Health Quality & Safety Commission New Zealand

Kupu Taurangi Hauora o Aotearoa

Tall Man Lettering List

REPORT

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Summary

The New Zealand Tall Man lettering list ('the NZ list') includes look-alike, sound-alike medicine names that have been predicted to pose the greatest risk to patient safety. The published literature shows that Tall Man lettering should alert clinicians to medicines that are at risk of name confusion without increasing the risk of errors, particularly if clinicians are educated on the safety rationale of Tall Man lettering before use.

The Health Quality & Safety Commission (the Commission) has received many enquiries about Tall Man lettering lists, standards, endorsement and application techniques from health professionals and organisations, the pharmaceutical industry and software vendors. One of the primary drivers for developing the NZ list was to prevent the proliferation of various non-standardised lists of Tall Man names, which may lead to inconsistency in the application of the technique and result in confusion.

The Commission supports the use of Tall Man lettering as one of several ways to reduce the risk of getting medicine names confused. Other interventions like barcode verification and premarket assessment processes also contribute to risk reduction.

The Commission expects that Tall Man lettering will be widely adopted into electronic health initiatives and standards. To aid with this, the New Zealand Universal List of Medicines (NZULM) will consider how to incorporate the NZ list within its system by linking the Tall Man description to the main product record available for software vendors and other users to apply when needed. The medicine names should be used in the form provided.

The NZ list is recommended for use by:

- software vendors in medicine pick or drop-down lists in pharmacy and prescriber systems, to support prescribing and dispensing activities
- software vendors in medicine pick or drop-down lists requiring a person to select individual medicines as part of the creation of a clinical record or some other clinical task
- users who download NZULM data to generate their own medicine lists for a variety of in-house uses, including drop-down lists in 'smart' pumps, electronic medicine administration records and automated dispensing cabinet screens such as PYXIS medicine storage layout.

The numbers of medicines in the NZ list will be kept to a minimum to prevent over-use. There are 99 medicine name pairs and 20 individual medicines in the list.

Background

Tall Man lettering is an error-prevention strategy used to reduce the risk of look-alike medicine names errors. Tall Man lettering uses a combination of lower and upper case letters to highlight the differences between look-alike medicine names, like fluOXETine and fluVOXAMine, helping to make them more easily distinguishable.

The purpose of Tall Man lettering is to reduce the likelihood of errors due to medicine mis-selection. Tall Man lettering serves as a warning about the risk of confusing a particular medicine name based on the orthography of the medicine name. It does not replace medicine name safety testing, which is aimed at preventing medicines with similar names from coming onto the market.

The following organisations support the use of Tall Man lettering to reduce the risks associated with confusable medicine names:

- The Australian Commission on Safety and Quality in Health Care (ACSQHC)[1,2]
- The International Medication Safety Network (ISMN)
- The United States National Association of Boards of Pharmacy (NABP)
- Hong Kong Health Authority (HA-HK)
- United States Pharmacopeia (USP)
- United Kingdom the former National Patient Safety Agency (NPSA)[3]
- United Kingdom Medicines and Healthcare Products Regulatory Agency (MHRA)[4]
- The Joint Commission (US)
- United States Institute of Safe Medication Practice (ISMP)[5]
- Canadian Institute of Safe Medication Practice (ISMP-Canada)[6]
- Instituto para el Uso Seguro de los Medicamentos (ISMP-España)
- United States Office of Generic Drugs of the US Food and Drug Administration (FDA)[7]
- New Zealand Medicines and Medical Devices Safety Authority (Medsafe).[8]

No country has mandated the use of Tall Man lettering but the FDA has asked manufacturers of 16 look-alike name pairs to voluntarily revise the appearance of their established names.[7] The ISMP lists are widely used internationally by health care practitioners, organisations and software vendors.[5,6]

There is no international standard for the application of Tall Man lettering. Australia is the only country with a standard that describes a consistent approach for application. Every other organisation has variation in which medicine name letters to present in uppercase (typography rules) and which medicine name pairs (generic or brand) are chosen. For example, some present dopamine and dobutamine as DOPamine and DOBUTamine and some present as doPamine and doBUTamine. Figure 1 gives the common Tall Man typography variants available and the rule definitions involved.

Figure 1: Tall Man lettering variants and rule definitions

Typography variants	Rule definition	Examples
Natural	Lowercase except for brand medicine names, where the initial letter is capitalised. The initial letter capitalisation also applies in Tall Man lettering.	paracetamol Panadol®
UPPERCASE	All letters are capitalised.	CEFUROXIME
mid Tall Man	Start from either end of the medicine name of a confusable pair or group and work towards the middle; capitalise the first letters encountered at either end that differ at least across two medicine names in a group along with all the letters occurring between them.	vinBLASTtine & vinCRIStine zoFRAn & zoTOn carbAMZEPINe & carbIMAZOLe
CD3 Tall Man	Same as mid Tall Man but only a maximum of three letters is capitalised per medicine name. Where there are more than three letters presented in a critical portion of the medicine name, capitalise the centre most three. Where this would result in letters that are common among all the medicine names of the group in those positions being capitalised, the next most peripheral letters that differ across at least two medicine names are capitalised. In order to prevent confusion with a lowercase letter 'l', the letter 'i' is not capitalised unless it is the initial letter of a proprietary medicine name.	cefiXime, cefOTAxime, cefTAZidime, cefUROxime
Wild Tall Man	There is no consistent rule.	DOPamine & DOBUTamine foliC & foliNIC HumaLOG® & HumuLIN®

In the small amount of literature available, Tall Man lettering has been evaluated in different ways. However, there is some evidence that highlighting sections of medicines names using Tall Man lettering can make similar medicine names easier to distinguish particularly if the clinicians are educated on the safety rationale of Tall Man lettering before use. [2,9–15,17–19]

Research by Filik et al indicates that Tall Man lettering may be effective because medicine names presented in this format appear novel and act as a warning.[9] Overuse of the technique could reduce its effectiveness as the names will no longer appear novel. To ensure that Tall Man lettering has the greatest possible impact, its use should be reserved for those names associated with the highest risk to patient safety. These names must be identified through a formal risk assessment process.

The approach for defining the list ensures that the actions taken by the Commission to derive a national list for Tall Man lettering is transparent, reproducible and based on the best available evidence. Medicine names get confused due to several factors, and this confusion can have severe, or potentially severe results. Therefore, elements of the risk assessment process are subjective and rely on the input of a panel of expert clinicians.

The mid Tall Man lettering format is advocated as being the most effective and easily applied variant by the ACSQHC and UK National Health Service (NHS).[2,10] However it is inconclusive whether Tall Man lettering is effective or not in preventing medicine selection errors.[2,9–15,17–19] More studies with larger sample sizes are required to conclusively show whether Tall Man lettering is effective in preventing medicine selection errors. In lieu of these studies, the Commission believes there are still benefits in implementing Tall Man lettering as recommended.

The NZ list is recommended for use by:

- software vendors in medicine pick or drop-down lists in pharmacy and prescriber systems, to support prescribing and dispensing activities
- software vendors in medicine pick or drop-down lists requiring a person to select individual medicines as part of the creation of a clinical record or some other clinical task
- users who download NZULM data to generate their own medicine lists for a variety of in-house uses, including drop-down lists in 'smart' pumps, electronic medicine administration records and automated dispensing cabinet screens such as PYXIS medicine storage layout.

Approach

The NZ approach for developing a Tall Man lettering list is predominantly based on the ACSQHC methodology. The approach summarised in Figure 2 was endorsed by the national Medication Safety Expert Advisory Group (MSEAG), given the rigour behind the development of the Australian list.[2] All medicines were evaluated using their recommended international non-proprietary name (rINN).

Figure 2: Approach overview

Approach		Deliverable
1.	Identify the medicine pairs available in NZ that are in the Australian list	Medicine pairs from the Australian list that are available in NZ
2.	NZ scan for information on medicine pairs with look-alike, sound-alike issues	NZ-specific medicines identified as having look-alike issues
3.	Check the NZ information gathered for duplicates, current availability and appropriateness	NZ confusable medicine pairs that are not in the Australian list
4.	Undertake the risk assessment process on the NZ medicine name pairs not in the Australian list	NZ risk-assessed medicines
5.	Apply mid Tall Man typography to the extreme and high-risk medicine name pairs and add the medicine name pairs from the Australian list that are available in NZ	NZ list

1. IDENTIFY THE MEDICINE PAIRS AVAILABLE IN NZ THAT ARE IN THE AUSTRALIAN LIST

The medicine pairs in the Australian list were checked for availability using the New Zealand Formulary (NZF) and NZULM resources by the National Medication Safety Programme Team. Confirmation on current availability was sought for medicines listed as being unregistered (Section 29) or not referenced in the NZF or NZULM from hospital and community pharmacies dispensing data records.

Both medicines named in the Australian list pair had to be available in NZ to be included in the NZ list. The Australian list includes classes of medicines with look-alike, sound-alike issues, eg, cephalosporins. Where appropriate, NZ equivalents were automatically added without further assessment, eg, cefuroxime, nitrazepam.

2. NZ SCAN FOR INFORMATION ON MEDICINE PAIRS WITH LOOK-ALIKE, SOUND-ALIKE ISSUES

NZ health professionals and organisations were asked via email, letters, phone, internet, networks and chat groups to identify medicine pairs with look-alike, sound-alike issues (Appendix 1). Guidelines given to identify these medicine pairs included reviewing incident reports, pharmacy intervention reports, ACC claim data and professional disciplinary proceedings involving medicines for look-alike, sound-alike issues over the last five years. While there is likely to be an under-reporting of medicine name confusion or newer agents may not have been on the market long enough for the risk to have been reported, a decision was made by the MSEAG not to screen the whole NZF for medicines with similar name potential. This process would have generated an unmanageable list and the evidence points to limiting the use of Tall Man lettering for best effect. To help address these limitations, there will be a process for ongoing maintenance of the list.

3. CHECK THE NZ INFORMATION GATHERED FOR DUPLICATES, CURRENT AVAILABILITY AND APPROPRIATENESS

The medicine pairs submitted by NZ health professionals and organisations were cleaned for duplication and current availability in NZ. The remaining medicine pairs were then reviewed for appropriateness by the expert panel established to undertake the risk assessment process. Members of the expert panel are listed in Appendix 2. Examples of medicines that were considered to be inappropriate for the risk assessment are listed in Appendix 3 with reasons.

4. UNDERTAKE THE RISK ASSESSMENT PROCESS ON THE NZ MEDICINE NAME PAIRS NOT IN THE AUSTRALIAN LIST

The risk assessment process comprised three components:

a. Assessment of the likelihood of confusion between two products (similarity)

The similarity process was completed by the National Medication Safety Programme Team as this process was deemed to be objective. To ensure certainty and consistency in the similarity scoring results, each member of the expert panel was randomly allocated five medicine name pairs to re-assess. The likelihood of confusion was based on:

- similar appearance of medicine names (orthography)
- similar strengths of products available
- similar routes of administration
- similar forms of products available.

As Tall Man lettering is primarily a tool designed to differentiate orthographically similar names, a significant weight was placed on the degree of this similarity. Likelihood of confusion was arbitrarily calculated as a score out of 100. The total score is a composite of name similarity (70 percent), strength similarity (20 percent), route similarity (5 percent) and dose form similarity (5 percent) (Figure 3).

No available literature quantifies the contribution of these various factors to confusion between medicine names. As such, it was necessary to assign an arbitrary weighting based on the information most likely to be seen and used when reading and selecting medicines from prescriptions and computer/device screens. Therefore name similarity was given the highest weighting followed by strength.

Name similarity was calculated using the BI–SIM calculator (normalised by length) found at http://www.cs.toronto.edu/~aditya/strcmp2/. Taking findings from the fields of cognitive psychology, linguistics and computer science, researchers developed measures that can quantify the orthographic similarity of two medicine names.[12,13] Kondrak and Dorr evaluated the effectiveness of these measures and found that a measure known as BI-SIM was the single measure of similarity that gave the greatest accuracy when predicting medicine name confusion.[15] This was supported by others.[18,19] Among other features, this measure places emphasis of scoring on similarity found at the beginning of the medicine names. This is an important consideration given that the risk of confusing two names will be increased if those names appear in close proximity in a list, eg, on a computer/device screen. BI–SIM scores normally range from 0.00 to 1.00.

Strength similarity was given a higher weighting over route and/or dose form similarity as many of the reported incidents reviewed indicated that strength similarity was a root cause in wrong medicine name errors.

Of these features, strength is most commonly associated with the medicine name on prescriptions, medicine packaging, and in computer systems, and was given a greater weighting than similarities in route and/or dose form.

Figure 3: Similarity scoring table

Scoring	
Name similarity:	BI-SIM score x 70
Strength similarity:	
No common strength	0
Some (but not all) strengths in common	10
All strengths in common	20
Route similarity:	
No common administration route	0
Some (but not all) routes in common	2.5
All routes in common	5
Dose form similarity:	
No common dose forms	0
Some (but not all) dose forms in common	2.5
All dose forms in common	5
	Max 100

Once all identified pairs were scored, the distribution of scores was measured using the Kolmogrov–Smirnov test (see Appendix 5). The test is used as a measure of normality of the calculated composite scores distribution. If it is normal, the data are able to comprise five equal sections (quintiles). Data are then arbitrarily allocated a similarity rating (with 1 being the most similar and 5 being the least similar), denoting the likelihood of confusion. This approach does not make statistical sense if the sample is not normally distributed, hence the need to verify the normality of the whole sample using the Kolmogrov–Smirnov test.

b. Assessment of the consequence of this confusion (severity)

The identified pairs were assigned a severity rating (Figure 4) by an expert panel of pharmacists, a nurse and a doctor. The severity process was considered to be a subjective measure, therefore the expert panel was chosen based on professional representation of the medicine use process, eg, prescribing, dispensing and administration as well as clinical and toxicological expertise.

The expert panel solely considered the properties of the two medicines and took into consideration:

- whether either (or any) of the medicines were known to be a 'high-risk' medicine, eg, insulin, anticoagulants, opioids, cytotoxics
- number of doses that would need to be administered to cause harm
- indication(s), eg, epilepsy versus vitamin supplementation
- whether allergy to either medicine is common
- whether either medicine had a significant number of known significant drug interactions. eg, greater than five major interactions (as per NZF)
- whether either medicine had a narrow therapeutic index
- whether administration of the intended medicine was time-critical.

To help the decision-making, the panel assumed that:

- an error was made, substituting one medicine for the other, and that the error reached the patient
- an error could have been made during prescribing, dispensing or administration processes (and still reached the patient)
- confusion between two medicines represents two possible errors (A is intended and B is given, or B is intended and A is given). Where one error is potentially more serious than the other, the 'severity' is based on the more serious error
- the patient is of average health
- there is only short-term exposure to the wrong medicine, ie, that the substitution error was detected within one week.

Figure 4: Severity rating table

Rating	
Severe	Confusion between the two medicines is likely to (or has been documented to) result in patient death or would require an intervention to sustain life.
Major	Confusion between the two medicines is likely to (or has been documented to) cause significant injury such as loss of organ function, or would require an intervention to prevent significant injury.
Moderate	Confusion between the two medicines is likely to (or has been documented to) require hospitalisation or transfer to a higher level of care (eg, transfer to ICU).
Minor	Confusion between the two medicines is likely to (or has been documented to) require increased observations or monitoring to ensure that it does not have an adverse outcome.
Minimium	Confusion between the two medicines is unlikely to cause any adverse outcome.

Appendix 4 gives examples of the range of factors that were considered when assigning severity ratings for a medicine pair. As all medicine name pairs were assessed by the same panel, inter-rater reliability testing was not required. Consensus was achieved through panel moderation.

c. *Combination of likelihood of confusion between two products (similarity) and consequence of this confusion (severity) scores*

Once both components were completed, the pairs were given a rating using a risk matrix based on the likelihood that the names would be confused and the potential severity (consequence) of this confusion (Figure 5). The 1–5 numbering refers to 1 being the most similar and 5 being the least similar.

Figure 5: Risk matrix table

		Potential Severity				
		Minimum	Minor	Moderate	Major	Severe
Likelihood of Similarity	1	M	H	E	E	E
	2	M	H	H	E	E
	3	L	M	H	H	E
	4	L	M	M	H	H
	5	L	L	L	M	M

Key: E – Extreme risk | H – High risk | M – Moderate risk | L – Low risk

Medicine name pairs that were risk assessed as being extreme or high risk had mid Tall Man format applied. Those items of moderate risk with high likelihood of confusion would have been considered if there had been smaller numbers in the extreme and high risk categories. It is not known what the ideal number is to have in a list, so the MSEAG agreed an arbitrary figure of 150 medicine name pairs +/- 10%, based on the literature indicating 'less is more' and considering that most health professionals will not be exposed to this number, depending on their field of expertise.

Limitations

The risk matrix is only two dimensional; applying the likelihood of confusion and potential severity of confusion. Additional factors such as the likelihood that the error would be detected and the frequency with which the error is likely to occur would have enhanced the risk assessment. However, these variables are highly practice-specific, subjective and not easily measured.

The severity scoring used in the risk assessment process is also a subjective measure. Under the right circumstances, omission or commission of almost any medicine can have extreme consequences. Predicting which error is likely to cause harm is difficult and reliant on a number of variables that could not be controlled in this process. These include a large range of patient-specific factors such as duration of exposure, co-morbidities, overall well-being, previous allergies/adverse drug reactions and other medicines taken concurrently.

Despite being found to be a significant risk to patient safety, some confusable medicine name pairs were excluded from the NZ list (see Appendix 6). This was mainly due to the names not sharing adequate orthographic similarity to warrant the use of Tall Man lettering. Generally, this was considered to be the case if Tall Man names did not contain at least two lowercase letters. An example is the name pair Fungizone™ and AmBisome™. While this pair of medicines has caused confusion and patient harm, use of Tall Man lettering, especially mid Tall Man format, is unlikely to considerably reduce name confusability. For these medicines, confusion likely arises from the fact that the two products are different formulations of the same active ingredient. Other interventions should be made to reduce harm from such confusable products.

5. APPLY MID TALL MAN TYPOGRAPHY TO THE EXTREME AND HIGH-RISK MEDICINE NAME PAIRS

The mid Tall Man format was created by taking two or more look-alike medicine names that were risk assessed as extreme or high and applying two steps:

1. *Working from the first letter of the medicine name, take each common letter to the right until two or more letters are different, and from that point on capitalise the letters.*

Cefuroxime	became	cefUROXIME
Cefotaxime	became	cefOTAXIME
Ceftazidime	became	cefTAZIDIME

2. *Working from the last letter of the medicine name, take each capitalised common letter to the left until two or more letters are different. Change the capital letters at that point back to lowercase letters.*

cefUROXIME	became	cefUROXime
cefOTAXIME	became	cefOTAXime
cefTAZIDIME	became	cefTAZIDime

Commonly, generic medicines names are presented in all lowercase while proprietary (trade) names are presented as proper nouns, ie, with an initial capital letter followed by lowercase This convention has been ignored to allow the application of the mid Tall Man format.[5]

The NZ list has been compiled to improve patient safety by minimising the risk of 'look alike' medicine names and encourage correct prescribing, dispensing and administration of medicines. However, it is acknowledged that trade (proprietary) medicine names are protected through laws related to intellectual property. At no point is there any intent that this safety initiative should breach any patent or trademarks.

Exceptions

Some exceptions were required, in particular where there were no common letters at the end (tail) of the medicine name to work backwards from. For example:

pegfilgrastim	became	pegFILGRASTIM
peginterferon	became	pegINTERFERON

Other exception considerations included but were not limited to:

- error risk if mid Tall Man format is applied
- use and proximity of names within a pick or drop-down list in an electronic system
- format of the same medicine in a different look-alike medicine name pair eg, primAQUIne and primIDOne versus prEDNISone and primIDOne
- clinical significance of the medicine name pairs
- classes of medicines, eg, benzodiazepines, cephalosporins
- letters I and L in a medicine name and how they would appear in lower- and uppercase using different fonts
- capitalisation already in use in a proprietary (trade) name
- prefixes and suffixes that form part of the medicine name such as numbers, salts and routes, eg, depot dose forms, injection or infusion.

For example, in the pair BENZATHINE benzylpenicillin and benzylpenicillin, only the benzathine part was capitalised. It was felt there was greater risk of error in choosing the wrong medicine if both steps of mid Tall Man format applied, eg, benzATHINE BENZylpenicillin and benzylpenicillin. This logic was also applied to the medicine name pair of folic acid and foliNIC acid. Mid Tall Man formatting would make it foliC acid and foliNIC acid, which the expert panel believed would be missed in an electronic system especially as the letters I and L are in close proximity.

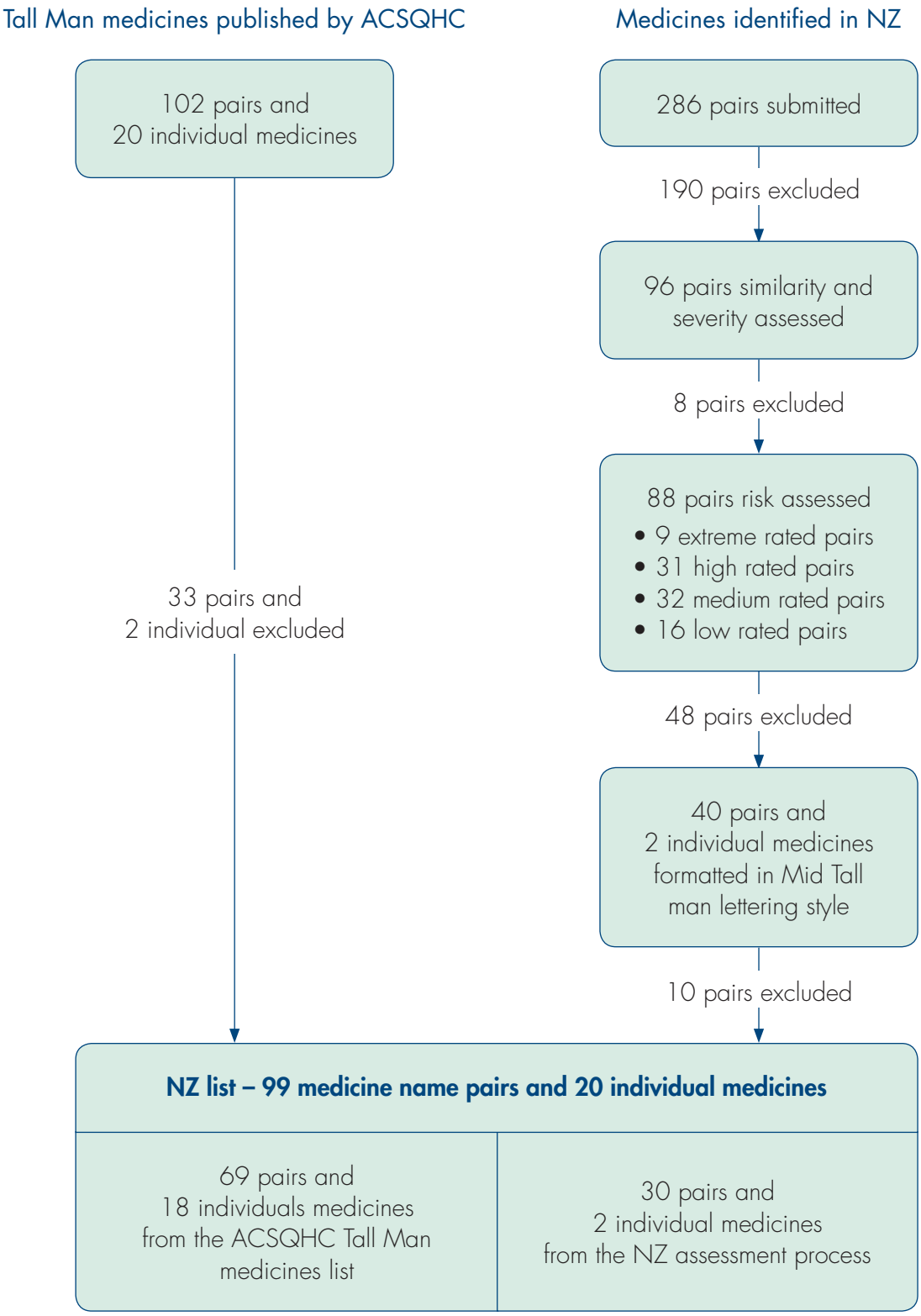
Sometimes, the medicine or medicine name pair had to be completely excluded despite having an extreme or high risk rating because the application of mid Tall Man lettering would not solve the risk. One example was the pair pREVENAR 13 and pNEUMOVAX 23, which would have the majority of the letters in Tall Man lettering. In this case, Tall Man lettering was unlikely to solve the risk of look-alike confusion, particularly as the medicines were likely to be in close proximity in an electronic system drop-down menu.

In all cases, logic regarding the main risk of confusion prevailed rather than the rigid application of the mid Tall Man format. This logic was reviewed by the expert panel as well as Daniel Lalor from the Medication Safety and Quality Program of Clinical Excellence Commission, New South Wales.

See page 13 for a complete list of the Tall Man names in the NZ list.

Results

There are 99 medicine name pairs and 20 individual medicines on the NZ list; a total of 188 individual medicines. This list is a mix of medicine pairs identified through the ACSQHC Tall Man medicine list for Australia and NZ assessment process. The diagram below identifies the results from developing the NZ list.



NEW ZEALAND TALL MAN LETTERING LIST

		Identified from
aLLOPURINol	aTENOLol	NZ risk assessment
amIODARONe	amLODIPIne	Australian list
amITRIPTYLIne	amINOPHYLLIne	Australian list
amiSULPIRIDe	amITRIPTYLIne	NZ risk assessment
amLODIPIne	amITRIPTYLIne	Australian list
aPomine	aVomine	Australian list
arATAC	arOPAX	Australian list
aTRopt	aZopt	Australian list
azATHIOPRINE	azITHROMYCIN	Australian list
ERYthromycin		Australian list
BENZATHINE benzylpenicillin	benzylpenicillin*	NZ risk assessment
bisOPROLOl	bisACODYl	Australian list
buMETANide	buDESONide	Australian list
caRAFate	caLTRate	Australian list
CARBAMazepine	OXCARBazepine	Australian list
	carbIMAZOLe	Australian list
caRVEDILOl	caPTOPRIl	Australian list
celAPRAM	celEBREX	Australian list
ciprAMIL	ciprOXIN	Australian list
cLARITHROMYcin	clINDAmycin	NZ risk assessment
	cIPROFLOXAcin	Australian list
cLOMIPRAMIne	cLOMIPHEne	Australian list
	cHLORPROMAZIne	Australian list
cLOMIPRAMIne	cloNIDine	NZ risk assessment
CLONazepam	cLOZAPine	NZ risk assessment
cLOZAPine	cHLORPROMAZIne	NZ risk assessment
coUMADIN	coVERSYL	Australian list
cyclosPORIN	cyclosERINE	Australian list
DEPO-medrol	SOLU-medrol	Australian list
DEPO-medrol	depo-PROVERA	Australian list
solu-CORTEF	SOLU-medrol	Australian list
dIGOXin	dOXAZOSin	NZ risk assessment
diPYRIDAMOLe	diSOPYRAMIDe	Australian list
doTHIEpin	doXEpin	Australian list

		Identified from
fluARIx	fluVAx	NZ risk assessment
flupENTHIXOL	flupHENAZINE	NZ risk assessment
foliNIc acid	folic acid*	NZ risk assessment
humALOG	humULIN	Australian list
hyoscine HYDROBromide	hyoscine BUTYLbromide	NZ risk assessment
isopto HOMATROpine	isopto CARpine	Australian list
imipramine*	trimIPRAMINE	Australian list
	imUPRine	NZ risk assessment
ISOtretinoin	tretinoin*	Australian list
januMET	januVIA	Australian list
ketALAR	ketOROLAC	Australian list
laMICTAl	laRGACTIl	Australian list
	laMISIl	Australian list
lamIVUDine	lamOTRIGine	Australian list
lanTUs	lanVIs	Australian list
loxaLATe	loxaMINe	NZ risk assessment
maxiTROL	maxiDEX	NZ risk assessment
methylprednisolone ACETate	meDROXYPROGESTERone	NZ risk assessment
methylprednisolone SODIUM SUCCINate		
m-eSLON	m-eNALAPRIL	NZ risk assessment
methADONe	methYLPHENIDATe	Australian list
metHOTREXATe	metOCLOPRAMIDe	NZ risk assessment
methylprednisolone ACETate	methylprednisolone SODIUM SUCCINate	NZ risk assessment
metoPROLOL	metOCLOPRAMIDe	NZ risk assessment
MOXIfloxacin	NORfloxacin	Australian list
neO-MERCAZOLe	neUROKARe	NZ risk assessment
NEOral	INDEral	Australian list
niMODIPine	niFEDIPine	Australian list
norVASC	norMISON	Australian list
novoMIX	novoRAPID	Australian list
novoRAPID	novoSEVEN	NZ risk assessment
oxyCONTIN	oxyNORM	Australian list
pegFILGRASTIM	pegINTERFERON	NZ risk assessment
PHENOXYMETHylpenicillin	penicillAMINE	NZ risk assessment
prEDNISone	primIDOne	NZ risk assessment
primAQUIne		NZ risk assessment

		Identified from
primaXIN	primaCOR	Australian list
	primaCIN	Australian list
procYCLIDine	proCHLORPERazine	NZ risk assessment
	proMETHazine	NZ risk assessment
proGRAF	proZAC	Australian list
proMETHazine	proCHLORPERazine	Australian list
propRANOLol	propOFol	Australian list
QUETIAPine	SERTRALine	Australian list
	quINine	NZ risk assessment
SIrolimus	TACrolimus	Australian list
sulfaSALazine	sulfaDIazine	Australian list
toPAMAX	toFRANIL	Australian list
tRAMadol	tEMOdal	Australian list
trimEPRAZINE	trimETHOPRIM	Australian list
	trimIPRAMINE	Australian list
valAciclovir	valGANciclovir	Australian list
Medicines used predominantly in cancer therapy		
cISplatin	cARBOplatin	Australian list
cyclIZINE	cyclOBLASTIN	Australian list
daCTINomycin	daPTomycin	Australian list
DAUNOrubicin	DOXOrubicin	Australian list
	IDArubicin	Australian list
DOCEtaxel	PACLItaxel	Australian list
IFOSFamide	CYCLOPHOSPHamide	Australian list
INFLIximab	RITUximab	Australian list
CETUximab		NZ risk assessment
vinBLASTine	vinCRISTine	Australian list
	vinORELBine	Australian list
avaSTIN	avaXIM	Australian list
ALKeran	LEUKeran	Australian list
	MYLeran	Australian list

Medicine classes		
Cephalosporins	cefEPIME	Australian list
	cefOTAXIME	Australian list
	cefOXITIN	Australian list
	cefTAZIDIME	Australian list
	cefUROXIME	NZ risk assessment
	cefTRIAXONE	Australian list
	cephaLEXin /cefaLEXin	Australian list
	cephaZOLin /cefaZOLin	Australian list
Benzodiazepines	CLONazepam	Australian list
	DIazepam	Australian list
	NITRazepam	NZ risk assessment
	OXazepam	Australian list
	LORazepam	Australian list
Selective Serotinin Reuptake Inhibitors (SSRI) / Serotonin Noradrenaline Reuptake Inhibitors (SNRI)	fluoxetine*	Australian list
	DULoxetine	Australian list
	PARoxetine	Australian list
	fluVOXAMine	Australian list
Sulphonylurea Agents	gliBENCLAMide	Australian list
	gliCLAZide	Australian list
	gliPIZide	Australian list

* not capitalised as part of the Tall Man lettering methodology exception rules

Maintenance of the NZ list

The Commission plans to maintain the NZ list through the contributions of health professionals and organisations.

Ideally the number of pairs on the NZ list should be kept to a minimum. It is not known what the ideal number is to have in a list so the MSEAG has agreed an arbitrary figure of 150 medicine name pairs +/-10% based on the literature, indicating 'less is more' and considering that most health professionals will not be exposed to this number depending on their field of expertise.

Medicine name pairs that are risk assessed to be of extreme or high risk will be included. Those items of moderate risk with high likelihood of confusion will be considered for inclusion depending on the number of pairs falling in the extreme and high risk categories. A decision to not include the names in the NZ list does not imply an acceptance of the risk associated with the name similarity. Other methods of reducing medicine name errors, such as use of barcode scanners, addressing storage conditions etc should be employed to minimise these risks.

Health professionals and organisations can notify the Commission (email info@hqsc.govt.nz) when:

- medicine name pairs are deemed to pose a risk to patient safety, and may benefit from application of Tall Man lettering
- medicines on the NZ list are no longer available and can be removed from the list.

Submissions will be considered by the MSEAG at its meetings using the approach described in Section 2 - Approach. Amendments to the NZ list will only occur annually if required. A register of NZ list submissions and subsequent outcomes will be published on the Commission's website: www.hqsc.govt.nz.

Recommendations

- The NZ list should be kept to a minimum to avoid overuse of the technique.
- The NZULM will consider how the NZ list can be incorporated into its system to aid software vendor utilisation. It will also provide guidance for vendors on how to use the Tall Man format in the NZULM.
- Software vendors will be encouraged to use the NZULM with Tall Man lettering functionality into their pick or drop-down list medicine functionality.
- Fonts where the capital I (as in 'India') looks identical to a lowercase L (as in 'jolly') should be avoided.
- Government agencies should promote the use of Tall Man lettering through the NZULM where appropriate within their frameworks and guidance regarding electronic systems involving medicines.
- Organisations that use Tall Man lettering should educate their staff on the safety rationale and principles of Tall Man lettering. Educational resources will be available from the Commission.
- Health professionals and organisations are encouraged to evaluate the use of Tall Man lettering on the prevention of medicine selection errors.

References

1. Australian Commission on Safety and Quality in Health Care 2011. National Standard for the Application of Tall Man Lettering: Project Report, ACSQHC, Sydney. http://www.safetyandquality.gov.au/wp-content/uploads /2013/03/National-Standard-for-the-Application-of-Tall-Man-Lettering-Project-Report-with-appendices-PDF-700KB.pdf last accessed 22 July 2013.

2. Australian Commission on Safety and Quality in Health Care 2011. Evaluating the effect of the Australian List of Tall Man Names. Australian Commission on Safety and Quality in Health Care, ACSQHC, Sydney, June 2011. http://www.safetyandquality.gov.au/wp-content/uploads/2012/02/Evaluating-the-Effect-of-the-Australian-List-of-Tall-Man-Names-30-Jun-2011-PDF-134KB.pdf last accessed 22 July 2013.

3. NHS National Patient Safety Agency and the Helen Hamlym Research Centre. Design for patient safety. A guide to the design of electronic infusion devices. London, 2010 http://www.nrls.npsa.nhs.uk/EasySiteWeb/getresource.axd?AssetID=68536 last accessed 22 July 2013.

4. Medicines and Healthcare Products Regulatory Agency (MHRA). Best practice on labelling and packaging of medicines. July 2012 http://www.mhra.gov.uk/home/groups/pl-a/documents/websiteresources/con157150.pdf last accessed 22 July 2013.

5. Institute of Safe Medication Practices. FDA and ISMP Lists of Look-Alike Drug Names with Recommended Tall Man Letters 2011 http://www.ismp.org/tools/tallmanletters.pdf last accessed 22 July 2013.

6. Institute of Safe Medication Practices Canada. Application of TALLman lettering for drugs used in oncology. ISMP Canada Safety Bulletin 2010; 10(8):1-4 http://www.ismp-canada.org/download/safetyBulletins/ISMPCSB2010-08-TALLmanforOncology.pdf last accessed 22 July 2013.

7. US Food and Drug Administration (FDA). Name differentiation project 2001. http://www.fda.gov/Drugs/DrugSafety/MedicationErrors/ucm164587.htm last accessed 22 July 2013.

8. Medsafe. Guideline on the Regulation of Therapeutic Products in New Zealand, Part 5: Labelling of medicines and other related products. August 2011 http://www.medsafe.govt.nz/regulatory/guidelines.asp last accessed 22 July 2013

9. Filik R et al. The influence of Tall Man lettering on drug name confusion - a laboratory-based investigation in the UK using younger and older adults and healthcare practitioners. Drug Saf 2010; 33:677-87.

10. Gerrett D et al. Final report of the use of Tall Man lettering to minimise selection errors of medicine names in computer prescribing and dispensing systems: NHS Connecting for Health 2009.

11. Filik R et al. Drug name confusion: evaluating the effectiveness of capital ("Tall Man") letters using eye movement data. Social Science and Medicine 2004; 59: 2597-601.

12. Filik R et al. Labelling of medicines and patient safety: evaluating methods of reducing drug name confusion. Human Factors 2006; 48(1):39-47.

13. Darker IT et al. The influence of 'Tall Man' lettering on errors of visual perception in the recognition of written drug names. Ergonomics 2011; 54(1):21-33.

14. Van de Vreede et al. Successful introduction of Tallman letters to reduce medication selection errors in a hospital network. Journal of Pharmacy Practice and Research 2008; 38 (4):263-266

15. Kondrak and Dorr. Automatic identification of confusable drug names. Artificial Intelligence Medicine. 2006 Jan; 36(1):29-42.

16. Ostini et al. Quality use of medicines-medication safety issues in naming look-alike, sound-alike medicines names. International Journal of Pharmacy Practice 2012; 20: 349-357

17. Grissinger M. Tall Man letters are gaining acceptance. Pharmacy & Therapeutics 2012; March: 37(3): 132-133

18. Kovacic L. Look-alike, sound-alike drugs in oncology. Journal of Oncology Pharmacy Practice 2011; June 17 (2): 104-118

19. Gabriele S et al. Visual differentiation in look-alike medication names. Canadian Patient Safety Institute February 10 2012. http://www.patientsafetyinstitute.ca/English/research/cpsiResearchCompetitions/2008/Documents/Gabriele/Report/Visual%20Differentiation%20in%20Lookalike%20Medication%20Names%20-%20Full%20Report.pdf last accessed 22 July 2013

Appendix 1: NZ organisations contacted

- All district health boards via the DHB Quality Managers Forum
- New Zealand Pharmacovigilance Centre
- New Zealand Formulary
- Accident Compensation Corporation (ACC)
- Pharmaceutical Management Agency (PHARMAC)
- Health Quality & Safety Commission
- New Zealand Medicines and Medical Devices Safety Authority (Medsafe)
- Pharmaceutical Society of New Zealand
- New Zealand College of Pharmacists
- Pharmacy Defence Association
- Medical Protection Society
- Medicus Indemnity New Zealand
- New Zealand Medical Professionals Limited
- New Zealand Hospital Pharmacist Association.

Appendix 2: Tall Man lettering risk assessment expert panel

- Dr Desireé Kunac, Senior Research Fellow, New Zealand Pharmacovigilance Centre, Preventive & Social Medicine, Dunedin School of Medicine, University of Otago
- Associate Professor David Reith, Clinical Pharmacology and Toxicology, Dunedin School of Medicine, University of Otago
- David Woods, Managing Editor, New Zealand Formulary
- Sandra Fielding, Nurse Leader – Medical Services, Bay of Plenty District Health Board
- Nirasha Parsotam, Medication Safety Specialist, Health Quality & Safety Commission
- Emma Forbes, Senior Project Manager, Health Quality & Safety Commission (facilitator).

Appendix 3: Examples of medicines submitted that were not risk assessed

Name 1	Name 2	Reason
Apo-B Complex	Apo-Bromocriptine	Tall Man lettering unable to fix this as the Apo is a company prefix
Aropax	Fluox	Not a look-alike issue
amprenavir	fosamprenavir	Neither available
amantadine	rimantadine	rimantadine not available
cefotaxime	cefotetan	cefotetan not available
chlorpromazine	chlorpropamide	chlorpropamide not available
ephedrine	epinephrine	epinephrine is called adrenaline in NZ as per MedSafe labelling rules. Electronically will convert to adrenaline
gentamicin	gatifloxacin	gatifloxacin not available
glipizide	glyburide	glyburide not available
heparin 500u/5ml	heparin 50u/5ml	Tall Man lettering unable to fix the strength similarity issue
Humalog	Humulin NPH	Humalog and Humulin are on the Australian list so will be taken forward automatically
Humalog Mix 25 or Mix 50	Humalog	Tall Man lettering unable to fix the suffix issue
Humulin 30/70	Humulin N	Tall Man lettering unable to fix the suffix issue
hydrazaline	hydroxyzine	hydroxyzine not available
imipramine	desipramine	desipramine not available
Inhibace Plus	Inhibace	Inhibace discontinued in NZ by Roche
metyrosine	metyrapone	metyrosine not available
Mucomyst	Mucinex	mucomyst not available
nicardipine	nifedipine	nicardipine not available
nimodipine	nisoldipine	nisoldipine not available
omeprazole infusion	omeprazole injection	Tall Man lettering unable to fix the dose form issue
pentobarbital	phenobarbital	pentobarbital not available
terbutaline	terfenadine	terfenadine discontinued worldwide
tiagabine	tizanidine	Neither available
tolazamide	tolbutamide	Neither available
zuclopenthixol depot	zuclopenthixol accuphase	Tall Man lettering unable to fix the suffix issue

Appendix 4: Examples of severity risk assessment

Example 1	cephalexin and cefaclor	minimum severity
Reasoning	Neither is a high-risk medicine. Allergies are known, but allergy to one is likely to imply allergy to the other (class level). Both agents have similar spectrums of antimicrobial activity and are commonly used for the same indications. Neither omission nor commission (assuming treatment is provided with the alternate agent) is likely to cause an adverse outcome.	
Example 2	**Avandia® (rosiglitazone) and Avanza® (mirtazepine)**	**minor severity**
Reasoning	Neither is a high-risk medicine. Avandia® has known serious side-effects, including increased risk of myocardial infarction, but this is rare. Allergies are not common, but interactions with both medicines are possible and may lead to hypoglycaemia (if patient is treated with sulphonylurea and receives Avandia®) or serotonin syndrome (if the patient is already on a SSRI). These are possible outcomes, but not likely. Drowsiness or altered mental state caused by commission of Avanza® would likely result and may need monitoring. Omission of Avanza® (thus abrupt withdrawal) may lead to clinical signs and symptoms of withdrawal, requiring treatment but not likely hospitalisation. Omission of Avandia® may affect glycaemic control, requiring increased monitoring.	
Example 3	**Lamictal® (lamotrigine) and Largactil® (chlorpromazine)**	**moderate severity**
Reasoning	Neither direction of substitution is obviously more severe than the other. Commission of either medicine is not likely to cause severe and immediate harm – neither is a high risk medicine with serious, common side-effects, and allergies or interactions are not common. Drowsiness caused by commission of Largactil® is likely to be the greatest consequence of commission. Omission of either medicine may cause significant issues either by resulting in a deterioration of mental status or seizure. It is probable that this would result in hospitalisation or increased care requirements.	
Example 4	**Prograf® (tacrolimus) and Prozac® (fluoxetine)**	**major severity**
Reasoning	Tacrolimus is an immunosuppressant used to prevent rejection of transplanted tissue. Inadvertent administration of tacrolimus may cause immunosuppression and expose the patient to infection. Potentially more seriously, omission of tacrolimus may result in rejection of transplanted tissue or organs.	
Example 5	**morphine and hydromorphone**	**serious severity**
Reasoning	Both morphine and hydromorphone are high-risk medicines. Hydromorphone is a high potency opioid, and there have been a number of cases of serious patient harm, including death, resulting from inadvertent administration of hydromorphone when morphine was intended.	

Appendix 5: Kolmogorov–Smirnov test results

The calculated similarity scores ranged from 23.05 to 80.91, with a mean of 49.04 and a standard deviation of 11.37. The distribution of scores was determined to be lognormal (Figure A) using the Kolmogorov–Smirnov test ($p>0.15$) rather than normal (Figure B). The ACSQHC list had a normal distribution.[1] By using lognormal, the assignment of the similarity rating was able to be completed. The difference in distribution may be explained by the significantly smaller sample numbers of medicine pairs that were risk assessed.

Figure A: Lognormal *Distribution of Composite similarity score*

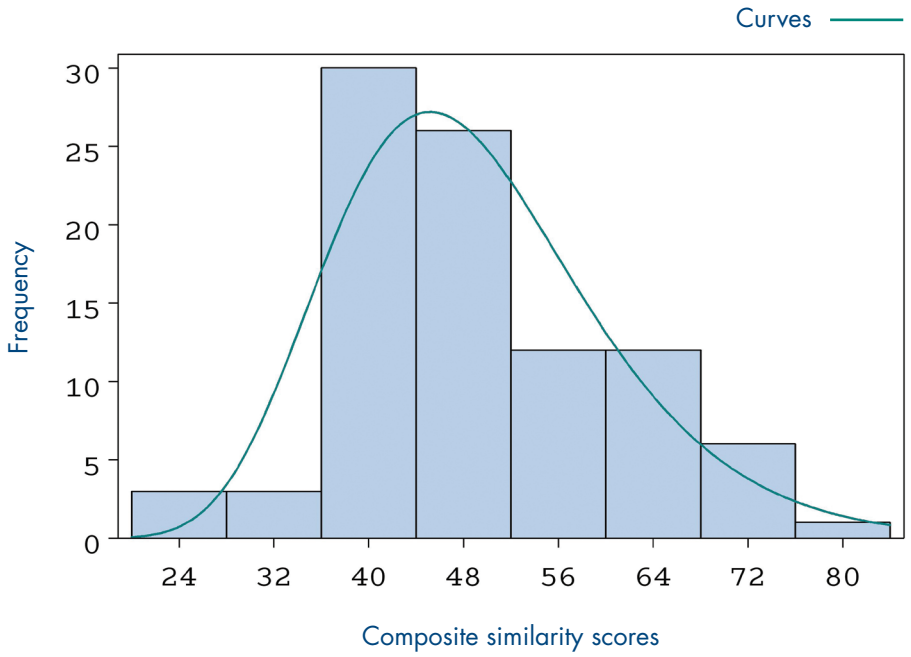
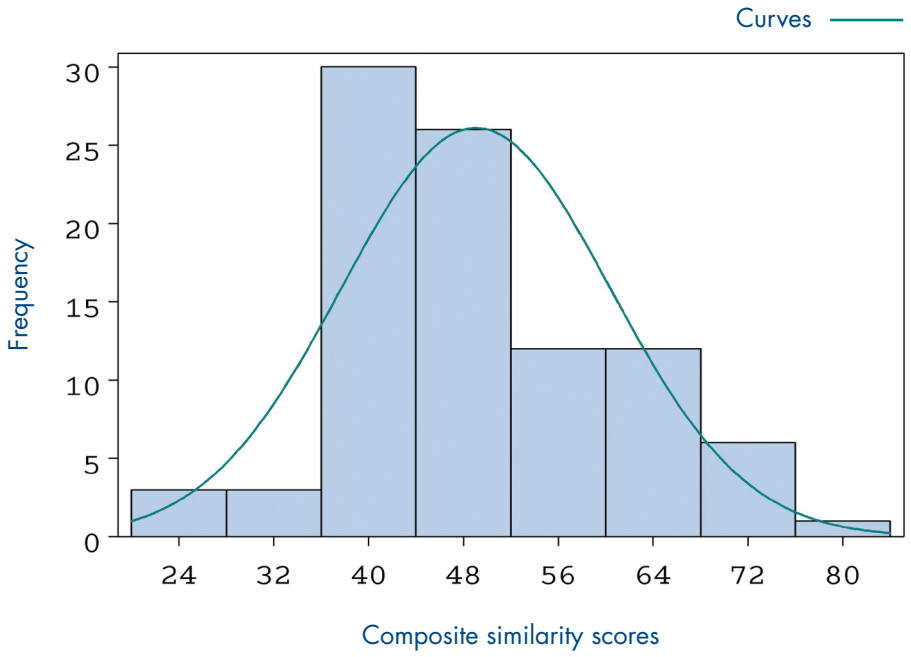


Figure B: Normal *Distribution of Composite similarity score*



Appendix 6: Final results for the NZ assessed list

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
benzylpenicillin	benzathine benzylpenicillin	41.482	20	0	5	66.482	2	Severe	Extreme	Format exception: Kept all lower case in name 1 and the different letters in name 2 have been capitalised.
benzylpenicillin	benzathine penicillin	46.669	20	0	5	71.669	2	Severe	Extreme	Excluded at Tall Man format stage: This is the BANs format. The INN format is above.
folic acid	folinic acid	58.331	0	5	2.5	65.831	2	Severe	Extreme	Format exception: Kept all lower case in name 1 and the different letters in name 2 have been capitalised.
sodium chloride	potassium chloride	48.608	10	2.5	2.5	63.608	2	Severe	Extreme	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list. Salt issue as well.
clomipramine	clonidine	40.831	10	2.5	2.5	55.831	3	Severe	Extreme	Format exception: Name 1 uses Australian Tall Man format.
clozapine	chlorpromazine	32.501	10	2.5	2.5	47.501	3	Severe	Extreme	Mid Tall Man format applied
Maxitrol (trade)	Maxidex (trade)	39.375	20	5	5	69.375	2	Major	Extreme	Format exception: No common end letters.
methotrexate	metoclopramide	32.501	10	2.5	2.5	47.501	3	Severe	Extreme	Mid Tall Man format applied
methylprednisolone sodium succinate	methylprednisolone acetate	45.997	10	5	5	65.997	2	Major	Extreme	Format exception: Kept suffix as they would follow on a 'picking list' and it is clinically important if they were confused.
clonazepam	clozapine	35	0	2.5	2.5	40	4	Severe	High	Format exception: Name 1 uses the Australian Tall Man format. Name 2 format from another pair as that medicine pair clinically more significant.

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
Dilantin (trade)	Nupentin (trade)	30.625	10	2.5	2.5	45.625	3	Major	High	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list'.
hyoscine hydrobromide	hyoscine butylbromide	56.665	0	2.5	2.5	61.665	2	Moderate	High	Format exception: Kept suffix as they would follow on a 'picking list' and it is clinically important if they were confused.
imipramine	Imuprine (trade)	45.5	0	2.5	2.5	50.5	3	Major	High	Format exception: Name 1 uses Australian Tall Man format.
Novorapid (trade)	Novoseven (trade)	35	0	2.5	2.5	40	4	Severe	High	Format exception: Name 1 uses Australian Tall Man format.
pegfilgrastim	peginterferon	26.922	0	5	5	36.922	4	Severe	High	Format exception: No common end letters.
prednisone	primidone	42	0	5	5	52	3	Major	High	Format exception: Name 2 format from another pair as that medicine pair clinically more significant.
primaquine	primidone	42	0	5	5	52	3	Major	High	Mid Tall Man format applied.
allopurinol	atenolol	25.452	10	5	2.5	42.952	3	Moderate	High	Mid Tall Man format applied.
amitriptyline	amisulpiride	32.305	0	5	5	42.305	3	Moderate	High	Format exception: Name 1 uses Australian Tall Man format.
cetuximab	rituximab	50.554	10	5	5	70.554	2	Minor	High	Format exception: Name 1 uses the group of medicines format from the Australian Tall Man list. Name 2 uses Australian Tall Man format.
cefuroxime	deferoxamine	35	0	2.5	2.5	40	4	Major	High	Excluded at Tall Man format stage: As a pair different first letters – highly unlikely will follow on a 'picking list. Name 1 added to cephalosporins medicine class.
clarithromycin	clindamycin	37.499	0	2.5	2.5	42.499	3	Moderate	High	Format exception: Name 1 uses the Australian Tall Man format.
Cozaar (trade)	Hyzaar (trade)	40.831	10	5	5	60.831	2	Minor	High	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list'.

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
digoxin	doxazosin	31.108	0	2.5	2.5	36.108	4	Major	High	Mid Tall Man format applied.
flupenthixol	fluphenazine	40.831	10	5	5	60.831	2	Minor	High	Format exception: No common end letters.
hydrocortisone	prednisone	27.503	10	2.5	2.5	42.503	3	Moderate	High	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list'.
Loxalate (trade)	Loxamine (trade)	43.75	10	5	5	63.75	2	Minor	High	Mid Tall Man format applied.
medroxyprogesterone	methylprednisolone	31.318	10	2.5	2.5	46.318	3	Moderate	High	Format exception: Name 2 format becomes two medicine names as the salt suffix will be displayed on picking lists.
M-Eslon (trade)	M-Enalapril (trade)	28.637	10	5	0	43.637	3	Moderate	High	Format exception: No common end letters.
metoclopramide	metoprolol	32.501	0	5	5	42.501	3	Moderate	High	Format exception: No common end letters. Name 1 from another pair as that medicine pair clinically more significant.
Neo-Mercazole (trade)	NeuroKare (trade)	29.169	0	5	5	39.169	4	Major	High	Mid Tall Man format applied.
phenoxymethylpenicillin	penicillamine	28.91	10	5	2.5	46.41	3	Moderate	High	Format exception: Name 1 format treated in a 'penicillin' group. Name 2 follows format as if compared with penicillin.
procyclidine	prochlorperazine	35	10	2.5	2.5	50	3	Moderate	High	Format exception: Name 2 uses the Australian Tall Man format.
procyclidine	promethazine	35	10	2.5	2.5	50	3	Moderate	High	Format exception: Name 1 format from another pair as that medicine pair clinically more significant. Name 2 uses the Australian Tall Man format.
propylthiouracil	Puri-Nethol (trade)	19.684	20	5	5	49.684	3	Moderate	High	Excluded at Tall Man format stage: only one letter the same at the start and end.
quinine	quetiapine	38.5	10	2.5	2.5	53.5	3	Moderate	High	Format exception: Name 2 uses the Australian Tall Man format.

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
sotalol	nadolol	30.002	10	2.5	2.5	45.002	3	Moderate	High	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list'.
zuclopenthixol	flupenthixol	47.502	10	2.5	2.5	62.502	2	Minor	High	Excluded at Tall Man format stage: Different first letters – highly unlikely will follow on a 'picking list'.
Clopixol Depot (trade)	Clopixol Acuphase (trade)	43.232	0	5	5	53.232	3	Moderate	High	Excluded at Tall Man format stage: Suffixed name – not clinically important to retain in list.
Fluarix (trade)	Fluvax (trade)	39.998	20	5	5	69.998	2	Minor	High	Mid Tall Man format applied.
cetuximab	infliximab	31.5	10	5	5	51.5	3	Minor	Moderate	Individually included medicine classes in NZ List.
allopurinol	amlodipine	35	0	5	5	45	3	Minor	Moderate	Not considered for Tall man lettering.
amitriptyline	nortriptyline	51.156	10	5	5	71.156	2	Minimum	Moderate	
amoxicillin	amoxicillin clavulanic acid	28.518	10	5	5	48.518	3	Minor	Moderate	
Avastin (trade)	Ovestin (trade)	45.003	0	0	0	45.003	3	Minor	Moderate	
bupropion	buspirone	42.777	0	5	5	52.777	3	Minor	Moderate	
cefazolin	cefuroxime	38.5	0	2.5	2.5	43.5	3	Minor	Moderate	
chlorpheniramine	chlorpromazine	43.75	0	5	2.5	51.25	3	Minor	Moderate	
cisplatin	oxaliplatin	38.185	10	5	5	58.185	3	Minor	Moderate	
co-trimoxazole	clotrimazole	47.502	0	2.5	2.5	52.502	3	Minor	Moderate	
Diastop (trade)	Diamide (trade)	35	0	5	5	45	3	Minor	Moderate	
Diurin (trade)	Duride (trade)	46.669	0	5	5	56.669	3	Minor	Moderate	
doxepin	donepezil	38.892	10	5	0	53.892	3	Minor	Moderate	
Flixonase (trade)	Flixotide (trade)	46.669	10	0	5	61.669	2	Minimum	Moderate	
fluconazole	flucytosine	38.185	0	2.5	2.5	43.185	3	Minor	Moderate	
fludarabine	fludrocortisone	35	0	2.5	2.5	40	4	Moderate	Moderate	

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
Fosamax Plus (trade)	Fosamax (trade)	40.831	10	5	5	60.831	2	Minimum	Moderate	Not considered for Tall man lettering.
Lipex (trade)	Lexapro (trade)	24.997	10	5	5	44.997	3	Minor	Moderate	
metformin	metoprolol	31.5	0	2.5	2.5	36.5	4	Moderate	Moderate	
Norimin (trade)	Noriday (trade)	45.003	0	5	5	55.003	3	Minor	Moderate	
phenylbutazone	phenoxybenzamine	35	0	2.5	2.5	40	4	Moderate	Moderate	
quinine	quinapril	38.892	0	2.5	2.5	43.892	3	Minor	Moderate	
risperidone	Redipred (trade)	22.274	0	2.5	2.5	27.274	4	Moderate	Moderate	
sertraline	Siterone (trade)	31.5	10	5	5	51.5	3	Minor	Moderate	
simvastatin	atorvastatin	43.75	10	5	5	63.75	2	Minimum	Moderate	
candesartan	Canesten (trade)	38.185	0	0	0	38.185	4	Minor	Moderate	
fluconazole	fluoxetine	28.637	0	2.5	2.5	33.637	4	Minor	Moderate	
metformin	metoclopramide	32.501	0	2.5	2.5	37.501	4	Minor	Moderate	
metronidazole	metoclopramide	32.501	0	2.5	2.5	37.501	4	Minor	Moderate	
ondansetron	olanzapine	25.452	0	5	5	35.452	4	Minor	Moderate	
Phosphate-Sandoz (trade)	potassium chloride	19.446	0	2.5	2.5	24.446	4	Minor	Moderate	
zopiclone	Zyrtec (trade)	15.554	0	5	2.5	23.054	4	Minor	Moderate	
beclomethasone	fluticasone	32.501	10	5	2.5	50.001	3	Minimum	Low	
brimonidine	brinzolamide	37.919	0	5	5	47.919	3	Minimum	Low	
clobazam	clonazepam	45.5	0	2.5	2.5	50.5	3	Minimum	Low	
ertapenem	cilastatin + imipenem	22.106	10	5	5	42.106	3	Minimum	Low	
Ferro-Gradumet (trade)	Ferro-Tab (trade)	37.499	0	5	5	47.499	3	Minimum	Low	
flutamide	finasteride	31.815	0	5	5	41.815	3	Minimum	Low	
cilastatin + imipenem	meropenem	20.265	10	5	5	40.265	3	Minimum	Low	

Name 1	Name 2	Weighted name similarity	Strength similarity	Route similarity	Dose form similarity	Composite similarity score	Similarity rating	Severity rating	Risk rating	Comments
omeprazole	pantoprazole	40.831	10	5	2.5	58.331	3	Minimum	Low	Not considered for Tall man lettering.
Panadeine (trade)	paracetamol	28.637	10	2.5	2.5	43.637	3	Minimum	Low	
pindolol	propranolol	35	10	2.5	2.5	50	3	Minimum	Low	
tamoxifen	tamsulosin	35	0	5	5	45	3	Minimum	Low	
tamoxifen	tenoxicam	35	10	2.5	2.5	50	3	Minimum	Low	
temazepam	triazolam	38.892	0	5	5	48.892	3	Minimum	Low	
bacitracin zinc	Bactroban (trade)	25.669	0	2.5	5	33.169	4	Minimum	Low	
betahistine	bromhexine	31.815	0	5	2.5	39.315	4	Minimum	Low	
hydroxocobalamin	hydroxychloroquine	38.892	0	0	0	38.892	4	Minimum	Low	
Apo B Complex (trade)	Apo-Bromocriptine (trade)	30.884	0	5	2.5	38.384	4	Excluded at severity assessment stage.		Tall man lettering unable to fix the prefix issue.
Aropax (trade)	Fluox (trade)	11.669	20	5	2.5	39.169	4	Excluded at severity assessment stage.		99% of the letters in Tall Man lettering is unlikely to solve the risk of look-alike confusion. Different first letter. Fluoxetine and paroxetine included in Australian list.
Dosan (trade)	diazepam	21.875	10	2.5	2.5	36.875	4	Excluded at severity assessment stage.		Dosan not available in NZ.
Infanrix-IPV (trade)	Infanrix Hexa (trade)	45.766	20	5	5	75.766	2	Excluded at severity assessment stage.		Tall man lettering unable to fix the suffix issue.
Prevenar 13 (trade)	Pneumovax 23 (trade)	29.169	0	5	5	39.169	4	Excluded at severity assessment stage.		Only one common letter - majority of the letters in Tall Man lettering is unlikely to solve the risk of look-alike confusion.
oxaliplatin	cisplatin	38.185	10	5	5	58.185	3	Excluded at severity assessment stage.		Duplicate already on list.
Seroquel (trade)	Serzone (trade)	39.375						Excluded at similarity & severity assessment stage.		Serzone discontinued. No further similarity information sought.
Timoptol	Timoptol XE	50.911	20	5	5	80.911	1	Excluded at severity assessment stage.		Tall Man lettering unable to fix the suffix issue and already in capitals.