to use, and then to stick to them throughout the whole document
- Readers do not like to have to keep switching between words that look different but are really saying the same thing. So define your terms from the beginning and then be consistent
- It is also important to reach an agreement with the statistician to ensure harmonisation between the statistical tables and your text



Harmonisation

- Below are some of the most important concepts and terms that should be consistent
 - British versus American Spelling
 - ‘Subjects’ versus ‘Patients’
 - Investigational Product Names
 - Treatment Group Names
 - Visit Names
 - Study Names



Section headings should be descriptive and parallel

Non-Parallel Non-Descriptive

Introduction
Background
Marx Generators
Line Pulse
Beam Generation
Transporting Beam
Pellets
Results
Conclusions

Parallel Descriptive

Introduction

Past Designs for Particle Beam Fusion

New Design for Particle Beam Fusion
 Charging Marx Generators
 Forming Line Pulse
 Generating Particle Beam
 Transporting Particle Beam
 Irradiating Deuterium-Tritium Pellets

Results of New Design

Conclusions and Recommendations



Organization is hidden when headings occur in a long list without secondary headings

Performance of the Solar One Receiver

Introduction
Steady State Efficiency
Average Efficiency
Start-Up Time
Operation Time
Operation During Cloud Transients
Panel Mechanical Supports
Tube Leaks
Conclusion

Performance of the Solar One Receiver

Introduction
Receiver's Efficiency
 Steady State Efficiency
 Average Efficiency
Receiver's Operation Cycle
 Start-Up Time
 Operation Time
 Operation During Cloud
Transients
Receiver's Mechanical Wear
 Panel Mechanical
Supports
 Tube Leaks
Conclusion



For secondary readers, use a glossary to define unfamiliar terms

Glossary

- **IMRAD:** An acronym that represents the organizational structure most often used in research reports: Introduction, Methods, Results, and Discussion.
- **Meta-analysis:** A method of combining the results of several studies into a summary conclusion, using quantitative strategies that will allow consideration of data in diverse research reports
- **Redaction:** The process of word-by-word, sentence-by sentence modification of a paper.



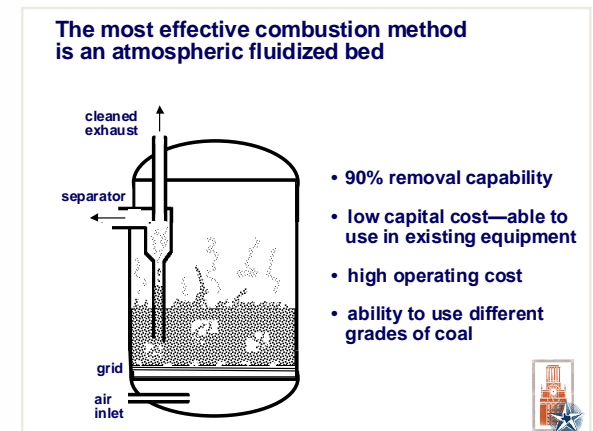
In Medical writing, formats vary considerably to serve different situations



Formal Reports



Journal Articles



Presentation Slides



Not all rules of format are constant

Reports Sandia Laboratories	Textbooks Prentice-Hall	Journals ASME
Figure 1	Fig. 1	fig. 1
Table	Table 1	Table 1
equation	equation (1)	Eq. 1



Format is the arrangement of type on the page

typography



layout



Each typestyle has its own personality and power

Serif

Times New Roman
abcdefghijklmnopqr
stuvwxyz1234567890

Garamond
abcdefghijklmnopqr
stuvwxyz1234567890

Courier
abcdefghijklmnopqr
stuvwxyz1234567890

Sans Serif

Arial
abcdefghijklmnopqr
stuvwxyz1234567890

Arial Narrow
abcdefghijklmnopqr
stuvwxyz1234567890

Comic Sans
abcdefghijklmnopqr
stuvwxyz1234567890



Avoid large blocks of capital letters

~~TYPE IS TO READ~~

Type is to read

~~WORDS SET IN ALL CAPS USE MORE SPACE
THAN TEXT SET IN LOWERCASE.~~

Words set in all caps use more space than
words set in lowercase.



Example: Morton-Thiokol's presentation to NASA suffered because of all capital letters on the slides

- PRIMARY CONCERNS-
- FIELD JOINT - HIGHEST CONCERN
- EROSION PENETRATION OF PRIMARY SEAL REQUIRES RELIABLE SECONDARY SEAL FOR PRESSURE INTEGRITY
- IGNITION TRANSIENT - (0-600 MS)
- (0-170 MS) HIGH PROBABILITY OF RELIABLE SECONDARY SEAL
- (170-330 MS) REDUCED PROBABILITY OF RELIABLE SECONDARY SEAL
- (330-600 MS) HIGH PROBABILITY OF NO SECONDARY SEAL CAPABILITY
- STEADY STATE - (600 MS - 2 MINUTES)
- IF EROSION PENETRATES PRIMARY O-RING SEAL - HIGH PROBABILITY OF NO SECONDARY SEAL CAPABILITY
- BENCH TESTING SHOWED O-RING NOT CAPABLE OF MAINTAINING CONTACT
- WITH METAL PARTS GAP OPERATING TO MEOP
- BENCH TESTING SHOWED CAPABILITY TO MAINTAIN O-RING CONTACT DURING INITIAL PHASE (0 - 170 MS) OF TRANSIENT



Choose a type size that is easy to read

48 point → posters

36 point → presentation slides

24 point
18 point
14 point → titles

12 point
10 point
8 point → text

footnotes



-
- A good medical writer ensures that the document finalized is as per audience requirement and of utmost quality (Language as well as appearance).
 - Good medical writing skills need to be developed both by experience and by skillset.
 - Continual learning is key to success.

