

Collecting clinical experience of homeopathic support in COVID-19, newsletter 22

Bayesian analysis of symptoms, 18th issue

LMHI newsletter

September 2021

Recently we published the fourth version of the COVID-19 mini-repertory and the app for calculating combined LR_s (English <https://hpra.co.uk/>; Spanish <https://hpra.co.uk/es>). The previous (third) version of the mini-repertory and app was based on 522 cases, this latest version on 1161 cases. Most of the added cases came from Spain [1] and India's second wave of the disease (see Acknowledgements). Appendix 1 shows the new mini-repertory, which contains 59 symptoms, 35 of which were selected for the app. Our data collection now contains 10 medicines based upon 20 or more cases: *Arsenicum album* (*Ars*), *Belladonna* (*Bell*), *Bryonia alba* (*Bry*), *Camphora* (*Camph*), *Gelsemium sempervirens* (*Gels*), *Hepar sulphuris* (*Hep*), *Nux vomica* (*Nux-v*), *Phosphorus* (*Phos*), *Pulsatilla* (*Puls*) and *Rhus toxicodendron* (*Rhus-t*).

These 10 medicines represented 81.8% of all cases, divided as in Figure 1.

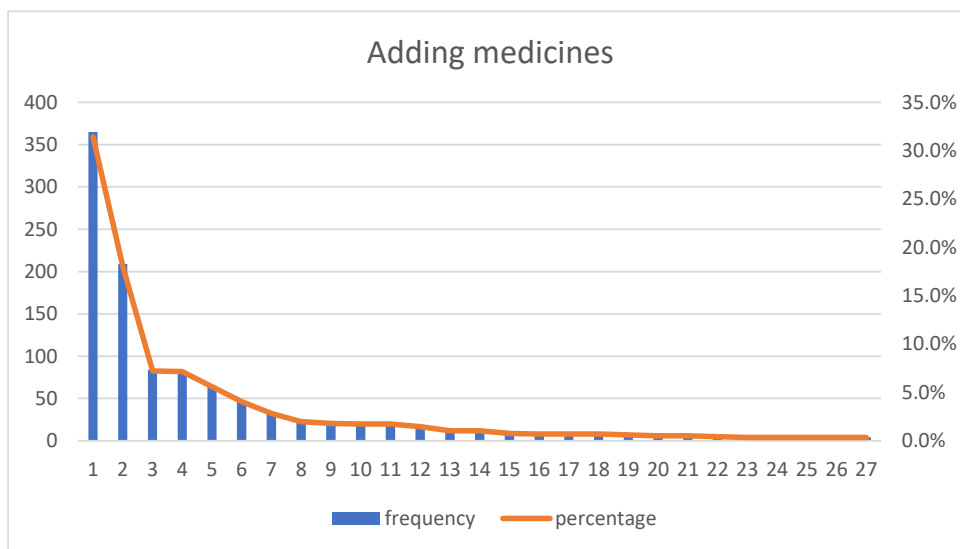


Figure 1: number of cases per medicine (left Y-axis) and percentage of cases per medicine (right Y-axis) in descending order

In newsletter number 18 (17th Bayesian issue) we discussed the learning process for homeopathic practitioners to reduce bias and improve the reliability of the data. In newsletter 17 (16th Bayesian issue) we explained that making an 'algorithm' for combinations of symptoms is not as simple as we originally thought. This is also a learning process for the makers of the app (Tom Smedley, Galen Ives, José Eizayaga and Lex Rutten). In this newsletter we explain our evolving thoughts about combining statistics and expert knowledge into an algorithm.

Pros and cons of algorithms

Prognostic factor research (PFR) in homeopathy is based on the conviction that expert knowledge is reproducible; we learn from experience which tells us that specific symptoms are related to specific homeopathic medicines. This relationship can be expressed as a likelihood ratio (LR).

LR = (prevalence of a specific symptom in a population responding well to a specific medicine) / (prevalence of the same symptom in the remainder of the population).

LR indicates the chance that the medicine will work following Bayes' theorem:

Posterior odds = LR x prior odds.

If $LR > 1$ the chance that the medicine will work is increased, and the higher the LR, the more this chance increases.

However, we all know that choosing the right homeopathic medicine is more than combining a few symptoms from the repertory with a simple formula. Homeopathic practitioners use the outcome of a repertorisation merely for generating ideas about eligible medicines; a Bayesian repertory and the app are not different in this respect.

Algorithm

An algorithm is a sequence of computer-implementable instructions helping to perform a complex task. A classic (non-Bayesian) 'homeopathic repertorisation' made by a computer program is, in fact, an algorithm: the practitioner selects some symptoms and the computer shows a table of symptoms and medicines where the medicines are ordered after specific calculations. For each medicine the importance of each symptom is indicated by a blank or a number (1 up to 4). The blank indicates that the medicine is not in the symptom-rubric, the number gives an indication of the importance of the symptom for the medicine. Experienced homeopathic practitioners know that a '3' is not necessarily three times as important as a '1'. They may possibly ignore a '3', for instance, for the medicine *Sulphur* in a symptom-rubric with 200 medicines, because the patient does not look like a '*Sulphur* patient'. On the other hand, a '1' in the same symptom-rubric for a medicine that is rarely prescribed, will draw the homeopathic practitioner's attention, especially if there is a '1' in one or more other symptom-rubrics in this repertorisation. Perhaps the practitioner knows more about this medicine and intuitively considers it as an interesting option.

The algorithm of the COVID-19 app

Computer algorithms can be both helpful and dangerous. A repertorisation is helpful only in the hands of an experienced homeopath. The app does not contain all the information of a large computer repertory, simply because we did not have the means to program this. The app is meant as a calculation tool based upon the mini-repertory shown in Appendix 1. Without the mini-repertory the app would be in danger of becoming a black box; it merely shows some eligible medicines, it is not a "cookbook" prescription.

However, this freely accessible app offers another interesting option. With the app, conventional doctors could select COVID-19 patients that seem eligible for homeopathic treatment. These patients could be referred to homeopathic practitioners for additional evaluation and prescription of the right medicine. Such an option might be interesting for, say, nursing homes and quarantine centres. In this respect, the app could serve as an ambassador for homeopathy to show that homeopathy is basically a systematic method that can partly be translated into an algorithm.

Including experience in an algorithm

Experienced homeopathic practitioners will realise that the numbers in the repertorisation mean something quite different from, say, laboratory findings. These repertorisation numbers are based on absolute occurrence of symptoms, not the prevalence of the symptom in respective medicine

populations. In a Bayesian repertory this problem has been handled because the LR is based on prevalence.

However, in a Bayesian repertory, blanks in the repertorisation cause a problem if we replace them by zeros. When we combine symptoms we must multiply the respective LRs together; a blank among the selected symptoms interpreted as a zero value would result in a zero value for the combined LR. In Newsletter 17, we discussed that we first interpreted a blank as a symptom without information, like an average prevalence, resulting in LR=1 for blanks. However, a blank does have a meaning, because not finding the symptom in a population which responds well to a specific medicine is more likely if the prevalence in this specific medicine population is actually below average, resulting in an LR between 0 and 1. In the previous version of the app we therefore assumed an LR of 0.5 for blanks.

Reflecting further on this, we felt uneasy about this standardisation of LR=0.5 for blanks. Intuitively, we felt that it must make a difference if a symptom with a prevalence of 20% in the whole population did not occur in 50 cases of a specific medicine, as opposed to a symptom with a prevalence of 2% in the whole population not appearing in 20 cases of a specific medicine. In our database of 1161 cases, the symptom 'chest discomfort' was seen in 224 cases, but in none of the 47 *Belladonna (Bell)* cases. The symptom 'desire warm drinks' was seen in 17 cases, but in none of the 20 *Rhus Toxicodendron (Rhus-t)* cases. Intuitively, it is less likely that the next *Bell* case we encounter will have 'chest discomfort' than that the next *Rhus-t* case will 'desire warm drinks'.

In statistics, the probability of finding one case with a symptom with a specific prevalence in a number of cases can be calculated with the binomial equation. The complement of this (i.e. the probability of *not* finding one case) is one minus this probability. In the new version of the app we use the complement of the binomial chance as the new basis for the LR calculation. The result is a lower LR for *Bell* (LR=0.11) and 'chest discomfort' than for *Rhus-t* and 'desire warm drinks' (LR=0.87), compatible with our intuition.

Statistics and expert opinion

We would like to emphasize that making this mini-repertory and app is a new experience for all of us, as is prospective recording of homeopathic treatment for most practitioners. We all must be prepared to learn; the developers of the app are adjusting their handling of missing data, the contributors of cases are learning how to handle bias.

One of the other things puzzling us is the handling of conflicting values in 'polar symptoms', i.e. symptoms with opposite characteristics. The table in Appendix 1 shows that some medicines have LR>1 for 'productive cough' and LR<1 for 'dry cough', indicating that these medicines are more indicated by a productive cough. Such opposite values confirm each other, but elsewhere for *Gelsemium (Gels)* LR=0.54 for productive cough and LR=0.84 for dry cough seems contradictory. It appears to indicate that both productive cough and dry cough are contra-indicating *Gels*, but a more likely explanation is that 'cough' in general is less present or less noticed (by higher threshold value) in patients where *Gels* is prescribed. In this case the difference in dry or productive cough is meaningless for *Gels* and indicate that both symptoms are less seen in this medicine population. We therefore assigned the largest value to both opposites.

These examples show that we try to combine expert knowledge and actual data. At times the actual data can contradict expert knowledge, perhaps due to bias. In such cases we try to find explanations and, if possible, statistical solutions, like in the handling of missing data. If there is no statistical solution we use conservative common sense, as in the handling of conflicting values in polar

symptoms. This way of handling polar symptoms is corroborated by the 'polarity analysis (PA)' proposed by Heiner Frei, which improved homeopathic efficacy in an RCT.[2]

We think that statistics and clinical experience should be considered as equal partners, and any conflicting outcome should be the basis for further reflection and research.

New app with a new layout and function

Our programmer, Tom Smedley, has made an extensive update for our app. The update of the layout was necessary because of the increased number of medicines (up to 10), but the functionality of the app has also much improved.

With the previous version of the app you saw the outcome after finishing the symptom selection. In the new version you will see results from the moment the combination of symptoms has a combined LR>2.5 in the pane at the right side of the symptom pane. The results change when you enter more symptoms or delete symptoms.

This offers an interesting new possibility: considering the most important or strongest symptoms first. To use this feature you start clicking on the most important or strongest symptom, then click the second most important/strongest symptom, and so on. You can also remove a symptom if you or the patient have second thoughts about the (ordering of the) symptoms.

Confirmatory symptoms

We have tried to keep the app as concise as possible for convenience. We selected 35 out of the 59 symptoms with LR calculations that seem to differentiate best between the 10 medicines. The app is just meant to give a first idea about the feasibility of homeopathic treatment and a first indication of which medicines may be eligible.

The advice provided by the app can be checked by looking for other symptoms that appeared in our data collection:

- *Arsenicum*: sleeplessness; fear of death; worrying about finances/family; night aggravates; cough < laughing; coldness chest
- *Belladonna*: conjunctivitis; cough > lying; high fever
- *Bryonia*: thirst for large quantities; cough < talking; cough < deep inspiration; cough > warm drinks; chest pain < cough; throat pain < cough; desire for rest; dry eyes; headache during fever; headache < motion; motion aggravates; worrying about finances/family; lying ameliorates
- *Camphora*: cough < talking; cough < lying; perspiration back; open air ameliorates; vertigo/dizziness
- *Gelsemium*: involuntary urination from cough; chest pain from cough; heavy eyelids – cannot keep eyes open; chilly back; headache > profuse urination; perspiration ameliorates
- *Hepar sulphuris*: loss of appetite; desire warm drinks
- *Nux vomica*: back pain; taste bitter; loss of appetite
- *Phosphorus*: gasping for air; fear of being alone; cough < cold air; appetite increased; back pain; chest pain; eye pain; heat body; expectoration bloody
- *Pulsatilla*: loss of appetite; wants to be held; bitter taste, weeping; coryza;
- *Rhus Toxicodendron*: coryza; appetite increased

NOTE: The above symptoms have been confirmed by this data collection, but the existing materia medica also shows many others. If the patient shows keynote symptoms which point to another medicine this should be carefully explored further.

Keep sending in cases

We also hope that homeopathic doctors realise that this mini-repertory and app are based on their own clinical experience. Do keep entering your cases on the existing platforms:

- Database of the American Institute of Homeopathy (AIH): login (<https://homeopathyusa.org/covid-19/auth/login>) or email (peter_gold@goldorluk.com) for login credentials.
- Vithoukas Compass: <https://www.vithoukascompass.com/en/Homeopathy/LMHI2020>
- Clificol: <https://intranet.clificol.net/>

Acknowledgements

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Appendix 2 shows a list of other contributors to the database underlying the mini-repertory. We regret that this list is not complete. For privacy reasons many contributors were anonymous or only known to us by initials. We want to express our greatest gratitude to all contributors for their cooperation. We hope they feel rewarded by our efforts to make a practical tool out of this combined experience.

Colleagues from all over the world sharing their knowledge

The LMHI COVID-19 case collection team

Lex Rutten, Peter Gold, Bernardo Merizalde, Robbert van Haselen, José Eizayaga, Raj Kumar Manchanda, Ashley Ross, Gustavo Cataldi, Altunay Agaoglu, Tiziana di Giampietro, Lefteris Tapakis, Theodore Lilas, Frederik Schroyens

References:

1. Clapers ML, Clapers JM, Vidal-jové J, Mora J. Analysis of Homeopathic Genus Epidemicus for COVID-19 Patients in Spain. *Homeopathy*. 2021;110. doi:[https://doi.org/ 10.1055/s-0041-1727204](https://doi.org/10.1055/s-0041-1727204).
2. Frei H. Polarity analysis, a new approach to increase the precision of homeopathic prescriptions. *Homeopathy*. 2009;98(1):49-55.

Appendix 1

Table 1: Mini repertory for COVID-19 symptoms, based on 1161 cases (July 2021). LRs of symptoms. See text for explanation.

Symptoms	LRars	LRbell	LRbrv	LRcamp	LRgels	LRhep	LRnux-v	LRphos	LRpuls	LRrtus-t
cough	0.79	0.76	1.34	1.15	0.75	0.82	0.99	1.23	0.94	0.68
fever	0.91	1.25	1.04	0.92	1.08	0.93	0.94	1.18	0.87	1.17
muscle/bone pain	0.90	0.51	1.32	1.05	1.10	0.67	0.80	0.88	0.69	2.02
dry cough	0.91	0.56	1.77	1.40	0.84	0.31	0.88	0.93	0.42	0.73
productive cough	0.91	1.42	0.38	0.62	0.84	2.04	0.88	1.66	1.92	0.73
fatigue	1.27	0.25	0.78	1.74	1.81	0.31	0.65	1.20	0.53	0.72
headache	0.66	1.37	1.23	0.81	1.46	0.42	1.42	1.01	0.74	0.85
throat pain	0.93	1.28	1.14	0.74	1.03	1.71	0.78	0.75	0.85	1.17
thirst	1.31	0.60	2.25	0.68	0.10	0.31	0.18	1.14	0.14	0.92
thirstless	0.28	0.60	0.16	0.68	4.26	0.31	1.54	0.81	5.62	1.08
loss of taste and/or smell	0.59	0.31	0.90	1.43	0.52	0.81	1.02	1.22	2.68	0.93
chill	0.71	0.75	0.62	1.32	2.53	0.68	1.45	0.83	0.86	0.59
coldness extremities	0.72	2.79	0.82	0.85	2.05	0.84	0.77	0.52	0.61	0.86
anxiety/fear	1.50	0.20	0.43	1.14	1.10	0.41	0.14	0.84	0.88	1.44
dyspnea	0.73	0.32	1.01	1.47	0.71	0.66	0.46	1.85	0.28	0.51
chest discomfort	0.72	0.11	1.05	0.99	0.98	0.45	0.31	2.57	0.65	0.25
diarrhoea	1.51	0.42	0.62	1.61	1.03	0.55	2.08	1.68	0.69	0.84
constipation	0.22	0.42	2.45	0.58	0.15	0.55	1.55	0.19	0.69	0.84
perspiration	0.72	0.46	0.79	1.79	0.85	1.63	1.60	1.23	1.21	1.11
perspiration < night	0.91	1.48	0.62	3.39	0.76	0.85	4.56	0.60	0.53	0.87
restless	1.50	0.87	0.55	0.48	0.27	0.89	0.29	0.73	0.46	4.94
nose blocked	0.70	1.53	0.59	0.55	0.73	1.55	0.70	1.11	1.38	1.78
sneezing	1.55	0.76	0.49	0.86	1.42	0.79	1.10	0.49	0.97	0.91
sleeplessness	0.81	0.26	0.56	0.50	0.73	1.12	1.18	1.28	0.98	3.36
nausea	1.54	0.27	0.59	2.62	0.55	0.48	3.46	0.17	0.54	2.04
vomiting	1.21	0.71	0.12	0.86	0.72	0.84	0.78	3.16	1.51	3.36

Symptoms	LRars	LRbell	LRbry	LRcamp	LRgels	LRhеп	LRnux-v	LRphos	LRpuls	LRrhus-t
abdominal pain	1.23	0.88	0.34	0.99	0.84	0.61	4.10	0.80	1.05	1.04
sadness	1.06	0.34	0.66	1.70	0.39	0.76	0.45	1.04	3.26	1.78
taste altered	0.65	0.43	0.92	6.17	0.42	0.64	2.23	0.27	0.85	0.68
confusion/dullness	1.90	0.61	0.91	2.17	2.78	4.12	0.71	1.05	2.75	0.81
< uncovering	0.99	2.06	0.59	2.26	0.48	0.79	1.42	2.02	0.40	0.82
desire cold drinks	0.19	0.72	1.03	1.00	0.81	0.81	0.79	5.32	0.56	0.87
desire warm drinks	1.40	0.72	1.53	1.00	0.81	3.09	0.79	0.63	0.56	0.87
vertigo/dizziness	0.96	0.66	0.77	0.83	0.59	0.81	1.63	1.61	0.46	0.84
> lying	1.01	0.68	2.62	0.84	0.62	0.83	0.76	1.69	0.46	0.85
conjunctivitis	0.33	4.31	1.09	0.89	0.55	0.88	0.84	0.60	1.97	0.90
pneumonia	0.57	0.28	1.09	1.29	0.30	0.58	0.40	2.35	1.08	0.67
dry mouth/throat	1.06	0.45	1.80	0.52	0.66	0.47	0.32	0.67	1.21	1.09
loss of appetite	0.98	0.95	0.83	2.18	1.04	1.53	1.69	0.65	1.60	0.74
coryza	1.12	0.33	0.72	0.76	1.07	0.34	0.97	0.44	1.77	2.46
heat body	0.96	0.69	0.62	0.78	0.80	0.54	0.43	1.49	0.46	0.58
back pain	0.26	0.52	0.95	1.18	0.48	0.65	4.07	2.81	0.23	1.24
taste bitter	1.02	0.45	1.06	6.79	0.55	0.67	4.27	0.32	1.14	0.70
chest pain	0.31	0.49	1.02	1.39	0.89	0.69	0.88	2.47	0.26	0.73
cough < talking	0.33	0.59	0.71	6.51	0.30	0.77	0.69	1.20	0.25	0.80
cough < deep respiration	0.51	0.60	1.17	0.80	0.28	0.78	0.70	1.87	0.33	0.80
chest pain < cough	0.18	0.65	1.50	0.82	4.55	0.81	0.73	1.35	0.40	0.83
thirst large quantities	0.24	0.69	18.54	0.85	0.53	0.84	0.77	0.94	0.53	0.86
cough < lying	0.76	0.71	0.87	1.00	0.68	0.84	0.78	3.42	0.59	0.90
appetite increased	0.27	0.72	0.62	0.86	0.53	0.85	0.84	6.49	1.60	3.57
> open air	0.28	0.72	0.91	3.39	0.81	0.85	0.79	0.63	1.71	0.87
worry (financial/family)	1.40	0.73	1.53	0.87	0.54	0.86	0.80	2.25	0.54	0.88
heaviness eyelids	0.29	0.73	0.31	3.62	38	0.86	0.80	0.65	0.58	0.88
gasping for air	0.18	0.75	0.97	0.88	0.34	0.87	0.81	2.20	0.34	0.88
cough < motion	1.05	0.76	1.31	0.89	0.54	0.88	0.82	2.41	0.53	0.89

Symptoms	LRars	LRbell	LRbry	LRcamph	LRgels	LRhlep	LRnux-v	LRphos	LRpuls	LRrhus-t
cough > lying	0.76	1.98	0.87	1.33	0.68	0.88	0.84	1.00	0.59	0.90
cough < cold air	1.37	0.77	0.65	4.52	1.08	0.88	0.84	5.06	0.63	0.90
irritable	0.83	0.79	1.36	0.90	0.60	0.89	0.85	1.41	2.33	0.91
chill back	0.38	0.79	0.65	0.90	20.78	0.89	0.85	0.66	0.60	0.91

Explanation of the mini-repertory

The Bayesian mini-repertory for COVID-19 related complaints covers 59 symptoms and 10 medicines: *Arsenicum album* (Ars), *Belladonna* (Bell), *Bryonia alba* (Bry), *Camphora* (Camph), *Gelsemium sempervirens* (Gels), *Hepar sulphuris* (Hep), *Nux vomica* (Nux-v) *Phosphorus* (Phos), *Pulsatilla* (Puls) and *Rus Toxicodendron* (Rhus-t). All symptoms should be considered as sub-rubrics for the respective repertory-symptoms, for example:

'irritable' should be read as: 'MIND – IRRITABILITY – In COVID-19 disease'.

This Bayesian mini-repertory is different from the standard (Kent's) repertory in several respects:

1. The importance of the symptom for respective medicines is expressed as likelihood ratio (LR).
 $LR = (\text{prevalence of the symptom in the medicine population}) / (\text{prevalence of the symptom in the remainder of the population})$.
 If $LR > 1$ the prevalence is above average (in the whole population); if $LR < 1$ the prevalence is below average.
2. LR is part of Bayes theorem:
 $\text{Posterior odds} = LR \times \text{prior odds}$; $\text{odds} = \text{chance} / (1 - \text{chance})$; $\text{chance} = \text{odds} / (1 + \text{odds})$
 If $LR > 1$, the chance and odds that the medicine will work if the symptom is present increases. If $LR < 1$, this chance and odds decreases.
 Higher LR means higher odds/chance that the medicine will work.
3. In a combination of symptoms, respective LRs should be multiplied together. This is done for you by the app (English <https://hpra.co.uk/>; Spanish <https://hpra.co.uk/es/>).
4. Some symptoms with high LR for one medicine, like 'heaviness eyelids' and 'chill back' for *Gels*, should be handled with care. In such cases, keynote symptoms lead to confirmation bias, producing an over-estimation of the LR for one medicine and under-estimation of others.

Appendix 2. List of contributors to the COVID-19 database

This list is incomplete due to missing data

Christoph	Abermann	Jamie	Oskin
Altunay	Agaoglu	Navin	Pawaskar
Lisa	Amerine	Philippe	Peyronnet
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Antonella	Bevere	Hélène	Renoux
Doug	Brown	Karl	Robinson
Ellie	Camp	Wim	Roukema
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Ciro	D'Arpa	Jenn	Schuppe
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Ifeoma	Ikenze	Gyandas	Wadhvani
Sema	Ilhan	Ron	Whitmont
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Charlotte	Mendes da Costa		
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