

ENGLISH FOR SPECIFIC PURPOSES IN MEDICAL LABORATORY PRACTICE: A CONTRASTIVE LINGUISTIC ANALYSIS OF SAFETY INSTRUCTIONS FOR SIX PPE ITEMS

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ABSTRACT

Safety instructions in Indonesian medical laboratories largely reach students in English through reagent package inserts, equipment manuals, safety data sheets, hazard labels, and wall signage issued by international manufacturers. Comprehension of this wording is therefore a safety variable and not merely a linguistic one. This study examines the English-language safety instructions attached to six items of personal protective equipment (PPE) in routine medical laboratory practice and identifies the features most likely to obstruct comprehension among Indonesian medical laboratory technology students. A descriptive qualitative design with document analysis examined the instructional wording on laboratory coats, utility gloves, safety goggles, medical face masks, safety footwear, and single-use examination gloves, along with references to international biosafety standards. The findings indicate that the imperative mood, commonly assumed to be the principal difficulty, transfers readily from Indonesian and presents little obstacle. Difficulty is concentrated instead in four areas: the modal gradient of *must*, *shall*, *should* and *may*, which flattens when mapped onto Indonesian *harus*; head-final nominal compounds carrying the technical specification in modifier position; low-frequency procedural verbs such as *don* and *doff*; and Dutch-derived loanwords and pseudo-anglicisms such as *handscoon* and *sendal* safety that students take to be English. The last of these is the most consequential, as it is invisible to students and to conventional language curricula alike. Treating safety instruction as a distinct text type in English for Specific Purposes teaching supports the prevention of occupational accidents and hazardous exposure and sustains an orderly laboratory environment consistent with service standards.

Keywords: English for Specific Purposes (ESP), laboratory biosafety, medical laboratory technology, personal protective equipment (PPE), pseudo-anglicism

INTRODUCTION

The diagnostic laboratory is the place in which specimens taken from patients are examined, and it forms an essential part of the diagnostic process as a whole. A laboratory also holds chemical reagents, electrical devices and biological agents that carry a high potential for harm. Where these are not handled properly, the consequences may include occupational injury, exposure to chemical substances, damage to equipment and deterioration of laboratory results. Every laboratory therefore requires written safety guidance that sets out the hazards of the reagents, chemicals and devices in use, together with instructions for safe operation.

Understanding these instructions is consequently not an administrative requirement attached to specimen processing. It determines the personal safety of staff and students as

they handle equipment and materials, and it determines whether instruments are damaged and results compromised. This is the reason safety instruction deserves treatment as a text type in its own right within Medical Laboratory Technology education. In practice, however, many medical laboratories still lack complete instructional guidance, a condition that invites misreading of procedures and, in turn, raises rather than lowers the risk of accidents. The application of standardised safety procedures is an absolute condition for the safety of everyone who works in or visits the laboratory environment. As science and technology advance and the quality demanded of health services rises, the demand for clarity in safety instruction rises with them, especially because most of the supporting documentation is issued in English.

Research on laboratory biosafety has repeatedly documented gaps in student knowledge and practice. Bui et al. (2024) surveyed medical laboratory students and found uneven command of fundamental biosafety principles despite formal instruction. Aliyo and Edin (2023) assessed teaching laboratories in health institutes and reported that stated safety requirements and observed practice diverged sharply. Tadesse et al. (2025) similarly recorded inconsistent biosafety management practice among clinical laboratory professionals, while Townsend and Goffe (2022) treated laboratory safety instruction as a teaching problem in its own right. Cornish et al. (2021), reviewing biosafety failures in clinical laboratories, traced several of them to breakdowns in the communication of procedure rather than to ignorance of the underlying hazard. Straub et al. (2023) found that correct use of personal protective equipment (PPE) by students was constrained more by capability, including uncertainty about what an instruction actually required, than by motivation. These findings align with work on language barriers in healthcare, which shows that linguistic difference contributes directly to patient safety incidents (Al Shamsi et al., 2020; Al-Yateem et al., 2023).

Needs analyses in English for Specific Purposes point in a similar direction, finding that the needs of English medical and laboratory students diverge from what general English provision supplies (Nurhidayat & Fatmawati, 2021; Alrashed & Abdel Latif, 2025). What remains unexamined is the wording of the safety instruction itself: the specific linguistic features through which a requirement is expressed, and the points at which those features fail to reach the student who must act on them. This study takes up instructional language directly. It examines the English wording that accompanies six PPE items in routine medical laboratory practice. Two questions are addressed:

1. RQ1: Which linguistic features in that wording leave students short of full comprehension?
2. RQ2: How can the answer be used to improve teaching materials and safety procedures in teaching laboratories?

METHOD

1. Research Design

The study used a descriptive qualitative design with document analysis. The design follows from the nature of the object under investigation: English-language instructions attached to items of personal protective equipment and hazardous materials used in the medical laboratory. No frequencies, scores, or statistical relationships are reported, because the aim is to characterise the linguistic properties of the instructions and to locate the points at which they are liable to be misread, not to measure the magnitude of a variable.

2. Corpus and Data Sources

The study involved no human participants. Its data are a corpus of documents: the English-language instructional wording that accompanies six core PPE items selected for their presence in routine practice across every teaching laboratory rotation, namely the laboratory coat, utility gloves, safety goggles, the medical face mask, safety footwear, and single-use examination gloves. The selection of these six specific items follows explicit regulatory justifications grounded in the World Health Organization's baseline containment standards for Biosafety Level 1 (BSL-1) and Biosafety Level 2 (BSL-2) laboratories (WHO, 2020a). These items constitute the core requirements for basic barriers against contact, droplet, and low-risk splash hazards typical of standard medical technology training environments. Conversely, highly specialized or advanced respiratory protective equipment—such as Powered Air-Purifying Respirators (PAPRs) or positive-pressure suits—was deliberately excluded from this corpus, as such gear falls under the advanced containment mandates of Biosafety Level 3 (BSL-3) or Biosafety Level 4 (BSL-4) protocols, which exceed the operational and educational scope of routine Indonesian teaching laboratories. Table 1 inventories the corpus by source type and the number of documents analysed. The point of reference for the analysis is the population of students who must read these documents, that is, students of the Department of Medical Laboratory Technology, Poltekkes Kemenkes Palembang, whose customary Indonesian designations for each item served as the comparison point in the contrastive stage of the analysis.

Table 1. Inventory of the corpus by source type

Source type	Wording examined	Documents analysed (n)
Reagent package inserts	Instructions for use and safety statements that accompany reagents and consumables	7

Source type	Wording examined	Documents analysed (n)
Equipment manuals	Operating and safety instructions for laboratory equipment	7
Safety data sheets (SDS)	Hazard, handling, and protective-equipment statements	7
Hazard labels and PPE packaging labels	Wording printed on the items and their packaging	7
Laboratory wall signage	Posted instructions on PPE use and laboratory conduct	7
International standard references	Laboratory Biosafety Manual, 4th ed., and its PPE monograph (WHO, 2020a, 2020b)	1
Total		36

3. Instruments

The data comprise instructional wording of the kind found on PPE packaging labels, product instructions for use, safety data sheets, and laboratory wall signage, together with international standard references, principally the fourth edition of the *Laboratory Biosafety Manual* and its supporting monograph on personal protective equipment (World Health Organization, 2020a, 2020b), which supplied the standard English designation against which each item was checked. The analytical instrument is an analysis matrix developed by the authors, in which each item is entered together with its standard English designation, its representative instruction, the linguistic features present in that instruction, the Indonesian term in common student use, and the risk arising where the two do not correspond. In qualitative document analysis, the researchers themselves function as the principal instrument, and the reliability of that instrument was established through an explicit operational procedure rather than through statistical coefficients. Each item was first entered into the matrix independently by the authors, and the resulting entries were then compared; any entry on which the coding assignments diverged was logged as a coding discrepancy. Discrepancies that could not be resolved through internal discussion among the authors, together with a sample of entries on which the authors had already agreed as a cross-check, were submitted to an external validator, an academic holding an M.Pd. in English with more than five years of teaching experience, based at Poltekkes Kemenkes Palembang but not otherwise involved in the study's data collection or

analysis, for independent review. The external validator's judgement was treated as final for entries left unresolved among the authors, and the analysis matrix was revised accordingly.

4. Data Collection Procedure

Data collection proceeded by item. For each of the six items, the original instructional wording was collected from the sources named above and entered in the analysis matrix, and each item was assigned its standard English equivalent as given in the international references. The Indonesian expression that students most commonly associate with the item was recorded alongside it.

Figures were prepared in addition to the textual description of each item. The figures are not photographs taken during a laboratory session but schematic drawings made deliberately without text, so that the English designation, the Indonesian term in local student use, and the instructional wording can each be attached to the figure and compared without the image itself pre-determining the very ambiguity under investigation.

5. Data Analysis

Analysis was carried out in two stages. In the first, the linguistic features present in the collected wording were grouped into categories: the imperative mood and the adverbials that mark its scope, the gradient of modal auxiliaries, the structure of nominal compounds, the class of procedural verbs employed, and the conditional clauses that frame an instruction. In the second, the English terms were compared with the Indonesian expressions in common student use in order to identify points of translation failure, including loanwords and pseudo-anglicisms. After each stage, all authors reviewed and discussed that results to keep interpretations consistent and aligned, and revised categories when an item's wording of a particular item's wording required it. Any disagreement in category assignment that persisted after this discussion was handled through the discrepancy-resolution procedure described under Instruments, in which an external validator, an academic holding an M.Pd. in English with more than five years of teaching experience, based at Poltekkes Kemenkes Palembang but not otherwise involved in the study's data collection or analysis, gave an independent, final reading of the unresolved entries.

RESULTS AND DISCUSSION

Result

The analysis yielded findings in four areas: the imperative mood and its scope, the gradient of modal auxiliaries, nominal compounds together with procedural verbs, and the designations of the six PPE items with the obstacles attached to each.

The Imperative Mood in Safety Instructions

Safety instructions in English are most obviously characterised by the imperative. Instructions rely predominantly on the imperative mood without an identified subject, as in *wear a laboratory coat at all times*, *discard used gloves in the biohazard container*, and *do not eat or drink in the laboratory*. A common assumption holds that this feature is the principal problem for learners to overcome.

The present analysis points in a different direction. Indonesian uses a comparable structure to issue directives, so that *gunakan jas laboratorium* corresponds directly to *wear a laboratory coat* without loss of force. What changes between the two is the language of expression, not the grammatical means of issuing the command.

The imperative becomes a genuine obstacle only when it is followed by adverbials of scope. Phrases such as *at all times*, *before leaving the laboratory*, *when a splash is foreseeable*, and *in addition* indicate when and how far a directive applies. A rapid scan that captures little more than the verb and its object misses precisely the content that governs the application of the directive.

The Modal Gradient

English encodes the binding force of a requirement through modal choice. The distinction between *must*, *shall*, *should*, and *may* is not stylistic variation but a difference in normative status. Indonesian maps most of these modals onto a single form, *harus*, so that the gradient flattens in translation. The consequence runs in both directions: a requirement may be read as a recommendation, and a recommendation may be read as a requirement. Table 2 sets out the gradient and the risk attached to each level.

Table 2. Modals in English safety instructions and their rendering in Indonesian

English modal	Force	Illocutionary force/speech act classification	Common Indonesian equivalent	Laboratory example	Risk if the distinction is lost
must/shall	Requirement	Mandatory requirement (obligating directive)	<i>harus</i>	Gloves must be changed between patients' specimens.	A requirement is read as a recommendation and applied selectively.
should	Strong recommendation	Advisory recommendation (advising directive)	<i>harus/ sebaiknya</i>	A face shield should be used when a splash is foreseeable.	A recommendation is read as a requirement; once found to be flexible, every modal is taken to be flexible.
may	Permission	Permissive option (permitting directive)	<i>boleh/dapat</i>	A cloth gown may be substituted where fluid exposure is not anticipated.	Permission is read as an instruction, producing unnecessary use, or as a requirement in the wrong setting.
do not	Scoped prohibition	Restricted prohibition (scope-bound directive)	<i>jangan</i>	Do not reuse single-use examination gloves.	The scope of the prohibition is misjudged.
never	Absolute prohibition	Absolute prohibition (exceptionless directive)	<i>jangan</i>	Never wear a laboratory coat outside the laboratory.	An absolute prohibition is downgraded to an ordinary one.

The practical implication is that students need training in judging the obligatory force of an instruction, not merely translating it. The ability to separate *must* from *should* decides whether an action is treated as an absolute duty or a situational option.

Nominal Compounds and Procedural Verbs

Two further features complicate reading, although they are rarely addressed in teaching. The first is the head-final nominal compound, as in *[[splash-resistant] [eye*

protection]], *[[fluid-resistant] [medical face mask]]*, and *[[closed-toe] [non-slip footwear]]*. In such structures, the head comes last, and the preceding modifiers carry the technical specification that determines which item to select. Indonesian places its modifiers after the head, so reading requires a reversal of order. A student reading left to right without recognising the pattern takes the first word as the head and passes over the specification. The second is the low-frequency procedural verb. The verbs *don* and *doff*, for putting on and removing PPE, scarcely occur in general English yet are the key terms in sequencing protocols. To support student comprehension, instructors can implement concrete lexical scaffolding, such as pairing these verbs with directional arrows on laboratory signage and emphasizing their morphological derivations (e.g., *donning* and *doffing*). Verbs such as *discard*, *decontaminate*, *autoclave*, *segregate*, and *seal* likewise carry specific technical senses. Where these words are unknown, the whole instruction loses the action it commands.

The Six PPE Items and Their English Designations

This subsection presents the six items of personal protective equipment that the study focuses on. Each item is treated in turn under four headings: the standard English designation, the scope of protection it affords, a representative instruction together with an analysis of its linguistic features, and the difficulty arising in translation with the risk that follows from it.

1) Laboratory Coat



Figure 1. Laboratory coat

The standard English designation is *laboratory coat*, commonly shortened to *lab coat*. The term *laboratory gown* is used for a disposable or fluid-resistant garment, while back-fastening and wrap-around gowns refer to enclosed styles used in higher-risk areas. Its function is to serve as a barrier between the wearer's clothing and skin and any splash of specimen, reagent, or aerosol.

The representative instruction is compound: *wear a laboratory coat, fully fastened, at all times in the laboratory, and never wear it outside the laboratory area*. Related wording includes *removing the laboratory coat before leaving the laboratory and not taking laboratory coats home for laundering*. Linguistically, the first sentence carries one

positive imperative, one appositive phrase (*fully fastened*), one adverbial of temporal scope (*at all times*), and one absolute prohibition joined by a conjunction. A rapid reading captures the instruction to wear the coat but misses the three subsequent elements, which determine whether the protection is effective.

The local term *jas laboratorium* derives from Dutch *jas*. Translated word for word into English, it yields *laboratory jacket*, which names a different garment and does not occur in biosafety documentation. The risk appears when students search product specifications, read manuals, or communicate with suppliers. In teaching, the collocations *fully fastened*, *knee-length*, and *long-sleeved* deserve drilling alongside the contrast between *coat* and *gown*.

2) Utility Gloves



Figure 2. Utility gloves

The standard designation is *utility gloves*, also called *heavy-duty gloves*. They are reusable, thicker than examination gloves, and intended for surface decontamination, spill clean-up, waste handling, and glassware washing. The representative instruction is *wear utility gloves when decontaminating work surfaces or handling laboratory waste; utility gloves are not a substitute for examination gloves during specimen handling*, supplemented by *inspect utility gloves for cracks or tears before each use and discard them when damaged*. The salient linguistic features are the temporal frame *when* followed by an *-ing* form, which marks the scope of use, and the construction *are not a substitute for* in the second clause. That construction functions as a prohibition, yet it is neither an imperative nor a modal, and it is accordingly read as supplementary comment rather than as a binding rule.

In student use the single Indonesian term *sarung tangan* corresponds to at least three English categories: *examination gloves*, *utility gloves*, and *sterile surgical gloves*, which differ in reusability, thickness, and permitted task. Glove selection of a glove is therefore not recognised as a safety decision, and errors in both ways: examination gloves worn for waste handling provide insufficient protection, while utility gloves worn for specimen processing reduce fine motor control and increase the risk of cross-contamination.

3) Safety Goggles



Figure 3. Safety goggles

English distinguishes three devices for eye and face protection. *Safety goggles* enclose the eyes and surrounding area and are required where splashes or airborne chemical particles are anticipated. *Safety glasses*, fitted with side shields, protect against particles and flying debris but do not afford adequate protection against liquid splashes. A *face shield* covers the whole of the face and is used in addition to eye protection, not in place of it.

A representative instruction reads: *splash-resistant eye protection must be worn when handling corrosive reagents*, supplemented by *a face shield should be used in addition to, not instead of, eye protection where a high-volume splash is foreseeable*. In both cases, the specification determining the choice of device sits in the modifier, whether *splash-resistant* or *impact-resistant*. The contrastive phrase *in addition to, not instead of* carries the substance of the rule and is readily lost in a rapid reading. The instruction also shifts taxonomic level, moving from the superordinate *eye protection* to the hyponym *goggles*, so that the reader must recognise where the two terms are not interchangeable.

The local term *kacamata pelindung* collapses the three devices into one. As a result, students do not select protective equipment of the hazard type and use whatever is at hand. For students who wear prescription lenses, the specification that *goggles must fit over prescription spectacles* is of direct importance, yet it is seldom conveyed in Indonesian teaching materials.

4) Medical Face Mask

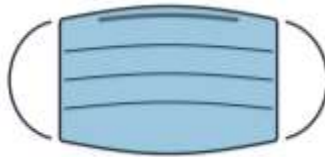


Figure 4. Medical face mask

Standard designations include *medical face mask*, *surgical mask*, and *procedure mask*. The item is not a respirator. A respirator designated *N95* or *FFP2* is a distinct item requiring *fit testing* and a *seal check* before use. The medical face mask acts as a barrier against droplets and splashes, whereas the respirator provides respiratory protection against aerosols. The representative instruction is to *wear a fluid-resistant medical face mask covering the nose and mouth*, often supplemented by *a fitted respirator; a medical face*

mask does not provide respiratory protection against aerosols, so use a fitted respirator where aerosol generation is anticipated. The phrases *fluid-resistant* and *fitted* are technically specifying modifiers, while the clause *does not provide* again, but instead presents a prohibition in non-imperative form.

The obstacle is both lexical and conceptual. The Indonesian word *masker*, itself of Dutch origin, covers both the surgical mask and the respirator, so the contrast English draws is not visible from the first language. The attendant risk is concrete: wearing a surgical mask during an aerosol-generating procedure such as centrifuging uncapped tubes, vortexing, or opening cultures produces a false sense of protection while exposure continues.

5) Safety Footwear



Figure 5. Safety footwear

The English designations for this item include *safety footwear*, *protective footwear*, and *closed-toe footwear*, further specified as *closed-heel*, *slip-resistant*, and *liquid-impermeable*. It protects feet from chemical and physical hazards, including spilled specimens, broken glassware, and falling objects, and reduces the likelihood of slipping. A typical requirement reads: *wear closed-toe, non-slip footwear in the laboratory at all times; open-toed shoes and sandals are not permitted*. The formulation is of interest because it states the rule partly by exclusion, listing the prohibited categories, *open-toed shoes*, *sandals*, and *perforated shoes*, alongside a requirement expressed through hyphenated modifiers. The phrase *closed-toe footwear* is itself head-final, so that the specification must be read back from the head in order to recover the requirement.

The expression *sendal safety*, in common student use, combines an Indonesian noun with an English modifier. Rendered into English, it yields *safety sandals*, which names precisely the open category that laboratory rules prohibit. Of the six items, this is the sharpest divergence, since the local term does not merely differ from the standard designation but contradicts the rule it is supposed to express.

6) Examination Gloves (Single-Use)



Figure 6. Single-use examination gloves

The standard English designation is *examination gloves*, ordinarily specified by material as *nitrile examination gloves*, *latex examination gloves*, or *vinyl examination gloves*, and by use as *single-use* or *disposable*. The qualifier *powder-free* marks the variant recommended in order to reduce allergic reactions. The representative instruction takes the form of an ordered sequence: *wear single-use examination gloves when handling specimens; change gloves between specimens; discard gloves in the biohazard container immediately after use and wash your hands*. Supplementary wording includes *do not reuse single-use examination gloves*, and *gloves are not a substitute for hand hygiene*. The salient feature is that the order of actions itself carries safety meaning: gloves are discarded before, not after, hand washing. Fuller protocols introduce the verbs *don* and *doff*, as in *don gloves last and doff gloves first*, which are of very low frequency in general English and go unrecognised.

The principal obstacle for this item is lexical. The term *handscoon*, in common student use, is a pseudo-anglicism derived from Dutch *handschoen*. Students take it to be an English word, yet it does not occur in English-language documentation. The consequences compound: literature and product searches return nothing, communication with suppliers or international partners breaks down, and, most dangerously, students fail to recognise the words *examination gloves* on a package label as naming the object they handle every day.

Table 3. English designations of the six PPE items and the associated linguistic obstacles

No.	Standard English designation	Term in Indonesian student use	Origin of the local term	Principal linguistic obstacle
1	Laboratory coat/lab coat	<i>Jas laboratorium</i>	Dutch <i>jas</i>	Rendered into English as laboratory jacket, which names a different garment.

No.	Standard English designation	Term in Indonesian student use	Origin of the local term	Principal linguistic obstacle
2	Utility gloves/heavy-duty gloves	<i>Sarung tangan</i>	Indonesian	One local term covers three English categories that differ in reusability and permitted tasks.
3	Safety goggles	<i>Kacamata pelindung</i>	Indonesian	One local term covers goggles, safety glasses, and face shield, which are selected by hazard type.
4	Medical face mask/surgical mask	<i>Masker medis</i>	Dutch masker	The local term covers both mask and respirator; the English contrast is invisible from the first language.
5	Safety footwear/closed-toe footwear	<i>Sendal safety</i>	Indonesian noun with an English modifier	Word-for-word translation yields safety sandals, naming the open category that is prohibited.
6	Examination gloves (single-use)	<i>Handscoon</i>	Dutch handschoen	Pseudo-anglicism: taken to be English, yet absent from English-language documentation.

The following table condenses the term corrections into a form usable directly as a contrastive glossary in teaching.

Table 4. Contrastive glossary of terms requiring correction

Term in common use	Correct English designation	Note on usage
<i>Handscoon</i>	Examination gloves (single-use)	Handscoon originates from Dutch 'handschoen' (/ˈɦɑnt.sxun/); specify by material, for example nitrile examination gloves.
<i>Sendal safety</i>	Closed-toe safety footwear	Safety sandals: open footwear prohibited in the laboratory.
<i>Jas lab</i> (rendered as laboratory jacket)	Laboratory coat/laboratory gown	Use disposable or fluid-resistant gowns.
<i>Masker</i> (for every type)	Medical face mask or respirator (N95/FFP2)	Separate droplet barrier from aerosol respiratory protection.
<i>Kacamata pelindung</i> (for every type)	Safety goggles, safety glasses, or face shield	Selection depends on the hazard type: splash, particle, or high-volume splash.
<i>Sarung tangan</i> (for every type)	Examination, utility, or sterile surgical gloves	The three differ in purpose and are not interchangeable.

Discussion

Taken together, the six items reveal a single pattern. The obstacles are not evenly distributed but cluster where English draws a distinction that Indonesian does not, whether between categories of equipment, as with mask and respirator, goggles and glasses, or examination and utility gloves, or between normative statuses, as with *must* and *should*. At those points, the instruction loses its regulatory force. This reading is consistent with earlier findings. Bui et al. (2024) and Aliyo and Edin (2023) report a divergence between stated biosafety requirements and observed practice; the present analysis suggests that part of that divergence is located in the wording of the requirement rather than in the student's knowledge of the hazard. Cornish et al. (2021) traced biosafety failures to breakdowns in the communication of procedure, and Straub et al. (2023) found PPE use constrained by capability rather than motivation, with uncertainty about what an instruction required being one component of that constraint. Evidence from healthcare more broadly, where linguistic difference contributes directly to safety incidents (Al Shamsi et al., 2020; Al-Yateem et al., 2023), points in the same direction.

Implications for English for Specific Purposes Teaching

The findings yield four critical implications for pedagogical practice. The first concerns the structural framework of ESP courses within Medical Laboratory Technology curricula. Rather than centering instruction on generic medical terminology lists, language programs must treat laboratory safety documentation as a distinct text type driven by highly contextualized grammatical and pragmatic operational rules. To operationalize these findings, educators can adopt a task-based simulation model—such as "Error Identification in PPE Donning Protocols"—wherein students audit mock reagent inserts, safety signage, and protocol checklists to locate and rectify embedded linguistic failures. In this model, the four identified linguistic obstacles are taught not as abstract grammatical components, but as critical regulatory variables within a structured, 1-semester ESP curricular blueprint (summarized in Table 5).

Table 5. Proposed one-semester ESP blueprint: teaching four features of laboratory safety instruction through simulated laboratory tasks

Weeks	Target feature	Simulated laboratory task	Evidence of learning
1–2	Instructional text type; imperative and adverbials of scope	Diagnostic pre-test of all four features. "Scope scan": students mark the verb, object and scope adverbial (at all times, before leaving the laboratory, when a splash is foreseeable) in authentic coat, glove and signage wording, then state when and where each directive applies.	Pre-test scores as baseline; accurate restatement of the scope of three directives.
3–5	Modal gradient (must/shall, should, may, do not, never)	"Binding-force sort": students rank laboratory sentences from absolute to optional without translating them. They then audit a draft laboratory procedure in which modals have been swapped (for example, must replaced by should) and mark which changes alter the obligation.	Ranking accuracy; written rationale for each altered modal using the categories of Table 2.
6–8	Head-final nominal compounds	"Specification decoding": students unpack compounds such as splash-resistant eye protection and fluid-resistant medical face mask into head and modifiers, then use a mock supplier catalogue to choose the item that matches a stated hazard.	Correct item selection; head-modifier analysis of ten compounds.

Weeks	Target feature	Simulated laboratory task	Evidence of learning
9–11	Procedural verbs (don, doff, discard, decontaminate, autoclave, segregate, seal)	"Error identification in PPE donning and doffing protocols": students receive a sequenced protocol with deliberately inserted errors (wrong verb, wrong order, missing scope adverbial, altered modal), locate and correct each one, then perform the corrected sequence at a simulated station.	Errors detected and corrected; rubric-scored performance of the corrected sequence.
12–13	Pseudo-anglicisms and Dutch-derived loanwords	"Supplier order and glossary audit": students write a short PPE order or enquiry using standard English designations, and audit a mock inventory list containing terms such as handscoon and sendal safety, replacing each with the correct designation.	Accuracy of designations in the order; group glossary of terms not to be used in English.
14	Integrated assessment	"Laboratory station circuit": rotating stations combine all four features, so that students read a label, judge the binding force of an instruction, choose the correct item, and sequence its donning.	Post-test on the same instrument as the pre-test; station rubric.

The second concerns modality, which should be addressed explicitly and separately. The contrast between *must*, *should*, and *may* is how English encodes degrees of obligation, and it can be taught directly from authentic laboratory sentences. Comprehension can be checked by asking students to rank instructions by binding force without translating them. The third concerns pseudo-anglicism. This calls for a contrastive rather than an additive approach, since students already possess the word and possess it wrongly. A short glossary of terms not to be used in English, paired with the correct designation as in Table 4, addresses the problem more efficiently than an expanded vocabulary list.

The fourth concerns the design of signage and teaching material. Evidence from safety communication research shows that pictorials do not interpret themselves and that their wording must be tested against the population that will read it (Bagagiolo et al., 2019; Caffaro et al., 2020). For Indonesian teaching laboratories, this supports signage that pairs an image with the English term and an Indonesian gloss. Grounded in Paivio's Dual-Coding Theory, this multi-modal approach integration serves to minimize cognitive split-attention in high-stakes laboratory settings, thereby ensuring that students efficiently build mental links between the visual object, the standard technical term, and its corresponding safety rule.

CONCLUSION

English-language safety instruction in the medical laboratory operates as an administrative safety control. Within the standard NIOSH Hierarchy of Controls, linguistic comprehension in ESP acts as a critical bridge between Administrative Controls and individual PPE Controls; if students cannot interpret the instructions, the administrative framework collapses, rendering the physical protective equipment ineffective. Analysis of the wording attached to six core items of personal protective equipment shows that Indonesian students' difficulty does not lie where it is usually assumed. The imperative mood, the most conspicuous feature of safety instruction, transfers readily from Indonesian. Difficulty is concentrated in four areas. The first is the modal gradient of *must*, *shall*, *should*, and *may*, which flattens when mapped onto Indonesian *harus*. The second is the head-final nominal compound, as in *splash-resistant eye protection*, which places the technical specification in modifier position. The third is the low-frequency procedural verb, above all *don* and *doff*, which goes unrecognised although it carries the commanded action. The fourth is the set of Dutch-derived loanwords and pseudo-anglicisms that students take to be English, and it is the most consequential of the four, being invisible to students and to conventional language curricula alike. *Handscoon* does not exist in English; *sandal safety* translates into a phrase naming the very category of footwear the rules prohibit; and *kacamata pelindung* and *sarung tangan* each cover several English categories whose separation encodes a safety decision. On this basis, English teaching in Medical Laboratory Technology programmes is best served by treating safety instruction as a text type in its own right, teaching the modal gradient explicitly, supplying a contrastive glossary for mistaken loanwords, and adopting bilingual signage that pairs image, English designation, and Indonesian gloss. Measures of this kind carry the potential to lower the risk of occupational accidents and hazard exposure while sustaining the quality of medical laboratory services.

Core Pedagogical Contributions

This study advances laboratory biosafety by repositioning ESP as an active administrative safety control, shifting instruction from generic terminology lists to high-stakes, task-based documentation analysis. By delivering a structured 1-semester ESP curricular blueprint and a contrastive vocabulary baseline, this research provides educators with a practical pedagogical framework to design targeted laboratory simulations. Ultimately, treating safety instructions as a distinct text type bridges the operational gap between safety communication and student compliance, minimizing hazard exposure during professional training.

Limitations & Classroom Action Research (CAR) Agenda

The primary limitation of this study is its reliance on qualitative document analysis without empirical validation of student comprehension or real-time behavioral compliance. To bridge this gap, future inquiries should implement a Classroom Action Research (CAR) agenda using an empirical pre-test/post-test classroom intervention across successive action cycles. This intervention will establish a diagnostic baseline by measuring student error rates under standard monolingual English signage (pre-test), followed by the introduction of dual-coded bilingual signage pairing visual icons, standard English terms, and Indonesian glosses. A subsequent post-test will evaluate the quantitative delta in both conceptual interpretation accuracy and physical safety execution, empirically validating the impact of visual and linguistic scaffolding on laboratory biosafety.

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